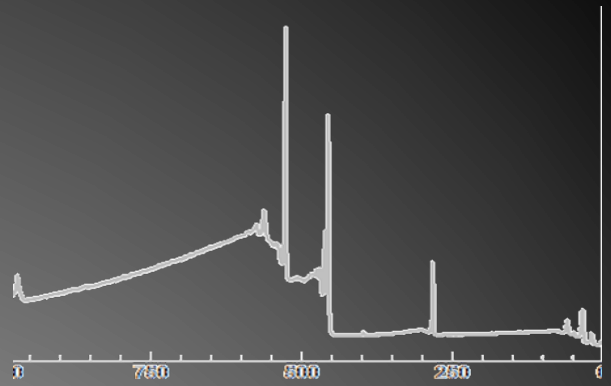
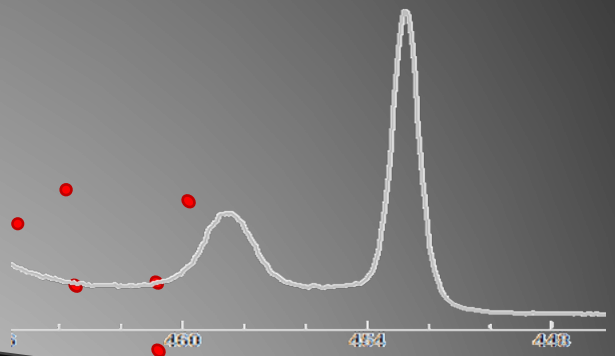
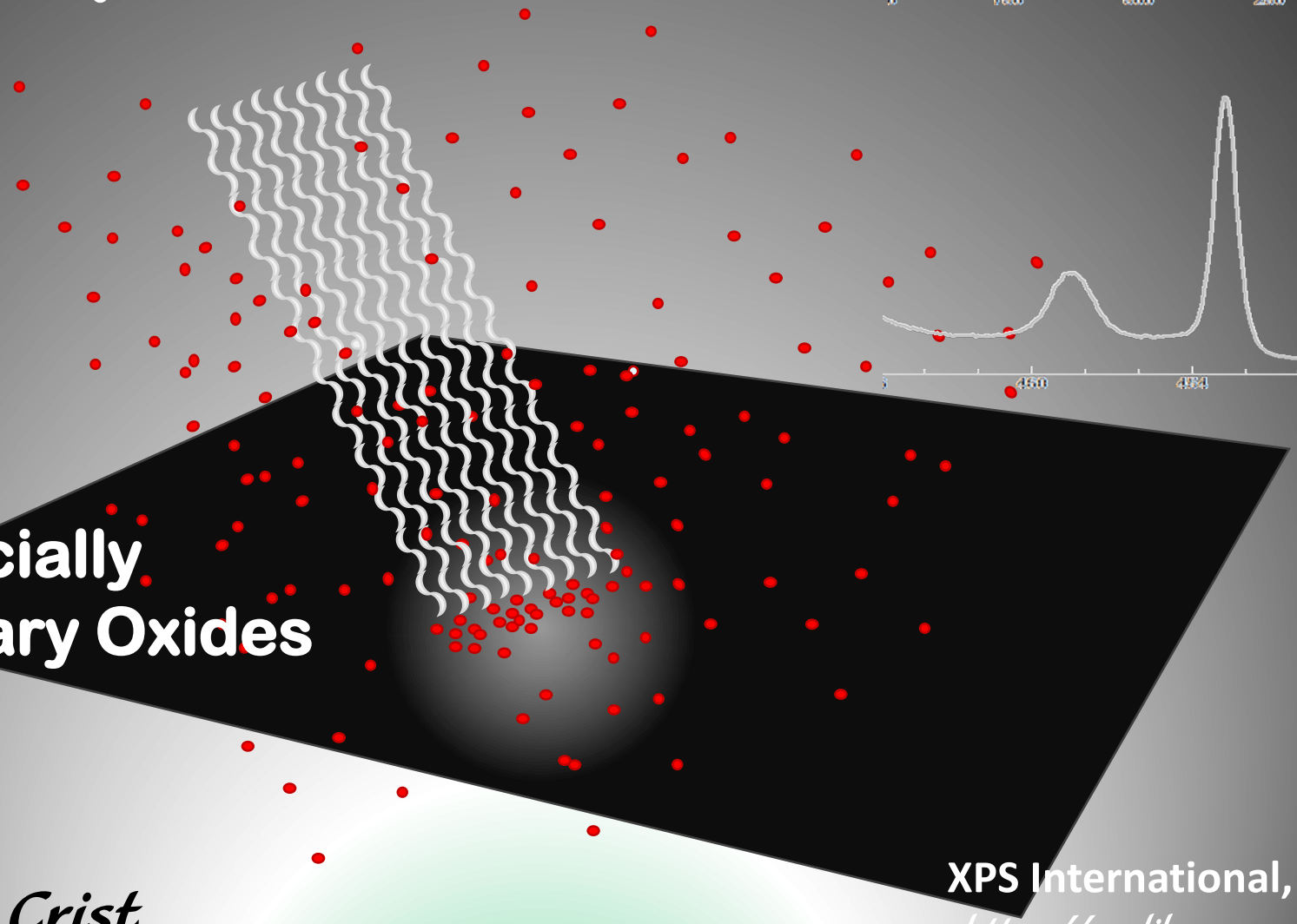
Monochromatic XPS Spectra







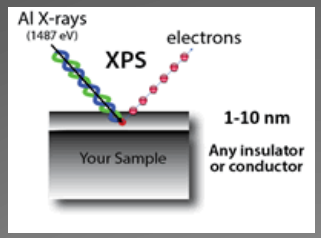
Commercially Pure Binary Oxides

B. Vincent Crist

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Monochromatic XPS Spectra
Commercially Pure Binary Oxides



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 H 1s H_2° LiH																	2 He 1s He⁺/Be He⁺/C
3 Li 1s LiOH Li_2O 54.9 55.6 (1.65) (1.6) 285.0 285.0 531.8 530.8 (1.6) (1.5)	4 Be 1s Be° BeO* 111.8 113.6 (0.79) (1.73) 286.2 285.0 111.88 531.2 (0.69) (1.71)													5 B 1s B° B_2O_3 187.5 193.7 (0.92) (1.30) 285.2 285.0 187.8 533.7 (1.03) (1.6)	6 C 1s HOPG Black 284.5 284.4 (0.42) (1.04)	7 N 1s Kapton BN 400.9 398.9 (1.31) (1.10) 285.0 285.0 191.3 (1.03)	8 O 1s CuO SiO_2 529.6 532.4 (0.98) (1.2.7) 284.7 285.0 934.0 103.1 (1.42) (1.19)	9 F 1s Teflon CaF_2 689.2 685.1 (1.8) (1.53) 285.0 285.0 292.0 348.1 (1.6) (1.6)	10 Ne 1s Ne⁺/Be Ne⁺/C 863.1 (1.3)
11 Na 1s Na° Na_2O 1071.8 1072.6 (1.1) (1.78) 285.0 530.6 (1.44)	12 Mg 2p Mg° MgO* 49.7 49.5 (0.58) (1.25) 286.5 285.0 49.77 529.9 (0.60) (1.38)											13 Al 2p Al° Al_2O_3* 72.9 74.4 (0.62) (1.39) 284.9 285.0 72.82 530.8 (0.41) (1.60)	14 Si 2p3 Si° SiO_2* 99.8 103.1 (0.57) (1.19) 285.8 285.0 99.35 532.4 (0.45) (1.27)	15 P 2p3 P° InP 130.1 128.8 (0.67) (0.62) 285.0 285.5 444.7 (0.78)	16 S 2p S° MoS_2 164.0 162.7 (0.72) (0.39) 285.0 229.7 (0.80)	17 Cl 2p3 PVC NaCl 199.8 199.3 (1.7) (1.19) 285.0 285.0 1072.0 (1.40)	18 Ar 2p3 Ar⁺/B Ar⁺/HOPG 241.8 241.8 (1.4) (0.89) 285.2 284.5 188.1
19 K 2p3 K° K_2O 294.4 292.7 (0.9) (1.37) 285.0 531.0 (1.6)	20 Ca 2p3 Ca° $CaCO_3$ 346.5 346.4 (1.0) (1.67) 284.6 285.0 346.5 530.8 (1.07) (1.64)	21 Sc 2p3 Sc° Sc_2O_3* 398.5 401.9 (0.9) (1.27) 285.9 285.0 398.46 530.0 (0.69) (1.30)	22 Ti 2p3 Ti° TiO_2 453.8 458.8 (0.90) (1.02) 285.1 285.0 453.95 530.0 (0.62) (1.20)	23 V 2p3 V° V_2O_5 512.2 517.0 (0.79) (0.99) 285.0 284.8 512.22 530.0 (0.75) (1.33)	24 Cr 2p3 Cr° Cr_2O_3 574.2 575.6 (1.05) (1.10) 284.8 285.0 574.37 530.1 (0.89) (1.27)	25 Mn 2p3 Mn° MnO_2 638.7 641.4 (1.00) (1.12) 286.3 284.6 638.74 529.0 (0.89) (1.02)	26 Fe 2p3 Fe° a-Fe_2O_3 706.6 709.8 (0.90) (1.31) 285.0 285.0 706.78 529.9 (0.99) (1.04)	27 Co 2p3 Co° Co_3O_4* 778.1 779.5 (0.99) (1.51) 285.0 285.0 778.26 530.0 (0.95) (1.00)	28 Ni 2p3 Ni° NiO* 852.6 853.7 (1.14) (1.19) 284.7 284.8 852.65 529.3 (1.02) (1.06)	29 Cu 2p3 Cu° Cu_2O 932.7 932.7 (1.22) (1.16) 284.7 285.0 932.67 530.5 (0.92) (1.00)	30 Zn 2p3 Zn° ZnO* 1021.8 1021.7 (1.10) (1.43) 284.8 285.0 1021.76 530.5 (0.97) (1.15)	31 Ga 3d5 Ga° Ga_2O_3* 18.5 20.7 (0.70) (1.28) 285.6 285.0 18.5 531.4 (0.60) (1.51)	32 Ge 3d5 Ge° GeO* 29.3 32.9 (0.68) (1.28) 285.1 285.0 29.28 532.1 (0.64) (1.40)	33 As 3d5 As° As_2O_3 41.8 45.3 (0.65) (1.26) 284.8 285.0 41.69 532.0 (0.67) (1.71)	34 Se 3d5 Se° SeO_x 54.8 59.3 (0.76) (1.09) 284.2 284.6 54.90 532.6 (0.78)	35 Br 3d5 KBr 68.8 (0.92) 285.0 293.0 (1.31)	36 Kr 3d5 Kr⁺/Be Kr⁺/C 86.9 (0.88) 285.0
37 Rb 3d5 Rb° RbOAc 111.5 109.7 (0.8) (1.40) 285.0 530.6 (1.9)	38 Sr 3d5 Sr° $SrCO_3$ 134.3 133.4 (0.9) (1.56) 285.0 531.5 (1.9)	39 Y 3d5 Y° Y_2O_3* 155.9 158.0 (0.60) (1.18) 286.0 285.0 155.92 530.7 (0.62) (1.30)	40 Zr 3d5 Zr° ZrO_2* 178.9 182.5 (0.63) (1.20) 285.5 285.0 178.80 530.4 (0.63) (1.44)	41 Nb 3d5 Nb° Nb_2O_5 202.1 207.2 (0.78) (1.12) 285.0 285.0 202.35 530.3 (0.57) (1.34)	42 Mo 3d5 Mo° MoO_3 227.8 233.0 (0.66) (1.03) 285.1 284.9 227.94 530.9 (0.57) (1.23)	43 Tc 3d5 Tc° TcO_2 Radioactive	44 Ru 3d5 Ru° RuO_2 280.0 280.7 --- (0.77) 284.7 284.6 280.11 529.3 (0.59) (0.95)	45 Rh 3d5 Rh° Rh_2O_3 307.2 308.6 (0.73) (0.90) 284.6 284.7 307.21 530.2 (0.69) (1.09)	46 Pd 3d5 Pd° PdO* 335.1 336.9 (0.80) (0.98) 284.6 284.9 335.10 530.6 (0.77) (1.09)	47 Ag 3d5 Ag° Ag_2O* 368.2 367.6 (0.64) (1.00) 284.8 284.3 368.28 530.1 (0.62) (1.20)	48 Cd 3d5 Cd° CdO* 405.0 404.1 (0.80) (1.42) 285.0 285.0 405.04 528.6 (0.61) (1.28)	49 In 3d5 In° In_2O_3* 443.8 444.3 (1.08) (1.33) 285.0 285.0 443.87 529.8 (0.71) (1.19)	50 Sn 3d5 Sn° SnO_2 484.9 487.3 (0.81) (1.32) 284.9 285.5 485.01 531.1 (0.68) (1.14)	51 Sb 3d5 Sb° Sb_2O_5 528.1 532.4 (0.88) (1.6) 284.8 285.0 528.26 531.0 (0.80) (1.6)	52 Te 3d5 Te° TeO_2 572.7 576.6 (0.97) (1.48) 284.3 284.9 572.97 530.8 (0.83) (1.42)	53 I 3d5 KI 619.2 (1.30) 285.0 293.2 (1.11)	54 Xe 3d5 Xe⁺/Be Xe⁺/C 669.6 (1.13) 285.0
55 Cs 3d5 Cs° Cs_2O 726.4 724.7 (1.3) (2.00) 285.0 198.9	56 Ba 3d5 Ba° $BaCO_3$ 780.6 779.9 (1.4) (2.07) 285.0 531.4 (1.77)	57 La 3d5 La° La_2O_3 835.8 834.4 (1.3) (2.5) 285.0 529.0 (1.66)	72 Hf 4f7 Hf° HfO_2* 14.4 17.2 (0.63) (1.31) 285.7 285.0 14.32 529.9 (0.62) (1.71)	73 Ta 4f7 Ta° Ta_2O_5* 21.8 26.3 (0.72) (1.11) 285.1 285.0 21.78 530.4 (0.56) (1.47)	74 W 4f7 W° WO_3 31.4 35.8 (0.58) (1.02) 285.1 285.1 31.38 530.6 (0.53) (1.28)	75 Re 4f7 Re° Re_2O_7 40.3 46.9 (0.67) (1.47) 285.0 285.0 40.30 532.2 (0.54) (1.49)	76 Os 4f7 Os° OsO_2 50.7 53.8 (1.2)	77 Ir 4f7 Ir° IrO_2 60.8 61.7 (0.80) (0.84) 284.5 284.8 60.88 530.0 (0.82) (0.99)	78 Pt 4f7 Pt° PtO_2 71.1 75.1 (0.96) (1.09) 284.4 284.9 71.15 531.3 (0.88) (1.52)	79 Au 4f7 Au° Au_2O_3 84.0 85.1 (0.66) (1.37) 284.1 285.1 83.98 530.2 (0.68) (1.13)	80 Hg 4f Hg° HgO 99.8 100.9 --- (1.07) 285.0 285.0 99.81 530.0 (0.65) (1.00)	81 Tl 4f7 Tl° Tl_2O_3* 117.8 118.1 (0.97) (1.1) 285.2 284.8 117.77 528.6 (0.66) (1.07)	82 Pb 4f7 Pb° PbO* 136.9 137.5 (0.67) (1.17) 285.0 285.0 136.95 528.9 (0.63) (1.09)	83 Bi 4f7 Bi° Bi_2O_3* 157.0 158.9 (0.73) (1.37) 284.9 285.0 157.05 529.6 (0.62) (1.52)	84 Po 4f7 Radioactive	85 At 4f7 Radioactive	86 Rn 4f7 Radioactive
87 Fr 4f7 Radioactive	88 Ra 4f7 Radioactive	89 Ac 4f7 Radioactive															

58 Ce 3d5 Ce° CeO_2 883.8 882.1 (3.2) (2.0) 285.0 529.6 (2.00)	59 Pr 3d5 Pr° Pr_2O_3 929.4 928.8 (2.96) (3.2) 285.0 528.5 (1.2)	60 Nd 3d5 Nd° Nd_2O_3 980.8 983.2 (2.9) (2.7) 285.6 285.0 530.8 (1.3)	61 Pm 4d5 Pm° Pm_2O_3 Radioactive	62 Sm 4d5 Sm° Sm_2O_3 1081.1 1083.8 --- (4.3) --- 285.0 128.7 529.9 (2.5) (1.6)	63 Eu 4d5 Eu° Eu_2O_3 128.2 136.2 --- (3.6) 284.3 285.0 128.18 530.5 (1.08) (1.4)	64 Gd 4d5 Gd° Gd_2O_3 140.2 (1187.5) --- (5.4) 281.4 285.0 140.31 529.3 (1.05) (1.5)	65 Tb 4d5 Tb° Tb_2O_3 145.9 (149.5) --- (?) --- 285.0 145.95 529.7 (1.16) (1.5)	66 Dy 4d5 Dy° Dy_2O_3 152.4 (153.5) --- (1.9) --- 285.0 152.34 529.4 (0.90) (1.7)	67 Ho 4d5 Ho° Ho_2O_3 159.8 160.9 --- (2.0) --- 285.0 159.58 529.3 (0.98) (1.6)	68 Er 4d5 Er° Er_2O_3 167.7 168.5 --- (1.9) --- 285.0 167.25 529.7 (1.00) (1.5)	69 Tm 4d5 Tm° Tm_2O_3 175.3 176.3 --- (1.1) 285.3 285.0 175.37 529.6 (1.06) (1.6)	70 Yb 4d5 Yb° Yb_2O_3 182.4 185.0 --- (2.7) 285.6 285.0 182.39 529.2 (0.61) (1.5)	71 Lu 4f7 Lu° Lu_2O_3* 7.1 8.0 (0.46) (2.5) 284.6 285.0 7.10 529.5 (0.69) (1.4)
90 Th 4d5 Th° ThO_2 333.1 334.5 (1.7) (1.6)	91 Pa 4d5 Radioactive	92 U 4f7 U° UO_2 377.1 380.7 Nat.	93 Np Radioactive	94 Pu Radioactive	95 Am Radioactive	96 Cm Radioactive	97 Bk Radioactive	98 Cf Radioactive	99 Es Radioactive	100 Fm Radioactive	101 Md Radioactive	102 No Radioactive	103 Lr Radioactive

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Handbooks of Monochromatic XPS Spectra

Volume 2 – *Commercially Pure Binary Oxides*

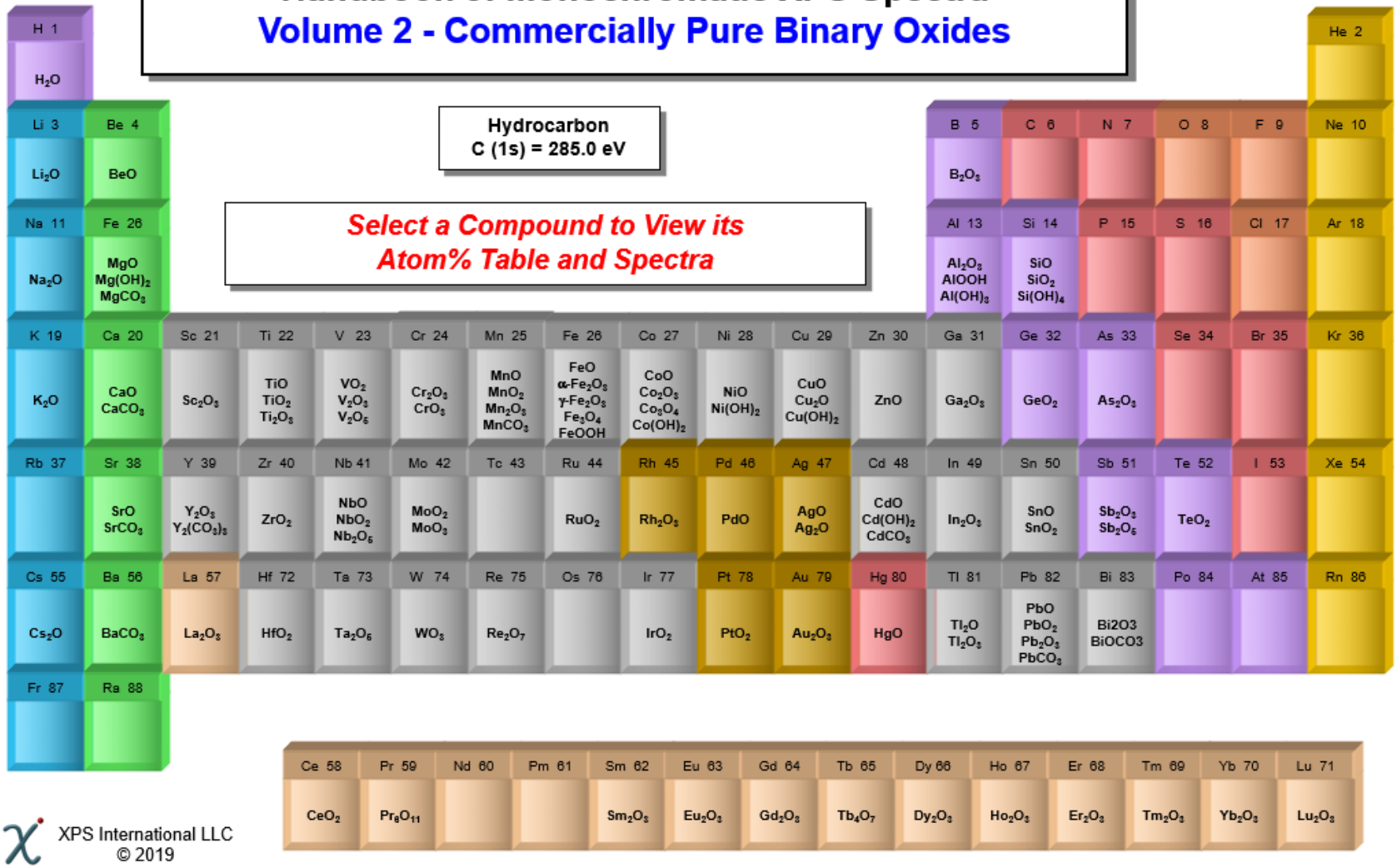
and a few Common Carbonates and Hydroxides

by

B. Vincent Crist, Ph.D.

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Handbook of Monochromatic XPS Spectra
Volume 2 - Commercially Pure Binary Oxides



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Cassiterite, SnO_2, black



Cuprite, Cu_2O, red



Cerrusite, $PbCO_3$, white



Anatase, TiO_2, black



Rhodochrosite, $MnCO_3$, red



Tenorite, CuO, black



Tellurite, TeO_2, yellow



Calcite, $CaCO_3$, yellow



Hematite, Fe_2O_3, brown



Diaspore, AlOOH, white

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Alphabetical List of Materials in Volume Two – Handbook of Commercially Pure Binary Oxides
Binary Oxides, Carbonates and Hydroxides – Alphabetical by Chemical Formula

AgO 28
Ag_2O xx
Al_2O_3 xx
$Al(OH)_3$ xx
As_2O_3 xx
Au_2O_3 xx
B_2O_3 xx
$BaCO_3$ xx
BeO xx
Bi_2O_3 xx
$(BiO)_2CO_3$ xx
CaO xx
$CaCO_3$ xx
CdO xx
$Cd(OH)_2$ xx
$CdCO_3$ xx
CeO_2 xx
CoO xx
Co_2O_3 xx
Co_3O_4 xx
$Co(OH)_2$ xx
CrO_3 xx
Cr_2O_3 xx
Cs_2O xx
CuO xx
Cu_2O xx
$Cu(OH)_2$ xx
$CuCO_3$ xx
Dy_2O_3 xx
Er_2O_3 xx

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Eu_2O_3 xx
FeO xx
α-Fe_2O_3 xx
γ-Fe_2O_3 xx
Fe_3O_4 xx
FeOOH xx
Ga_2O_3 xx
Gd_2O_3 xx
GeO_2 xx
HfO_2 xx
HgO xx
Ho_2O_3 xx
In_2O_3 xx
IrO_2 xx
K_2O xx
La_2O_3 xx
Li_2O xx
Li_2CO_3 xx
Lu_2O_3 xx
MgO xx
$Mg(OH)_2$ xx
$MgCO_3$ xx
MnO xx
MnO_2 xx
Mn_2O_3 xx
$MnCO_3$ xx
MoO_2 xx
MoO_3 xx
Na_2O xx
NbO xx
NbO_2 xx
Nb_2O_5 xx
NiO xx
$Ni(OH)_2$ xx

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PbO xx
PbO_2 xx
Pb_2O_3 xx
$PbCO_3$ xx
PdO xx
Pr_6O_{11} xx
PtO_2 xx
Re_2O_7 xx
Rh_2O_3 xx
RuO_2 xx
Sb_2O_3 xx
Sb_2O_5 xx
Sc_2O_3 xx
SiO xx
SiO_2 xx
$Si(OH)_4$ xx
Sm_2O_3 xx
SnO xx
SnO_2 xx
$SrCO_3$ xx
SrO xx
Ta_2O_5 xx
Tb_4O7 xx
TeO_2 xx
ThO_2 xx
TiO xx
TiO_2 xx
Ti_2O_3 xx
Tl_2O_3 xx
Tm_2O_3 xx
VO_2 xx
V_2O_3 xx
V_2O_5 xx
WO_3 xx

Y_2O_3 xx
$Y_2(CO_3)_3$ xx
Yb_2O_3 xx
ZnO xx
ZrO_2 xx

INTRODUCTION

This handbook contains wide scan survey spectra and high energy resolution narrows scan spectra from commercially pure samples of binary oxides, a few natural minerals, several hydroxides and carbonates. The spectra were collected under conditions that maximized the accuracy and reliability of the binding energies. The reference energies used to calibrate the energy scale were those reference energies recommended by the National Physical Laboratory in the UK, and now ISO TC/201. Section "F" provides the details of energy scale calibration. For those compounds that were non-conductive or semi-conductive in behavior, the reference energy for the hydrocarbon carbon (1s) signal from those samples was defined as 285.0 eV. The binding energies of all truly conductive samples were reported exactly as measured and without correction.

ORGANIZATION AND DETAILS OF SPECTRAL SETS

Organization

The spectra are organized alphabetically by using the chemical formula (e.g. AgO to ZrO_2). Data and spectra from the binary oxide known as "aluminum (III) oxide" has chemical formula "Al_2O_3" in the upper right and left corners of the pages that belong to that set of spectra. This means that spectra and data for "Antimony Oxide" will be found by looking for the chemical formula: "Sb_2O_3". Just underneath of this chemical formula the mineral name is reported if the sample was a natural mineral.

Contents of Each Set of Spectra

The compounds in this volume include: AgO, Ag_2O, Al_2O_3, $Al(OH)_3$, AlOOH (Diaspore), As_2O_3, Au_2O_3, B_2O_3, $BaCO_3$, BeO, Bi_2O_3, $(BiO)_2CO_3$, CaO, $CaCO_3$ (Calcite), CdO, $Cd(OH)_2$, $CdCO_3$, CeO_2, CoO, Co_2O_3, Co_3O_4, $Co(OH)_2$, CrO_3, Cr_2O_3, Cs_2O, CuO, Cu_2O (Cuprite), $Cu(OH)_2$, $CuCO_3$ (Azurite), Dy_2O_3, Er_2O_3, Eu_2O_3, FeO, α-Fe_2O_3 (Hematite), γ-Fe_2O_3, Fe_3O_4, FeOOH (Goethite), Ga_2O_3, Gd_2O_3, GeO_2, HfO_2, HgO, Ho_2O_3, In_2O_3, IrO_2, K_2O, La_2O_3, Li_2O, Li_2CO_3, Lu_2O_3, MgO, $Mg(OH)_2$, $MgCO_3$, MnO, MnO_2, Mn_2O_3, $MnCO_3$ (Rhodochrosite), MoO_2, MoO_3, Na_2O, NbO, NbO_2, Nb_2O_5, NiO, $Ni(OH)_2$, PbO, PbO_2, Pb_2O_3, $PbCO_3$ (Cerrusite), PdO, Pr_6O_{11}, PtO_2, Re_2O_7, Rh_2O_3, RuO_2, Sb_2O_3, Sb_2O_5, Sc_2O_3, SiO, SiO_2 (Quartz), $Si(OH)_4$ (Opal), Sm_2O_3, SnO, SnO_2 (Cassiterite), $SrCO_3$, SrO, Ta_2O_5, Tb_4O_7, TeO_2, ThO_2, TiO, TiO_2, Ti_2O_3, Tl_2O_3, Tm_2O_3, VO_2, V_2O_3, V_2O_5, WO_3, Y_2O_3, $Y_2(CO_3)_3$, Yb_2O_3, ZnO, and ZrO_2.

The first page of each data set includes a title line that reports the chemical name, the oxidation state of the element, and its' formula weight (FW). Just below the title line the "Surface Composition Table" lists the peak assignments from each wide scan survey spectrum, corrected and measured binding energies of all major and minor peaks, relative sensitivity factors, relative peak areas and the atom % abundance of each major signal. Each data set includes a wide scan survey spectrum, a valence band spectrum, a 1,000-1,400 eV range spectrum and high energy resolution spectra of the

primary metal signal, secondary metal signals, the carbon (1s) signal, the oxygen (1s) signal and several Auger signals. The spectra and their annotations are presented exactly as produced and exported by the Spectral Data Processor v4.1 software from XPS International LLC.

Descriptions above each subsequent spectrum include the original key information about the sample, the source of the sample if known, and peak labels. Detailed information about the operating capabilities of the SSI XPS system and analysis conditions used to collect these data are presented in the next section of this book.

The remaining pages of each set include the high energy resolution narrow scan spectra which were obtained by measuring the main XPS signals found in the wide scan survey spectrum. These spectra contain detailed peak-fit results in a table at the top left corner of the spectrum and the actual peak-fit results. The binding energies of the non-conductive samples were corrected to the binding energy of the hydrocarbon carbon (1s) signal at 285.0 eV which is a common practice. This method of energy referencing non-conductive materials is widely used and accepted because there is currently no standard method for charge referencing spectra from insulating materials. Each peak-fit table includes the binding energies of each peak, their FWHM, peak height, percentage of Gaussian peak-shape used, percentage of asymmetry used, normalized peak area and relative peak area. The relative peak area percentages are based on the total peak area intensity of that signal only. Relative peak area percentages are not atom % values.

Philosophy of Data Collection

The spectra in this book were collected under analysis conditions that are practical, readily reproduced, and typically used in laboratories that use monochromatic X-ray sources and are working under real world practical analysis conditions. We have produced this volume of reference spectra because many XPS laboratories need practical reference spectra and do not have the time or money to produce XPS spectra from common reference materials. The signal to noise (S/N) ratios in the wide scan survey spectra is large enough to reveal the presence of minor components that are often not detected. The high energy resolution spectra were obtained under analysis conditions that would give a FWHM = 0.75 eV from the Ag ($3d_{5/2}$) signal of freshly ion etched silver (Ag).

A few high energy resolution spectra, labeled with the superscript “UR” were obtained under the “ultimate energy resolution” conditions available on the SSI S-Probe XPS system. This “ultimate” level of energy resolution produced a FWHM = 0.44 eV from the ($3d_{5/2}$) signal of freshly ion etched silver (Ag). In the production of these spectra we did not attempt to clean the surfaces of any sample because that would make charge referencing of the non-conductive samples a difficult task. For practical reasons we used the hydrocarbon carbon (1s) spectra from the naturally formed layer of adventitious hydrocarbons for charge referencing because that signal is the “de facto” standard for charge referencing non-conductive materials. This method of correcting for charge-up increases the uncertainty in the accuracy of the related binding energies.

The spectral data contained within this 5 volume series of handbooks are designed to assist engineers, scientists, analysts, theoreticians, and teachers who use XPS on an everyday basis under practical working conditions. We hope that these spectra will help XPS users to analyze industrial problems, gather high grade reference data, perform basic research, test theories and teach others. These spectra are designed to be practical tools for everyday

use and were obtained under practical working conditions. We have not attempted to produce research grade spectra, but we have, in fact, produced research grade spectra because of our self-consistent methods. In the production of these spectra no attempt was made to produce a pure, clean surface, but an effort was made to produce surfaces with a minimum amount of natural surface contamination.

Peak-Fitting (Curve-Fitting) of High Energy Resolution Spectra

Peak-fitting was performed by using Spectral Data Processor (SDP v7.0) from XPS International LLC (www.xpsdata.com). This software allows the user to control the full width at half maxima (FWHM) value of any peak, the binding energy (BE) of any peak, peak areas, peak heights, the ratio of pairs of peak areas, the ratio of pairs of FWHM, the energy difference between two peak maxima, the shape of a peak as a sum-function of Gaussian and Lorentzian peak shapes, and the percentage of asymmetry in any peak.

By empirically peak-fitting the spectra from large sets of closely related materials in a trial and error method and analyzing the trends, it was possible to recognize several fundamental peak-shape and peak-fitting parameters for pure elements, binary oxides, polymers, and semiconductors. We have used those empirical findings to guide our efforts to peak-fit the many spectra which had complicated peak shapes. In some cases we used the theoretical peak area ratio of a spin-orbit coupled pair to assist the peak-fitting of a spectrum, and also the energy interval between spin-orbit coupled signals derived from pure element spectra.

The reduced “chi-squared” value, which indicates the goodness of a peak-fit, was used to determine if a peak-fit was reasonable or not. Based on practical experience a “chi-squared” value between 1 and 2 implies a relatively good peak-fit. A “chi-squared” value between 2 and 4 implies that the fit has not yet been optimized. A “chi-squared” value larger than four (4) implies that one or more signals are missing from the peak-fit.

A Shirley-type (sigmoid) baseline was used for most peak-fits. Peak-fits for the main XPS signals were optimized by using a Gaussian : Lorentzian ratio between 80:20 and 90:10. After peak-fitting many binary oxides, we observed that the FWHM of the C(1s), O(1s) and the main metal signal of the binary oxide were usually in range 1.0-1.4 eV. We used this observation as an indicator of charge compensation quality. If one of the peaks fell with this range (1.0-1.4 eV), then all other spectra were expected to represent spectra without charge induced broadening. If all three of the main spectra were found to have FWHM > 1.5 eV, then we understood that charge compensation was not adequate. In response, we repeated some measurements until at least one of the main signals had FWHM < 1.5 eV, by moving the mesh-screen closer to the surface of the sample or by increasing the flood gun voltage by 1-3 eV.

Charge Compensation of Non-Conductive Compounds

Charge compensation of non-conductive materials was handled by using the patented SSI mesh-screen together with a low voltage flood gun of electrons which used an acceleration voltage adjusted to 2-4 eV, unless otherwise noted. The mesh-screen device uses an 85% transmission electro-

formed mesh made of nickel metal that is supported above the surface of the sample by mounting the mesh on a conductive metal frame that is grounded to the sample mount. To achieve good charge compensation the mesh-screen was positioned so the distance between the mesh and the surface of the sample is between 0.5-1.0 mm. When the distance between the mesh-screen and the surface of the sample is greater than 1.2 mm, the usefulness of the mesh-screen flood gun system was null. This mesh-screen method has been found to useful on a wide variety of XPS systems that use monochromatic X-rays and a source of electrons that are from a flood source or a poorly focused source of low voltage electrons.

The mesh-screen is understood to function as an electron cut-off lens with some tendency to allow incoming flood gun electrons to focus on the area being irradiated with monochromatic X-ray beam because the X-ray beam does not have a uniform flux density of the area of the beam. In effect, the mesh-screen produces a nearly uniform electric potential at the surface of the sample and allows incoming flood-gun electrons to pass through whenever they are needed.

The mesh-screen was used above every sample except for a few that were analyzed before the mesh-screen method was invented. Because the electrical nature of many of the samples was unknown until we attempted to collect data, nearly all samples were covered by the mesh-screen device. When the mesh-screen covers a conductive sample there is a very slight drop in counts because the mesh-screen captured or deflected some of the photo-emitted electrons. If ion etching is done with the mesh in place, then a slight amount of nickel appears on the ion etched sample.

Abbreviations Used

Due to the limited space provided to describe each sample in each electronic data-file, it was necessary to use various abbreviations. The abbreviations are:

TOA = take-off-angle for the electrons (the angle between the surface plane and the main axis of the electron collection lens)
FG = flood gun
mesh = mesh-screen used for charge control
1mm = 1 mm height used for the mesh-screen
semi-con = semi-conductive behavior
Tech = technical grade purity
pellet = sample pressed into pellet form by pellet press used to make infrared KBr pellets,

INSTRUMENT AND ANALYSIS CONDITIONS USED TO COLLECT XPS SPECTRA

A. Instrument Details

Manufacturer:	Surface Science Instruments (SSI)
Model:	S-Probe (upgraded from M-Probe model 2703)
Operation Software:	1.36.05 (Compiled in MS-DOS "C" v6.0)
Analyzer Type:	Fixed Analyzer Transmission (FAT), which is the same as: Fixed Pass Energy = Constant Analyzer Energy (CAE) 180° Hemi-spherical (truncated)
Input Lens Field of View:	30° for sample normal to lens axis (1" diameter port) (always larger than X-ray beam; retarding potential scanned)
X-ray Type:	Al° K_α monochromatic (one 2" diameter, thin, natural SiO_2 wafer glued onto a Zerodur substrate and heated to 65° C)
X-ray Source:	10 kV, 1.5-22.0 mA (depending on spot size used)
X-ray Energy Defined as:	1486.7 eV (8.3393 Å), Bragg angle = 78.5°
Excitation Source Window:	0.6 μ aluminum in S-Probe (10μ Mylar in X-Probe)
Angle of X-ray Incidence:	α = 71° (relative to sample normal)
Electron Emission Angle:	β = 0° (relative to sample normal)
Angle between X-ray Axis and Electron Analyzer Axis:	ϕ = 71° (fixed, non-variable)
Pass Energies of Analyzer:	150 V for Resolution 4 setting 100 V for Resolution 3 setting 50 V for Resolution 2 setting 25 V for Resolution 1 setting
Type & Size of Input Slit:	Fixed (2 mm X 35 mm) with magnetic compression
Type & Size of Output Slit:	None (dispersion limited by hemisphere voltages)
Electron Collection Lens Field of View:	~ 1 mm^2 for β = 0° at 1,000 eV KE
Electron Collection Lens Efficiency:	7% over 2π steradians
Sample Surface to Tip of Electron Collection Lens Distance:	~33 mm

Crystal to Sample Surface Distance:	~190 mm
Crystal to X-ray Anode Distance:	~190 mm
True Background Noise:	<10 electrons/second at -50 eV (shot noise limited)
Detector Type:	SSI Position Sensitive Detector, resistive anode encoder, 40 mm X 40 mm, electronically defined as 128 active channels with max ct rate of 1,000,000 cps
Dead Time:	zero (unless ion etching pure element while collecting data)
Base Pressure:	4×10^{-10} torr
Normal Operating Pressure:	1.6×10^{-9} torr
X-ray FWHM Diffracted by natural SiO_2:	~0.25 eV
Power Settings:	200 Watts in a 250 x1100µ X-ray beam 100 Watts in a 150 x 800µ X-ray beam 45 Watts in an 80 x 350µ X-ray beam 15 Watts in a 40 x 250µ X-ray Beam
X-ray Induced Current:	1.1×10^{-9} amps for a 600µ spot in X-Probe
Approximate True X-ray Power:	$\sim 6 \times 10^{-6}$ W in a 600µ spot
Approximate True X-ray Irradiance:	~8 W/m^2
Approximate True X-ray Photon Flux:	$\sim 7 \times 10^{9}$ photons/sec

B. Experimental Details

Electron Take-Off-Angle:	90° relative to sample surface (unless otherwise reported)
Pass Energies Used:	Wide scans were done at PE = 150 eV Narrow scans were normally done at PE = 50 eV Valence band scans were done at PE=150 eV
X-ray Beam Size Used: (S-Probe system)	Wide scans: 250 x 1500 µ ellipse (at 90° TOA) 250 x 1100 µ ellipse (at 35° TOA) Narrow Scans: 250 x 1500 µ ellipse (at 90° TOA) 150 x 1000 µ ellipse (at 90° TOA)
SSI Mesh-Screen:	An 85% transmission (20 µ diameter wire with 200 µ spacing) nickel metal mesh screen was adhered to a small 25 mm x 25 mm x 1.5 mm (W x L x H) aluminum plate with a 20 mm x 20 mm aperture.

	The mesh-screen was placed over all insulating samples So that the distance between the sample surface and the mesh-screen was <1.0 mm but >0.5 mm.
Dwell Time (counting time):	200 milliseconds/channel
Data Transfer Time:	4 milliseconds
Max. Number of Channels:	5,000 (channels = data points)
Scan Time for One Wide Scan:	~ 3.5 minutes (using 1024 data points)
Scan Time for One Narrow Scan:	~100 seconds (using 256 data points)
Energy Range:	-100 to +1400 eV (BE range)
Typical Step Size:	0.1 eV/step (i.e. 0.1 eV/data point)

C. Data Processing Details

Baseline Subtraction:	None, unless S/BG gave a small display. When the baseline was removed, the intensity of the lowest point was subtracted from all points.
Data Smoothing:	None (the 128 channel PSD system producing a smoothing effect)
Energy Shifting:	All non-conductive samples were charge referenced so that the hydrocarbon carbon (1s) signal appeared at 285.0 eV

D. Sample Details

The "Description" given on the first page of each data set reports: the empirical chemical formula for the oxide, the hydroxide or carbonate, the reported bulk purity, source, a production lot number, the electron take-off-angle (TOA), the height of mesh-screen above the surface, the electrical behavior of the sample under analysis conditions, sample color, sample preparation, sample size, known melting point in degrees Centigrade, density in grams/cubic-centimeters, and a note on solubility.

Sources of Commercially Pure Binary Oxide, Carbonate and Hydroxide Samples

Most of the commercially pure binary oxides were purchased from the Aldrich Chemical Co. Most of the packages from the Aldrich Chemical Co. included an "Analytical Information" sheet which reported an ICP or AA analysis summary, a production lot number, the Aldrich product number, sample purity (e.g. 99+%), sample appearance (color and physical form), date of chemical analysis, formula weight and a label on the bottle that reported the melting point, toxicity, a Chemical Abstracts registry number and density. The samples

from Aldrich were generally quite pure. Other oxide samples were obtained from either Cerac Inc. (USA) or Rare Metallics Co., Ltd. (Japan). These samples tended to have mixed oxides. The packages from Cerac Inc. included a "Certificate of Analysis" with an ICP or AA analysis summary, a production lot number, a product number, purity (e.g. 99+%), and mesh size. The packages from Rare Metallics Co. did not include analytical data reports, but instead had stock numbers and a purity statement. Two samples (i.e. SiO_2 natural crystal and Al_2O_3 as a fused plate) were obtained from in-house sources and do not have any purity reports.

Powdered Samples - Pressed into 3 mm Diameter Pellets

Until analyzed, all finely powdered samples were kept un-opened, in their original glass or plastic containers, which were packaged inside of plastic-lined aluminum bags and stored in an electrically controlled dehumidifier. Just prior to analysis, each bottle was opened in the normal air of the room, where the XPS system was kept, and a small 50-100 mg portion of the powdered sample was removed via a clean Nichrome spatula and placed in the compression chamber of a hand-operated, stainless steel pellet press (Qwik Handi-Press) that is normally used to produce pellets for infrared analyses. All finely powdered samples were compressed without any treatments. The resulting pellets varied in thickness from 0.3 - 0.8 mm. The "Qwik Handi-Press" was manufactured by the Barnes Analytical Division of Spectra-Tech Inc. (652 Glenbrook Road, Stamford, Connecticut, 06906, FAX#: 203-357-0609). Part # 0016-111 to 0016-121 contains 1, 3, and 7 mm die sets. Our hand-press was purchased through the Aldrich Chemical Co.

To avoid iron and/or chromium contamination from the anvil, a small piece of freshly cleaned aluminum foil was placed over the sample in the compression chamber. This aluminum foil is standard kitchen grade foil which was gently rubbed with a cotton swap lightly soaked with iso-propanol (IPA) and allowed to dry in air. Those powders, that were clumped together, were very gently ground into a powder just prior to compression. To avoid unnecessary heat-induced oxidation, those samples which were hard and granular were very gently and slowly hand ground into a fine powder using an agate marble mortar and pestle. As soon as each sample was removed from the compression chamber, it was mounted on top of a fresh drop of silver (Ag°) paint placed in the center of a 5 mm diameter brass boat that was 1.3 mm in height. Silver paint was used so that conductive oxides could behave as true conductors thereby providing true electron binding energies for those oxides that were indeed conductive. This arrangement kept the mesh-screen at a suitable distance from the sample surface. In general, each oxide was exposed to room air for <15 min.

Benefits of Pressing Powders into Pellets

A comparison of the electron counts obtained from powdered samples pressed onto double-sided adhesive tape and positioned at a 35° electron take-off-angle with the electron counts obtained from hand-pressed glossy or semi-glossy pellets positioned at a 90° electron take-off-angle (TOA) revealed that the pellet form at a 90° electron TOA produces 3-5 times higher electron counts than a powdered sample pressed onto double-sided tape at a 35° electron TOA. By pressing the finely powdered oxides into pellets, it was also found the surface charging behavior of these glossy or semi-glossy samples was very easy to control with the mesh-screen flood-gun device.

Problems Caused by Pressing Powdered Samples into Pellets

By pressing finely powdered oxides into pellets, the surface of the resulting pellets were usually smooth enough to appear glossy or semi-glossy. A few samples were found to be contaminated with iron or chromium which indicated that the oxide had undergone a pressure induced reaction with the stainless steel anvil. Very strong hand pressure was indeed found to cause some oxides to react with the stainless steel anvil, but medium hand pressure did not produce the undesired iron and chromium contamination. Other forms of accidental contamination (chlorine or previously analyzed oxides) were caused by insufficient cleaning of the stainless steel anvil, which was normally cleaned with a chlorine-containing metal polishing solution (Pikal) and rinsed with distilled water and isopropanol. All analyses that showed any unexpected contamination were repeated.

Solution to Pressure Induced Contamination of Pellets

Extensive experiments on different methods to avoid contamination while producing pellets revealed that contamination is minimized or avoided by using freshly cleaned aluminum foil as a "buffer" between the oxide powders and the metals in the steel anvil components. The aluminum foil, which is sold as a kitchen wrap material, is cleaned with 100% isopropanol (isopropyl alcohol) just prior to use. The foil is cut to a size that is readily fits inside the pellet press device.

We have also used "glycine" weighing paper which is commonly used as a paper to hold powders when weighing them. This weighing paper is common in chemical laboratories and can be substituted for the aluminum foil whenever the pressing results with the aluminum foil produce undesired binding of the foil to the sample. The glycine paper method sometimes introduces very small amounts of contaminants which produce very weak N (1s) and C (1s) signals.

E. Energy Resolution Details

Table 1: Experimentally Observed Relation between Energy Resolution and Analysis Conditions

Signal and Material used to Define Effective Energy Resolution (treatment)	Energy Resolution FWHM (eV)	Pass Energy	X-ray Spot Size
Si ($2p_{3/2}$) (fractured edge of crystal)	0.38 eV	10 eV	40 x 250µ
Si ($2p_{3/2}$) (fractured edge of crystal)	0.43 eV	25 eV	80 x 350µ
Au ($4f_{7/2}$) (foil - ion etched clean)	0.64 eV	10 eV	250 x 1000µ
Au ($4f_{7/2}$) (foil - ion etched clean)	0.79 eV	25 eV	250 x 1000µ
Au ($4f_{7/2}$) (foil - ion etched clean)	0.86 eV	50 eV	250 x 1000µ
Au ($4f_{7/2}$) (foil - ion etched clean)	1.40 eV	150 eV	250 x 1000µ
Ag ($3d_{5/2}$) (foil - ion etched clean)	0.42 eV	10 eV	40 x 250µ
Ag ($3d_{5/2}$) (foil - ion etched clean)	0.64 eV	25 eV	40 x 250µ
Ag ($3d_{5/2}$) (foil - ion etched clean)	0.75 eV	50 eV	40 x 250µ
Ag ($3d_{5/2}$) (foil - ion etched clean)	1.00 eV	100 eV	40 x 250µ
Ag ($3d_{5/2}$) (foil - ion etched clean)	1.30 eV	150 eV	40 x 250µ
Cu ($2p_{3/2}$) (foil - ion etched clean)	0.85 eV	10 eV	250 x 1000µ
Cu ($2p_{3/2}$) (foil - ion etched clean)	0.94 eV	25 eV	250 x 1000µ
Cu ($2p_{3/2}$) (foil - ion etched clean)	1.06 eV	50 eV	250 x 1000µ
Cu ($2p_{3/2}$) (foil - ion etched clean)	1.60 eV	150 eV	250 x 1000µ
Cu ($2p_{3/2}$) (foil - ion etched clean)	0.85 eV	10 eV	150 x 800µ
Cu ($2p_{3/2}$) (foil - ion etched clean)	0.96 eV	25 eV	150 x 800µ
Cu ($2p_{3/2}$) (foil - ion etched clean)	1.05 eV	50 eV	150 x 800µ
Cu (3s) (foil - ion etched clean)	2.35 eV	50 eV	250 x 1000µ

Table 2: Theoretical Analyzer Resolution versus Pass Energy Setting

Theoretical Analyzer Resolution	Pass Energy	Effective Detector Width
0.25 eV	25 eV	3.5 eV
0.50	50	7.0
1.00	100	14.0
1.50	150	21.0

F. Energy Scale Reference Energies and Calibration Details

From May 1986 to January 1993 (Based on HP energy calibration)

Energy Scale Reference Energies:	932.47 eV for Cu ($2p_{3/2}$) signal
	122.39 eV for Cu (3s) signal
	83.96 eV for Au ($4f_{7/2}$) signal
Binding Energy Uncertainty:	< ±0.08 eV
Digital-to-Analog (DAC) Conversion Setting:	163.88

After January 1993 (Based on NPL reference energies published in 1990)

Energy Scale Reference Energies:	932.67 eV for Cu ($2p_{3/2}$) signal
	122.45 eV for Cu (3s) signal
	83.98 eV for Au ($4f_{7/2}$) signal
Observed Reference Energy:	75.01 eV for Cu (3p3) signal
Binding Energy Uncertainty:	< ±0.05 eV
Digital-to-Analog (DAC) Conversion Setting:	163.87

Note: NPL has recently revised reference energies to be 932.62 eV for Cu ($2p_{3/2}$) and 83.96 eV for Au ($4f_7/2$) for monochromatic systems using an electron take-off-angle of 45° (Ref. 8)

Reference Energies of Adventitious Hydrocarbon Contaminants

From May 1986 to January 1993 the electron binding energy of adventitious hydrocarbons was assumed to occur at 284.6 eV based on SSI and C. D. Wagner's research and recommendations.

Publications by P. Swift in the journal of Surface and Interface Analysis **4**, p.47 (1982), S. Kohiki and K. Oki in the Journal of Electron Spectroscopy and Related Phenomena **33**, p.375-380 (1984), and G. Barth, R. Linder and C. E. Bryson, III in the journal of Surface and Interface Analysis **11**, p.307-311 (1988) have shown that the electron binding energy for various hydrocarbon contaminants and polymers is not necessarily a constant number.

Research by this author indicates that the electron binding energy for adventitious hydrocarbons lies somewhere between 284.4 and 287.0 eV and is dependent on the electronic nature of the surface. By taking a simple average of all available binding energies, the author has found that 284.9 eV is average binding energy for hydrocarbons captured from UHV onto the surface of recently ion etched metals where the surface is many hours old (>8 hr). For naturally-formed native oxides, the average binding energy is 285.2 eV. Binary oxides, for metals located at the far left of the periodic table (columns 1-4) tend to have higher C (1s) binding energies (285.3-286.7 eV), while most of the transition metal oxides center around 285.0 eV. Near the far right of the periodic table, the C (1s) binding energy rises to a 285.2-286.5 eV range (columns 12-14).

In routine practice, this author prefers to use the 285.0 eV number to compare data with previous publications. Factors that may cause this rather large range of electron binding energies for adventitious hydrocarbon contamination include: (a) variations in surface dipole moment at the vacuum-surface interface of the oxide material, which is known to be much larger in length and intensity than the surface dipole moment of a pure metal, and also, in the case of naturally formed native oxide films, (b) the thickness of the native oxide, (c) any physical or chemical treatments, (d) the thickness of the adventitious hydrocarbon layer, and (e) the electrical behavior of the instrument used to analyze the sample. The type of instrument being used may cause different shifts in the observed binding energy of the adventitious hydrocarbon contamination because the source may or may not generate different amounts of low energy secondary electrons from the window that protects the X-ray source. The heat from the source and contamination that de-gases from a just turned on source can also influence observed binding energies. Electron flood guns may or may not influence the binding energy as well.

Instrument Stability and Long Term Calibration

Each of the three SSI XPS systems, that we have used, was calibrated 2-3 times per week until its ability to maintain accurate voltage settings was defined. Once it was determined that the systems could maintain reliable voltage settings for 1-3 months, it was decided that good calibration could be maintained by checking and, if necessary, correcting the pass energies of the system on a 2-4 week basis. Each

of the three SSI XPS instruments that we have used, have been checked or calibrated on a routine basis every 2-4 weeks by using SSI's reference energies. By using this method over several years time, it was found that the maximum uncertainty (error in pass energies) was normally < ±0.10 eV, but a few times rose to ±0.15 eV or less. In a very rare case, the uncertainty rose to 0.20 eV. Long term use of the SSI systems has shown that the DAC circuit does not change enough to be observed unless the room temperature changes by more than 10 degrees Centigrade. If the room temperature changes within a few hours time by more than 10 degrees or the temperature of the DAC chip is changed by more than 10 degrees, then a >0.1 eV shift, which is much, much smaller than the reliability of almost all literature data, can be observed. Variables, which seem to cause pass energy settings to change slightly, include building line-voltages, ion etching conditions, and the addition or removal of some electrical device.

G. Electron Counting and Instrument Response Function Details

Instrument Response Functions (for the X-Probe System only)

Instrument Response Function: $Q(E) = E^{+0.27}$ for 150 eV PE (ref.3)
Instrument Response Function: $Q(E) = E^{+1.0}$ for 50 eV PE (ref.3)

Signal/Background Ratios for Ion Etched Silver using a 250x1000 µ Spot*

Pass Energy	25 eV	50 eV	100 eV	150 eV
S/BG ratio**	>140	>110	>70	>50

* Using a 90° electron take-off-angle and a smooth Ag°/Mylar film.
** The S/BG ratio is a simple numerical ratio of electrons counts at the peak maximum relative to the average electron counts observed at approximately 10 eV lower BE.

Voltage Settings of the Electron Collection Lens

Pass Energy*	29.6-29.8	54.7-54.9	105.1-105.3	155.9-156.2
Detector Widths	3.743	7.486	14.954	22.297
Sensitivity Exponent	-0.1	0.3	0.7	1.1
V1 Offset	30	55	105	155
V1 Slope	0.600	0.611	0.676	0.709

*These pass energies include corrections for instrument work function. True pass energies were set to 25, 50, 100, and 150 eV ±0.1 eV.

H. Effects of Poorly Focusing the Distance between the Sample and the Electron Lens

If the focus distance between the sample surface and the electron collection lens is poorly adjusted, then the number of electron counts drops very quickly. A 0.5 mm error in focus produces a >300% decrease in counts, but does not produce any observable error in binding energies. A 0.1mm error in focus produces a 15% decrease in peak area counts and is easily observed as a horizontal displacement in the static (un-scanned mode) XPS signal as observed on the standard CRT display of the detector signal. Such a decrease in signal intensity causes the operator to correct the focus error to maximize the electron count rate and maintain good laboratory practice and self-consistency. In this manner, the operator minimized the chance of obtaining false BE readings and has accurately reproduced a nearly absolute focus point which greatly increases the quantitative accuracy of any unknown sample and the accuracy of the measured binding energies. Experiments with Bragg angle alignment of the crystal indicated that the maximum error due to an unusual bad alignment of the crystal would be <0.1 eV. To observe an error greater than 0.1 eV, the electron counts were found to decrease by >50%.

I. Quantization Details and "RSF Exponents"

By default, the SSI system uses a 0.7 number as the RSF exponent factor for each pass energy setting which is used in an equation that modifies theoretically calculated atomic photo-ionization cross-sections (John H. Scofield) to generate relative sensitivity factors that are valid for this XPS systems and which can be used to generate valid atomic percentages. This correction corrects for the overall instrument response function which includes the transmission function. For signals in the 0-700 eV range, the 0.7 RSF exponent factors produces a ±10% accuracy in quantitative results for XPS signals obtained with 150 eV pass energy. For signals that occur at higher binding energies, it is necessary to change the RSF exponent factor to a 1.1-1.5 value.

To obtain a useful RSF exponent factor for an SSI system, it is possible to use freshly ion etched poly-crystalline copper foil to test the validity of the sensitivity exponent factor for larger BE ranges and different pass energies. By integrating the peak areas of the Cu($2p_{1/2}$), Cu($2p_{3/2}$), Cu(3s), Cu(3p) and Cu(3d) signals it is possible to perform trial and error choices of the RSF exponent until a useful number is determined. When a useful number is entered into the software routine, the software generates fictional atomic percentages for each of the integrated copper signals which, when optimized, generates a 20 atom % value with an uncertainty of ±1-2 atom % for all five signals. If the RSF exponent factor is wrong then the atomic percentages will generate numbers such as 10%, 11%, 26%, 24%, and 29% or perhaps 31%, 28%, 14%, 13%, and 14%.

This trial-and-error approach may require 1-2 hours time and can be done by using wide scan survey spectra data or more preferably narrow scan spectra for each of the pass energies. This method, in effect, assumes that all five of the relative sensitivity factors (RSFs) for copper are reasonably correct which was confirmed by analyzing various natural crystals and pure polymers.

This method, in effect, assumes that the pure copper sample is a standard material that is composed of 5 components which are present in 20 atomic % abundances. Once a useful RSF exponent factor is found it will generate a 20 atom % result for each of the five copper signals. After a useful RSF exponent factor is found, it is tested by analyzing freshly exposed bulk regions of crystalline materials such as SiO_2, Al_2O_3, and NaCl. The high and low BE signals of the NaCl crystal are especially useful to test the validity of the sensitivity exponents.

As further checks, the freshly exposed bulk of common polymers (e.g. Mylar or PMMA) or a thin film of high purity silicone oil can also be analyzed. Teflon has repeatedly given slightly larger than desirable error by comparison to the other materials listed above. For that reason Teflon is a less desirable material to test the sensitivity exponents.

J. Test of the Reliability of Relative Sensitivity Factors (RSFs)

Crude testing of Scofield's RSF numbers was performed by measuring the atomic percentage of each signal for a pure element. This testing used the software's automatic peak area integration software that is reasonably accurate. The results indicate that some of the relative sensitivity factors for some of the weaker signals may be more uncertain. If, however, all factors are taken into account, then Scofield's numbers are reliable to a 90-95% accuracy level for truly homogeneous materials.

K. Traceability Details

The definition of traceability reported by Martin P. Seah and Cedric J. Powell in the J. Vac. Soc. Technol. Vol 8, p.736 (1990) publication is: "The property of a result of a measurement whereby it can be related to appropriate standards, generally international or national standards, through an unbroken chain of comparisons."

Traceability of Reference Binding Energies (Calibration)

At the time that these spectra were collected, there were no international standards for binding energies or reference energies. Recently, many people in the world have been using NPL's reference energies, which have become "de facto" standards. After further refinement and round-robin testing, the NPL values have become ISO values.

Many workers and researchers are unfortunately still using various numbers provided by the instrument makers. The author of this book was using Surface Science Instruments (SSI) Co. reference energies until December 1992, and then switched to NPL binding energies (binding energies (BEs)) in January 1993. SSI reference energies originally came from Hewlett-Packard (HP) and their high precision voltage systems. SSI and HP both used high precision voltage meters from HP to calibrate their ESCA machines (i.e. X, M, and S-Probe and HP-5950 A-type and B-type, resp.).

In a recent effort to improve the accuracy of binding energies (BEs) obtained from pure elements, the S-Probe pass energies were checked and corrected, if needed, almost every work-day for two months to obtain high precision and high accuracy binding energies (BEs) for the pure elements that are metals. This study used the NPL reference energies with Cu ($2p_{3/2}$) at 932.67 eV with +/- 0.02 uncertainty and Au ($4f_{7/2}$) 83.98 eV with +/-0.02 uncertainty by using 0.02 eV/pt. steps for the calibrations. To determine the "true" BE of each of the pure elements, which were scraped clean in air and then ion etched in vacuum, a 0.05 eV/pt. step-size was used. A repetitive ion etching (depth profile) style was used to collect wide scan, valence (Fermi edge) band, and narrow scans of the main signals for each metal at 50, 25 and 10 eV pass energies. Each repetitive experiment run lasted about 4 hours. If NPL BE numbers are accepted as "de facto" international standards, then the ultimate traceability of binding energies (BEs) in this data set can be related to NPL BE numbers for Cu ($2p_{3/2}$) and Au ($4f_7)_{/2}$. Because the refined NPL values are now ISO standard values, the traceability of the reference energies used in this data set are traceable to ISO standards.

Transfer of Traceability from Pure Metals to Non-conductive Binary Oxides

A question that should be posed is traceability to the non-conductive binary oxide binding energies. For the binary oxides in this volume, traceability begins with NPL's binding energies (BEs) for pure copper and gold as state above. Traceability then transfers to pure element binding energies (BEs) which is based on NPL reference binding energies (BEs). Traceability then transfers to pure element binding energies (BEs) based on SSI's reference binding energies (BEs), and then the naturally formed native oxide data published in Volume 1 of our XPS Handbook series where binding energies (BEs) were measured from pure element signals and also the naturally formed native oxide signals.

Naturally formed native oxides typically have thin oxide films (10-80Å) which, in general, behave as good or true electrical conductors, which allows a direct measure of the true binding energy of many, but not all, binary oxides. To determine if traceability can indeed be transferred to true binary oxides, it was necessary to study the behavior of the naturally formed native oxides by applying various flood gun settings with the samples grounded and insulated. The results from that study can be used to transfer traceability to the experimentally observed binding energies (binding energies (BEs)) of pure binary oxides. The most difficult transfer of traceability occurs for the naturally formed native oxide systems. If the flood gun study was not done, then it is difficult to transfer traceability in a reliable manner from a conductive metal to one of its corresponding non-conductive binary oxides.

Traceability of Instrument Response (Throughput) Function

Copper, gold and silver data obtained from the M-Probe system were submitted to Martin P. Seah at the NPL for a round robin test on transmission function; the results of which were published in the journal of Surface and Interface Analysis, p.243 (1993). In that publication, M-Probe data, which we contributed, were attributed to group #35. That paper reported that instrument has a $Q(E) = E^{0.27}$

for a Res 4 pass energy (PE=150eV) and a Q (E) = $E^{1.0}$ for the Res 2 pass energy (PE=50 V). If the NPL method is accepted as a "de-facto" standard, even though it is not an internationally recognized standard, then the transmission function and quantitation results of the S-Probe system are traceable to the "metrology spectrometer" at NPL.

Traceability of Relative Sensitivity Factors (RSFs) used for Quantization

Scofield's theoretically calculated photo-ionization cross-sections are internationally used as the "de-facto" standard theoretical RSFs, except in Russia and a few other places, where other RSF numbers are preferred but are, in effect, after renormalization almost identical to Scofield's RSFs. The SSI system uses a very simple equation that modifies normalized values of Scofield's photo-ionization cross-section values to generate relative sensitivity factors. That equation corrects the instrument response function for differences due to pass energy, differences due to transmission function, and the inelastic mean free path versus kinetic energy dependency.

Traceability of Sample Purity

The purity of the commercially pure (99%) binary oxides is linked to the ICP or AA analyses performed by the Aldrich Chemical Co. and their methods for calibrating their instruments.

L. Reference Papers Describing Capabilities of X-Probe, M-Probe, and S-Probe XPS Systems

1. Robert L. Chaney, *Surface and Interface Analysis,* **10,** 36-47 (1987) [re: X-Probe]
2. Noel H. Turner, *Surface and Interface Analysis,* **18,** 47-51 (1992) [re: Quantization]
3. M. P. Seah, *Surface and Interface Analysis,* **20,** 243-266 (1993) [re: Response Function]
4. L.T. Weng et al, *Surface and Interface Analysis,* **20,** 179-192 (1993) [re: Response Function]
5. L.T. Weng et al, *Surface and Interface Analysis,* **20,** 193-205 (1993) [re: Response Function]
6. B. Vincent Crist, *Surface Science Spectra*, **1**, 292-296 (1993) [re: KBr spectra]
7. B. Vincent Crist, *Surface Science Spectra*, **1**, 376-380 (1993) [re: Ar/C spectra]
8. M. P. Seah, I.S. Gilmore, and G. Beamson, *Surface and Interface Analysis,* **26,** 642-649 (1998)

XPS Spectra
of
Commercially Pure Binary Oxides
and a few Common Carbonates and Hydroxides

AgO

Silver (II) Oxide (FW = 123.87)
Surface Composition Table

Description: AgO (99%) from Aldrich Lot# 00108JV, pressed into 3 mm pellet, analyzed at 90 deg TOA, conductive gray-black powder pressed into 5 mm pellet, mp >100 C dec., d. 7.44, sol. in ammonia (dec.)

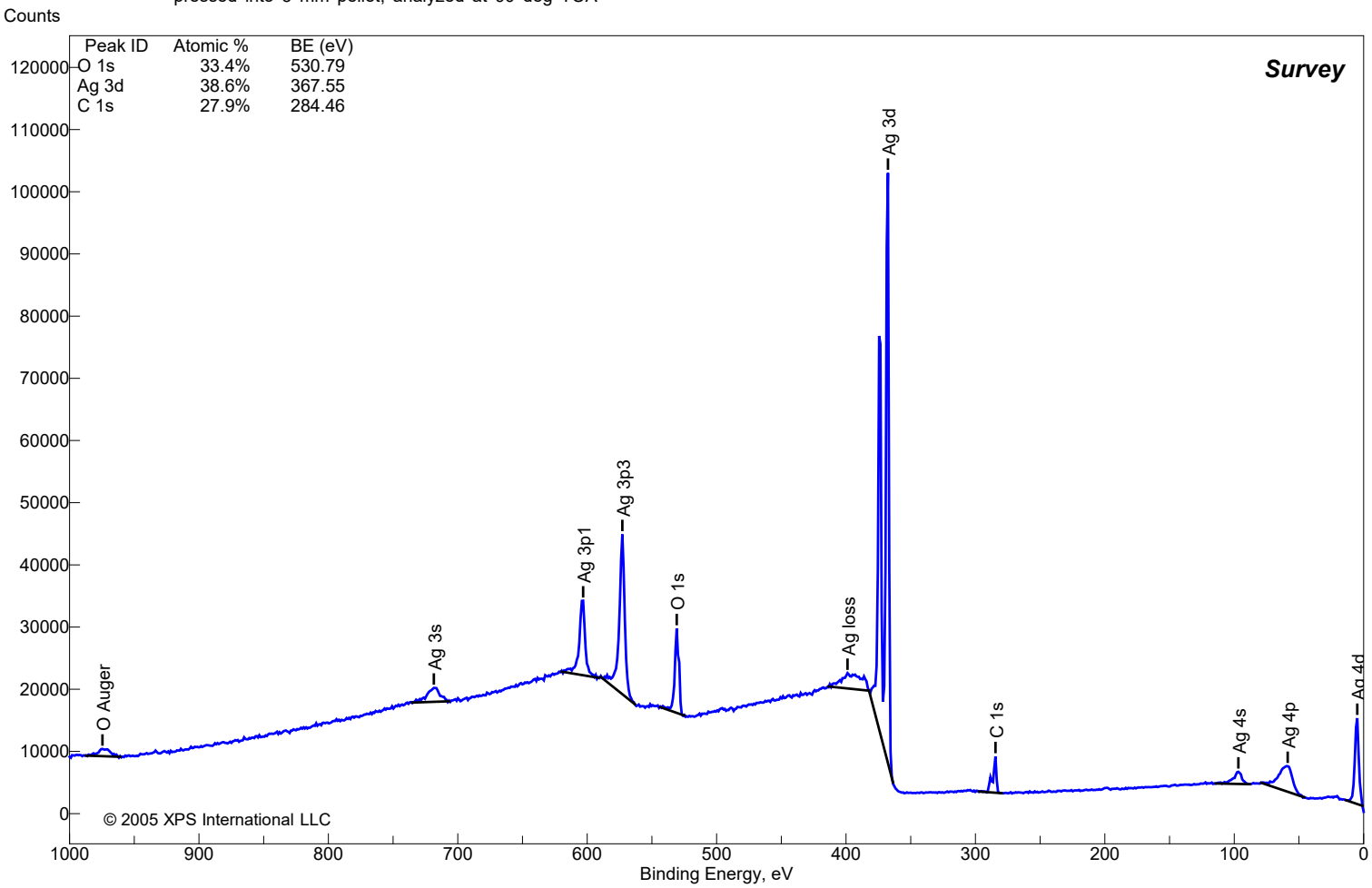
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Ag 4d	4.9	4.9	1.55	1.5	62,729	
Ag 4p	58.7	58.7	1.36	1.5	63,032	
Ag 4s	96.8	96.8	0.64	1.5	19,754	
C 1s	284.5	284.5	1.00	1.5	24,842	27.9%
Ag 3d	367.5	367.5	18.04	1.5	556,356	38.6%
Ag loss	398.8	398.8	1.80	1.5	59,988	
O 1s	530.8	530.8	2.93	1.5	61,714	33.4%
Ag 3p3	572.8	572.8	8.06	1.5	162,297	
Ag 3p1	603.1	603.1	4.03	1.5	78,803	
Ag 3s	718.5	718.5	2.93	1.5	32,609	
O Auger	974.6	974.6	0.00	1.5	14,615	
Ag Auger	1134.7	1134.7	0.00	1.1	19,283	
Ag Auger	1189.0	1189.0	0.00	1.1	4,809	
Ag Auger	1225.6	1225.6	0.00	1.1	3,524	

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AgO

Silver (II) Oxide (FW = 123.87)

Sample Description: AgO (99%) from Aldrich lot# 00108JV (contaminated with Ag2O), conductive pressed into 3 mm pellet, analyzed at 90 deg TOA

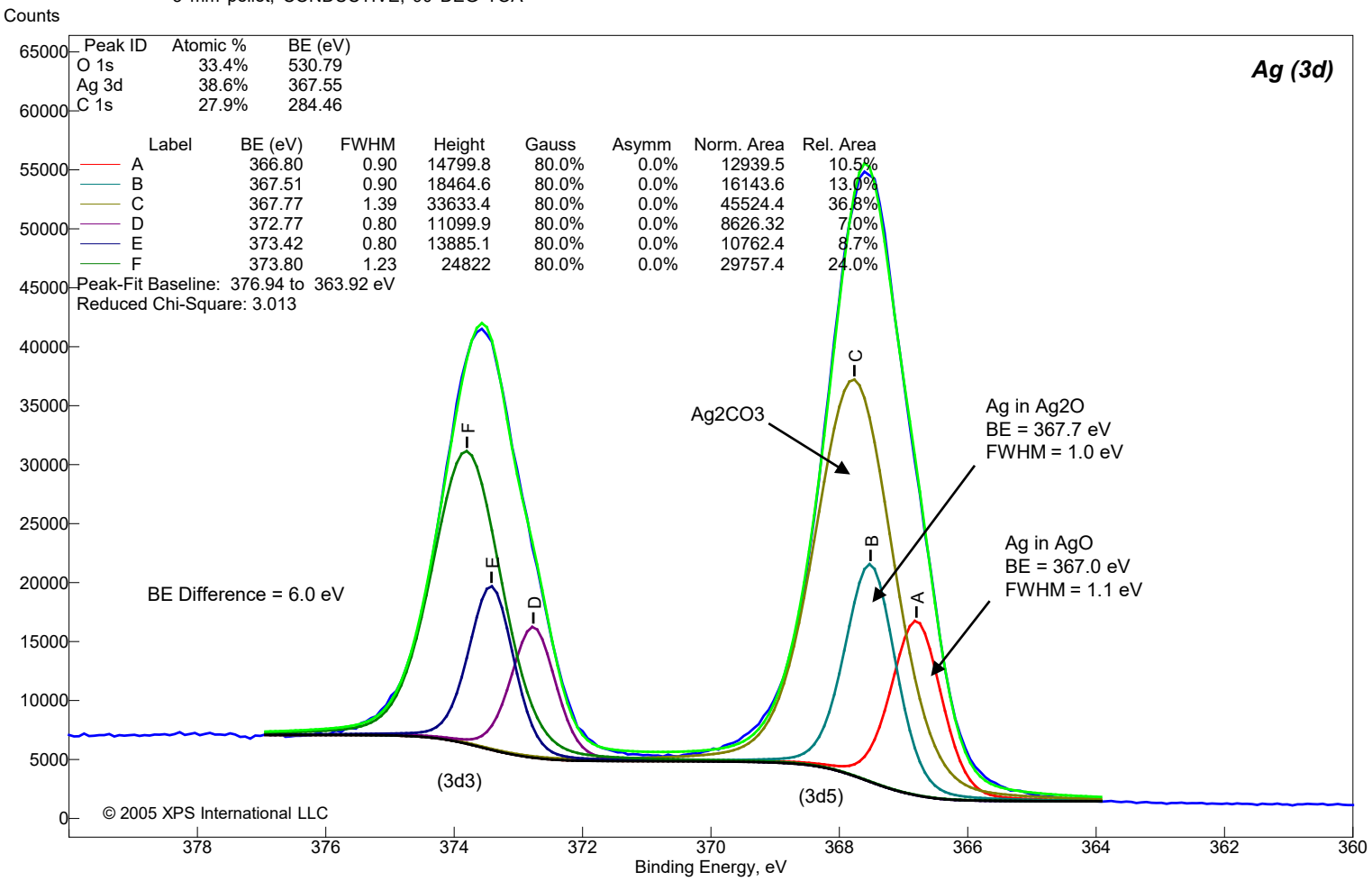


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AgO

Silver (II) Oxide (FW = 123.87)

Sample Description: AgO (99%) Aldrich lot# 00108JV (contaminated with Ag2O)
3 mm pellet, CONDUCTIVE, 90 DEG TOA

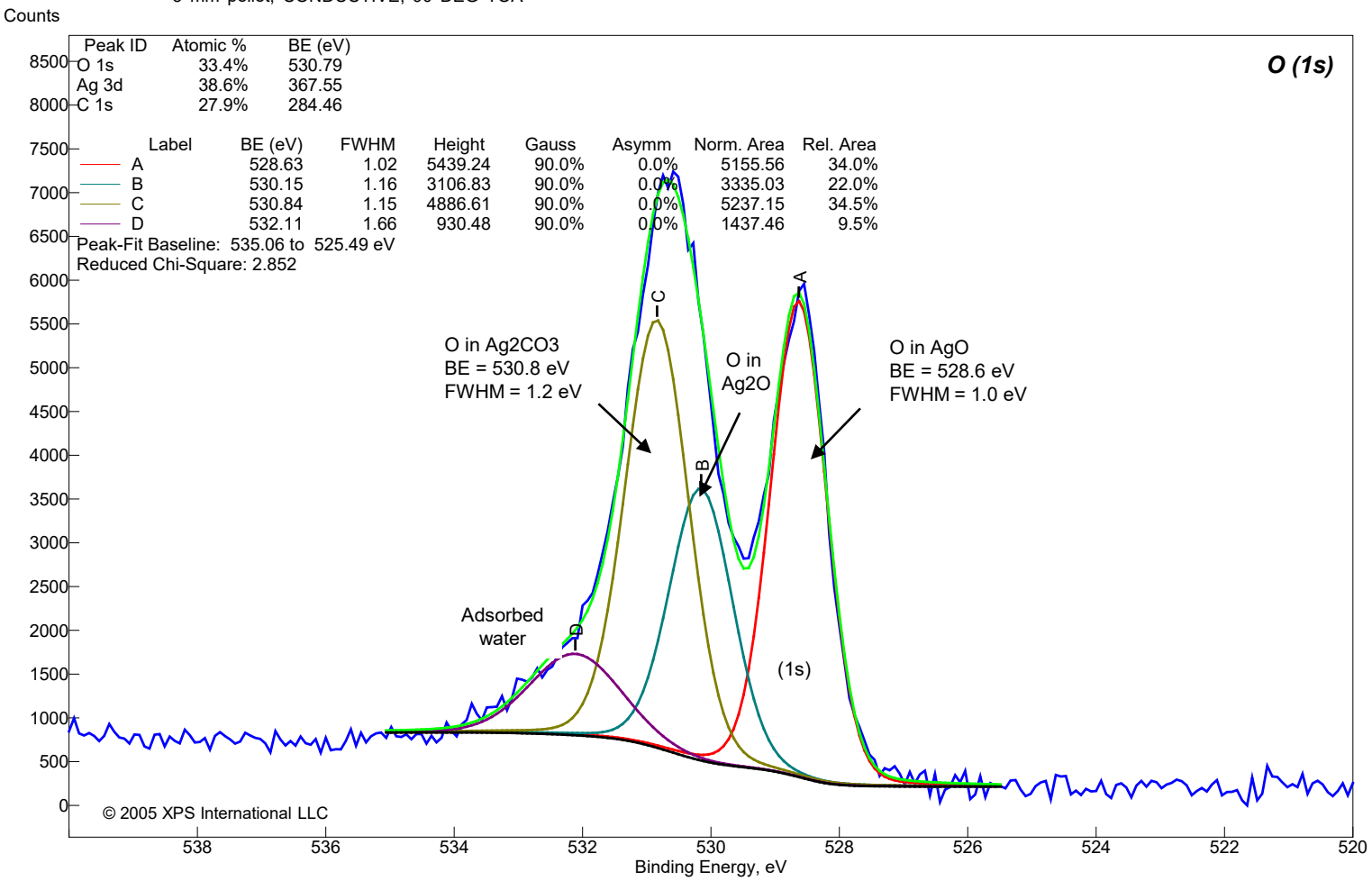


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AgO

Silver (II) Oxide (FW = 123.87)

Sample Description: AgO (99%) Aldrich lot# 00108JV (contaminated with Ag2O)
3 mm pellet, CONDUCTIVE, 90 DEG TOA

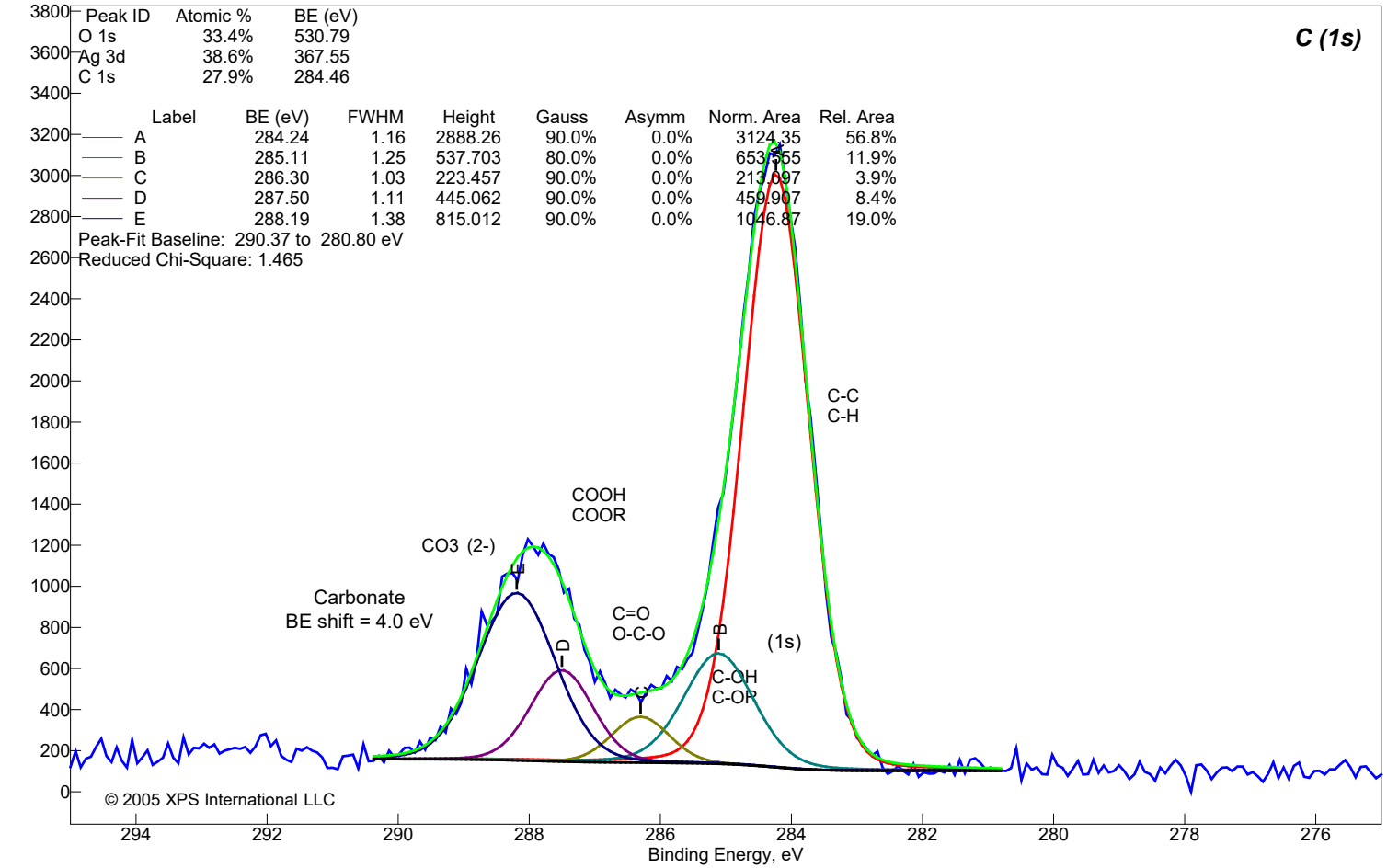


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AgO

Silver (II) Oxide (FW = 123.87)

Sample Description: AgO (99%) Aldrich lot# 00108JV (contaminated with Ag2O)
3 mm pellet, CONDUCTIVE, 90 DEG TOA

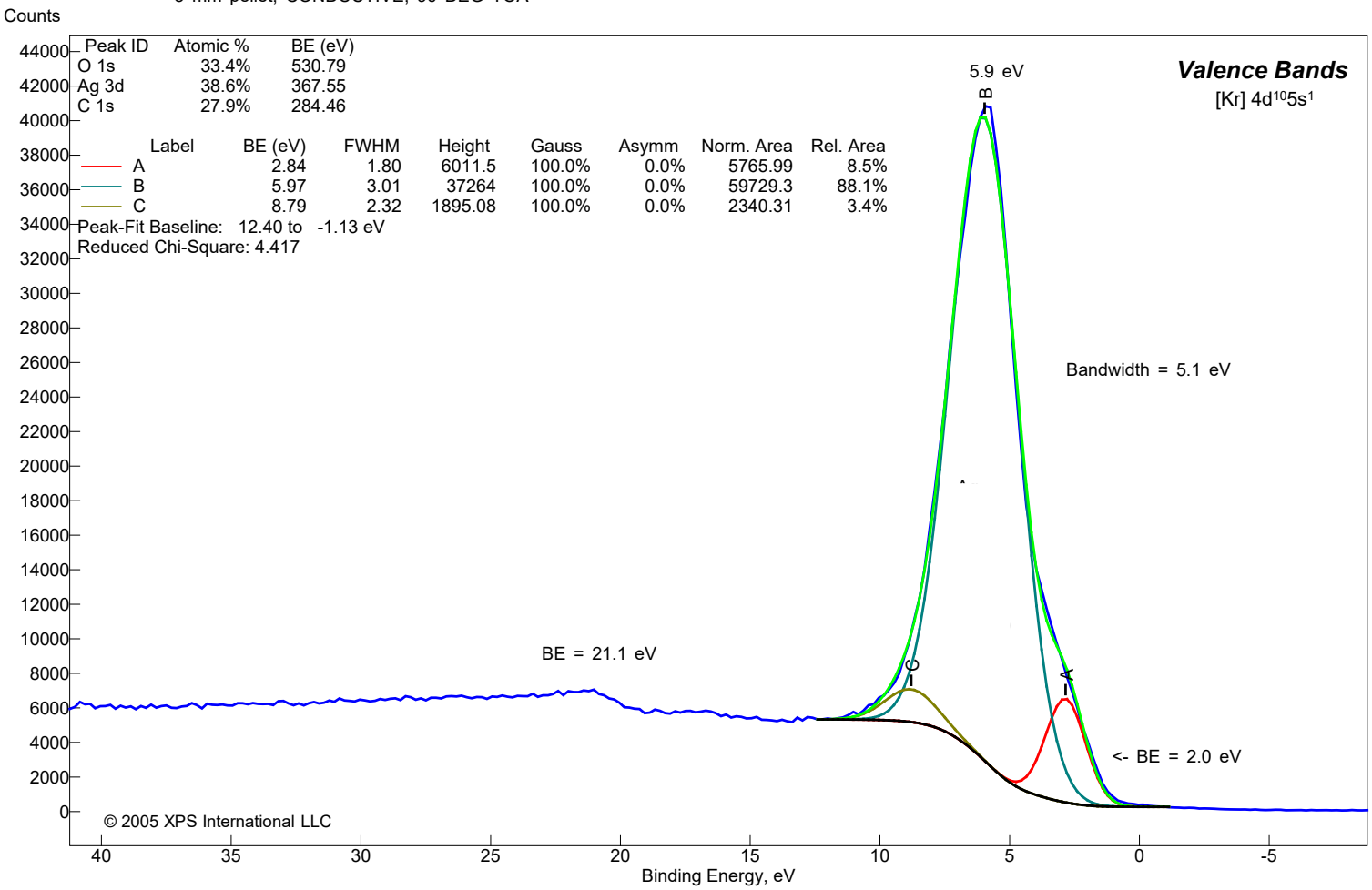


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AgO

Silver (II) Oxide (FW = 123.87)

Sample Description: AgO (99%) Aldrich lot# 00108JV (contaminated with Ag2O)
3 mm pellet, CONDUCTIVE, 90 DEG TOA

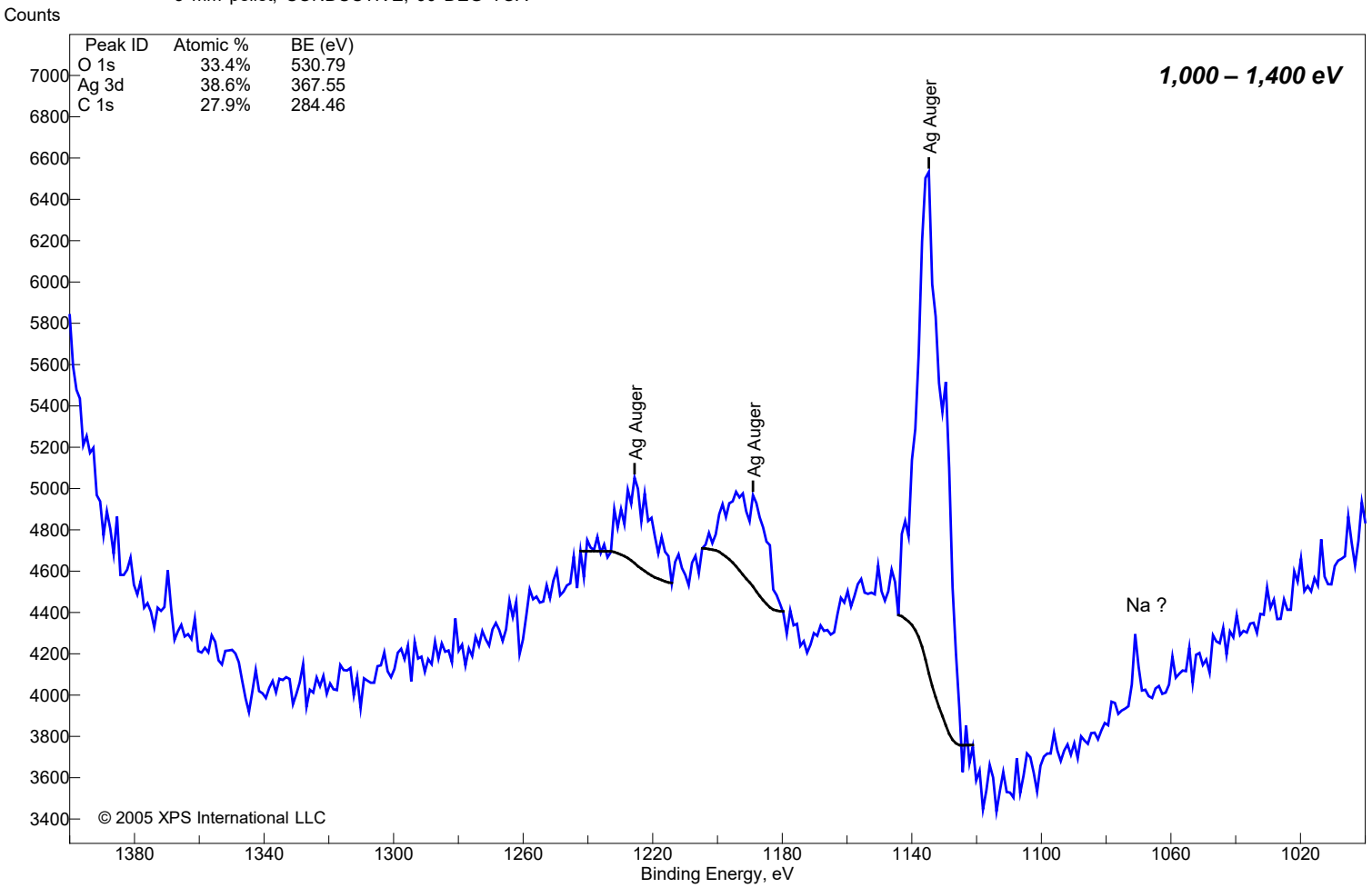


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AgO

Silver (II) Oxide (FW = 123.87)

Sample Description: AgO (99%) Aldrich lot# 00108JV (contaminated with Ag2O)
3 mm pellet, CONDUCTIVE, 90 DEG TOA

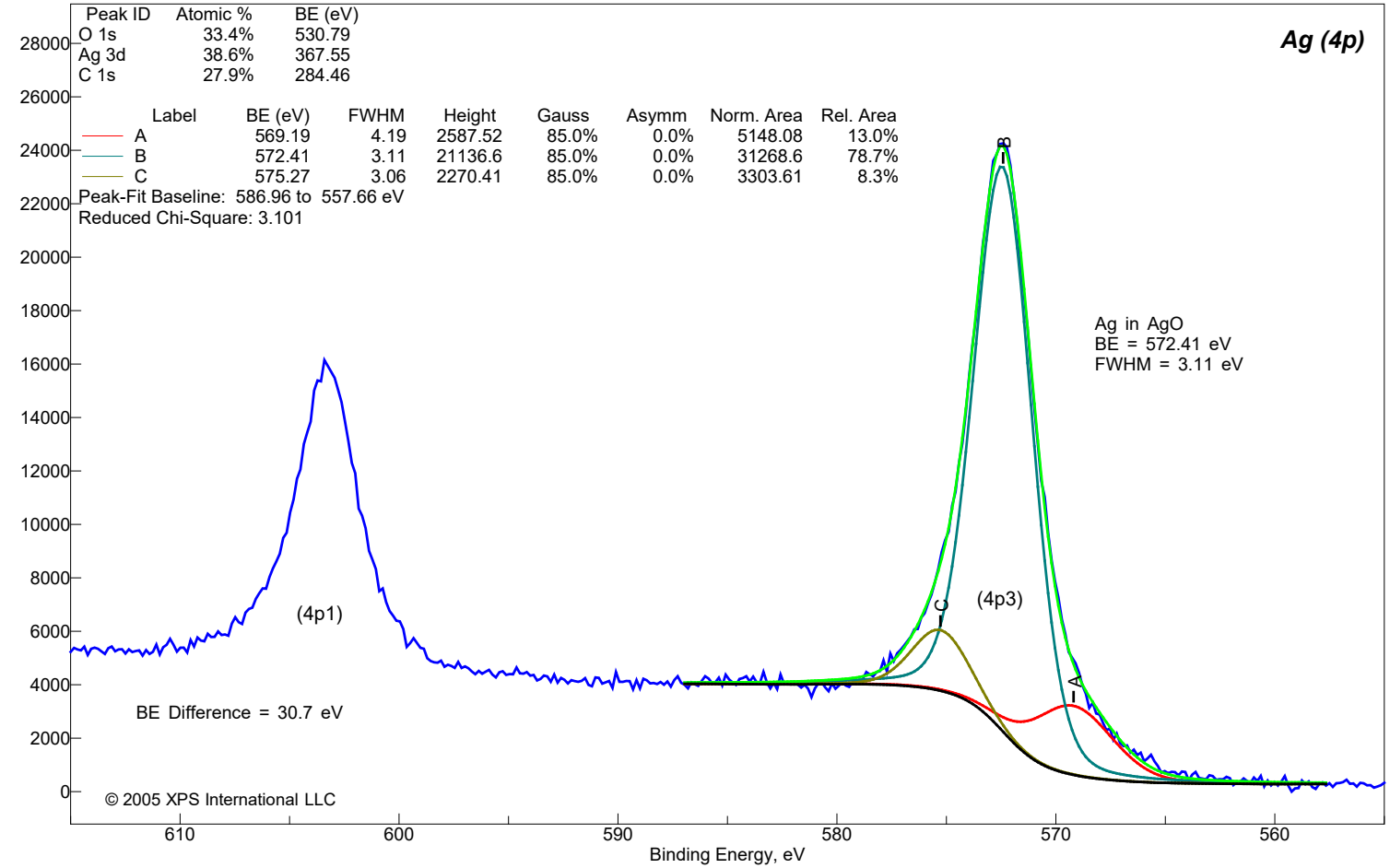


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AgO

Silver (II) Oxide (FW = 123.87)

Sample Description: AgO (99%) Aldrich lot# 00108JV (contaminated with Ag2O)
3 mm pellet, CONDUCTIVE, 90 DEG TOA



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Ag_2O

Silver (I) Oxide (FW = 231.74)
Surface Composition Table

Description: Ag_2O (99.99%) from Aldrich Lot# 00105CV, analyzed at 35 deg TOA, mesh at 1mm, conductive black powder pressed into 5 mm pellet, mp 230, d. 7.14, sol in dil. HNO_3 and ammonia

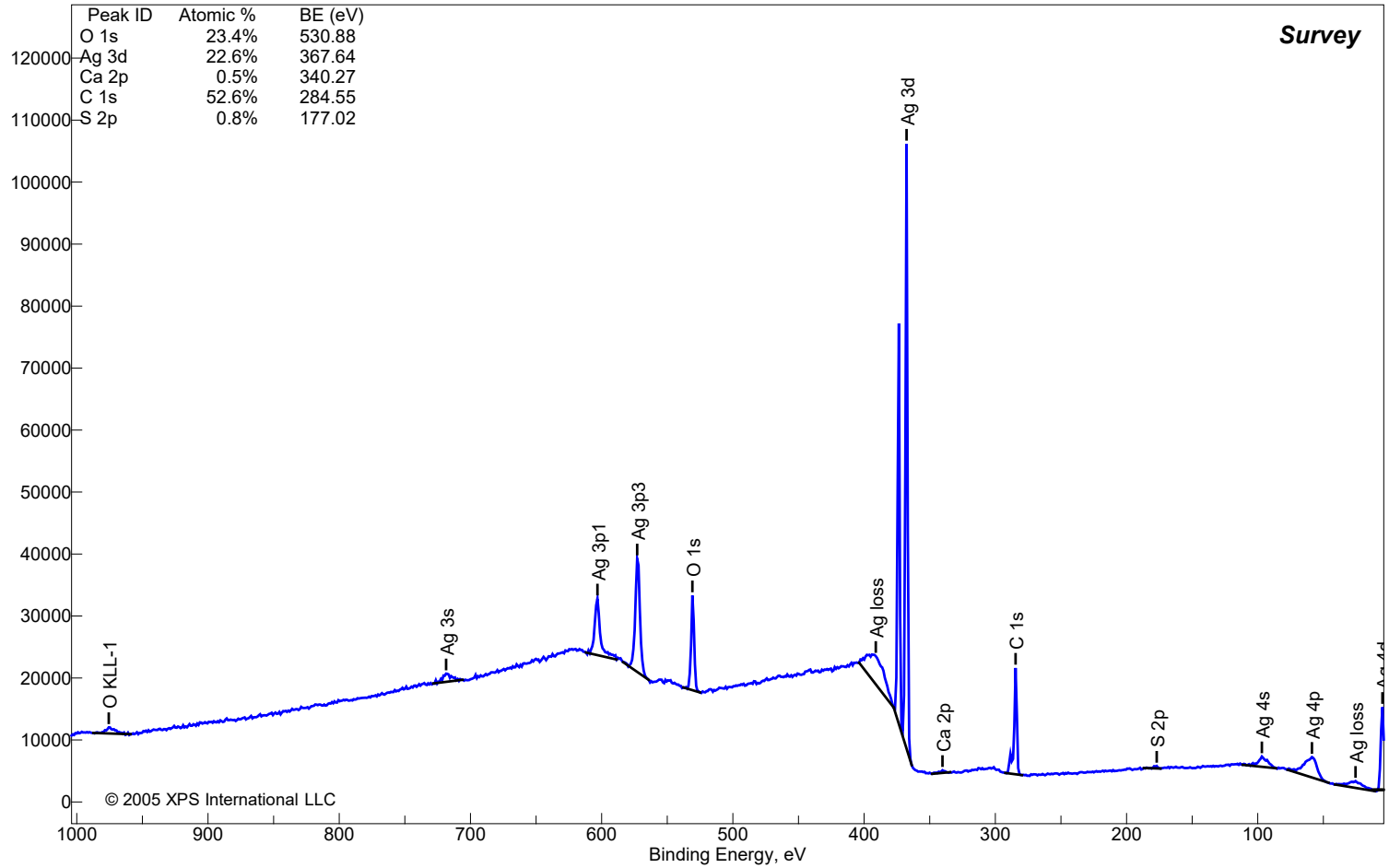
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Ag 4d	5.6	5.0	1.55	1.4	5580.7	
Ag loss	26.1	25.5	0.15	1.4	2430.6	
Ag 4p	59.3	58.7	1.36	1.4	6388.2	
Ag 4s	97.5	96.9	0.64	1.4	2398.0	
S 2p	177.6	177.0	1.68	1.4	210.5	0.8%
C 1s	285.1	284.5	1.00	1.4	7338.6	52.6%
Ca 2p	340.9	340.3	5.07	1.4	337.9	0.5%
Ag 3d	368.2	367.6	18.00	1.4	51467.1	22.6%
Ag loss	391.7	391.1	0.00	1.4	11949.7	
O 1s	531.6	530.9	2.93	1.4	6937.9	23.4%
Ag 3p3	573.5	572.9	8.06	1.4	13040.6	
Ag 3p1	603.8	603.2	4.03	1.4	7758.5	
Ag 3s	719.2	718.6	2.93	1.4	1785.8	
O KLL-1	976.3	975.7	0.70	1.4	1379.4	

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Ag_2O

Silver (I) Oxide (FW = 231.74)

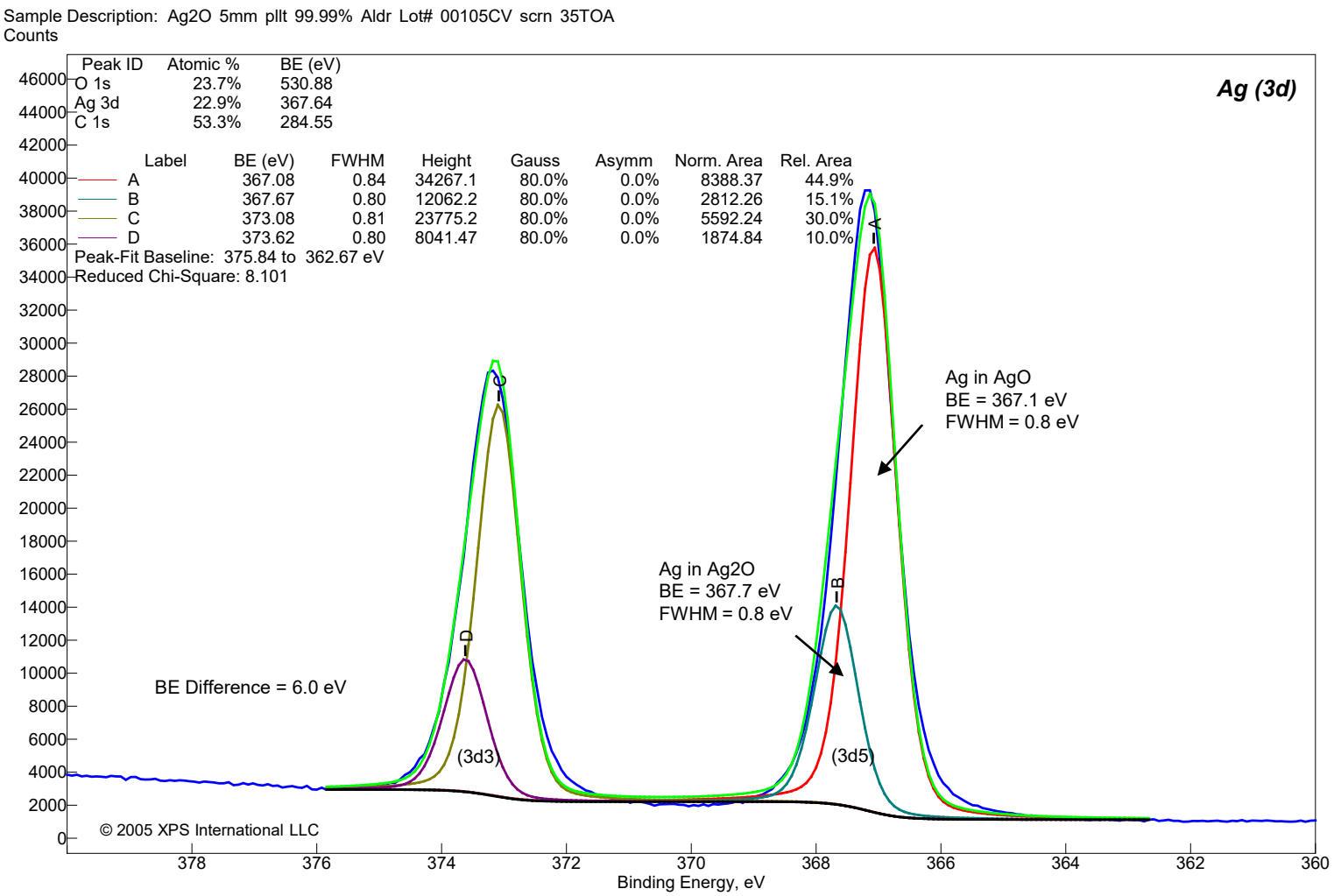
Sample Description: Ag2O (99.99%) from Aldrich Lot# 00105CV
pressed into 5 mm pellet, analyzed at 35 deg TOA, mesh-screen at 1 mm height



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Ag_2O

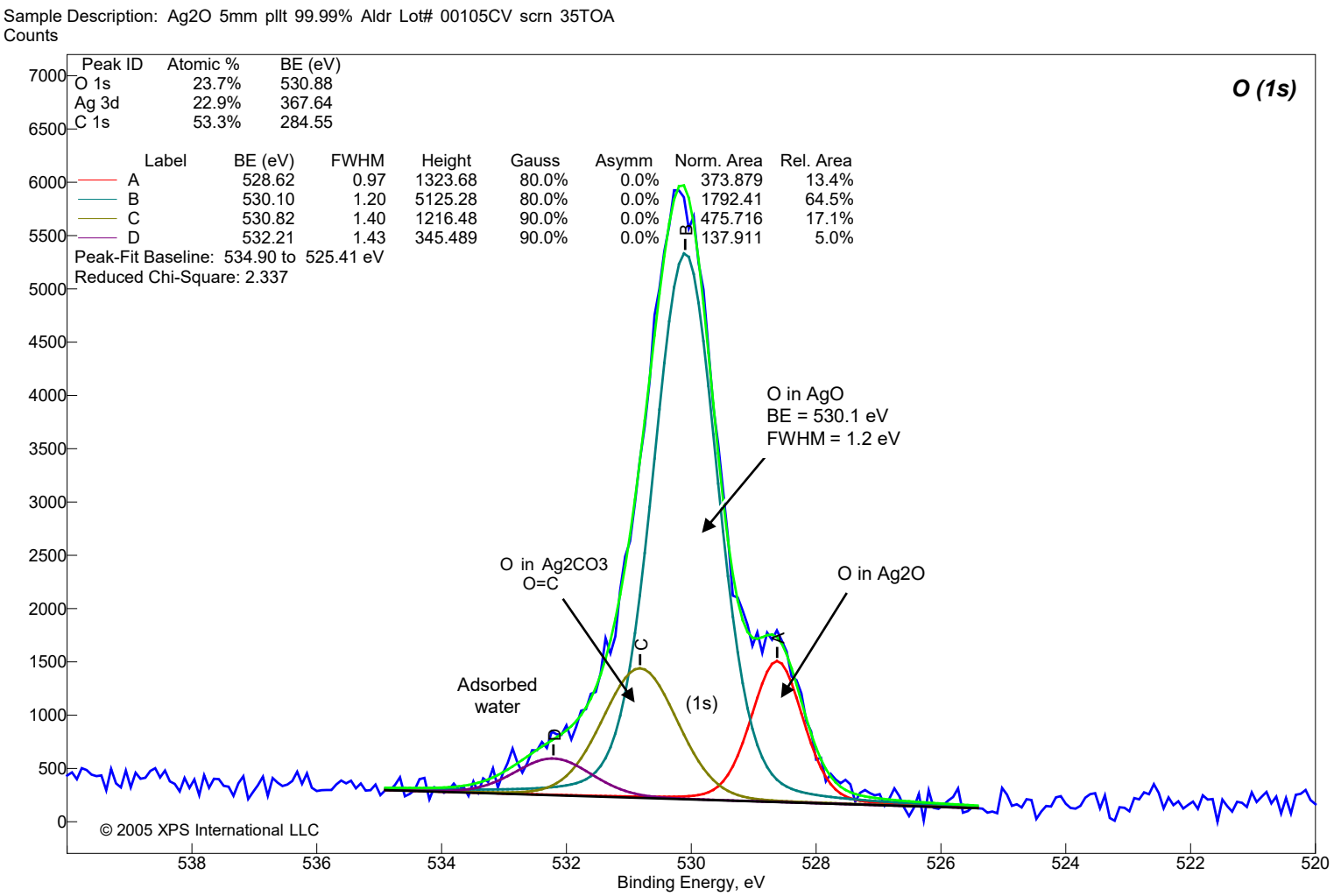
Silver (I) Oxide (FW = 231.74)



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Ag_2O

Silver (I) Oxide (FW = 231.74)

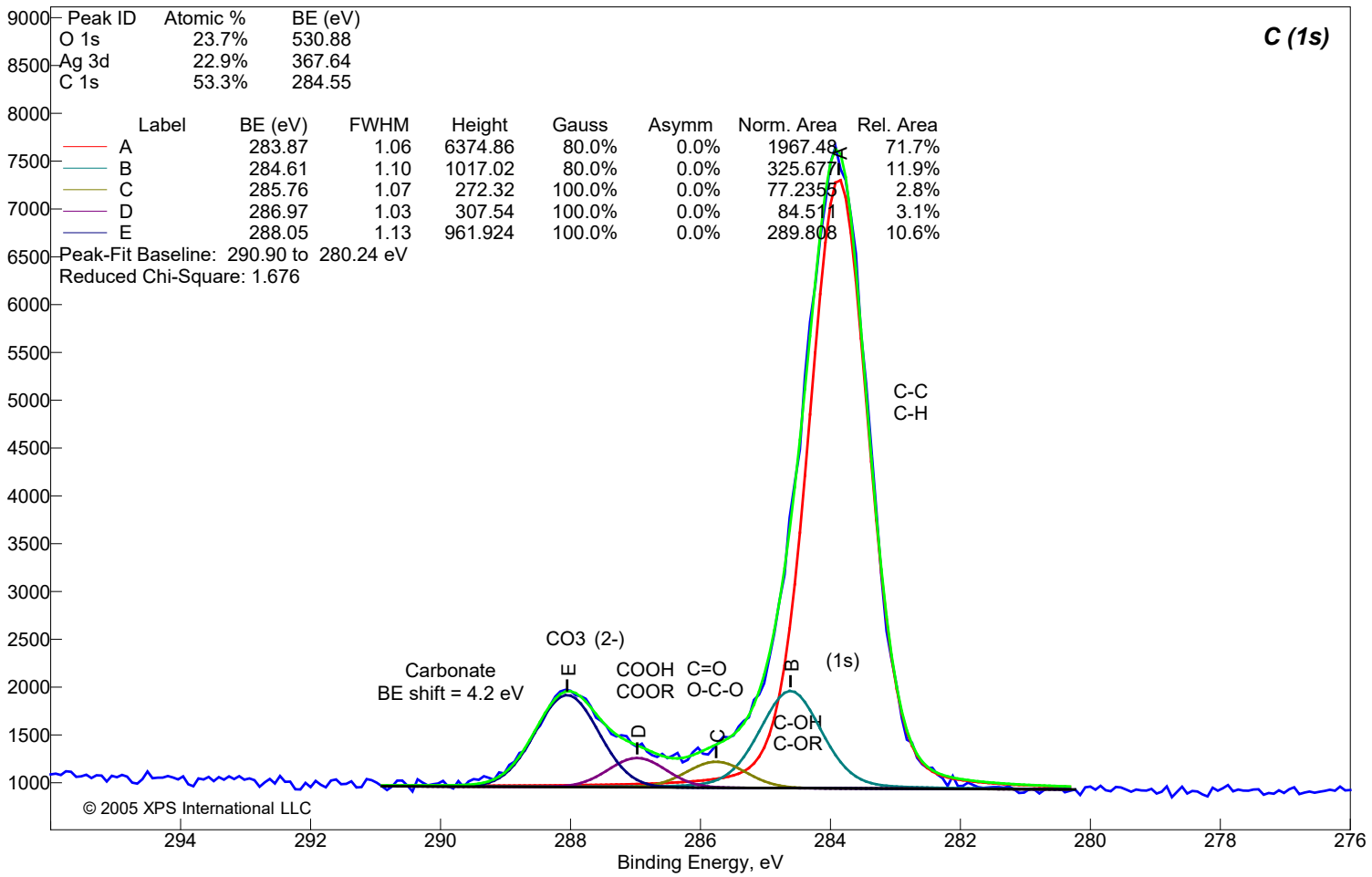


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Ag_2O

Silver (I) Oxide (FW = 231.74)

Sample Description: Ag2O 5mm pllt 99.99% Aldr Lot# 00105CV scrn 35TOA

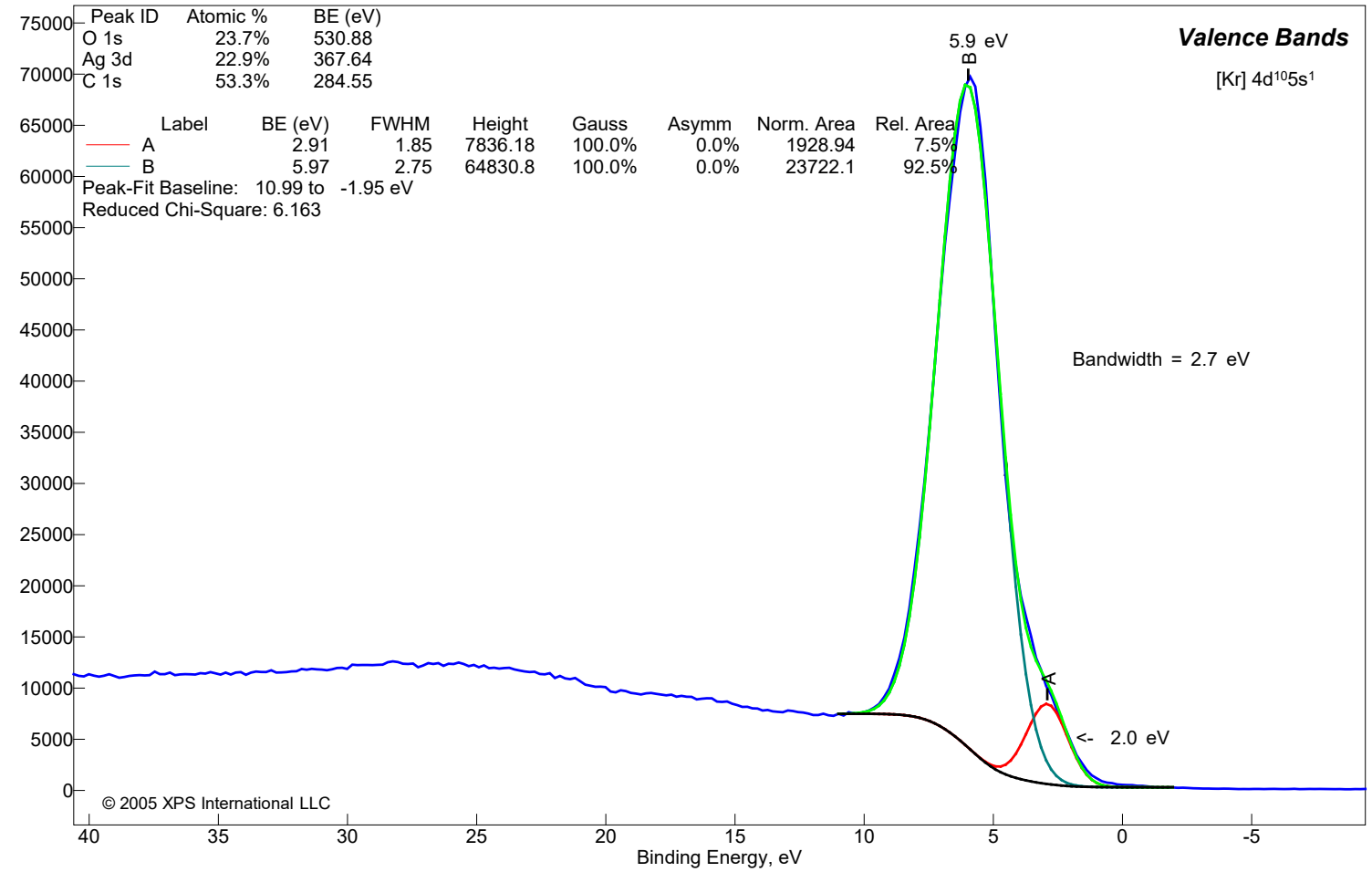


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Ag_2O

Silver (I) Oxide (FW = 231.74)

Sample Description: Ag2O 5mm pllt 99.99% Aldr Lot# 00105CV scrn 35TOA



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Al_2O_3

Aluminum (III) Oxide (FW = 101.96)
Surface Composition Table

Description: Al_2O_3 (99%), analyzed at 90 deg TOA, mesh at 1mm, non-conductive fused into clear glass 1 mm thick, mp 2040 C, d 3.97

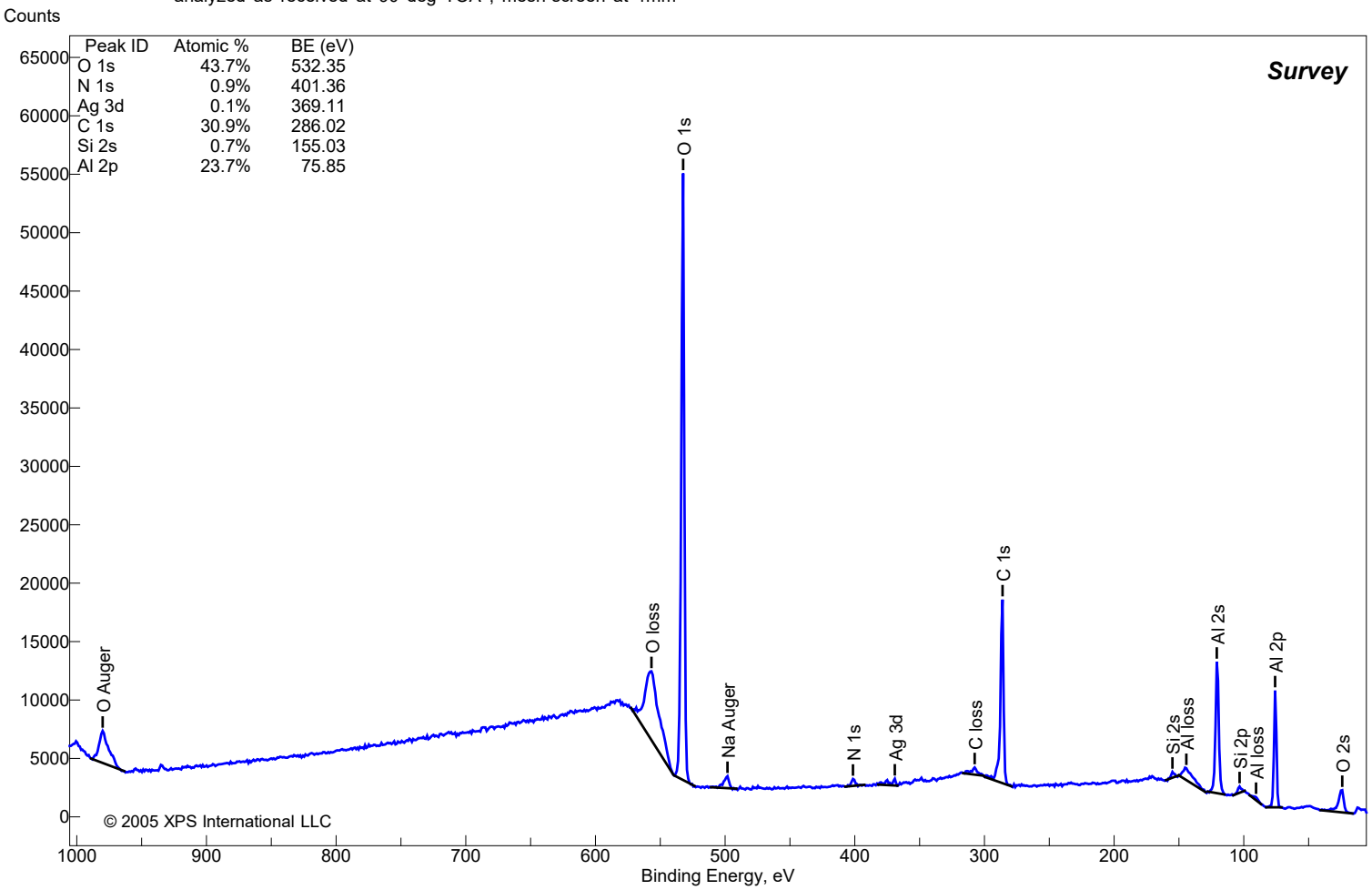
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	24.0	19.9	0.14	1.2	12,578	
Al 2p	75.9	71.8	0.54	1.2	28,737	23.7%
Al loss	90.5	86.4	0.00	1.5	1,485	
Si 2p	103.2	99.1	0.82	1.5	2,122	
Al 2s	120.8	116.7	0.75	1.2	42,744	
Al loss	144.3	140.2	0.00	1.2	11,965	
Si 2s	155.0	150.9	0.96	1.2	1,481	0.7%
C 1s	286.0	281.9	1.00	1.2	57,477	30.9%
C loss	307.5	303.4	0.00	1.2	4,508	
Ag 3d	369.1	365.0	18.04	1.2	4,186	0.1%
N 1s	401.4	397.3	1.80	1.2	2,528	0.9%
Na Auger	498.1	494.0	3.40	1.2	6,270	
O 1s	532.4	528.3	2.93	1.2	180,659	43.7%
O loss	556.8	552.7	0.00	1.2	95,458	
O Auger	980.1	976.0	0.00	1.2	29,773	

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Al_2O_3

Aluminum (III) Oxide (FW = 101.96)

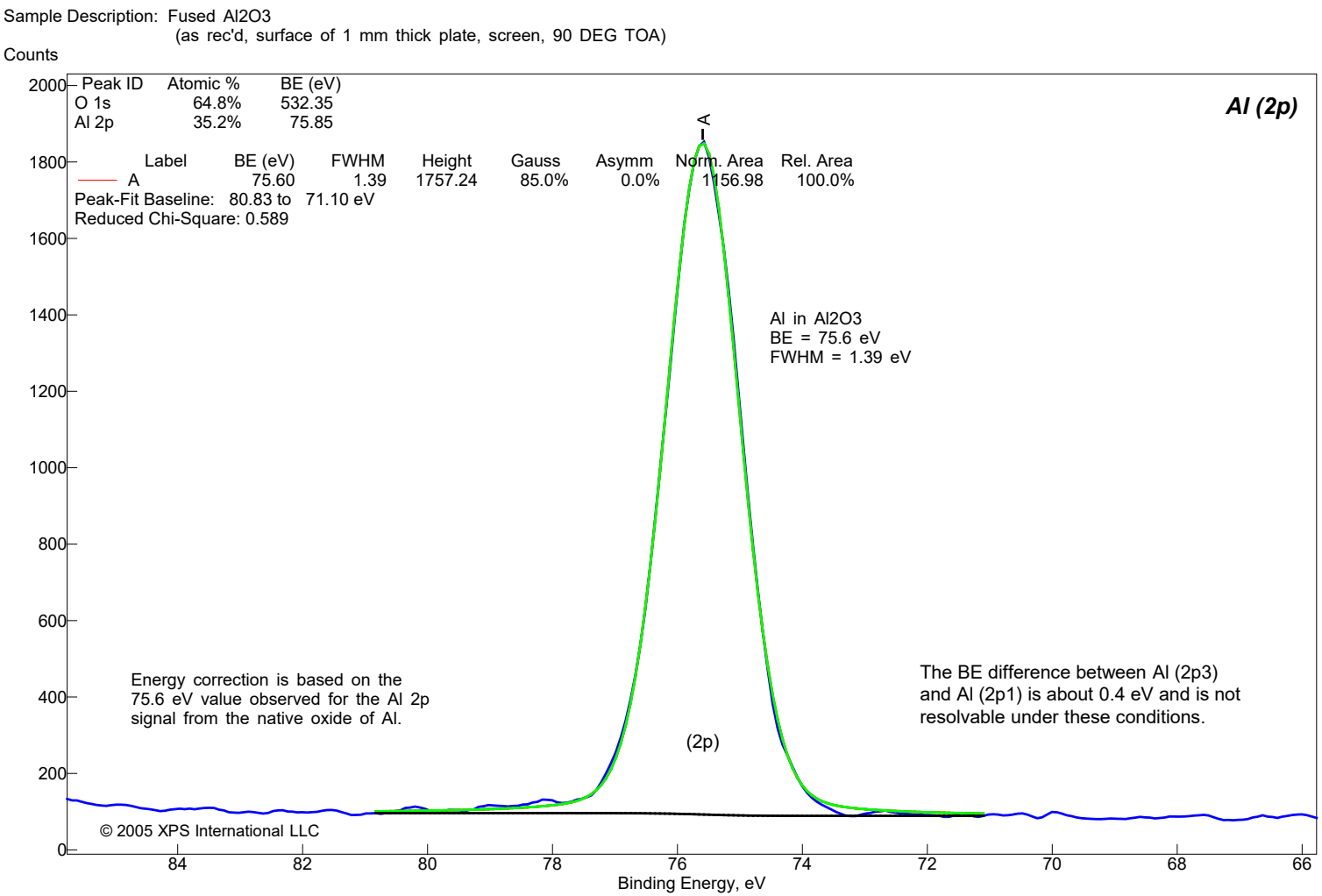
Sample Description: Al2O3 (99%) fused into glass 1mm thick
analyzed as received at 90 deg TOA , mesh-screen at 1mm



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Al_2O_3

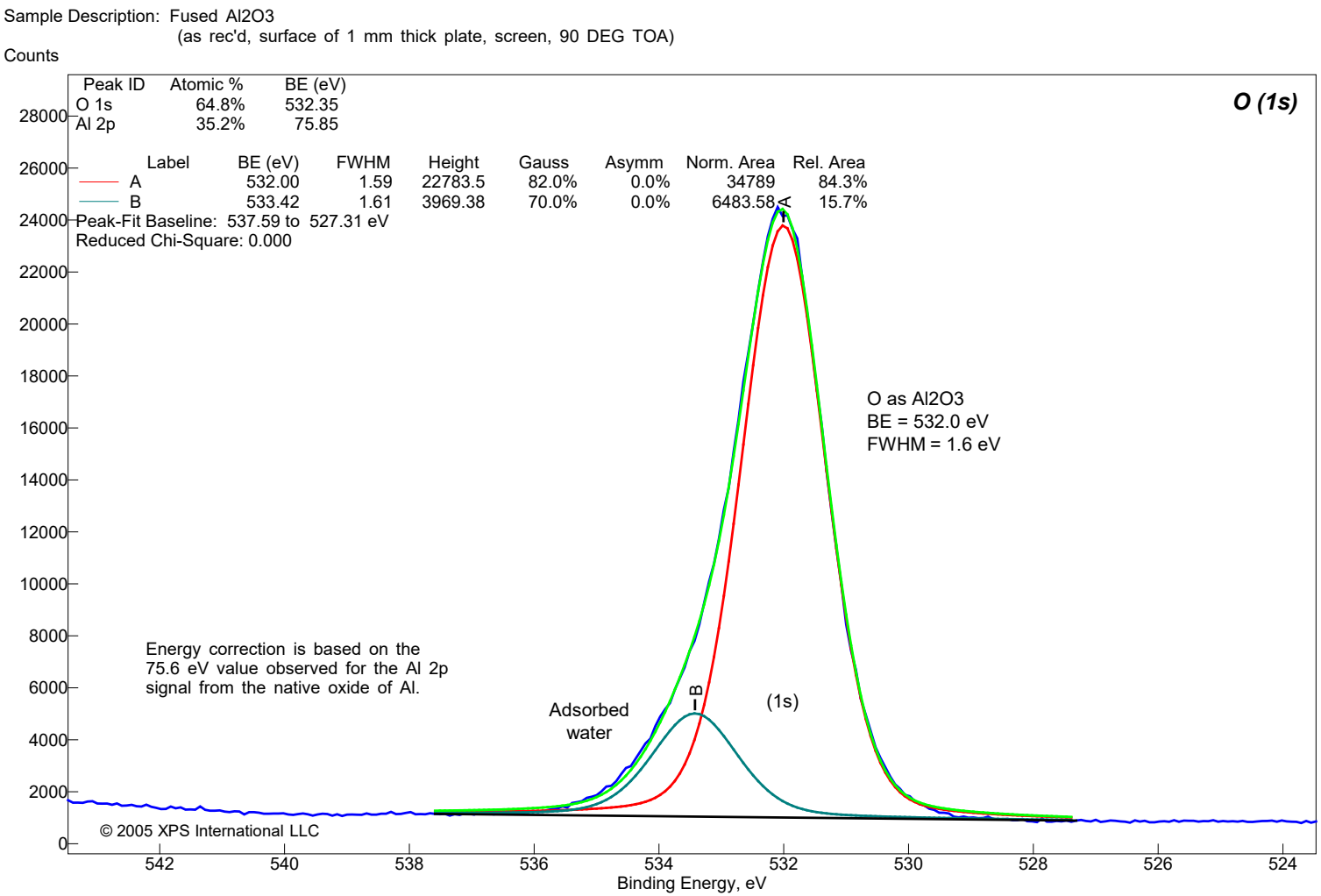
Aluminum (III) Oxide (FW = 101.96)



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Al_2O_3

Aluminum (III) Oxide (FW = 101.96)

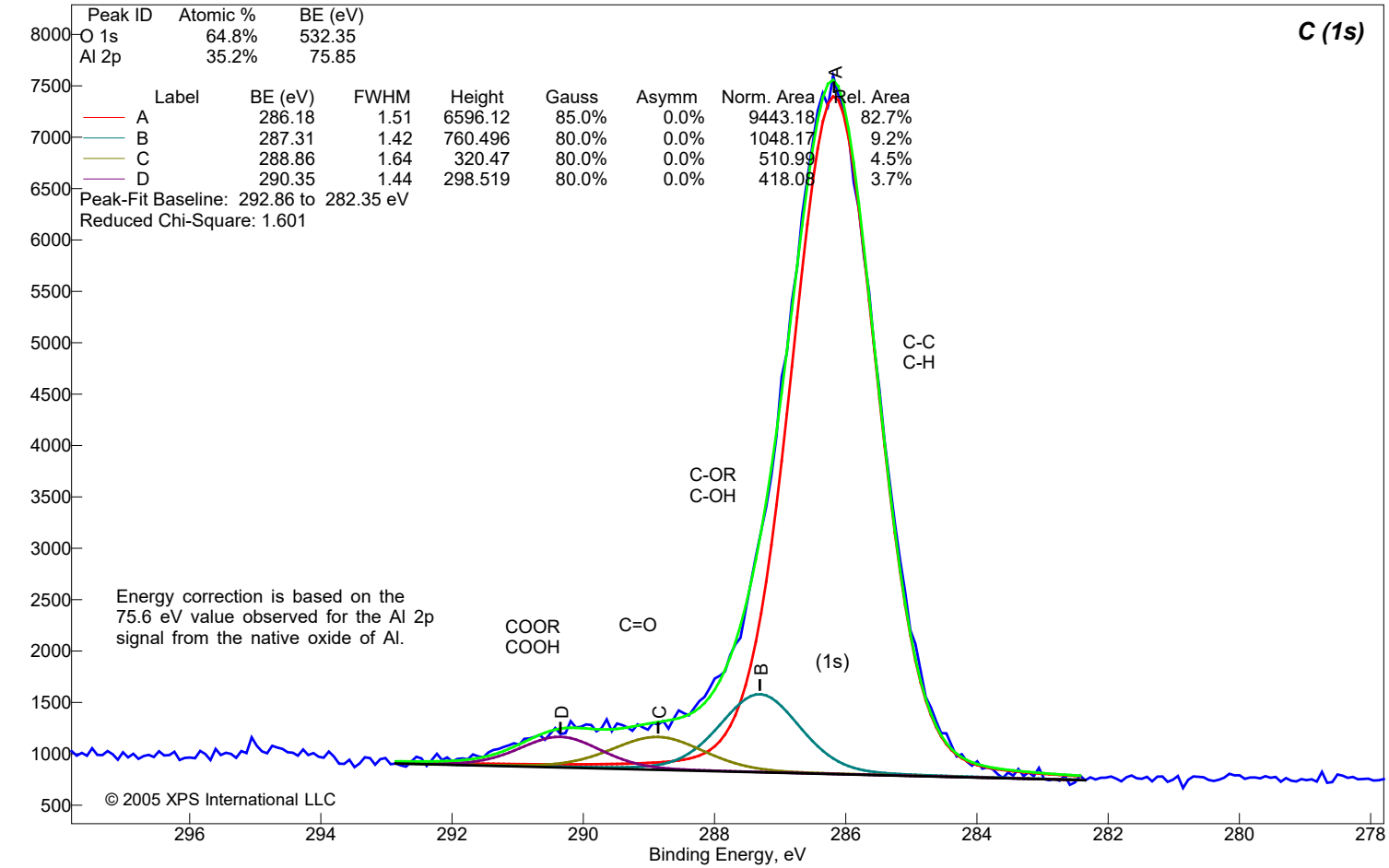


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Al_2O_3

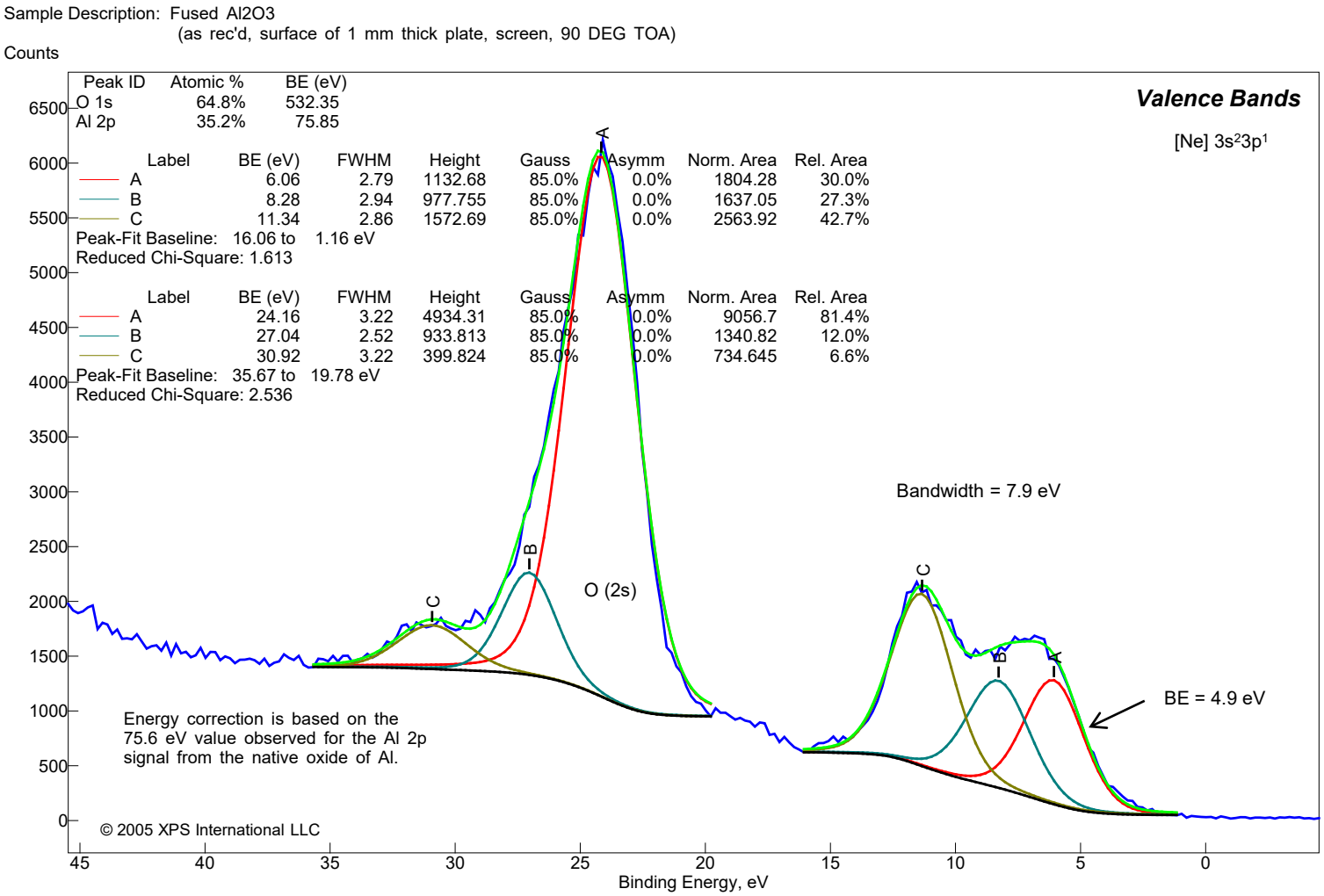
Aluminum (III) Oxide (FW = 101.96)

Sample Description: Fused Al2O3
(as rec'd, surface of 1 mm thick plate, screen, 90 DEG TOA)



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Aluminum (III) Oxide (FW = 101.96)

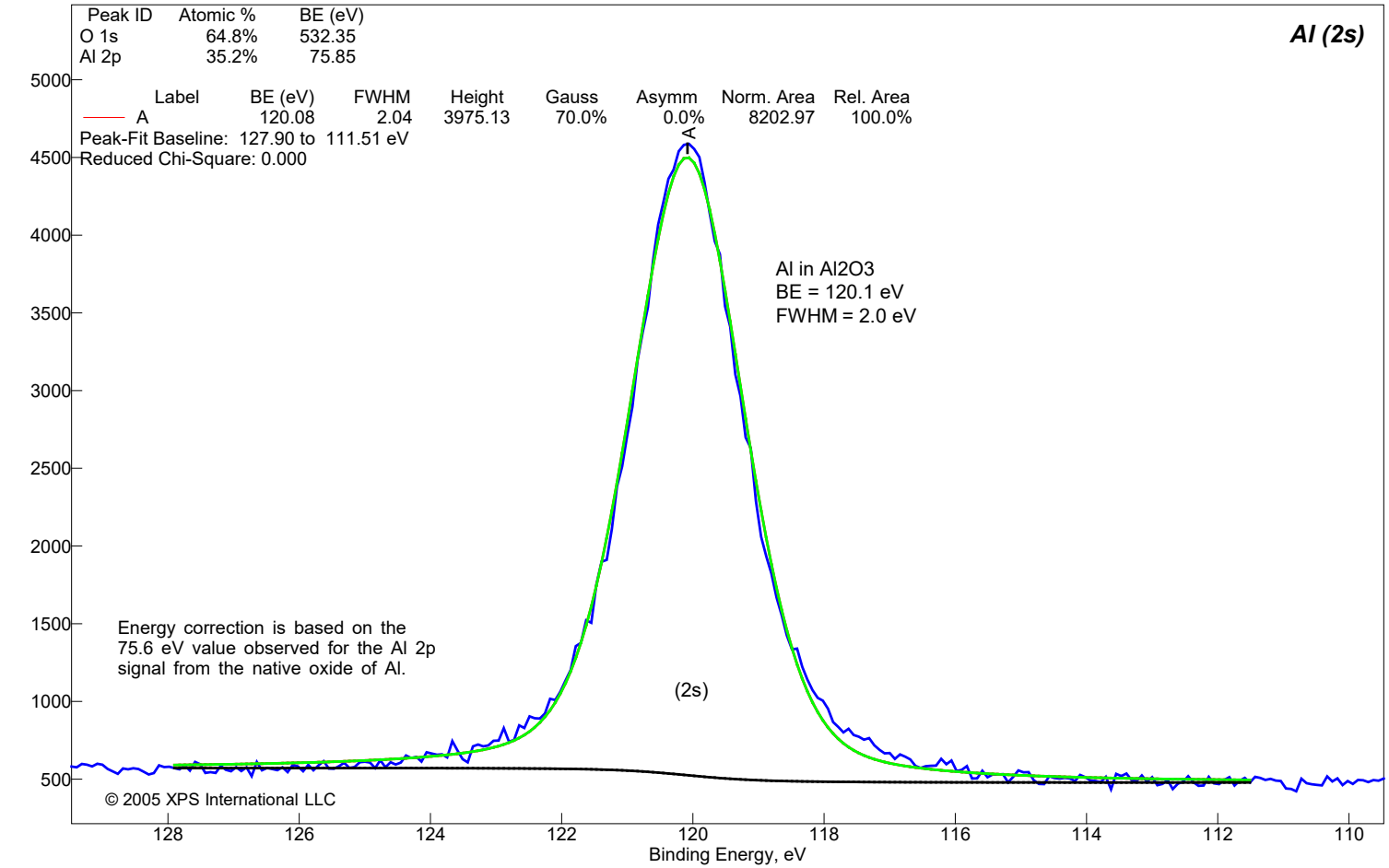


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Al_2O_3

Aluminum (III) Oxide (FW = 101.96)

Sample Description: Fused Al2O3
(as rec'd, surface of 1 mm thick plate, screen, 90 DEG TOA)



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$Al(OH)_3$

Aluminum (III) Hydroxide (FW = 78.00)
Surface Composition Table

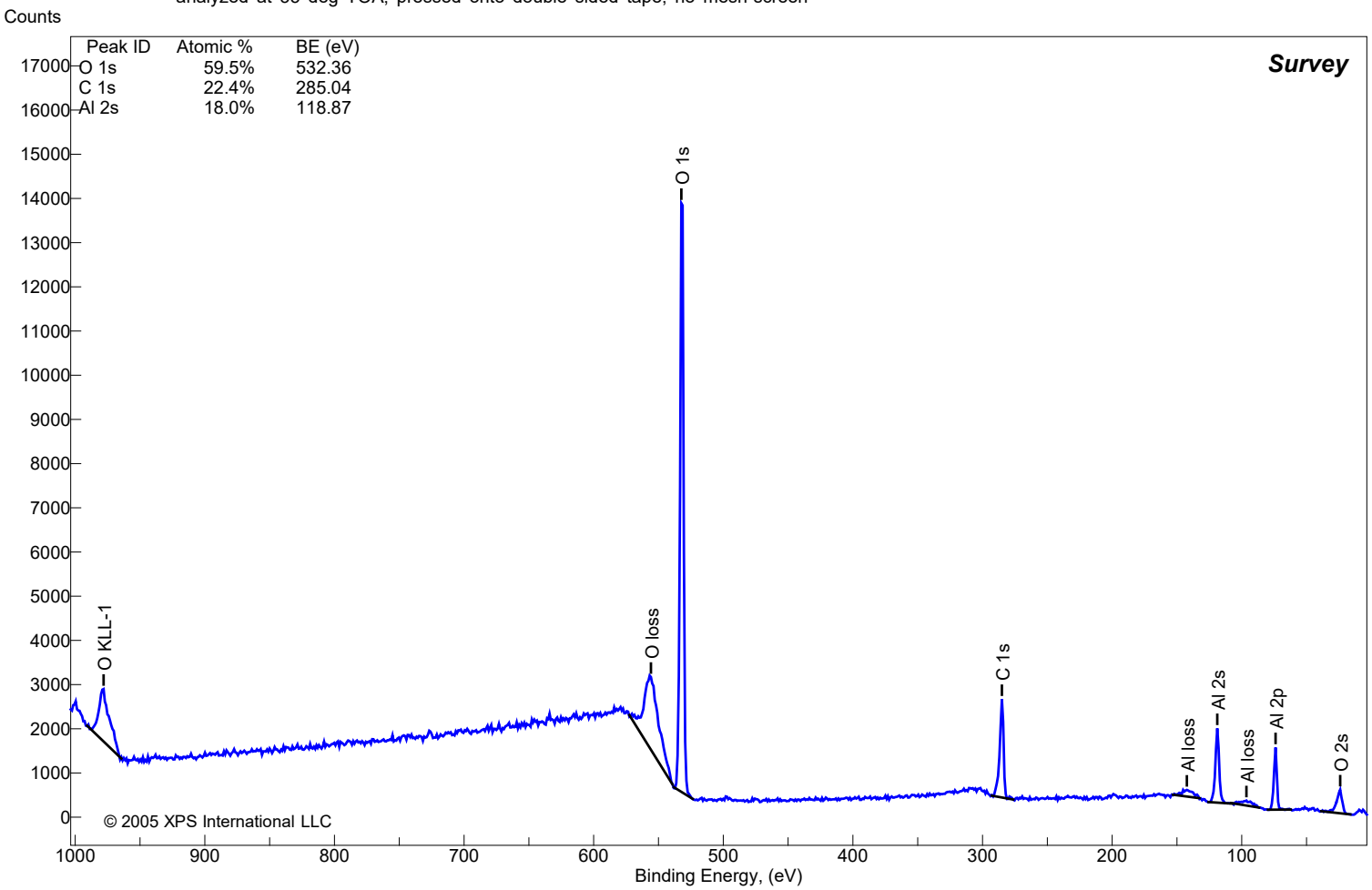
Description: $Al(OH)_3$ (Tech.) from Perfect Parts Chem. Co., analyzed at 35 deg TOA, no mesh, non-conductive white powder pressed onto double sided tape, dec to Al2O3 >300 C, sol in aq. alkaline soln, HCl, H_2SO_4

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	24.0	20.2	0.14	0.6	3,409	
Al 2p	73.9	70.1	0.54	0.6	4,885	
Al loss	96.4	92.6	0.00	0.6	1,419	
Al 2s	118.9	115.1	0.75	1.5	7,230	18.0%
Al loss	142.3	138.5	0.00	0.6	2,350	
C 1s	285.0	281.2	1.00	1.5	9,833	22.4%
O 1s	532.4	528.6	2.93	1.5	54,136	59.5%
O loss	555.8	552.0	0.00	0.6	28,217	
O KLL-1	978.1	974.3	0.70	0.6	13,859	

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Aluminum (III) Hydroxide (FW = 78.00)

Sample Description: Al(OH)3 (Tech. Grade) from Perfect Parts Chemical Co.
analyzed at 35 deg TOA, pressed onto double sided tape, no mesh-screen

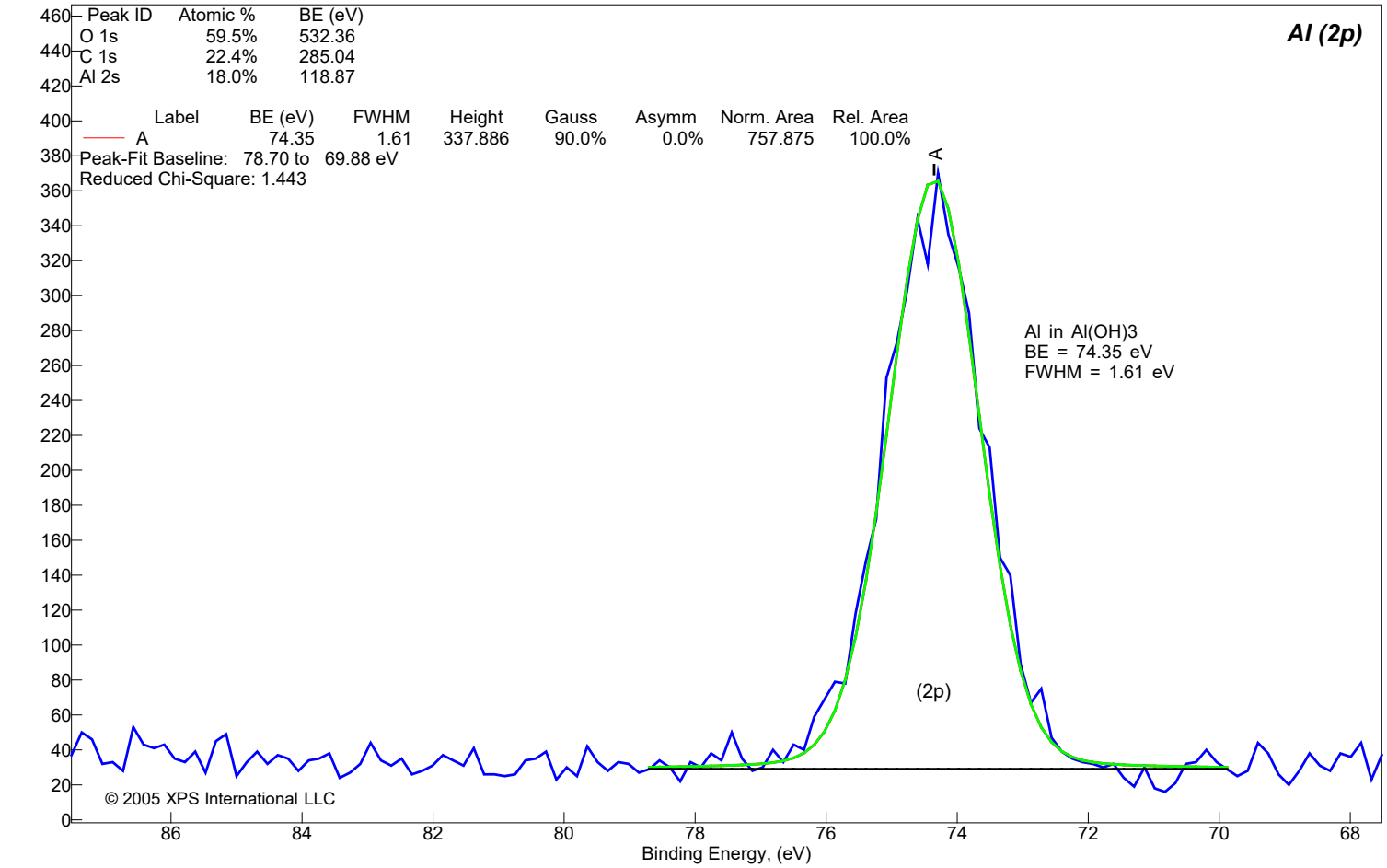


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$Al(OH)_3$

Aluminum (III) Hydroxide (FW = 78.00)

Sample Description: ALUMINUM HYDROXIDE (Al(OH)3) powder/tape (no mesh)
TECHNICAL GRADE, PERFECT PARTS CHEMICAL CO.

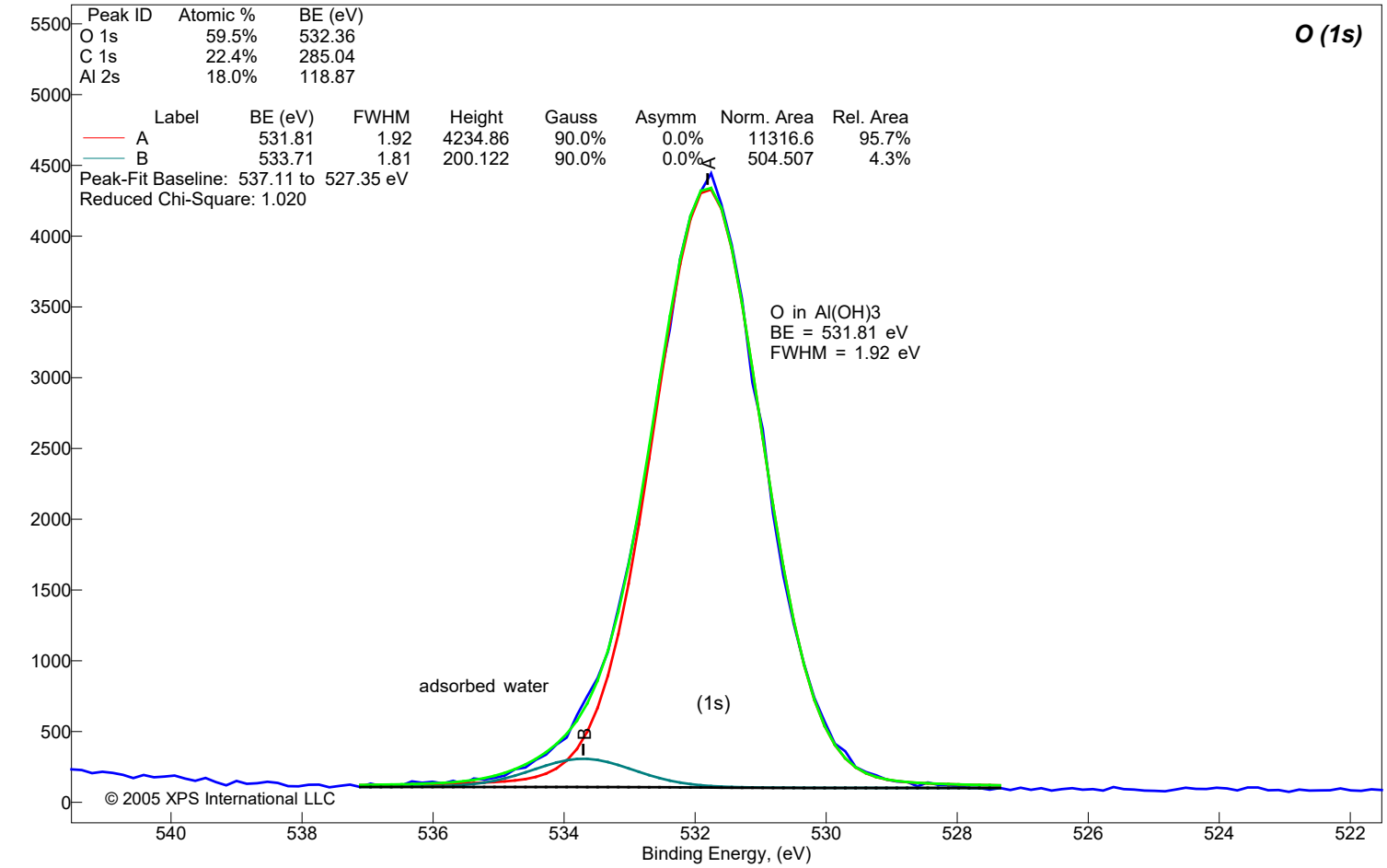


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$Al(OH)_3$

Aluminum (III) Hydroxide (FW = 78.00)

Sample Description: ALUMINUM HYDROXIDE (Al(OH)3) powder/tape (no mesh)
TECHNICAL GRADE, PERFECT PARTS CHEMICAL CO.

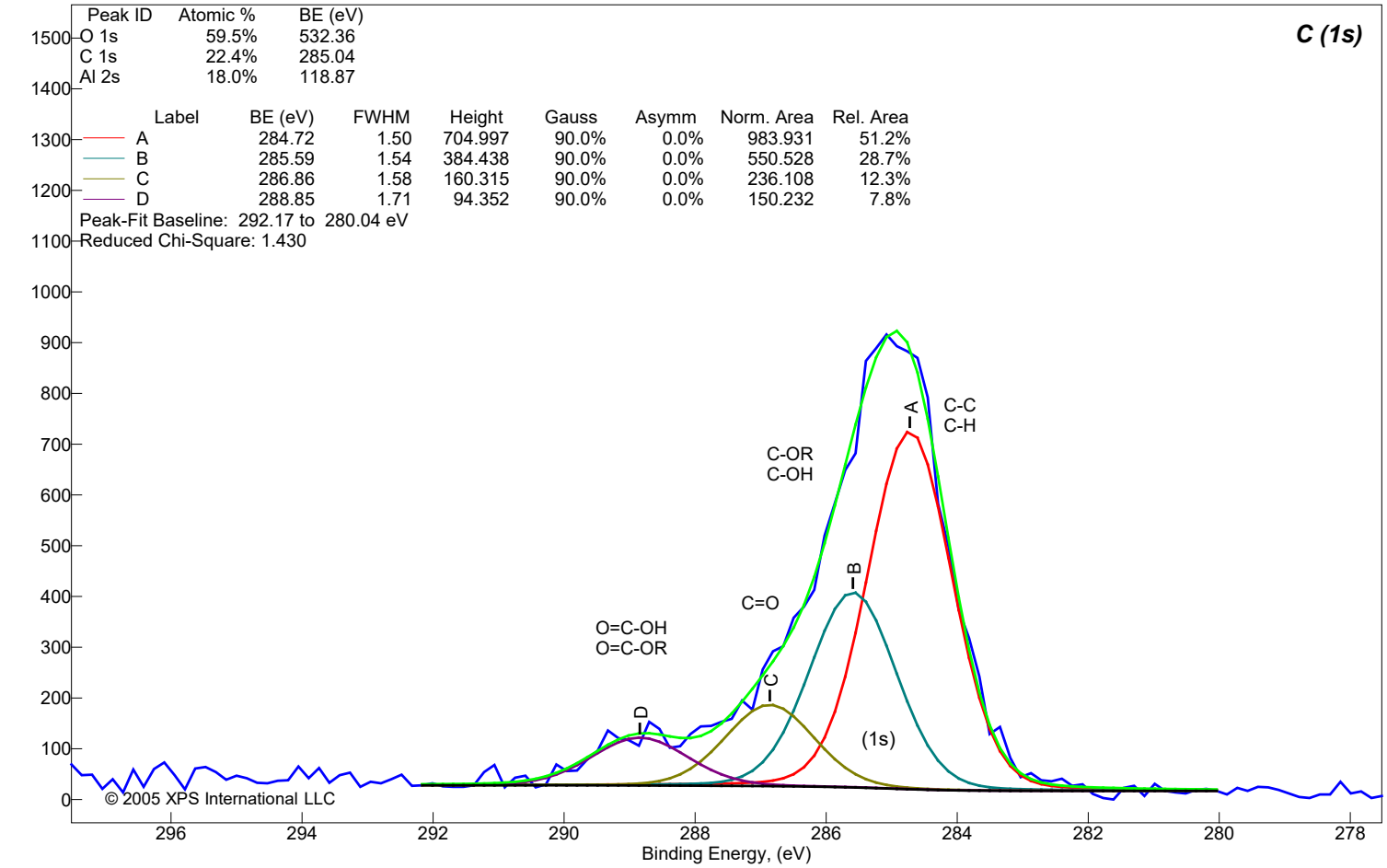


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$Al(OH)_3$

Aluminum (III) Hydroxide (FW = 78.00)

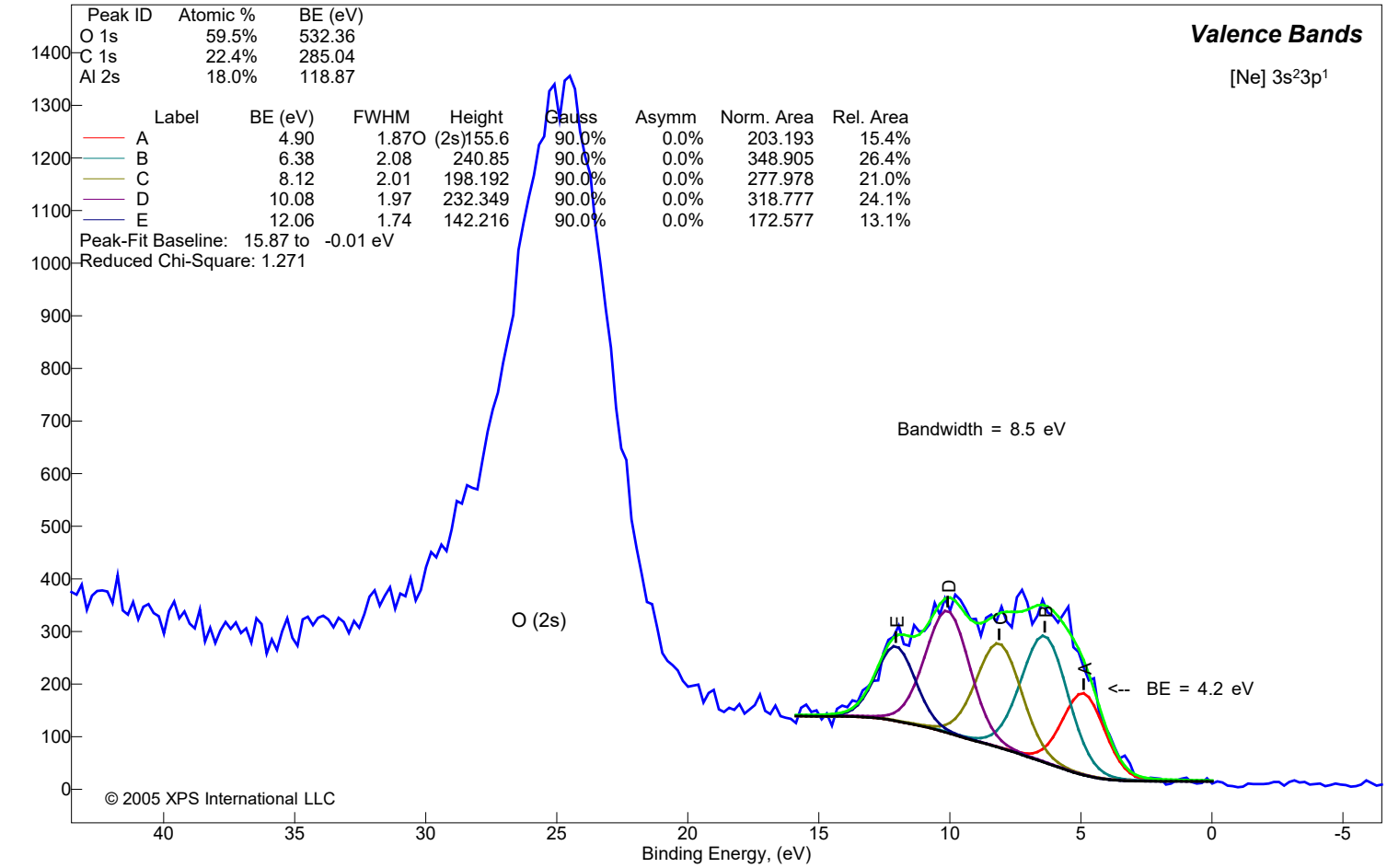
Sample Description: ALUMINUM HYDROXIDE (Al(OH)3) powder/tape (no mesh)
TECHNICAL GRADE, PERFECT PARTS CHEMICAL CO.



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Aluminum (III) Hydroxide (FW = 78.00)

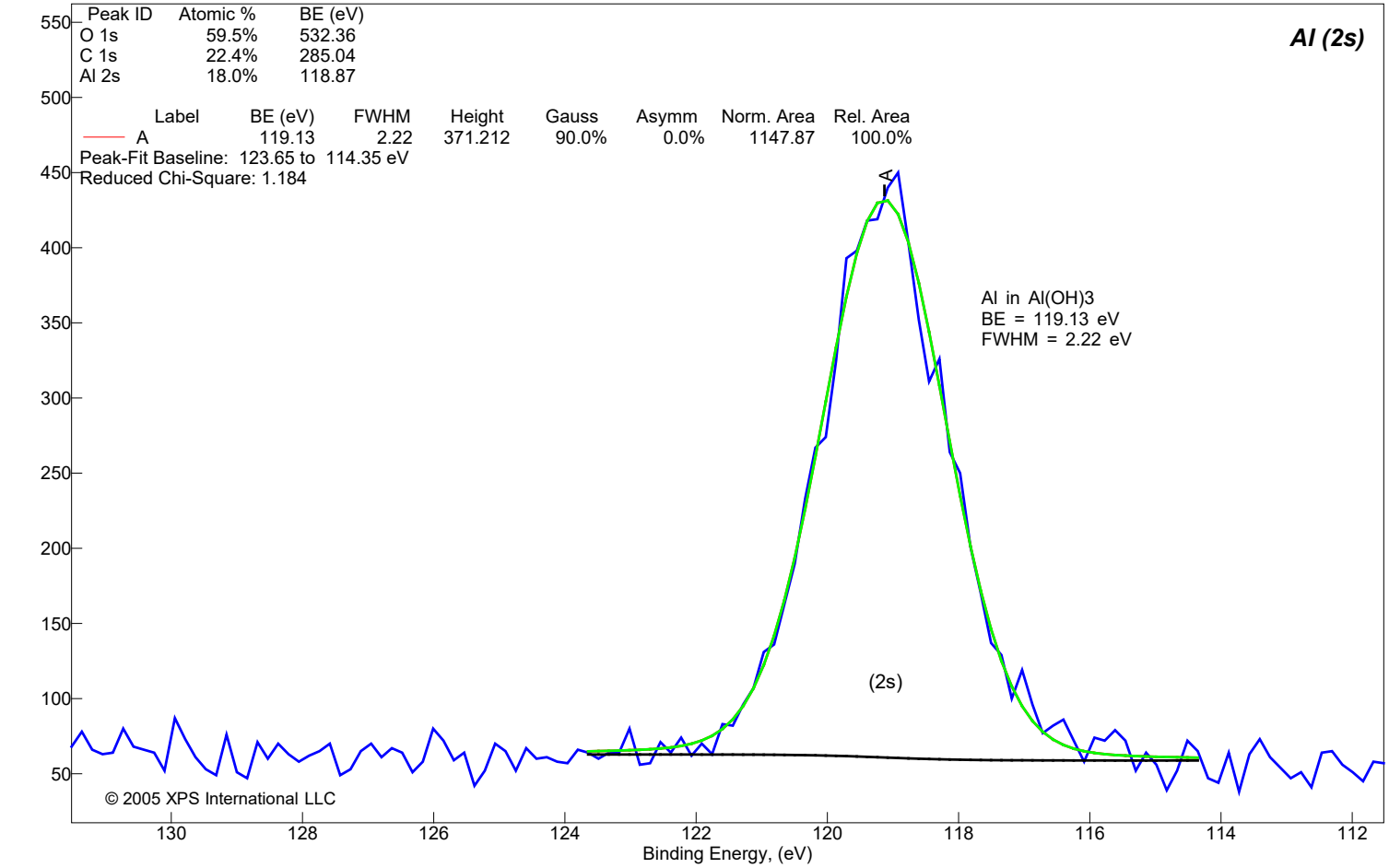
Sample Description: ALUMINUM HYDROXIDE (Al(OH)3) powder/tape (no mesh)
TECHNICAL GRADE, PERFECT PARTS CHEMICAL CO.



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Aluminum (III) Hydroxide (FW = 78.00)

Sample Description: ALUMINUM HYDROXIDE (Al(OH)3) powder/tape (no mesh)
TECHNICAL GRADE, PERFECT PARTS CHEMICAL CO.



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AlOOH
Diaspore

Aluminum (III) Oxy-hydroxide (FW = 59.99)
Surface Composition Table

Description: AlOOH (Diaspore, Al_2O_3-H_2O) a natural mineral, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white, freshly fractured in air

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
C 2s	24.2	24.2	0.15	1.4	2,945	
Al 2p	75.0	75.0	0.54	1.4	6,323	
Al KLL-1	99.4	99.4	0.22	1.4	2,556	
Al 2s	119.9	119.9	0.75	1.4	9,912	24.8%
Al loss	144.4	144.4	0.00	1.4	4,440	
C 1s	286.1	286.1	1.00	1.4	11,569	26.1%
C loss	303.7	303.7	0.00	1.4	1,695	
O 1s	532.5	532.5	2.93	1.4	46,298	49.1%
O loss	555.9	555.9	0.00	1.4	25,489	
O loss	581.3	581.3	0.00	1.4	1,853	
O KLL-1	979.2	979.2	0.70	1.4	6,850	

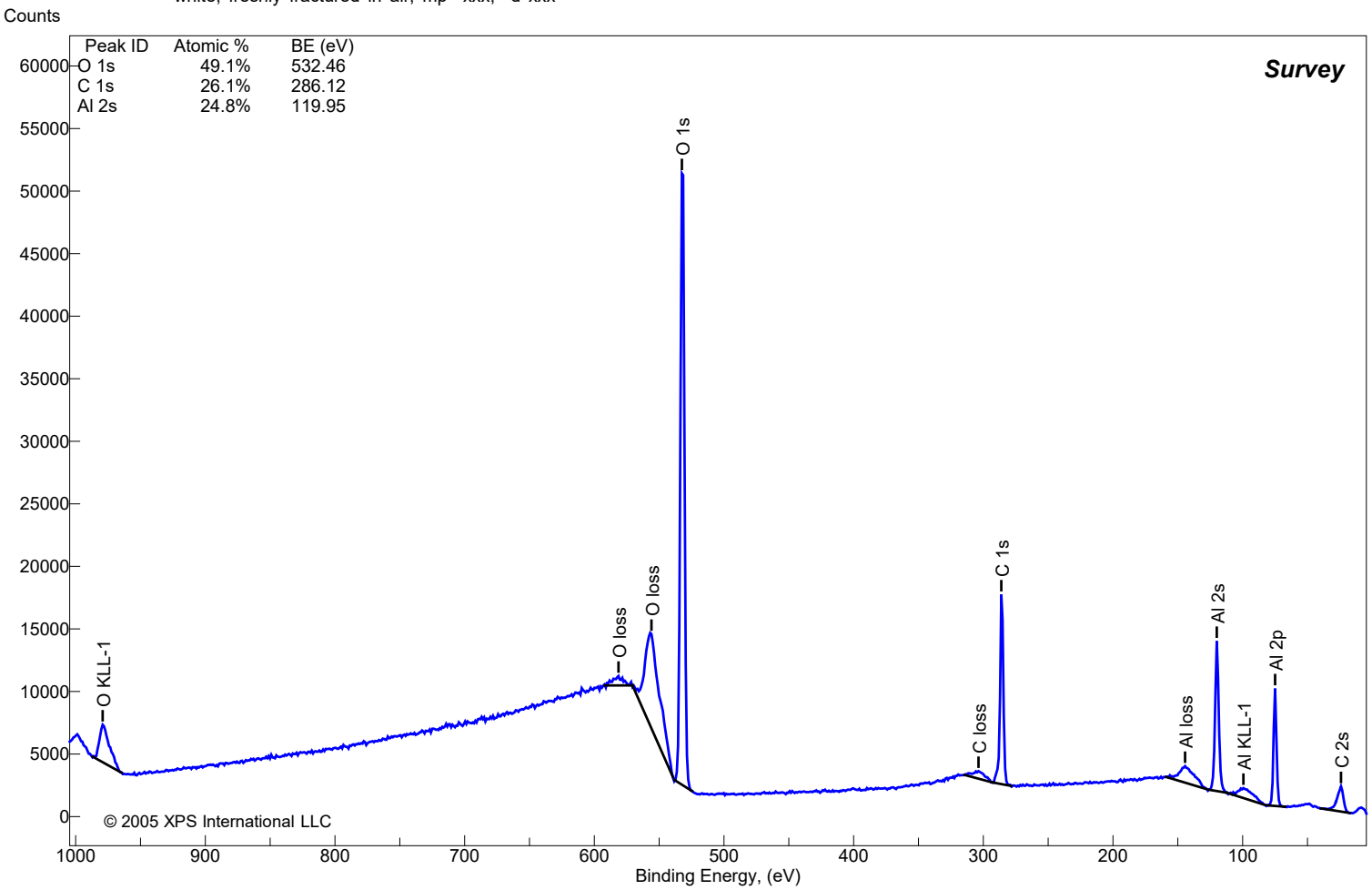
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AlOOH
Diaspore

Aluminum (III) Oxy-hydroxide (FW = 59.99)

Sample Description: AlOOH (Diaspore, Al2O3-H2O), analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white, freshly fractured in air, mp xxx, d xxx

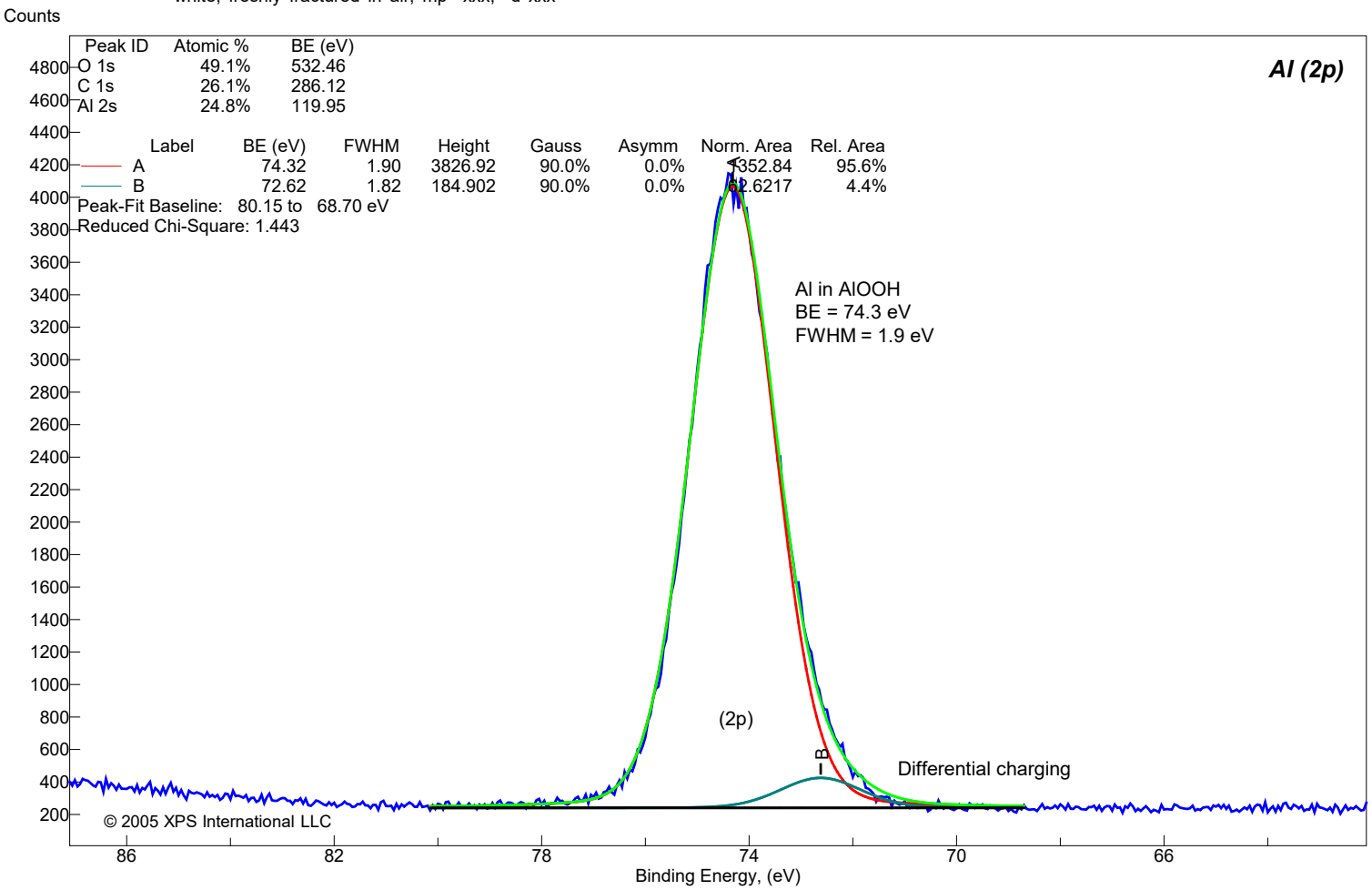


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AlOOH
Diaspore

Aluminum (III) Oxy-hydroxide (FW = 59.99)

Sample Description: AlOOH (Diaspore, Al2O3-H2O), analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white, freshly fractured in air, mp xxx, d xxx

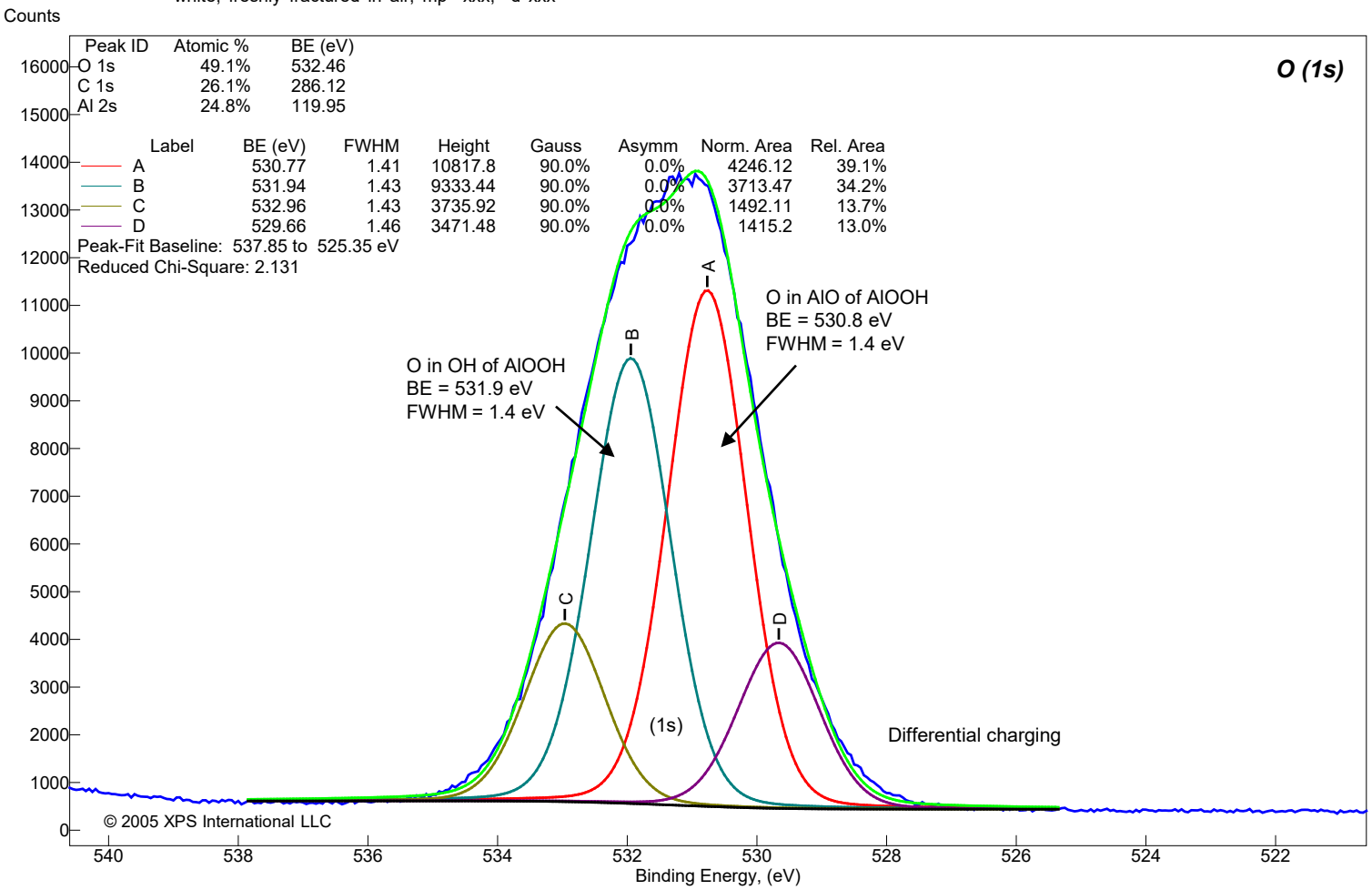


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AlOOH
Diaspore

Aluminum (III) Oxy-hydroxide (FW = 59.99)

Sample Description: AlOOH (Diaspore, Al2O3-H2O), analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white, freshly fractured in air, mp xxx, d xxx

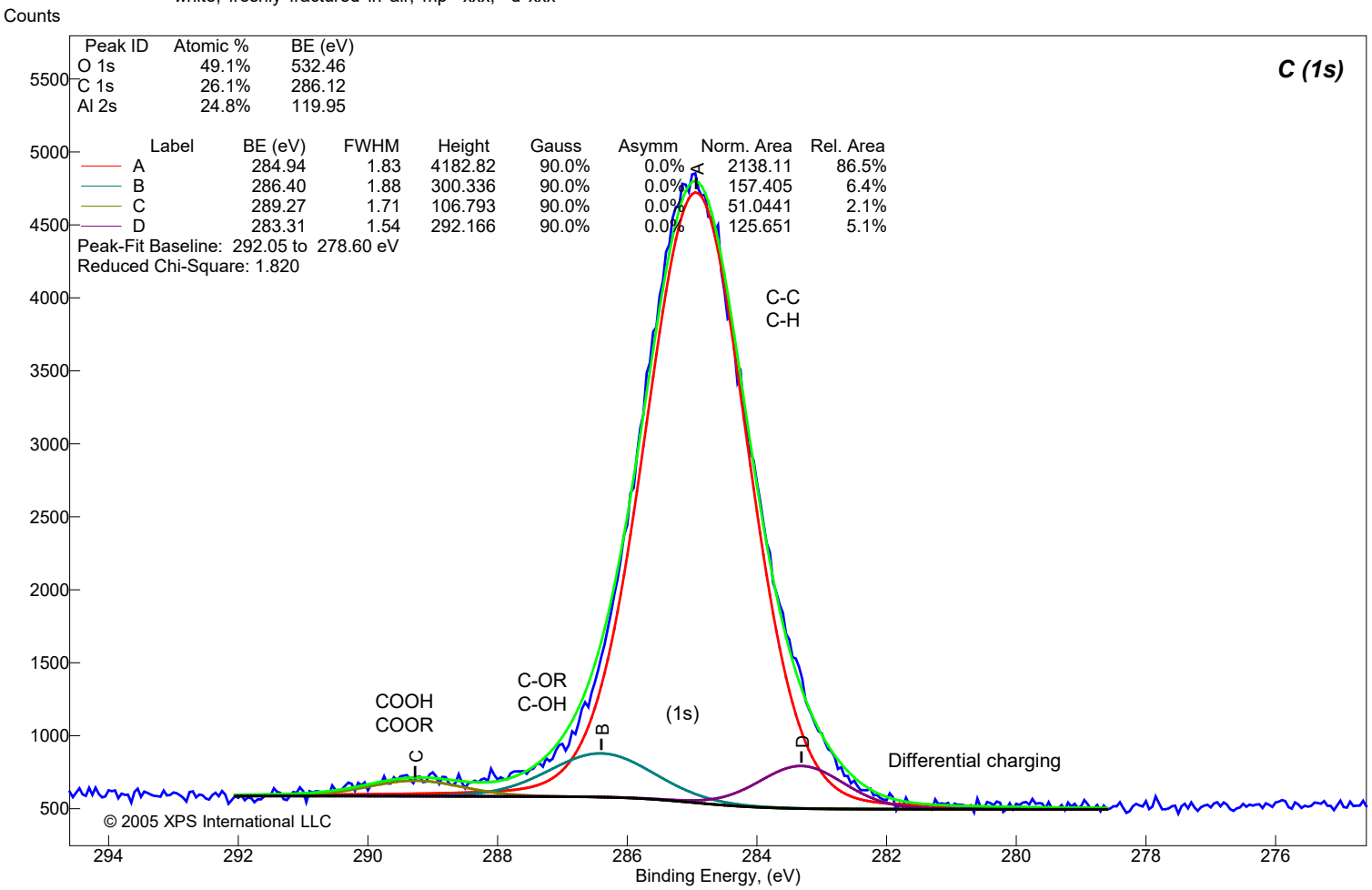


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AlOOH
Diaspore

Aluminum (III) Oxy-hydroxide (FW = 59.99)

Sample Description: AlOOH (Diaspore, Al2O3-H2O), analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white, freshly fractured in air, mp xxx, d xxx

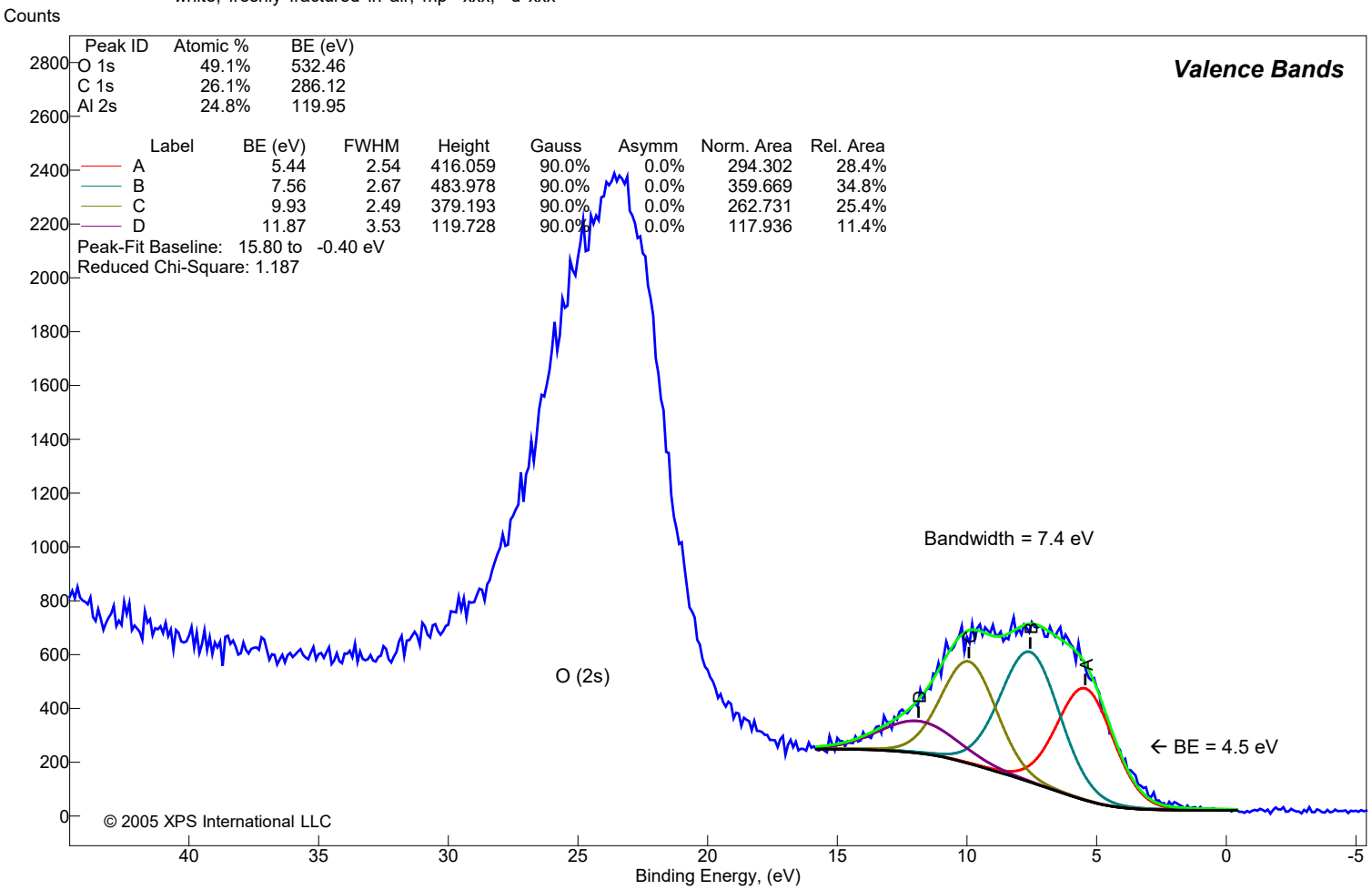


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AlOOH
Diaspore

Aluminum (III) Oxy-hydroxide (FW = 59.99)

Sample Description: AlOOH (Diaspore, Al2O3-H2O), analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white, freshly fractured in air, mp xxx, d xxx

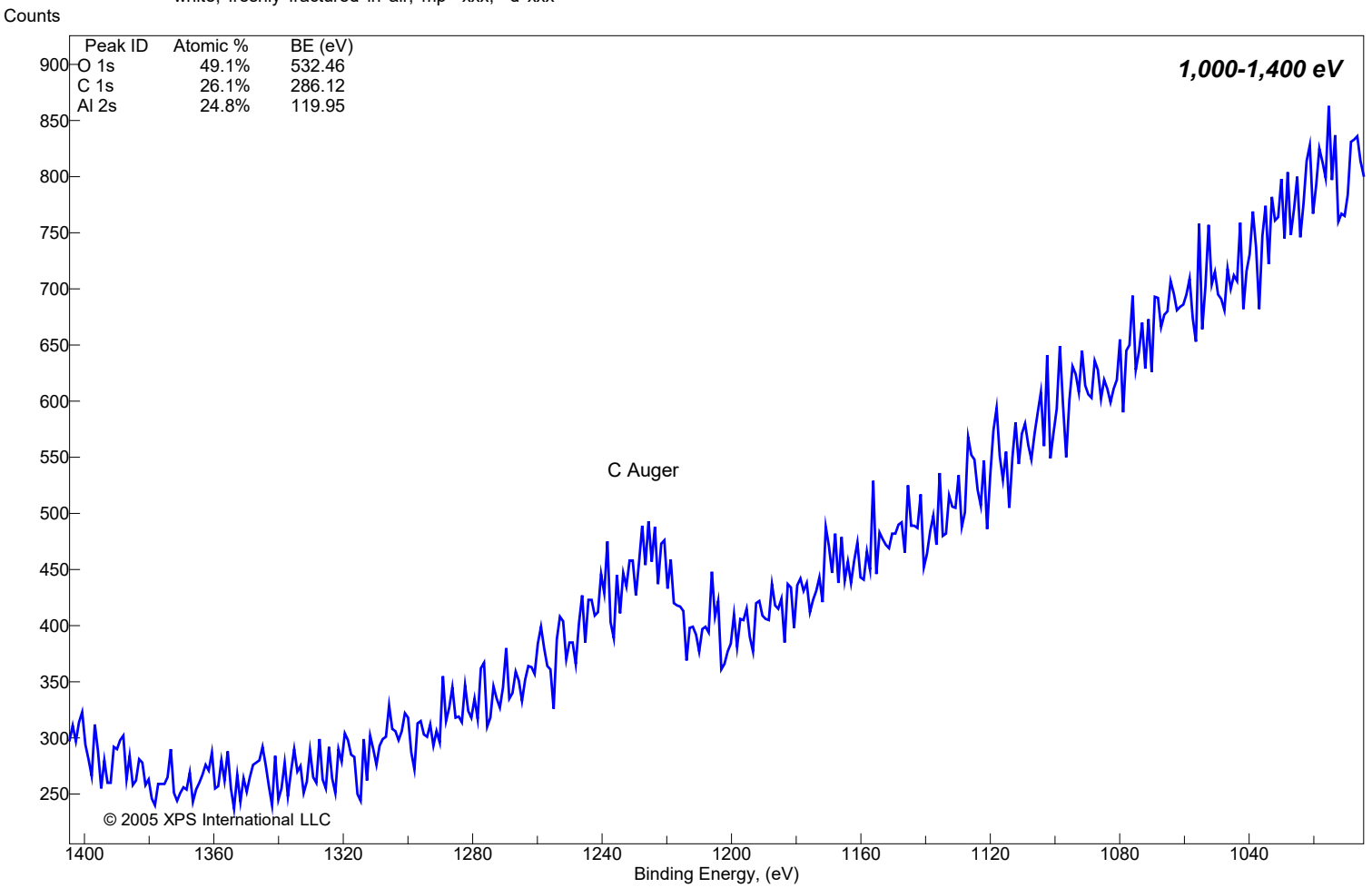


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AlOOH
Diaspore

Aluminum (III) Oxy-hydroxide (FW = 59.99)

Sample Description: AlOOH (Diaspore, Al2O3-H2O), analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white, freshly fractured in air, mp xxx, d xxx

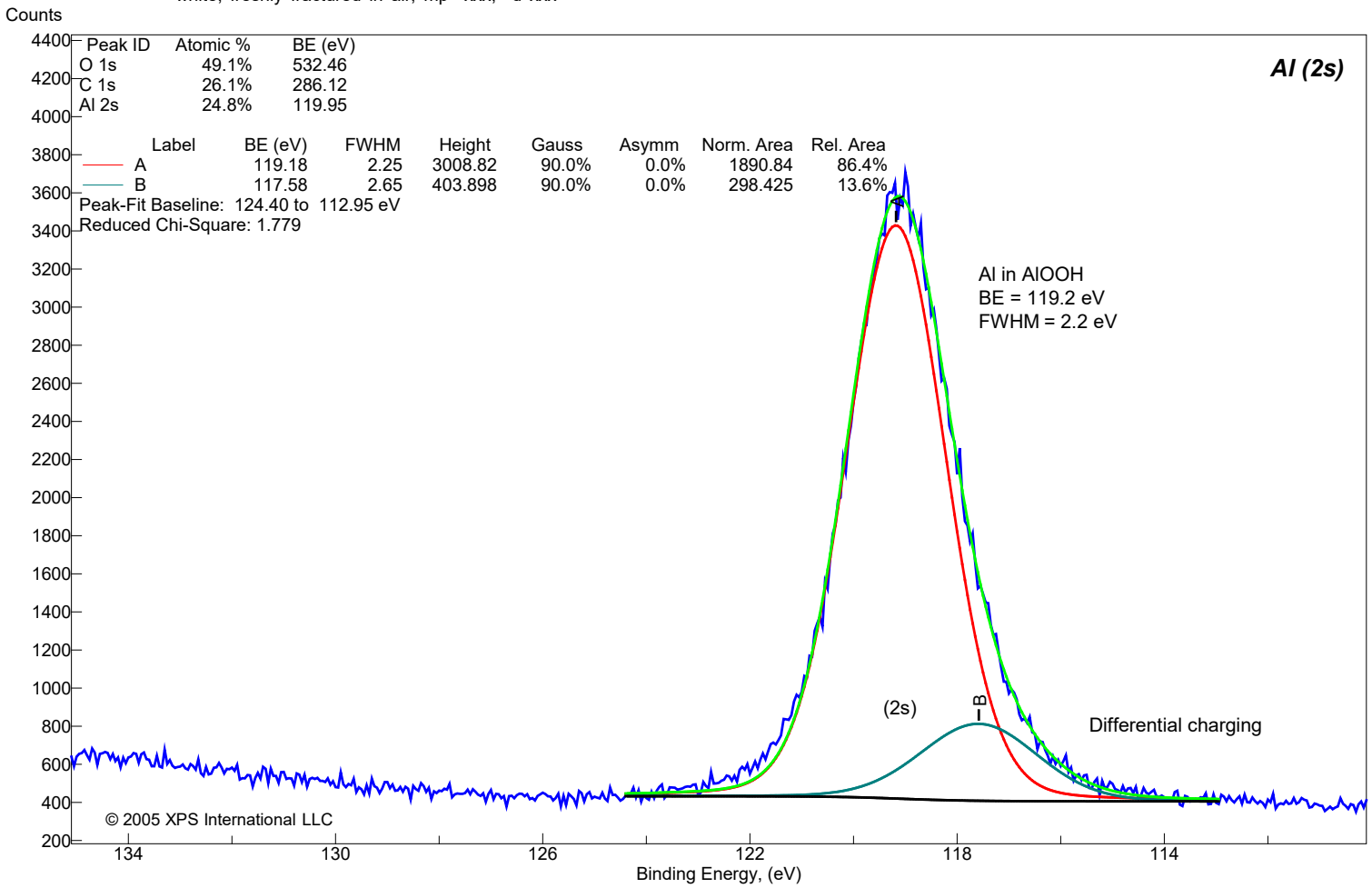


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AlOOH
Diaspore

Aluminum (III) Oxy-hydroxide (FW = 59.99)

Sample Description: AlOOH (Diaspore, Al2O3-H2O), analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white, freshly fractured in air, mp xxx, d xxx

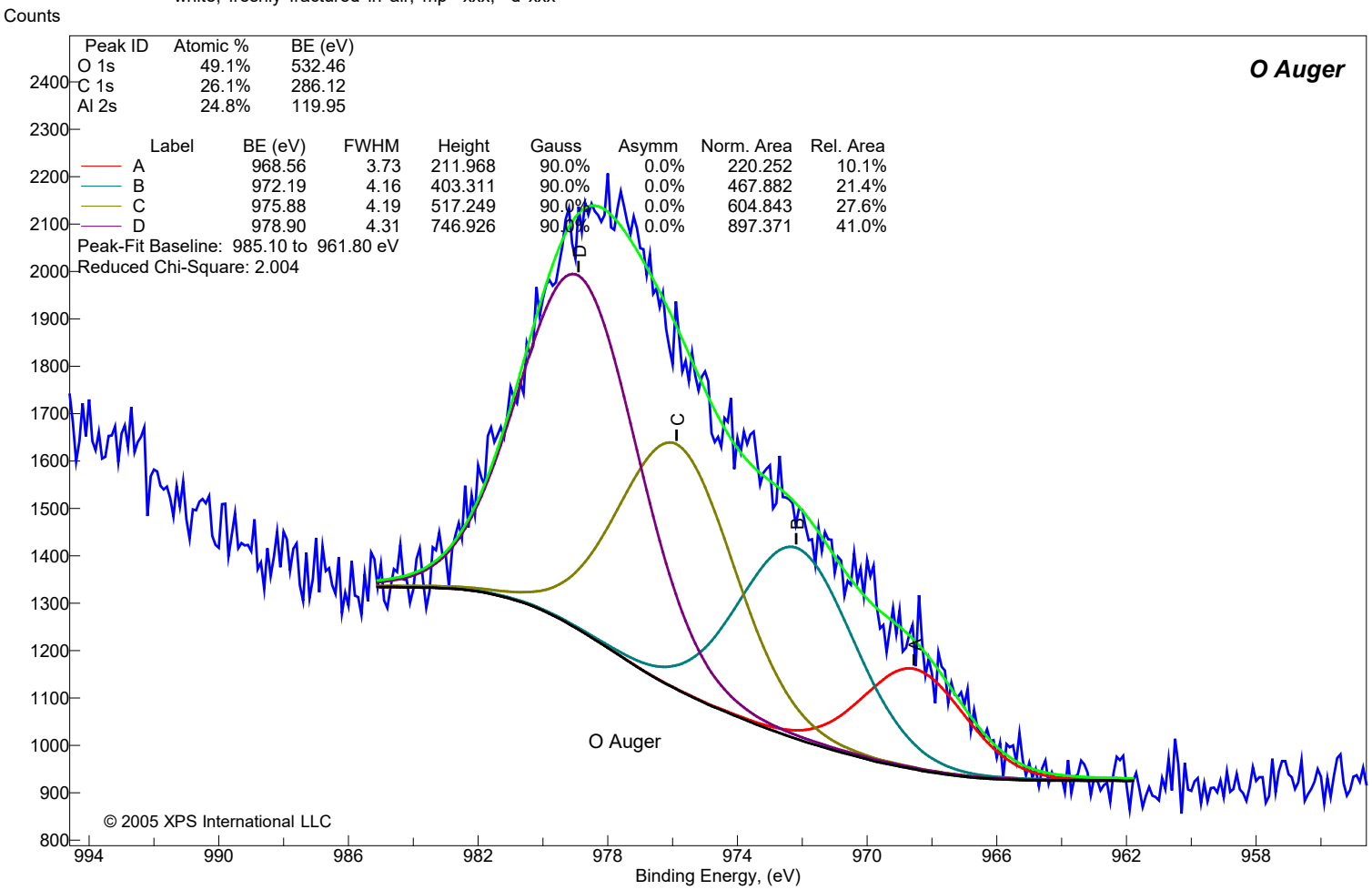


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AlOOH
Diaspore

Aluminum (III) Oxy-hydroxide (FW = 59.99)

Sample Description: AlOOH (Diaspore, Al2O3-H2O), analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white, freshly fractured in air, mp xxx, d xxx



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As_2O_3

Arsenic (III) Oxide (FW = 197.84)
Surface Composition Table

Description: As_2O_3 (99.995%) from Aldrich Lot# 04445CW, analyzed at 90 deg TOA, mesh at 1mm, non-conductive white powder pressed into 3 mm pellet, mp 312 C, d 3.7, sol in boiling water, HCl, insol. in alcohol

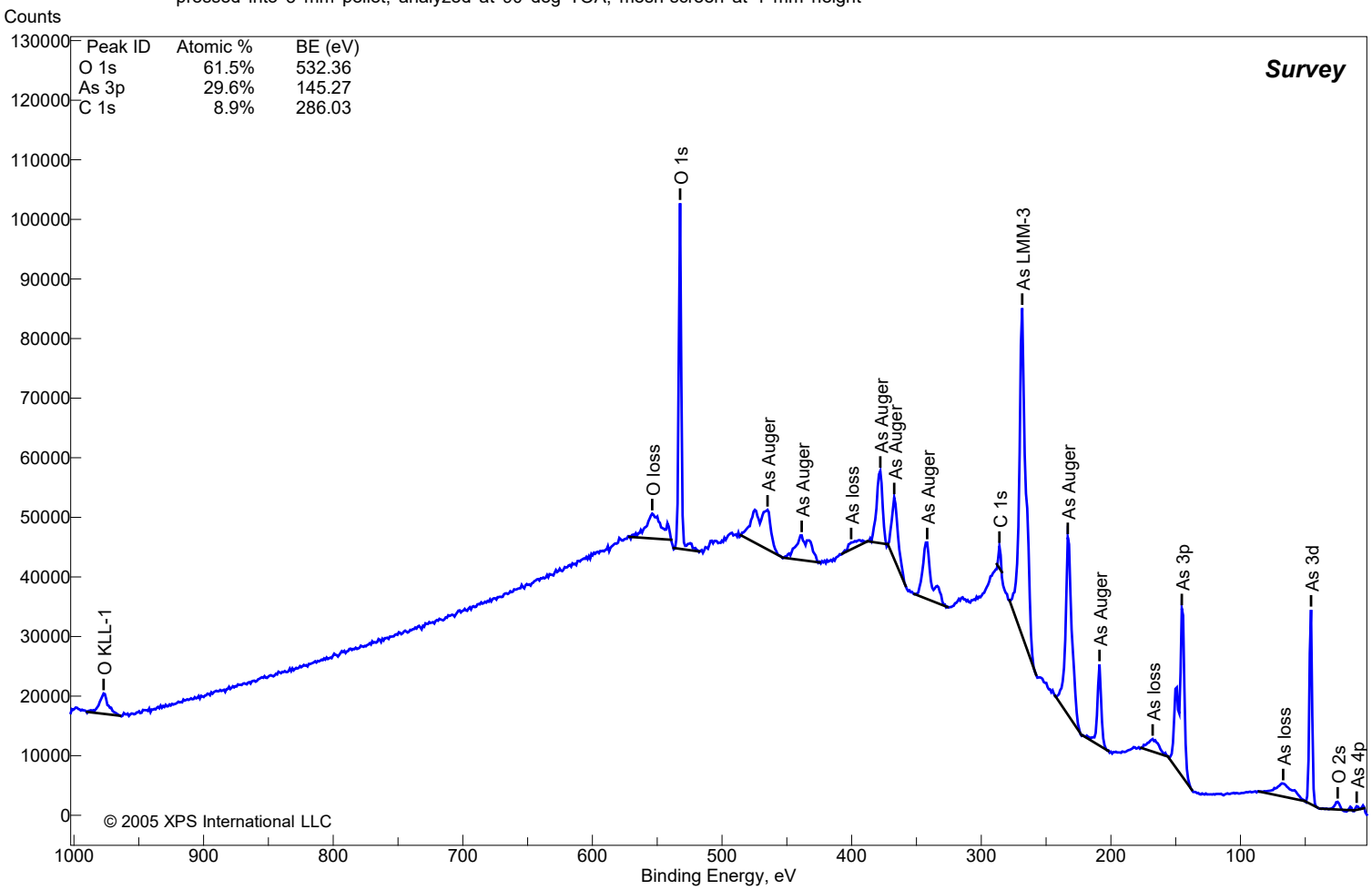
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
As 4p	10.4	10.4	0.12	1.4	1,945	
O 2s	25.0	25.0	0.14	1.4	6,487	
As 3d	45.6	45.6	1.82	1.4	68,690	
As loss	67.1	67.1	0.00	1.4	29,942	
As 3p	145.3	145.3	4.07	1.4	128,540	29.6%
As loss	167.8	167.8	0.00	1.4	17,059	
As Auger	208.8	208.8	0.00	1.4	39,047	
As Auger	233.2	233.2	0.00	1.4	145,382	
As LMM-3	268.4	268.4	0.40	1.4	270,869	
C 1s	286.0	286.0	1.00	1.4	8,106	8.9%
As Auger	341.7	341.7	0.00	1.4	62,610	
As Auger	367.2	367.2	0.00	1.4	48,861	
As Auger	377.9	377.9	0.00	1.4	54,150	
As loss	400.4	400.4	0.00	1.4	10,545	
As Auger	438.5	438.5	0.00	1.4	45,111	
As Auger	464.9	464.9	0.00	1.4	82,310	
O 1s	532.4	532.4	2.93	1.4	119,613	61.5%
O loss	553.9	553.9	0.00	1.4	51,082	
O KLL-1	977.1	977.1	0.70	1.4	25,155	

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As_2O_3

Arsenic (III) Oxide (FW = 197.84)

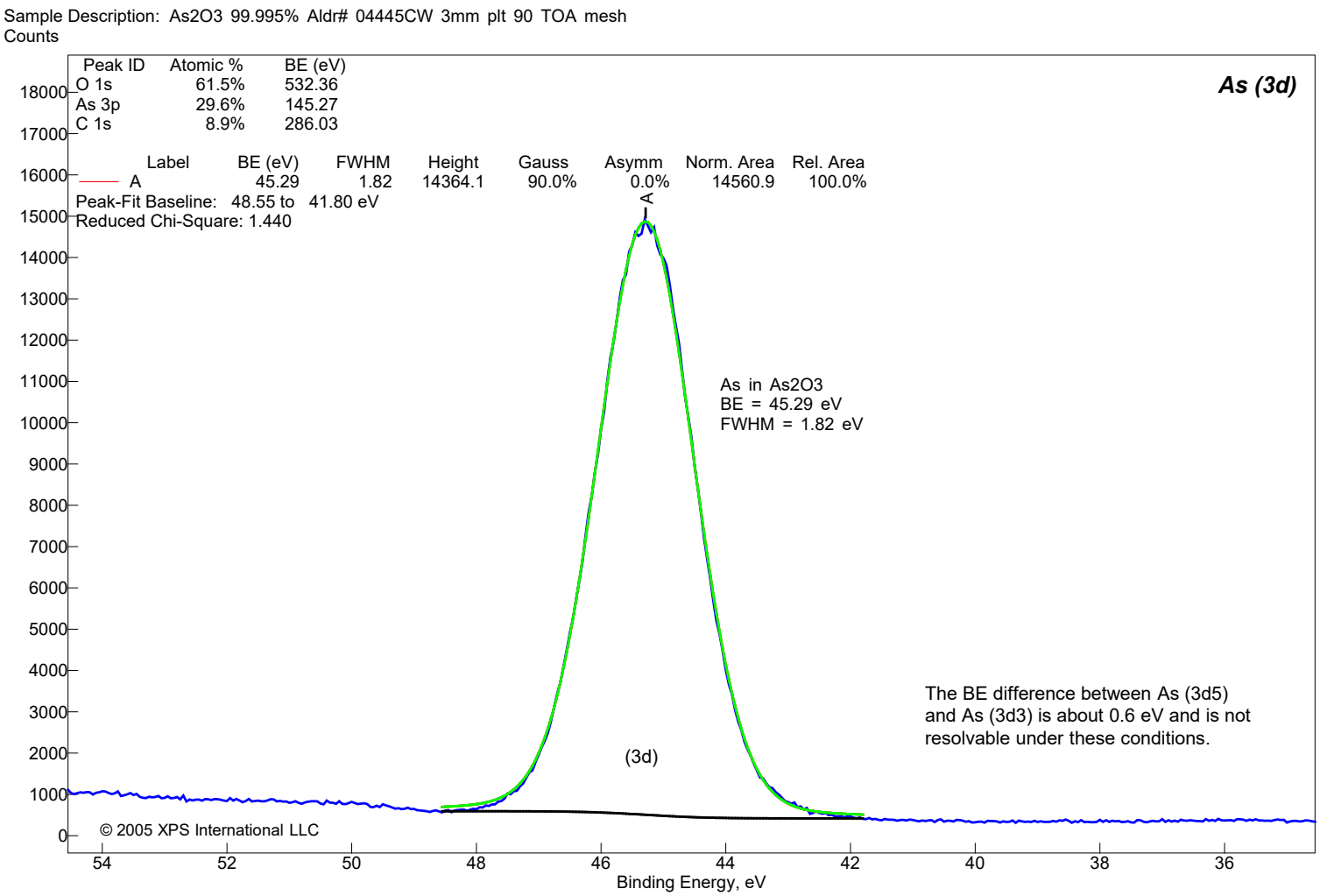
Sample Description: As2O3 (99.995%) from Aldrich lot# 04445CW
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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As_2O_3

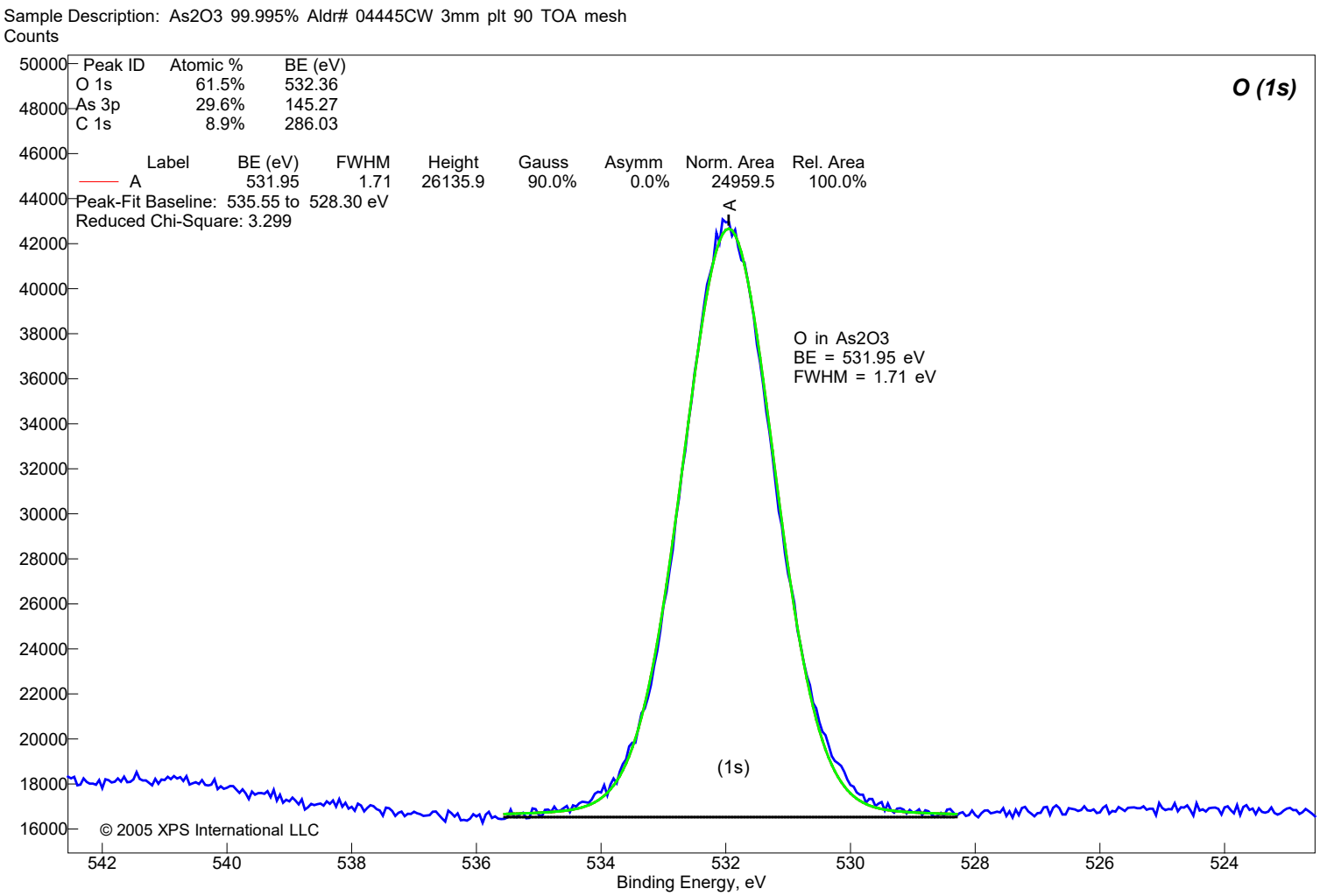
Arsenic (III) Oxide (FW = 197.84)



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As_2O_3

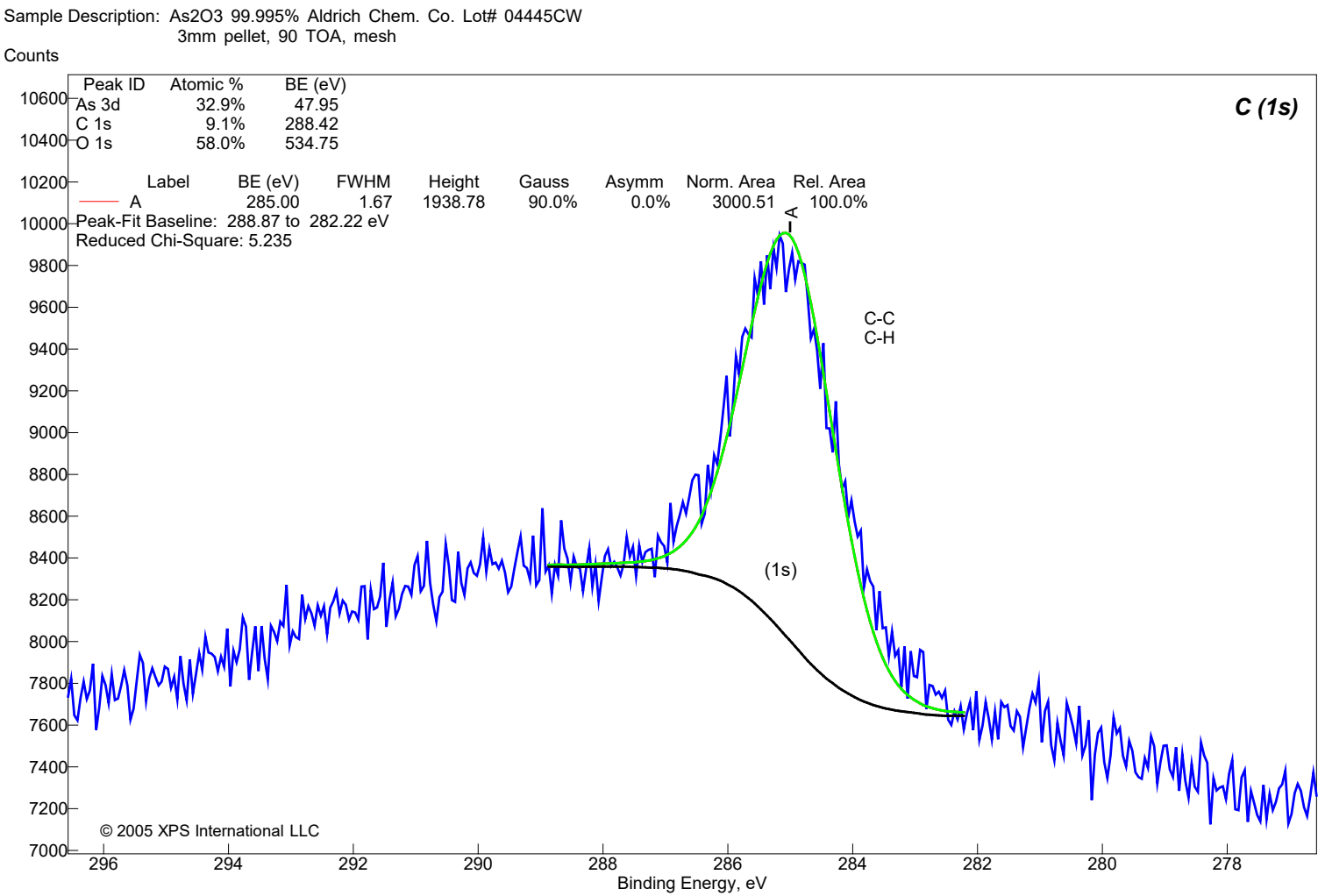
Arsenic (III) Oxide (FW = 197.84)



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As_2O_3

Arsenic (III) Oxide (FW = 197.84)

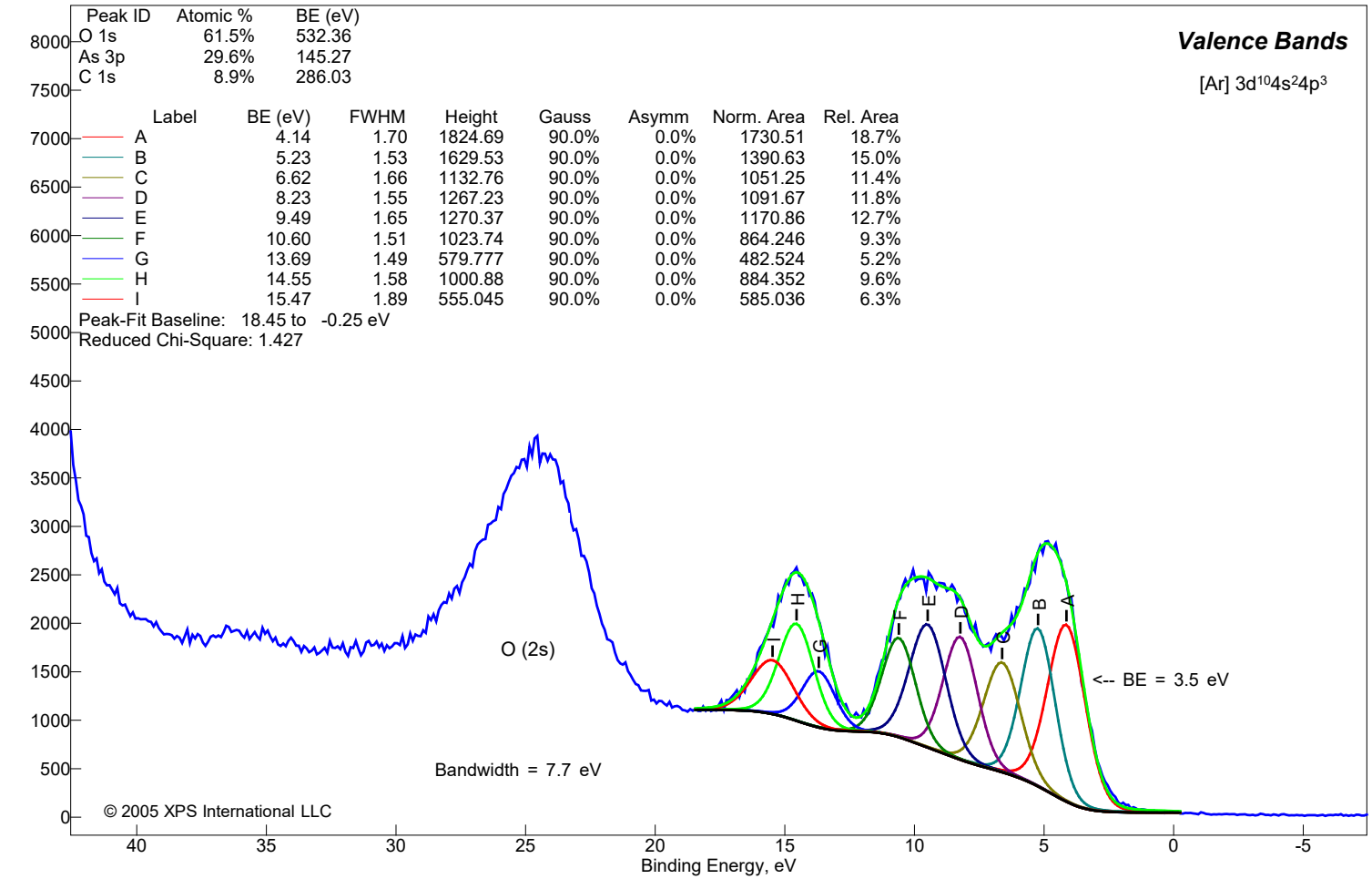


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As_2O_3

Arsenic (III) Oxide (FW = 197.84)

Sample Description: As2O3 99.995% Aldr# 04445CW 3mm plt 90 TOA mesh

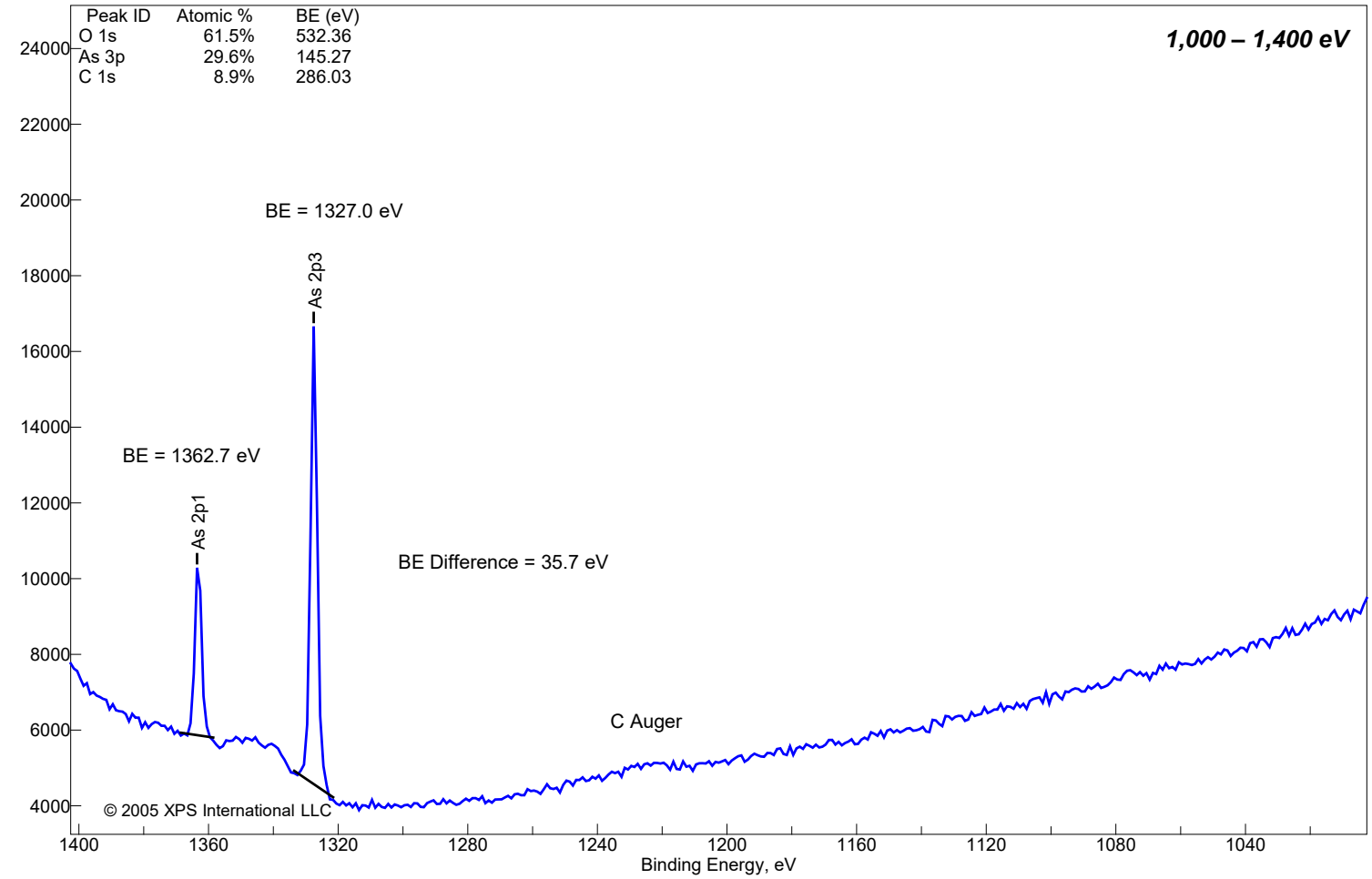


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As_2O_3

Arsenic (III) Oxide (FW = 197.84)

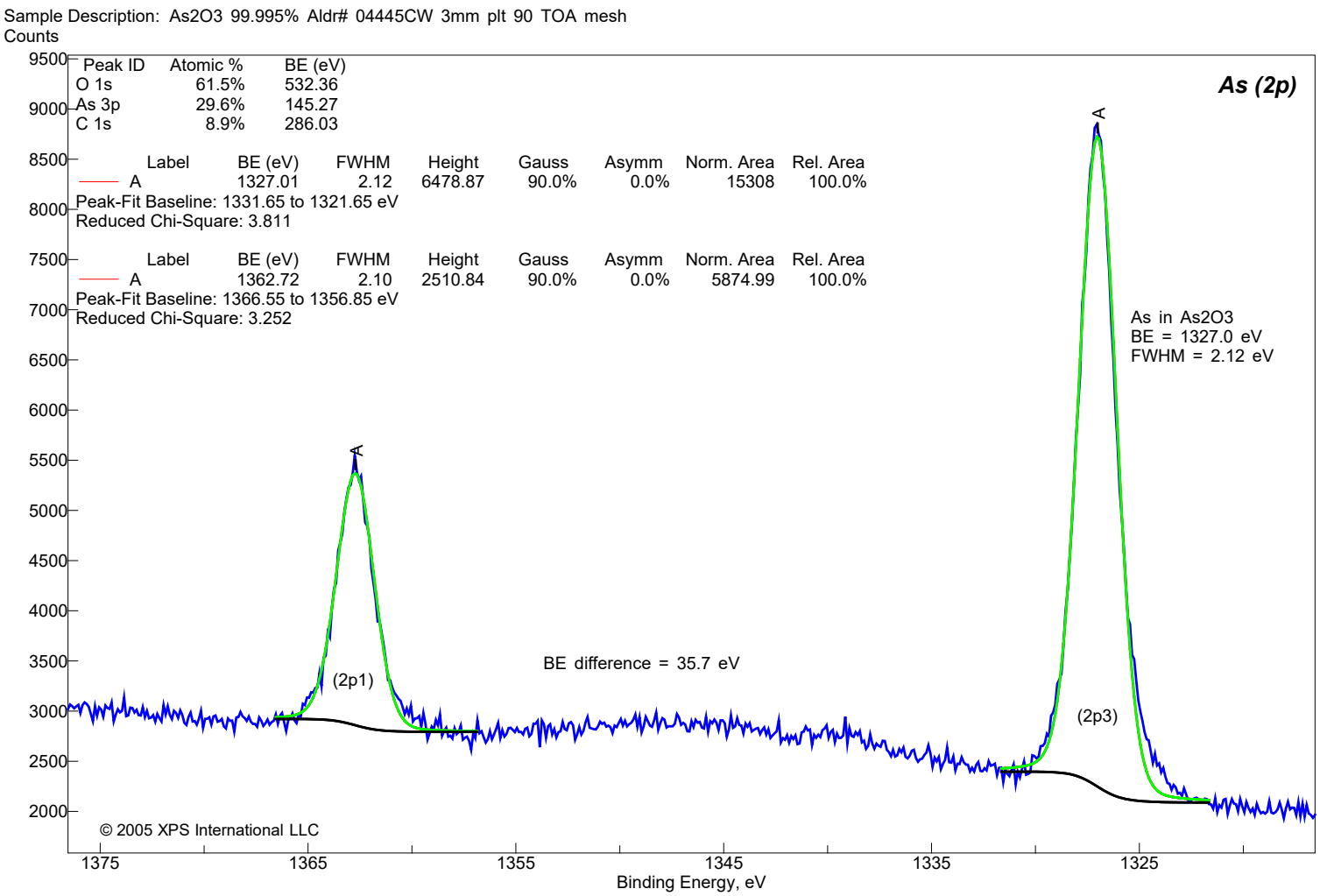
Sample Description: As2O3 99.995% Aldr# 04445CW 3mm plt 90 TOA mesh



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As_2O_3

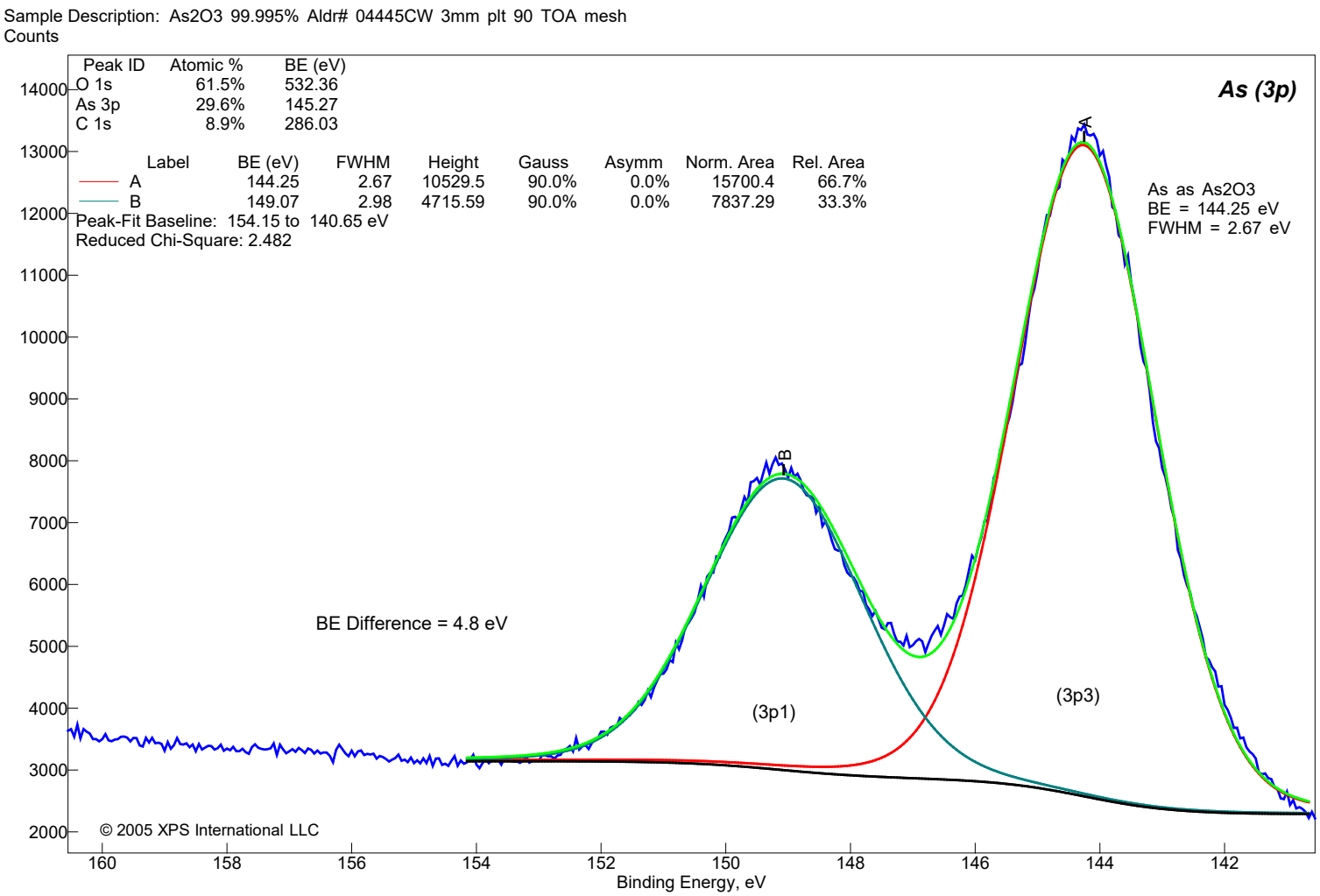
Arsenic (III) Oxide (FW = 197.84)



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As_2O_3

Arsenic (III) Oxide (FW = 197.84)



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Au_2O_3

Gold (III) Oxide (FW = 441.93)
Surface Composition Table

Description: Au_2O_3 (Au 86%) from Aldrich Lot# 00306AW, analyzed at 90 deg TOA, mesh at 1mm, semi-conductive brown powder, pressed into 3 mm pellet, mp 150 C dec., sol in HCl, HNO_3

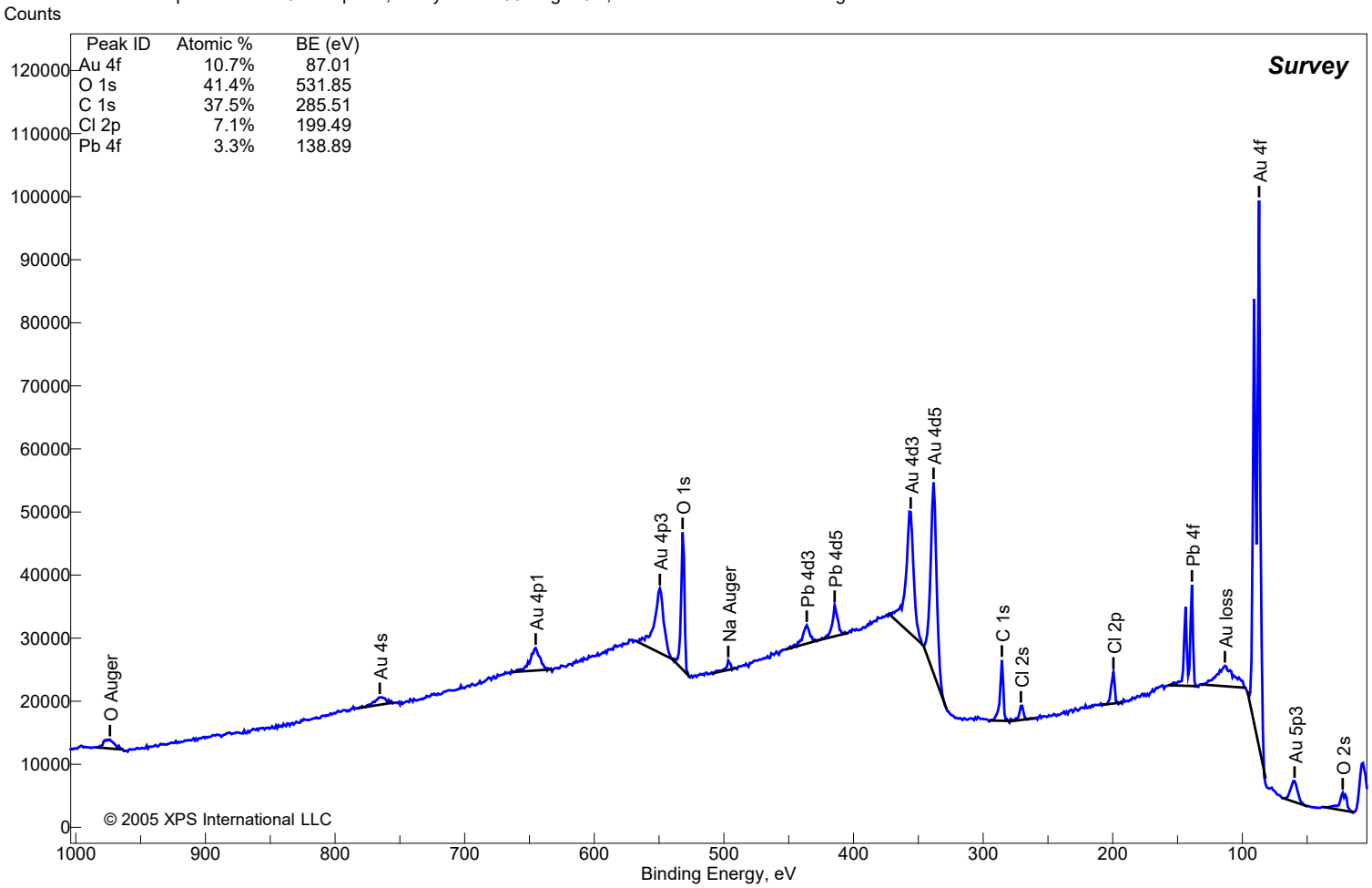
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	22.6	22.6	0.14	1.5	15,712	
Au 5p3	59.7	59.7	1.10	1.5	17,360	
Au 4f	87.0	87.0	17.12	1.1	68,640	10.7%
Au loss	113.5	113.5	0.00	1.5	42,102	
Pb 4f	138.9	138.9	22.74	1.5	58,144	3.3%
Cl 2p	199.5	199.5	2.28	1.5	11,661	7.1%
Cl 2s	270.9	270.9	1.69	1.5	8,850	
C 1s	285.5	285.5	1.00	1.5	24,448	37.5%
Au 4d5	338.3	338.3	11.74	1.5	137,776	
Au 4d3	355.9	355.9	8.06	1.5	115,235	
Pb 4d5	414.5	414.5	13.02	1.5	20,249	
Pb 4d3	436.1	436.1	8.87	1.5	15,737	
Na Auger	496.7	496.7	0.00	1.5	5,574	
O 1s	531.8	531.8	2.93	1.5	56,013	41.4%
Au 4p3	549.4	549.4	5.89	1.5	72,433	
Au 4p1	645.2	645.2	2.14	1.5	25,057	
Au 4s	765.5	765.5	1.92	1.5	12,209	
O Auger	973.7	973.7	0.00	1.5	11,355	

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Au_2O_3

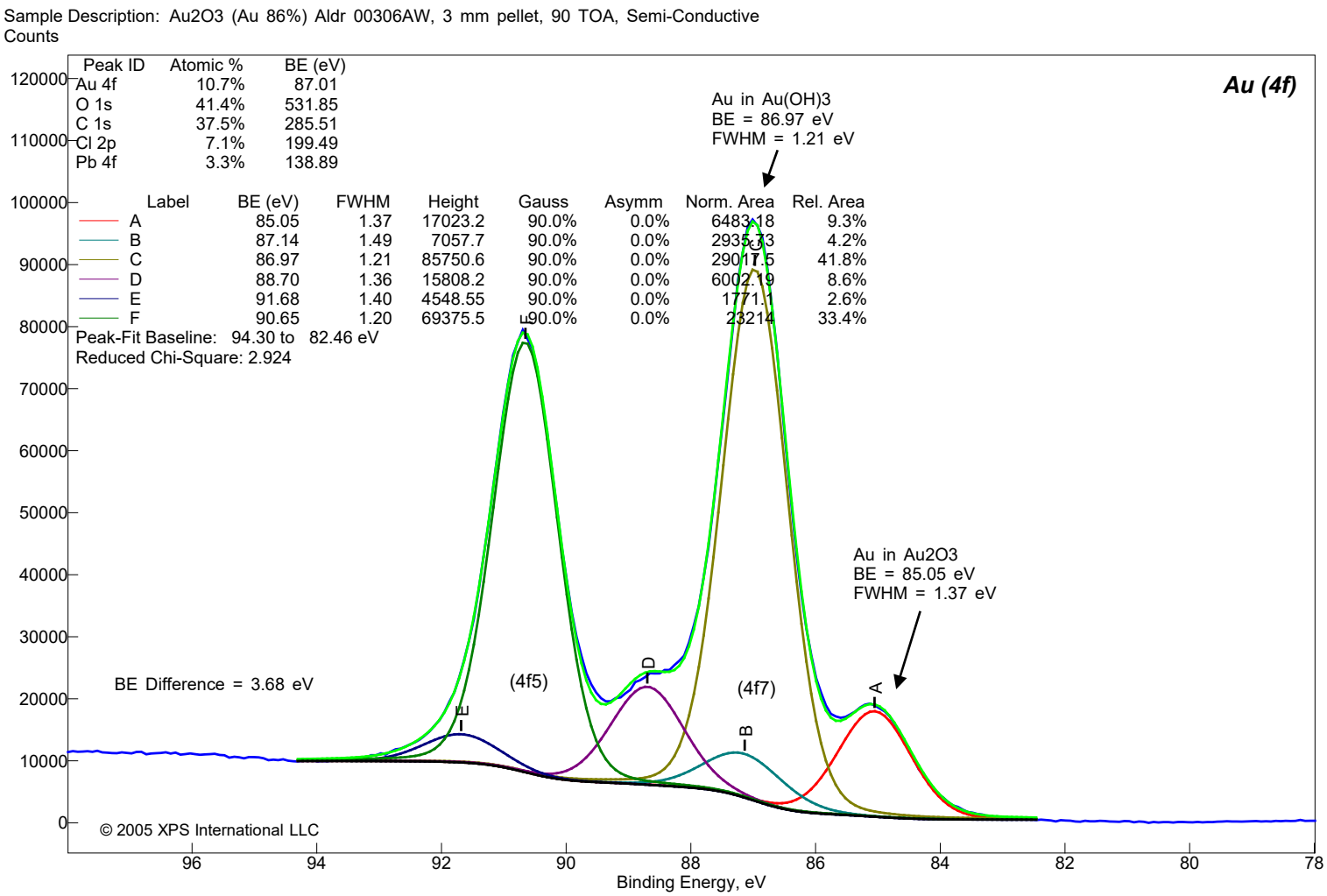
Gold (III) Oxide (FW = 441.93)

Sample Description: Au2O3 (Au 86%) from Aldrich Lot# 00306AW, Semi-Conductive
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



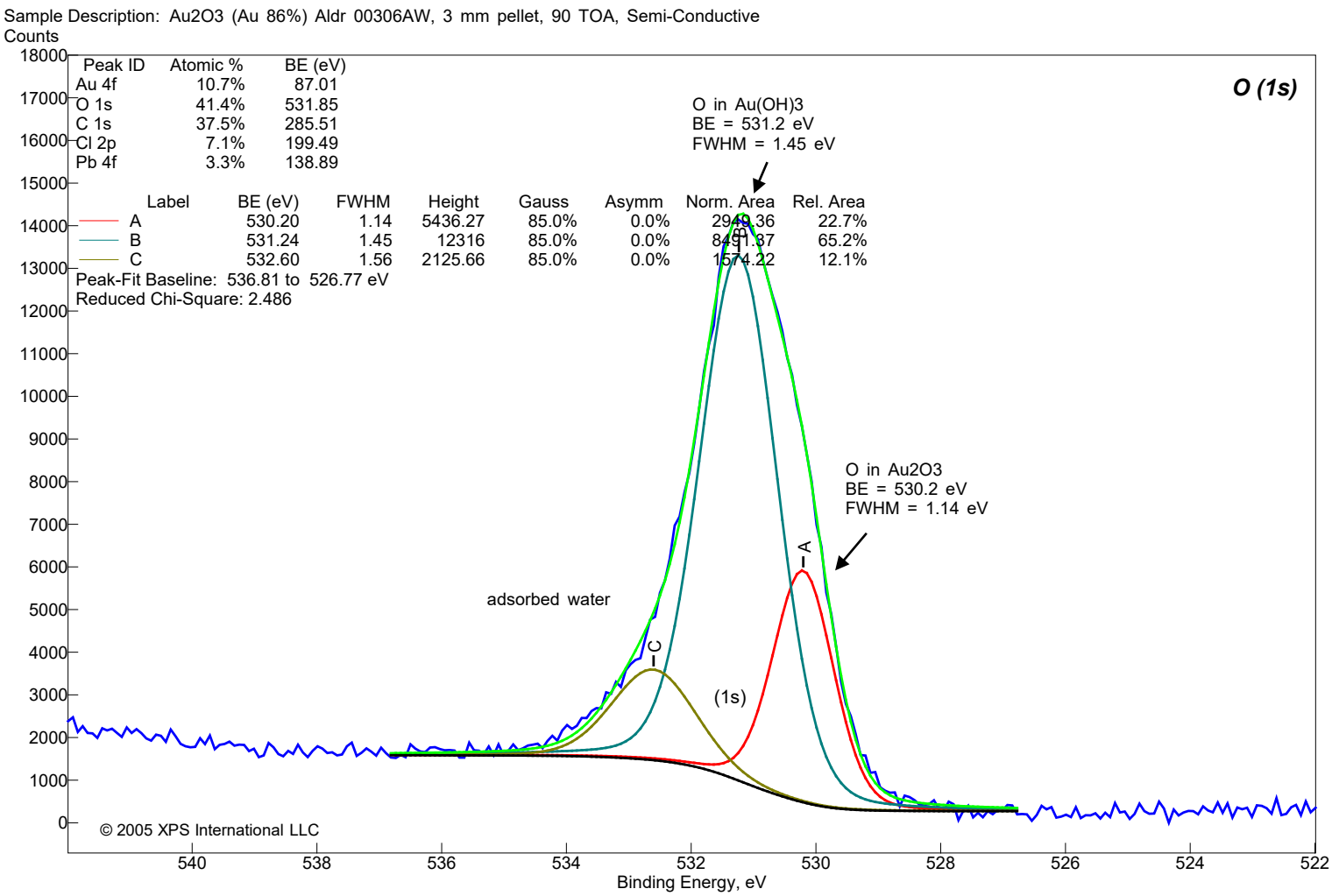
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Gold (III) Oxide (FW = 441.93)



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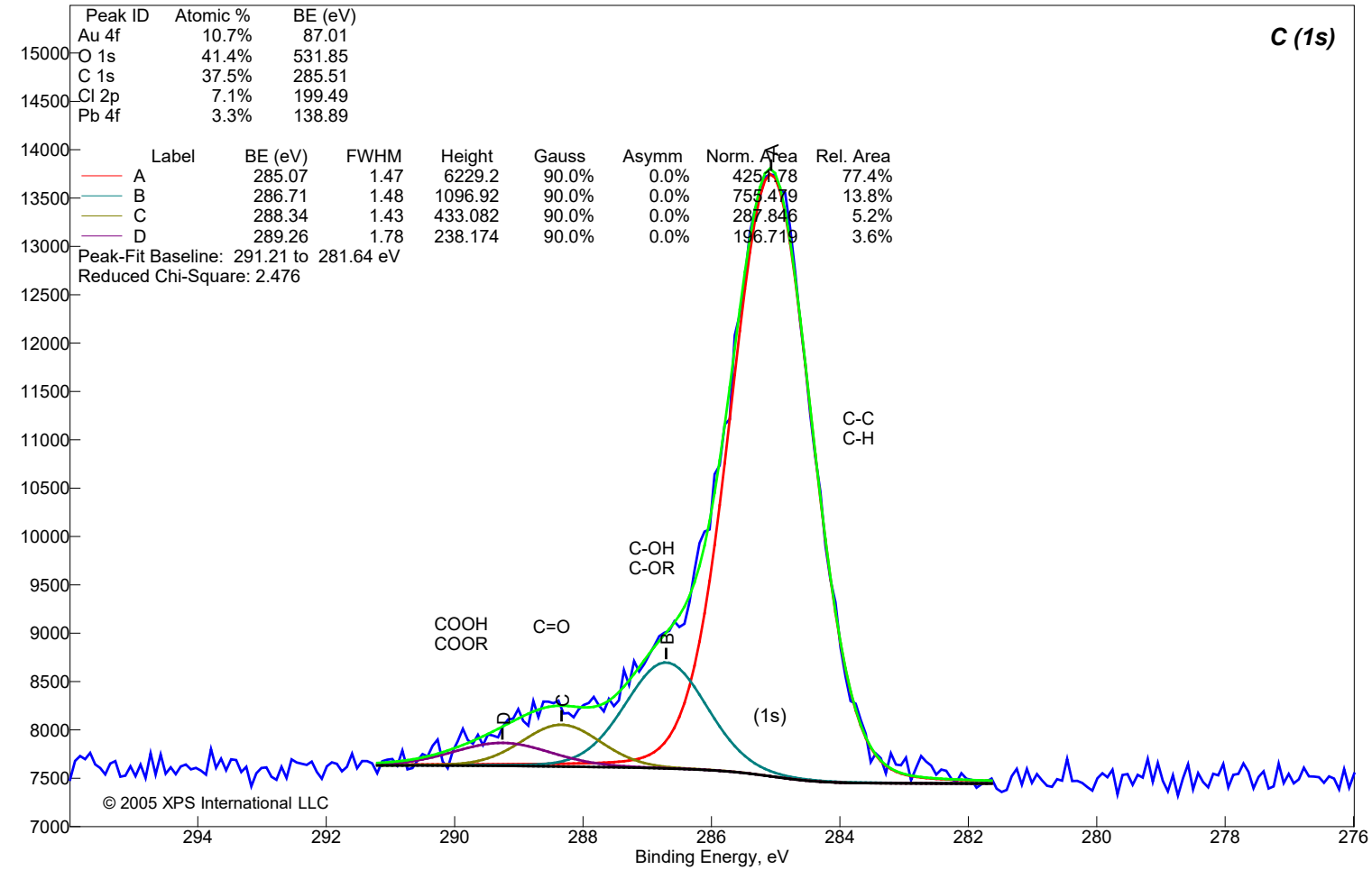
Gold (III) Oxide (FW = 441.93)



Au_2O_3

Gold (III) Oxide (FW = 441.93)

Sample Description: Au2O3 (Au 86%) Aldr 00306AW, 3 mm pellet, 90 TOA, Semi-Conductive

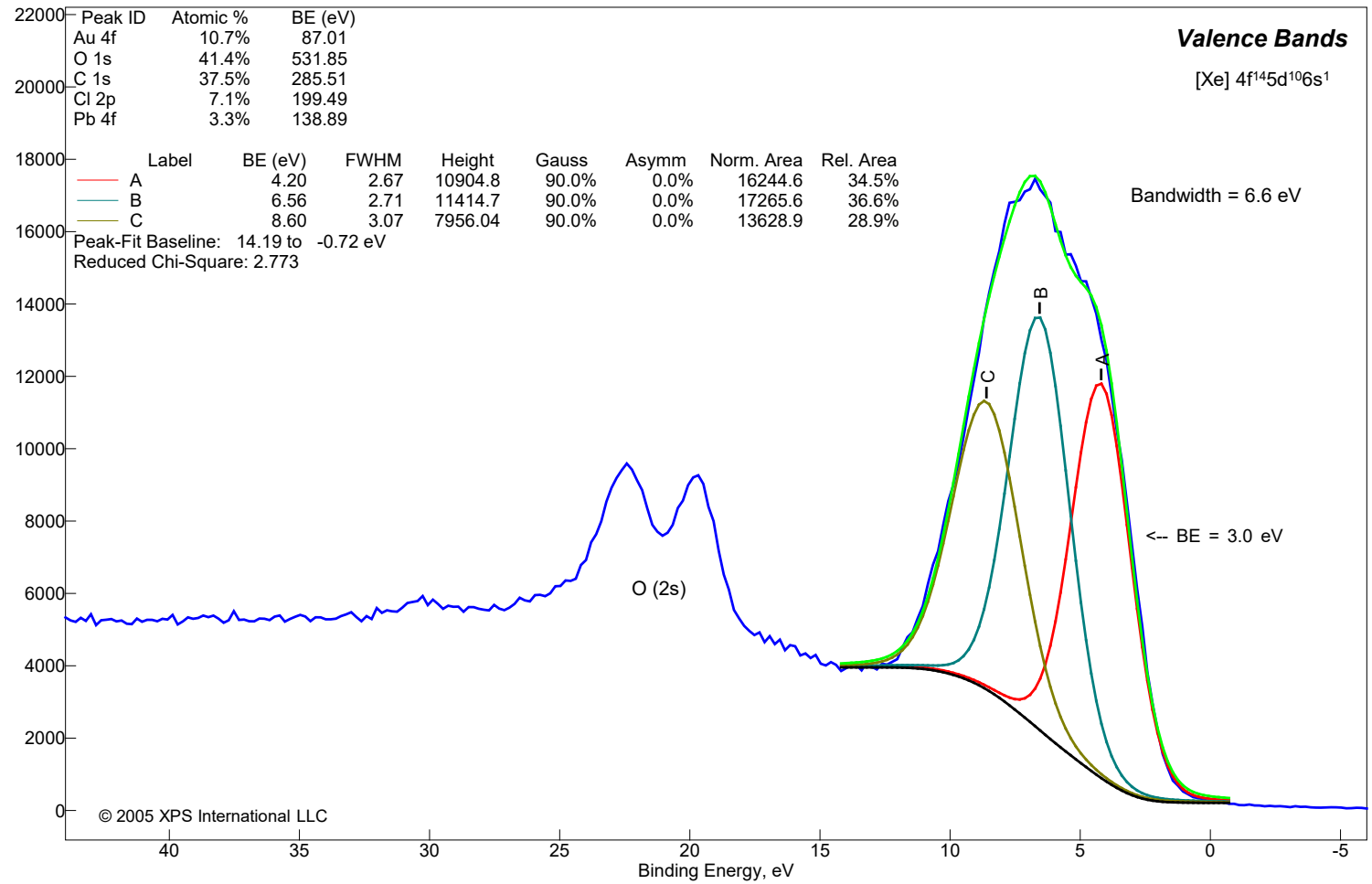


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Au_2O_3

Gold (III) Oxide (FW = 441.93)

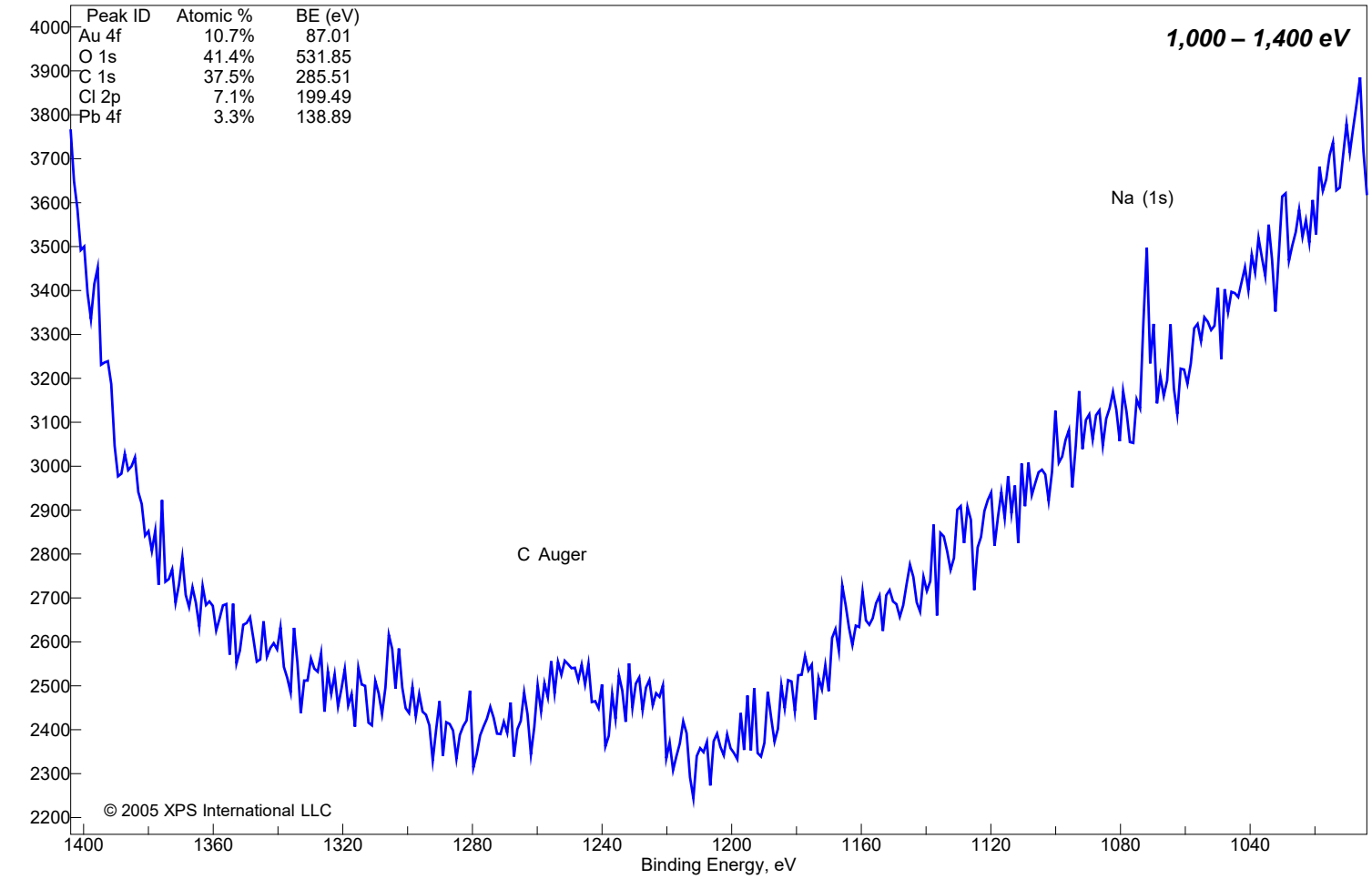
Sample Description: Au2O3 (Au 86%) Aldr 00306AW, 3 mm pellet, 90 TOA, Semi-Conductive



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Gold (III) Oxide (FW = 441.93)

Sample Description: Au2O3 (Au 86%) Aldr 00306AW, 3 mm pellet, 90 TOA, Semi-Conductive

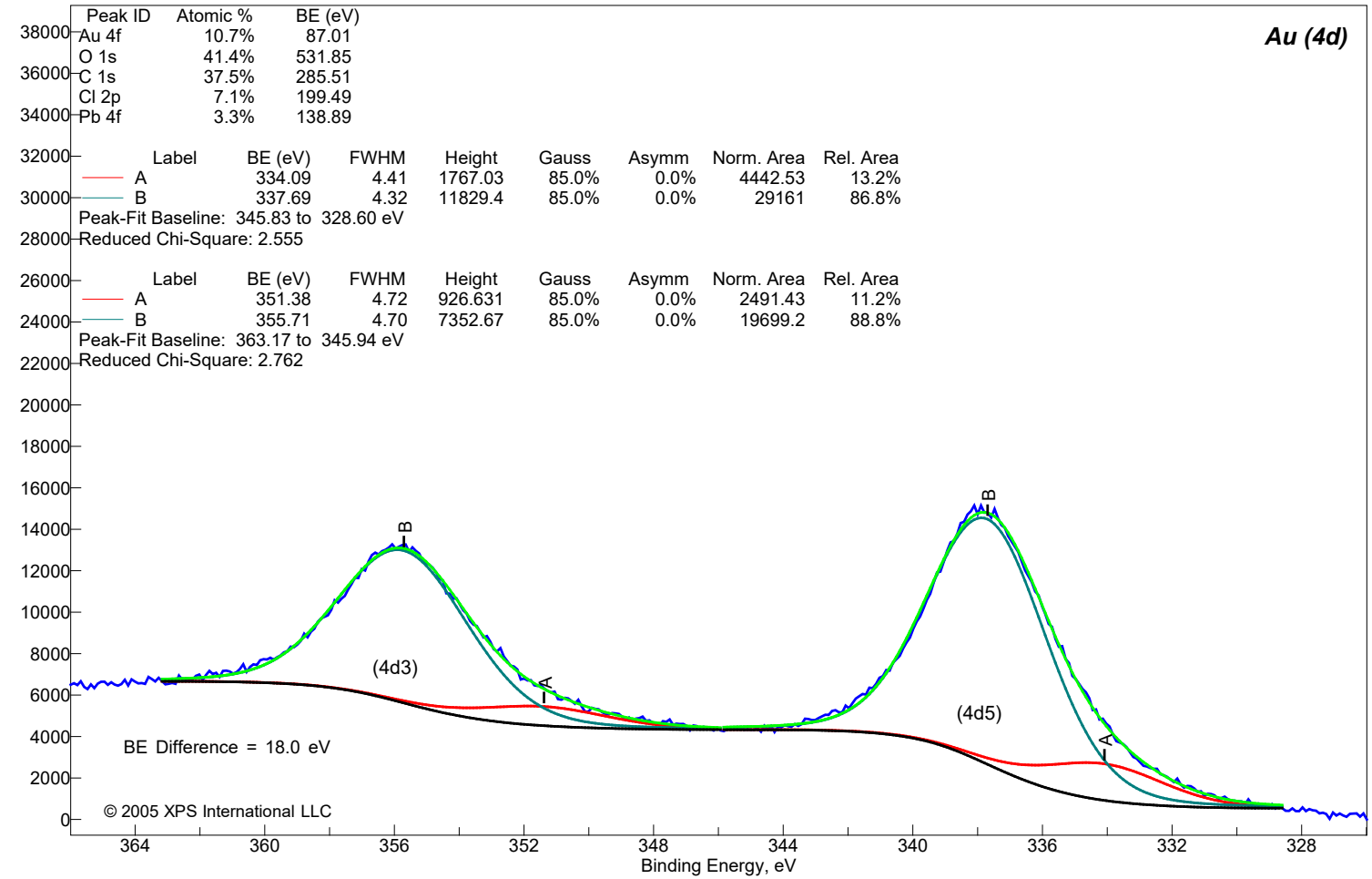


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Au_2O_3

Gold (III) Oxide (FW = 441.93)

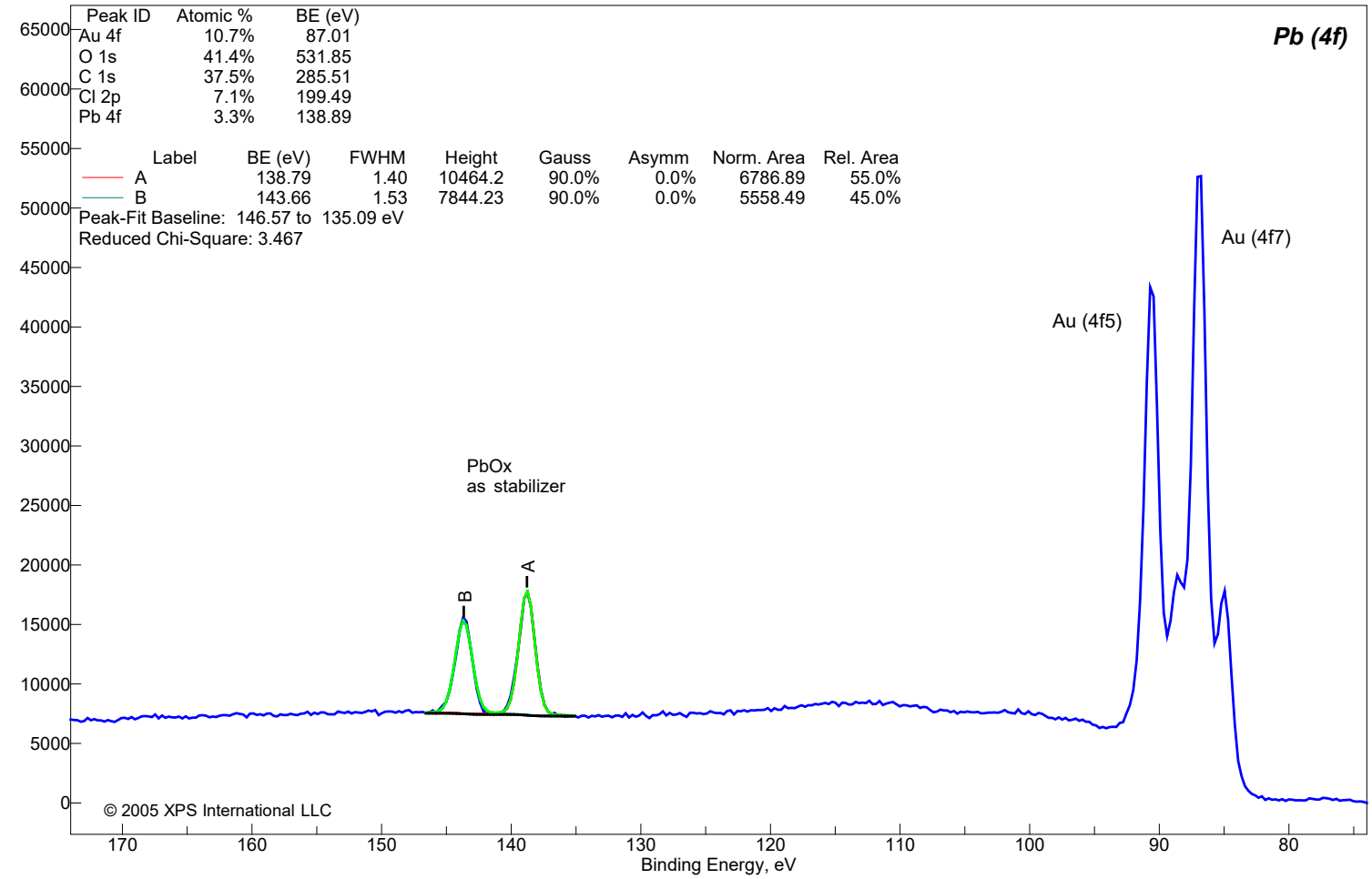
Sample Description: Au2O3 (Au 86%) Aldr 00306AW, 3 mm pellet, 90 TOA, Semi-Conductive



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Gold (III) Oxide (FW = 441.93)

Sample Description: Au2O3 (Au 86%) Aldr 00306AW, 3 mm pellet, 90 TOA, Semi-Conductive



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B_2O_3

Boron (III) Oxide (FW = 69.62)
Surface Composition Table

Description: B_2O_3 (99.999%) from Aldrich Lot# 02829BV, analyzed at 90 deg TOA, mesh at 1mm, non-conductive white pieces, bulk freshly exposed, mp 450 C, d. 2.46, sol in boiling water

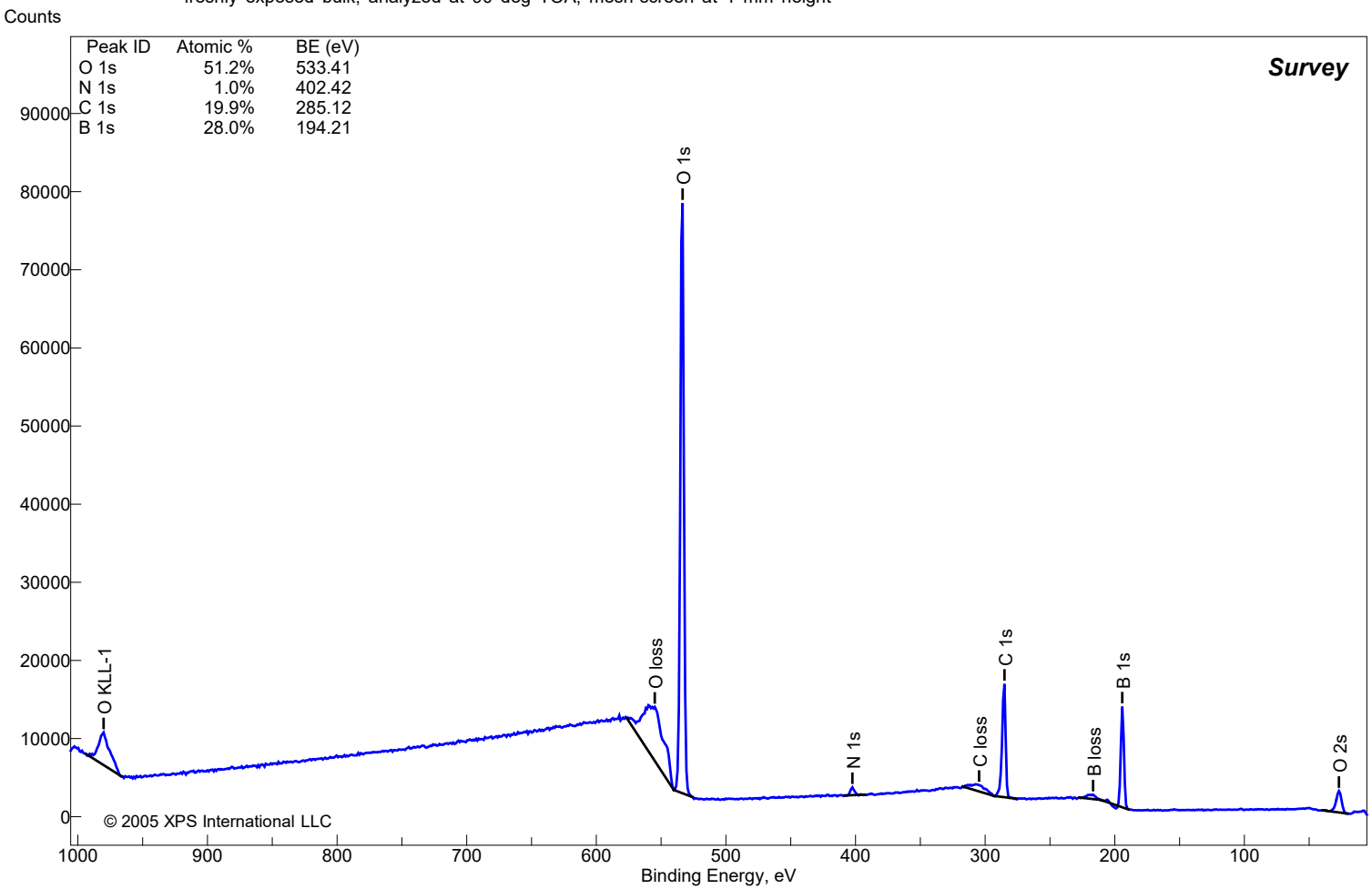
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	27.1	23.6	0.14	1.5	8,540	
B 1s	194.2	190.7	0.49	1.5	22,156	28.0%
B loss	216.7	213.2	0.00	1.5	2,580	
C 1s	285.1	281.6	1.00	1.5	28,994	19.9%
C loss	304.7	301.2	0.00	1.5	7,042	
N 1s	402.4	398.9	1.80	1.5	2,184	1.0%
O 1s	533.4	529.9	2.93	1.5	154,657	51.2%
O loss	554.9	551.4	0.00	1.5	79,553	
O KLL-1	980.1	976.6	0.70	1.5	26,712	

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B_2O_3

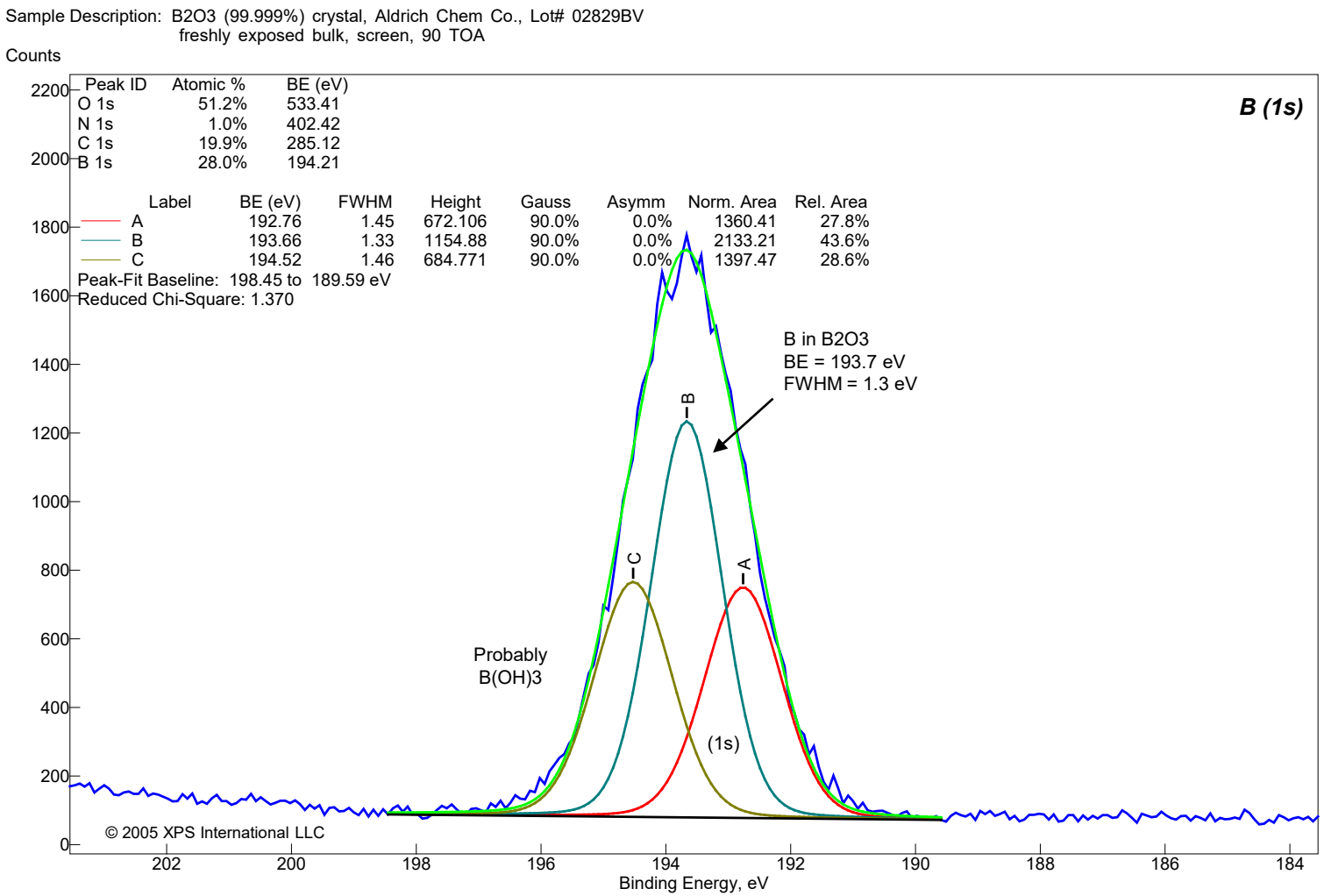
Boron (III) Oxide (FW = 69.62)

Sample Description: B2O3 (99.999%) crystal, from Aldrich Chem Co., Lot# 02829BV
freshly exposed bulk, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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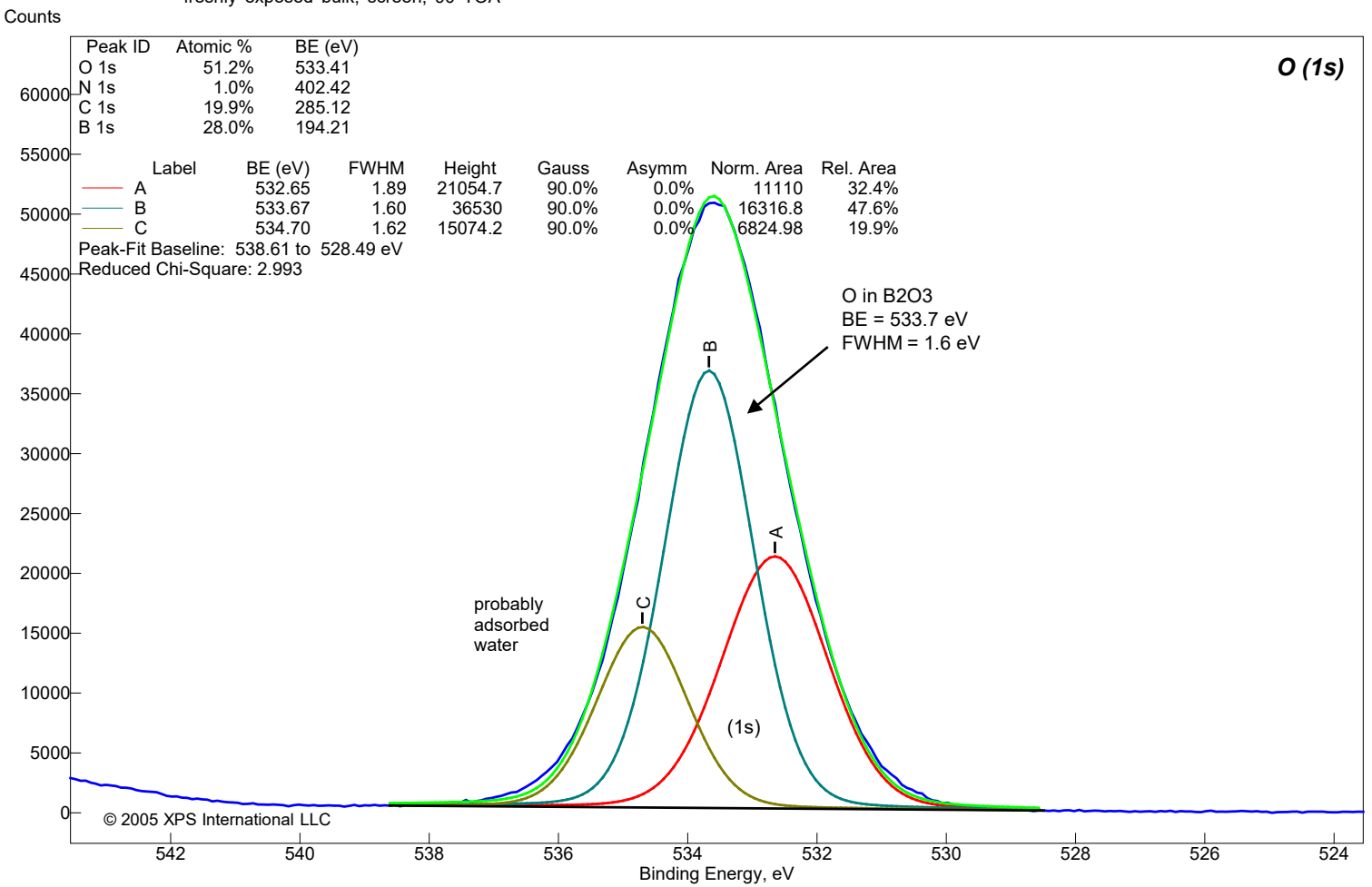
Boron (III) Oxide (FW = 69.62)



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Boron (III) Oxide (FW = 69.62)

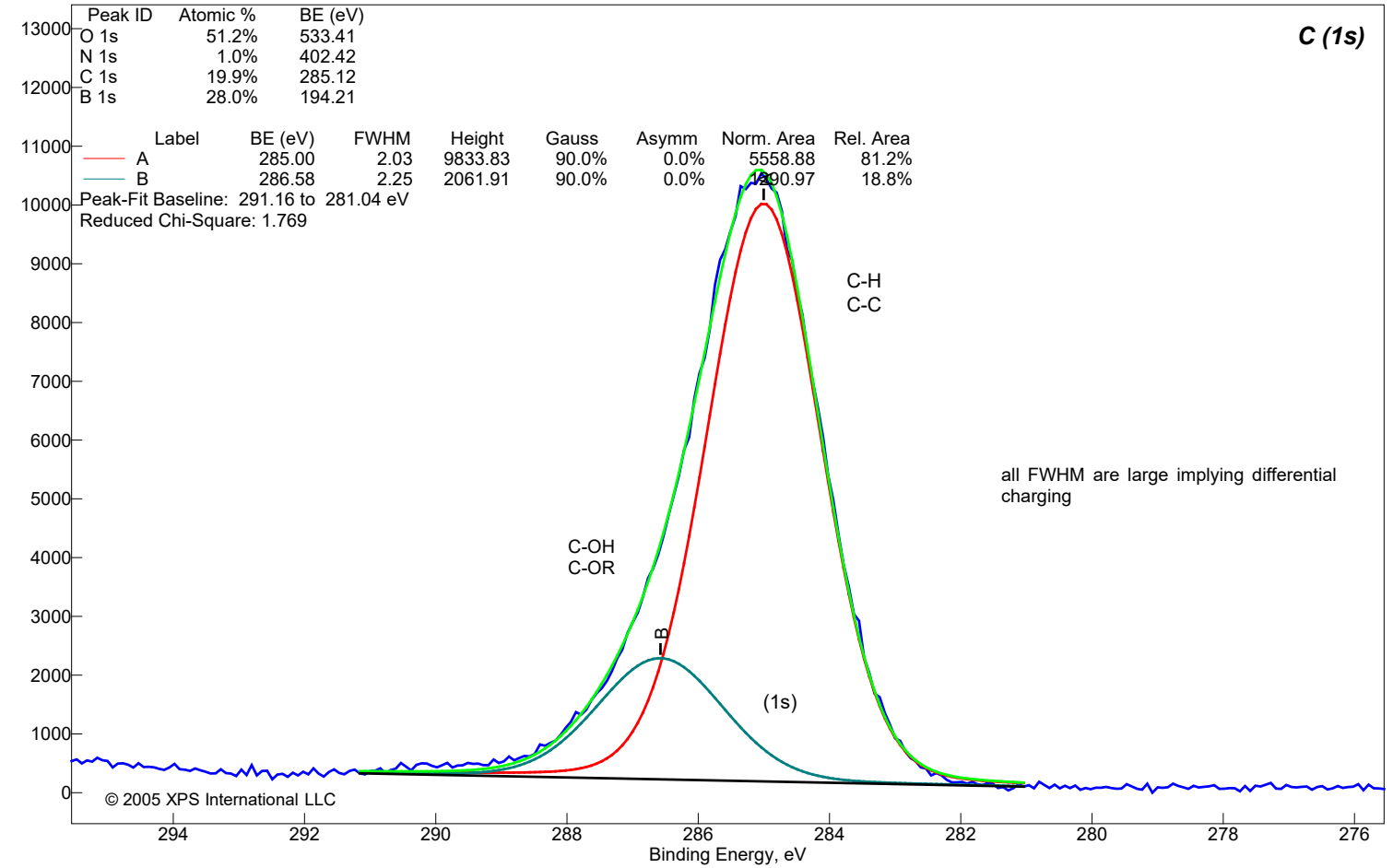
Sample Description: B2O3 (99.999%) crystal, Aldrich Chem Co., Lot# 02829BV
freshly exposed bulk, screen, 90 TOA



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Boron (III) Oxide (FW = 69.62)

Sample Description: B2O3 (99.999%) crystal, Aldrich Chem Co., Lot# 02829BV
freshly exposed bulk, screen, 90 TOA

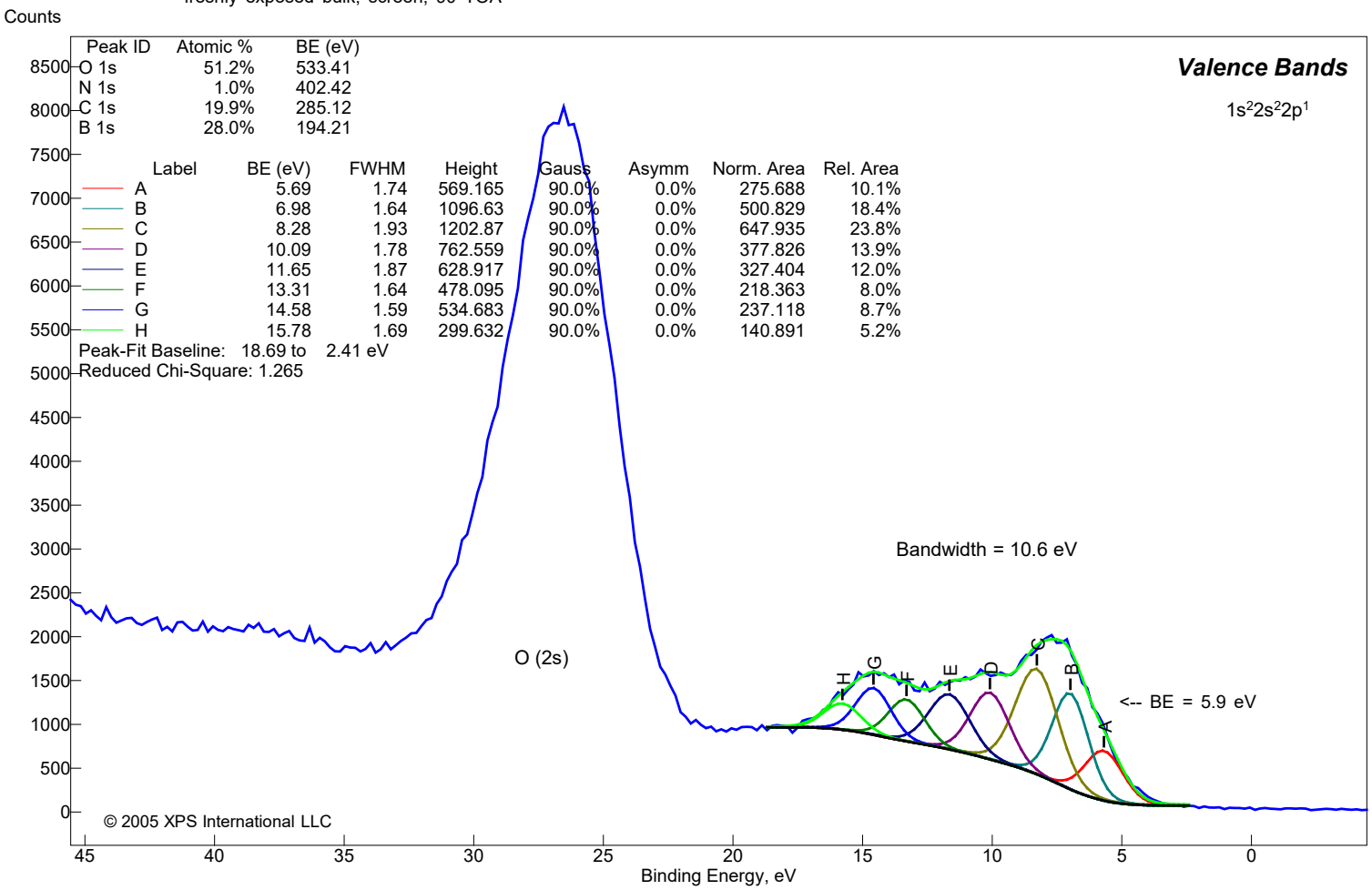


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B_2O_3

Boron (III) Oxide (FW = 69.62)

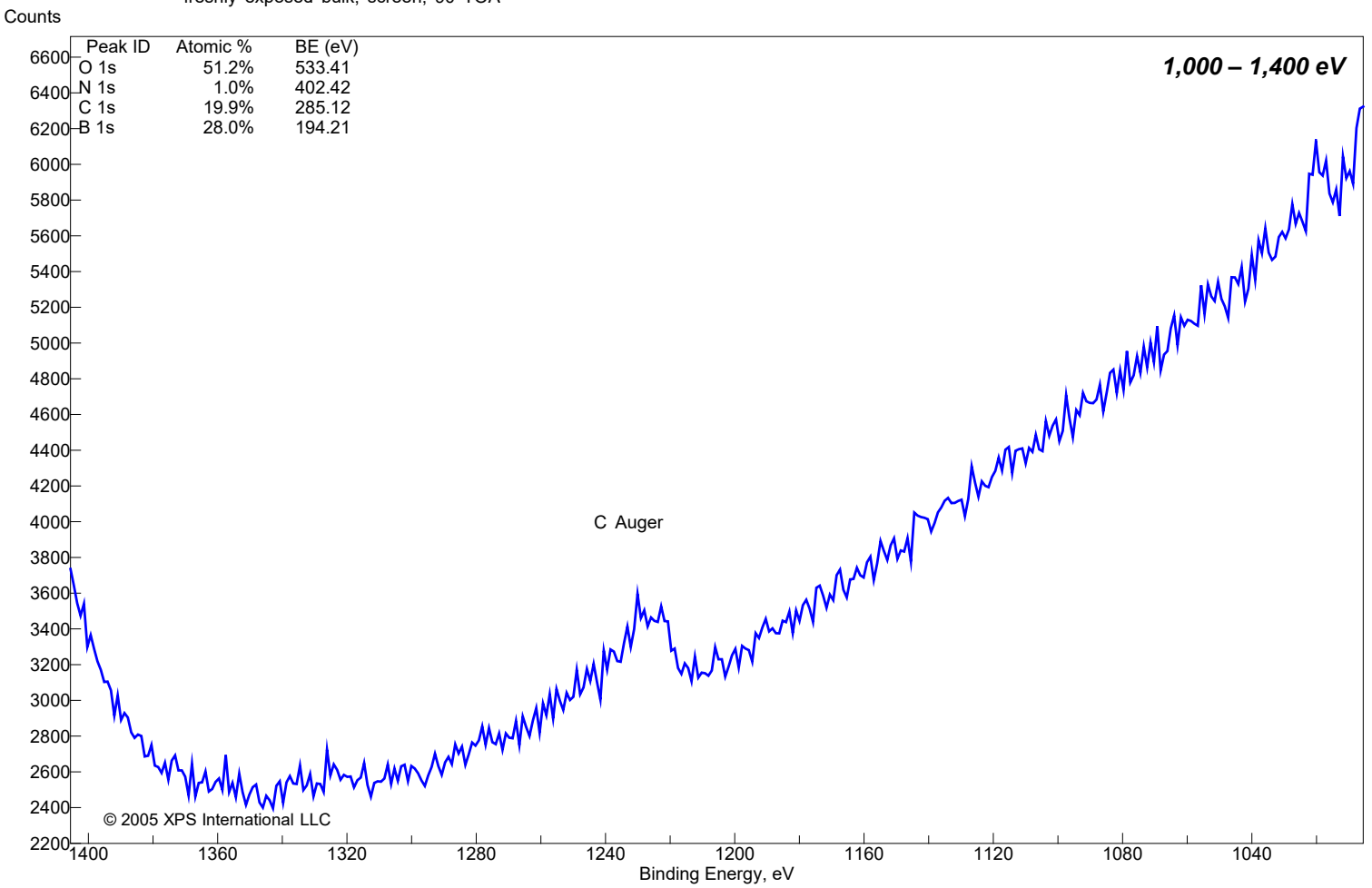
Sample Description: B2O3 (99.999%) crystal, Aldrich Chem Co., Lot# 02829BV
freshly exposed bulk, screen, 90 TOA



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Boron (III) Oxide (FW = 69.62)

Sample Description: B2O3 (99.999%) crystal, Aldrich Chem Co., Lot# 02829BV
freshly exposed bulk, screen, 90 TOA



$BaCO_3$

Barium (II) Carbonate (FW = 197.33)
Surface Composition Table

Description: $BaCO_3$ (99%) from Takeda Chem. Co., analyzed at 90 deg TOA, mesh at 1mm, non-conductive, ion-etched white powder pressed onto double sided tape, mp 811 C, d 4.43, sol in dilute HCl, acetic acid

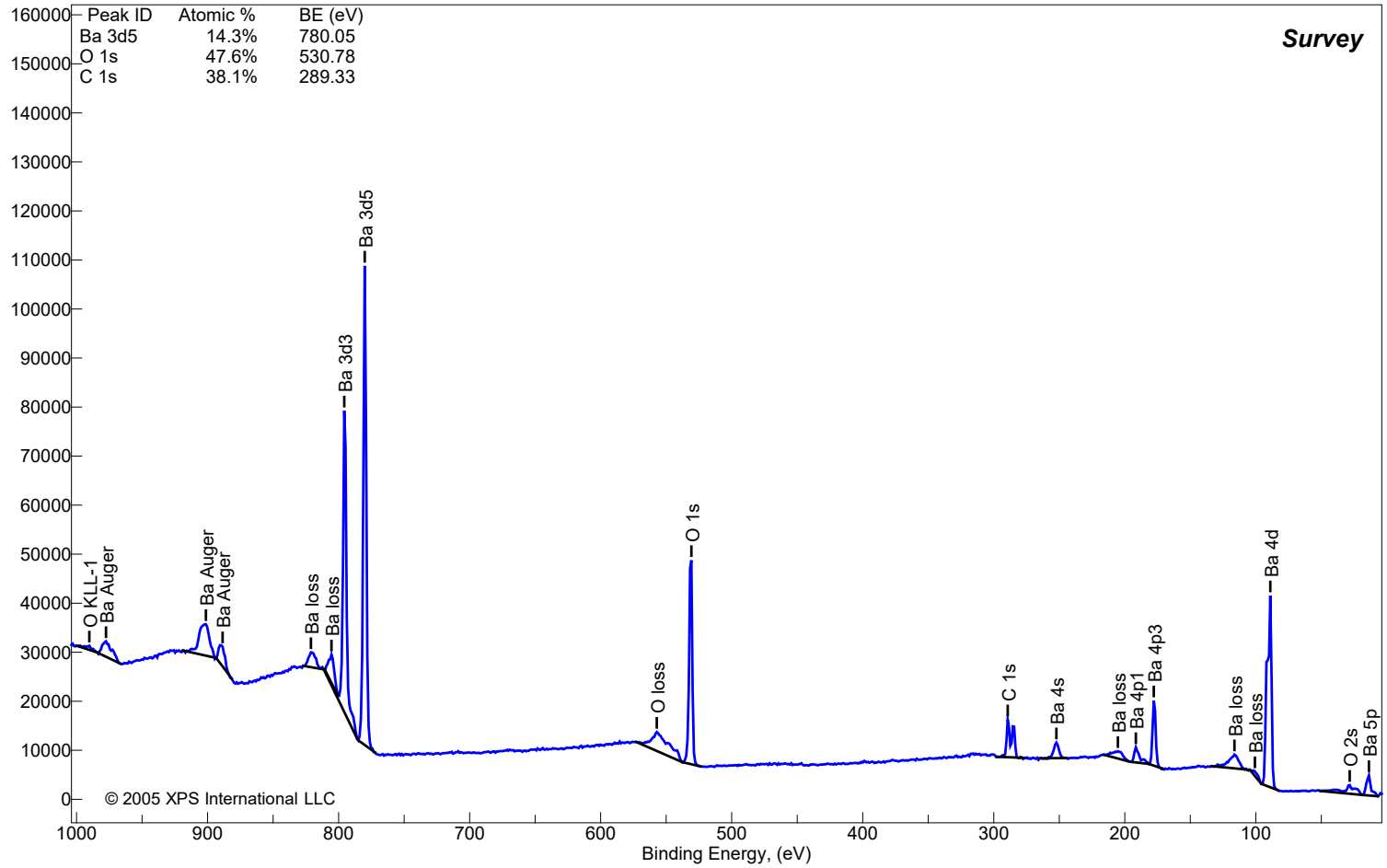
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Ba 5p	9.7	13.7	0.60	0.6	14,087	
O 2s	24.3	28.3	0.14	0.6	16,029	
Ba 4d	84.9	88.9	5.86	0.6	126,404	
Ba loss	96.7	100.7	0.00	0.6	3,987	
Ba loss	112.3	116.3	0.00	0.6	21,001	
Ba 4p3	173.9	177.9	2.73	0.6	31,102	
Ba 4p1	187.6	191.6	2.73	0.6	12,297	
Ba loss	201.3	205.3	0.00	0.6	11,815	
Ba 4s	248.2	252.2	1.13	0.6	12,022	
C 1s	285.3	289.3	1.00	0.6	31,178	38.1%
O 1s	526.8	530.8	2.93	0.6	99,714	47.6%
O loss	553.2	557.2	0.00	0.6	52,032	
Ba 3d5	776.0	780.0	25.84	0.6	219,761	14.3%
Ba 3d3	791.7	795.7	17.92	0.6	191,859	
Ba loss	801.5	805.5	0.00	0.6	24,083	
Ba loss	817.1	821.1	0.00	0.6	16,753	
Ba Auger	884.6	888.6	0.00	0.6	18,109	
Ba Auger	897.3	901.3	0.00	0.6	49,697	
Ba Auger	973.5	977.5	0.00	0.6	22,408	
O KLL-1	986.2	990.2	0.70	0.6	4,185	

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$BaCO_3$

Barium (II) Carbonate (FW = 197.33)

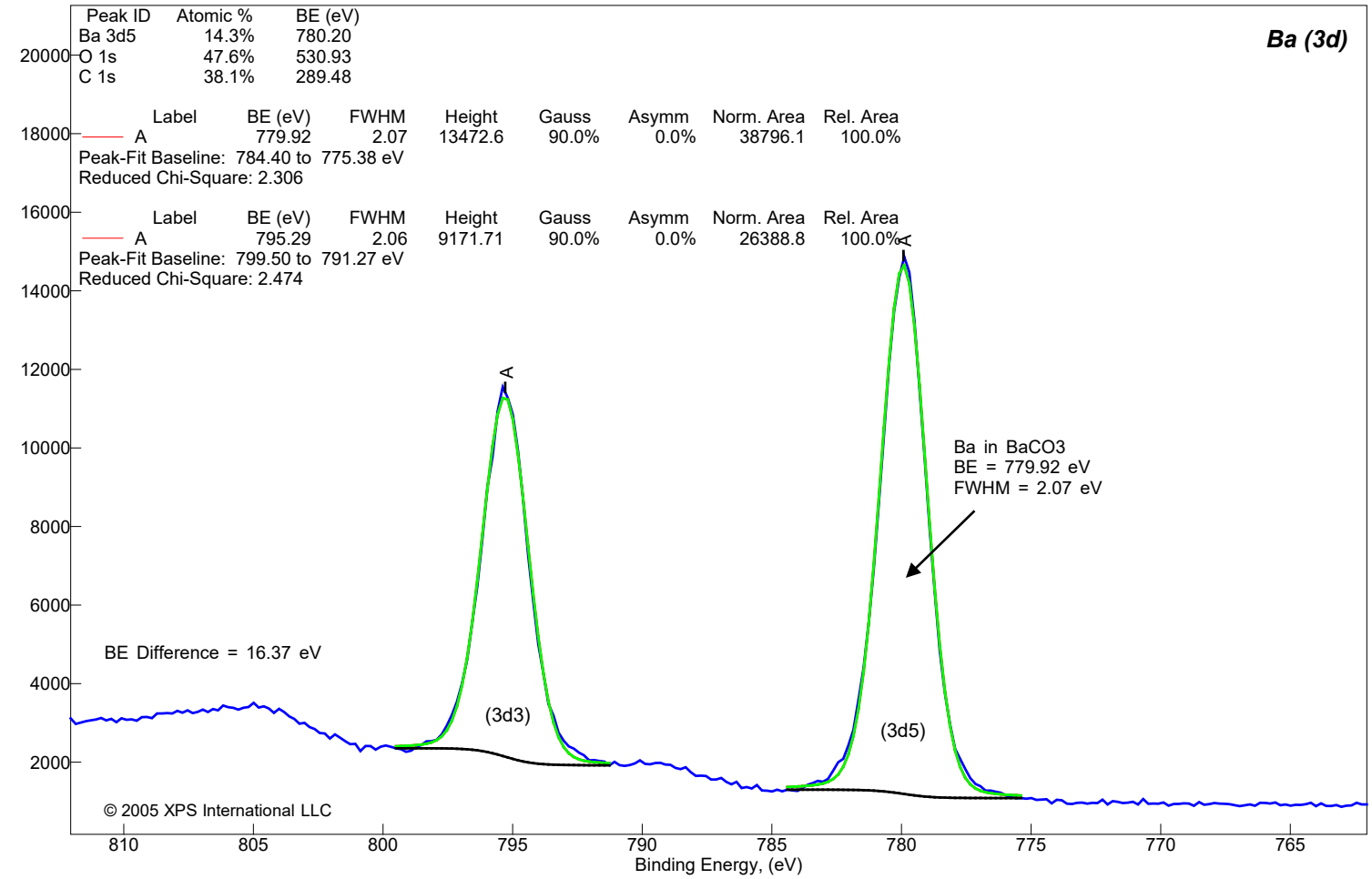
Sample Description: BaCO3
ion etched 10 min. at 4 keV, pressed onto double sided tape, 90 deg TOA



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Barium (II) Carbonate (FW = 197.33)

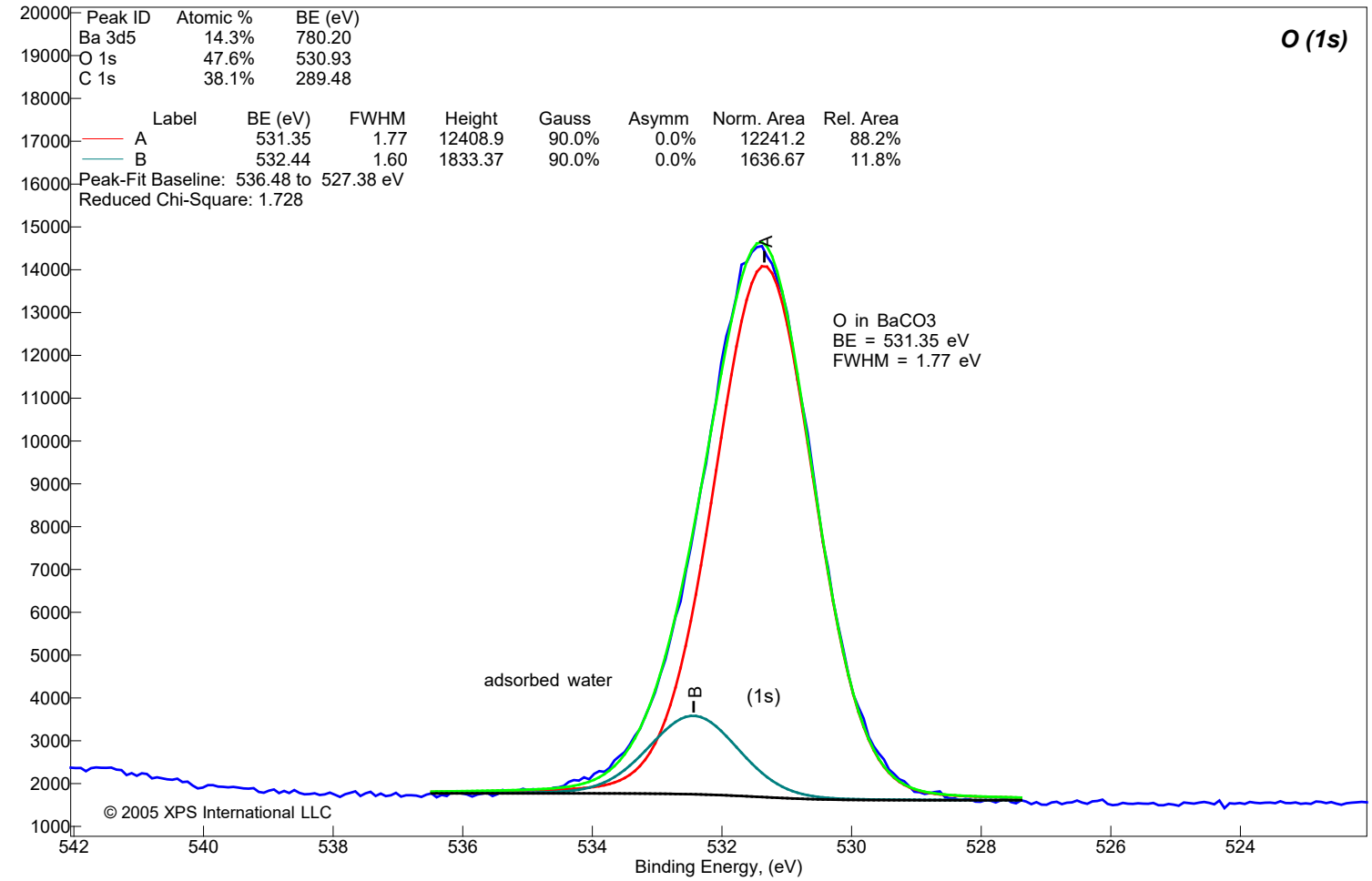
Sample Description: BARIUM CARBONATE (BaCO3) POWDER/DST (90 TOA, ETCHED 10 MIN AT 4 KeV)



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Barium (II) Carbonate (FW = 197.33)

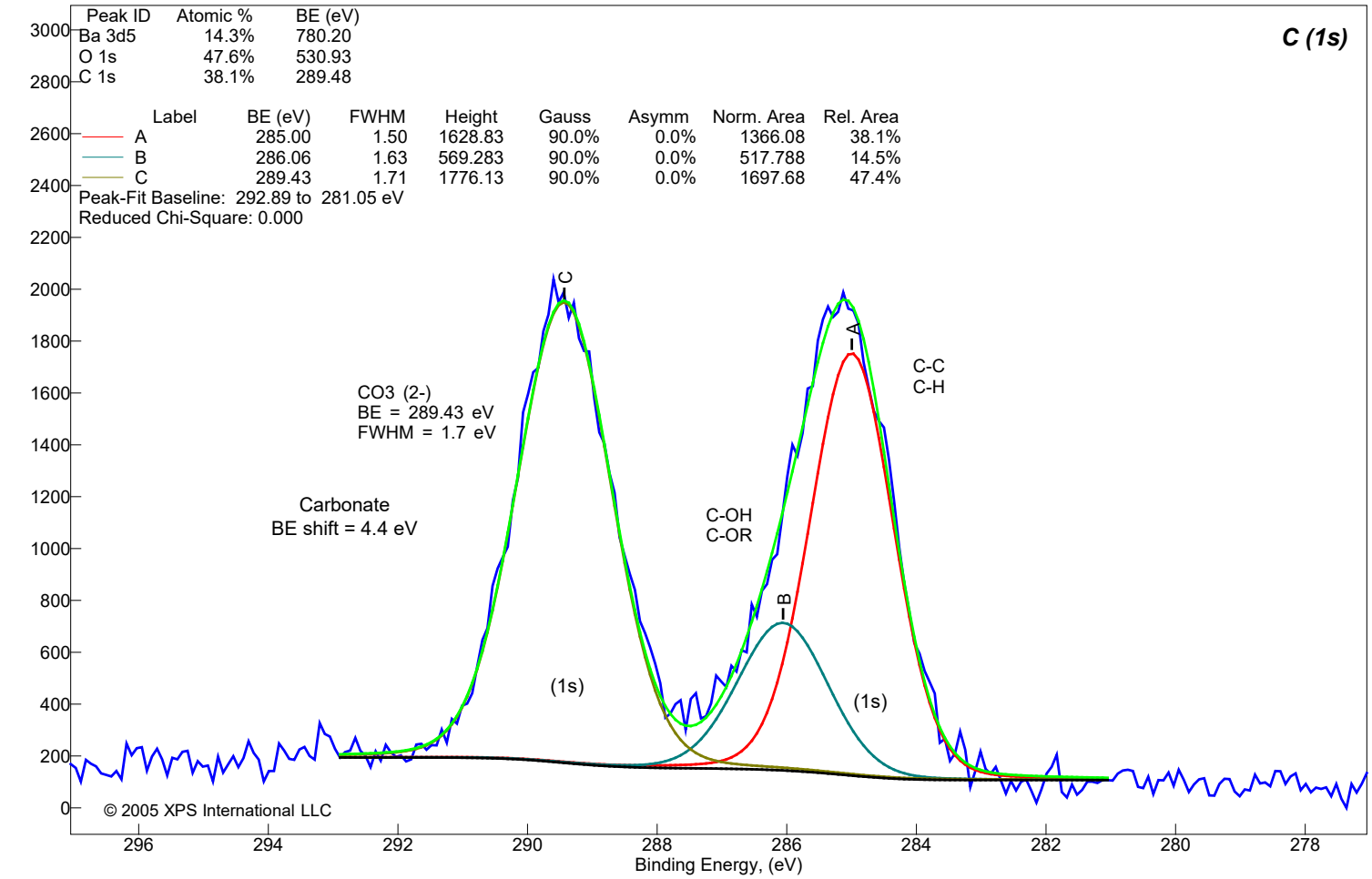
Sample Description: BARIUM CARBONATE (BaCO3) POWDER/DST (90 TOA, ETCHED 10 MIN AT 4 KeV)



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Barium (II) Carbonate (FW = 197.33)

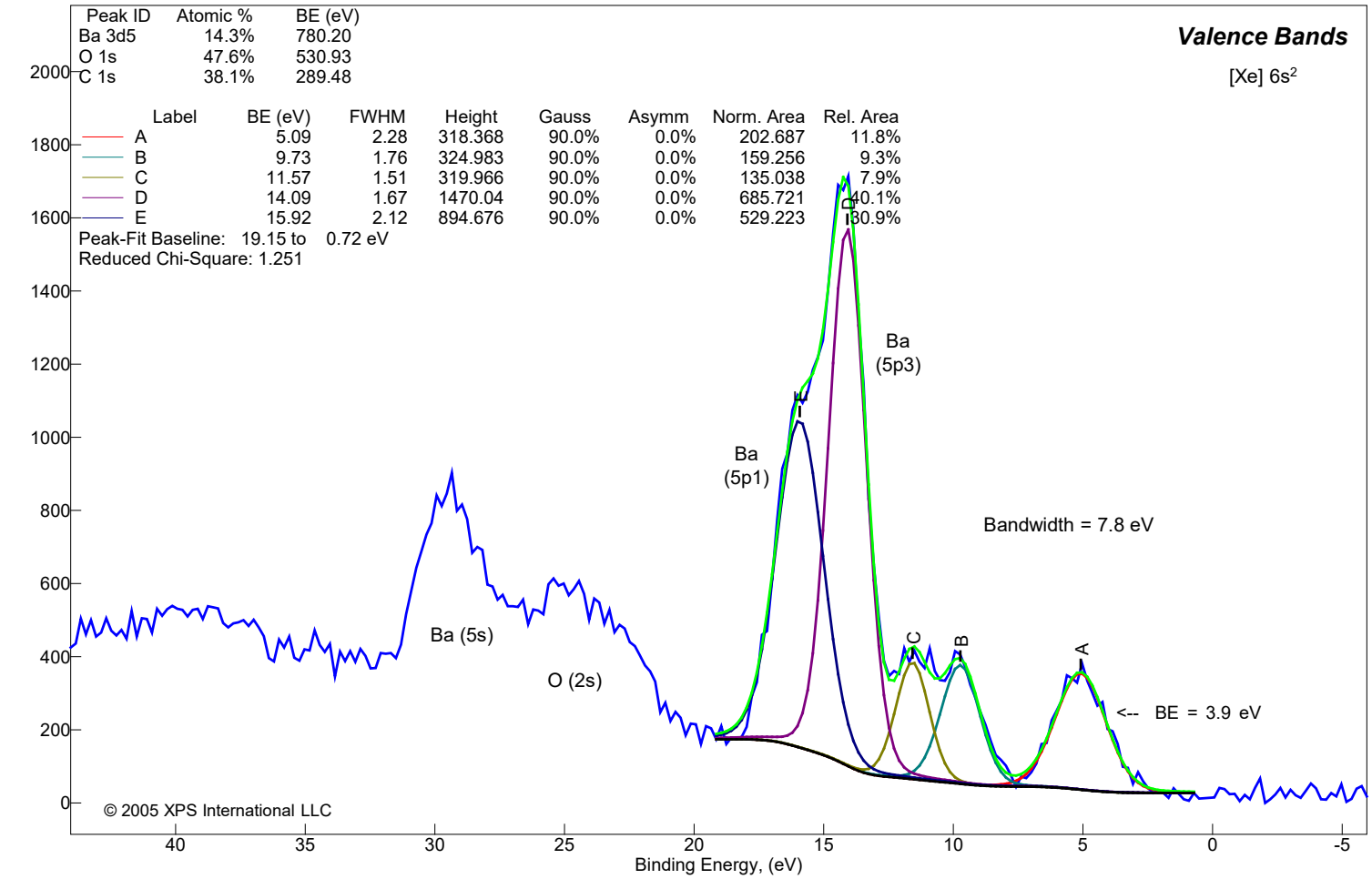
Sample Description: BARIUM CARBONATE (BaCO3) POWDER/DST (90 TOA, ETCHED 10 MIN AT 4 KeV)



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Barium (II) Carbonate (FW = 197.33)

Sample Description: BARIUM CARBONATE (BaCO3) POWDER/DST (90 TOA, ETCHED 10 MIN AT 4 KeV)

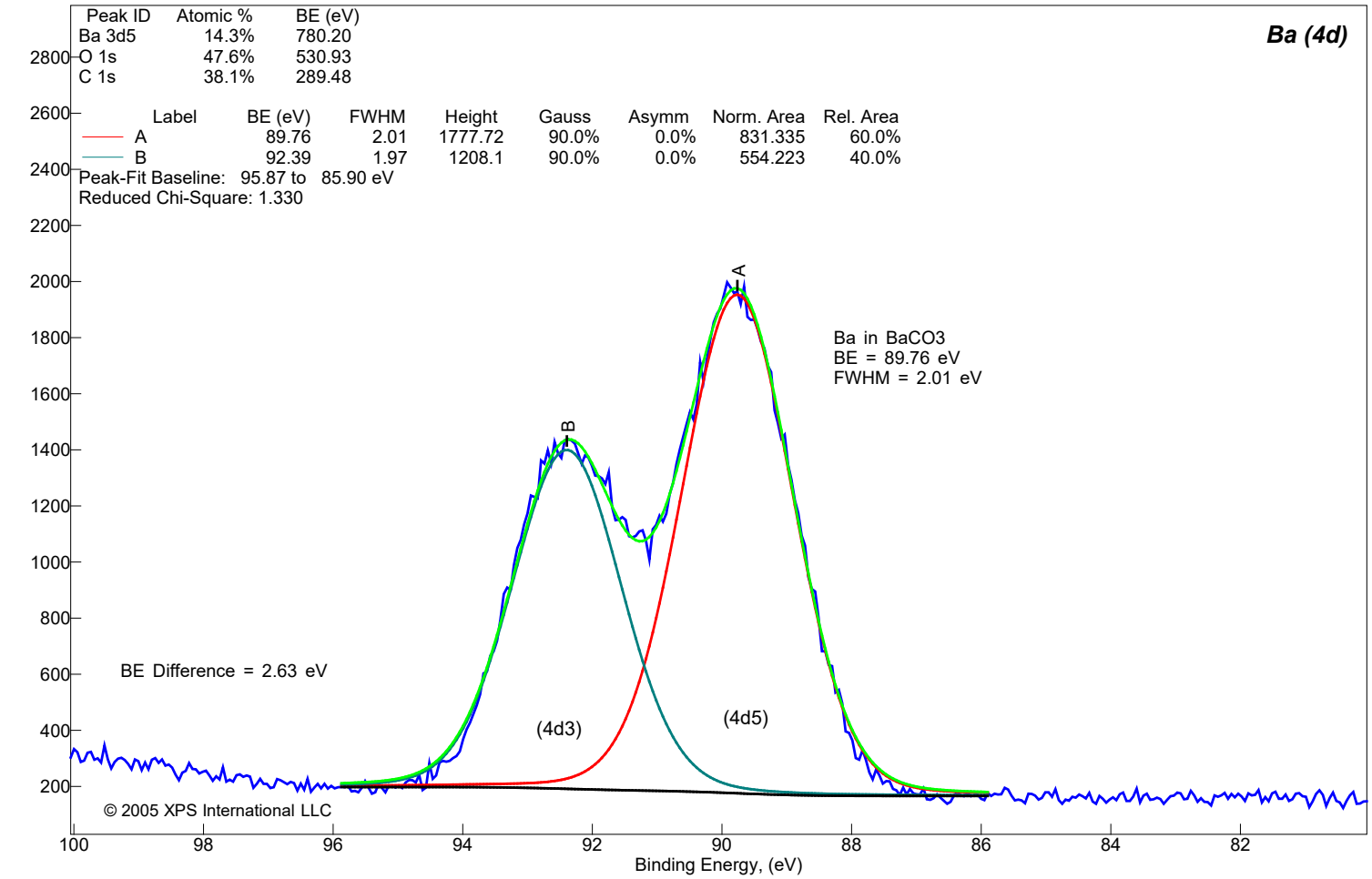


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$BaCO_3$

Barium (II) Carbonate (FW = 197.33)

Sample Description: BARIUM CARBONATE (BaCO3) POWDER/DST (90 TOA, ETCHED 10 MIN AT 4 KeV)



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BeO

Beryllium (II) Oxide (FW = 25.01)
Surface Composition Table

Description: BeO (99.99%) from Aldrich Lot# 00213JX, analyzed at 90 deg TOA, mesh at 1mm, non-conductive white powder pressed into 3 mm pellet, mp 2575 C, d 3.01, sol in conc. HCl

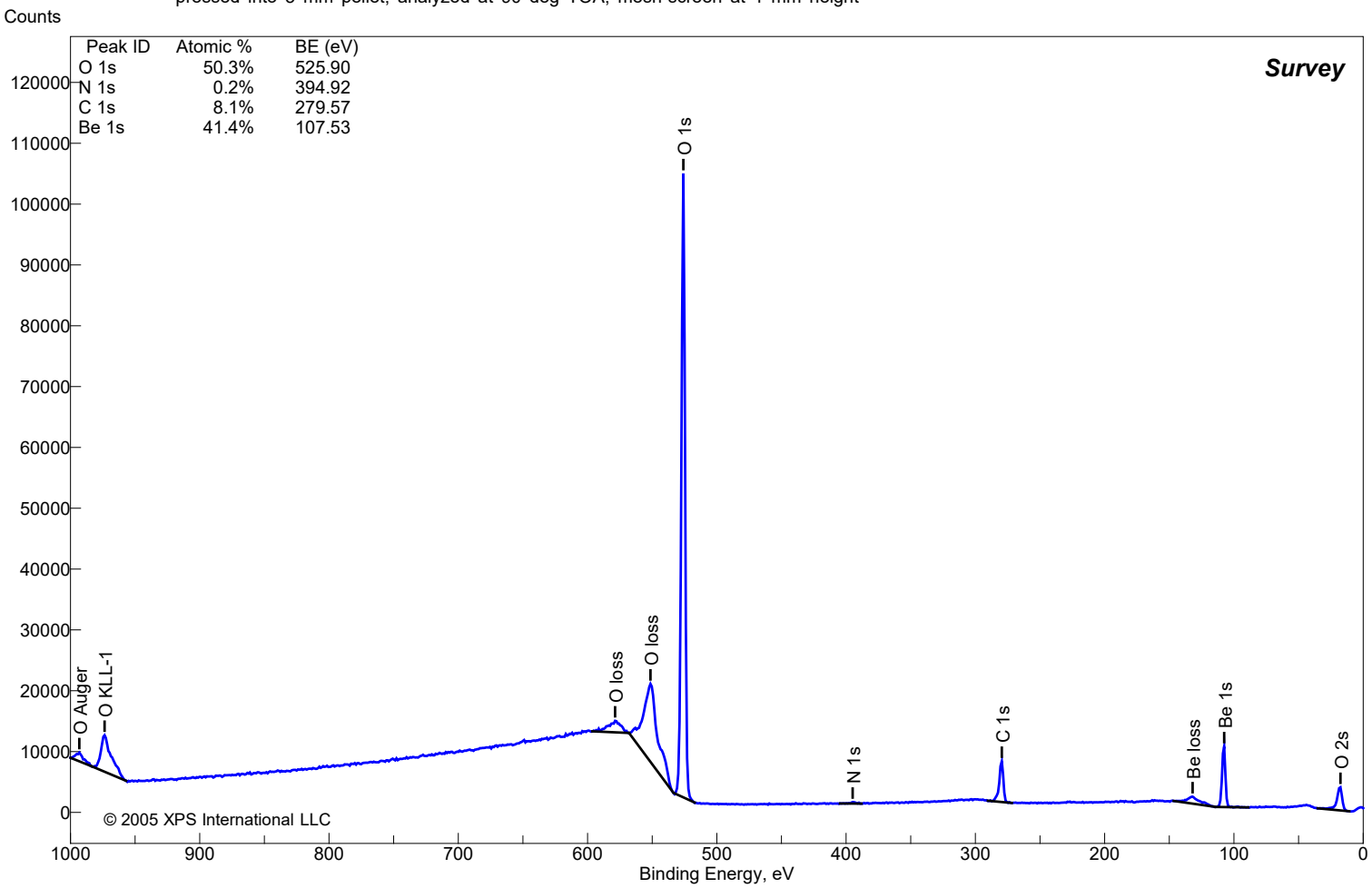
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	23.6	17.6	0.14	1.4	9,540	
Be 1s	113.5	107.5	0.20	1.4	15,449	41.4%
Be loss	138.0	132.0	0.00	1.4	6,774	
C 1s	285.6	279.6	1.00	1.4	12,865	8.1%
N 1s	400.9	394.9	1.80	1.4	457	0.2%
O 1s	531.9	525.9	2.93	1.4	170,492	50.3%
O loss	557.3	551.3	0.00	1.4	84,436	
O loss	584.7	578.7	0.00	1.4	11,488	
O KLL-1	979.6	973.6	0.70	1.4	28,269	
O Auger	999.2	993.2	0.00	1.4	4,973	

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BeO

Beryllium (II) Oxide (FW = 25.01)

Sample Description: BeO (99.99%) from Aldrich Lot# 00213JX
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height

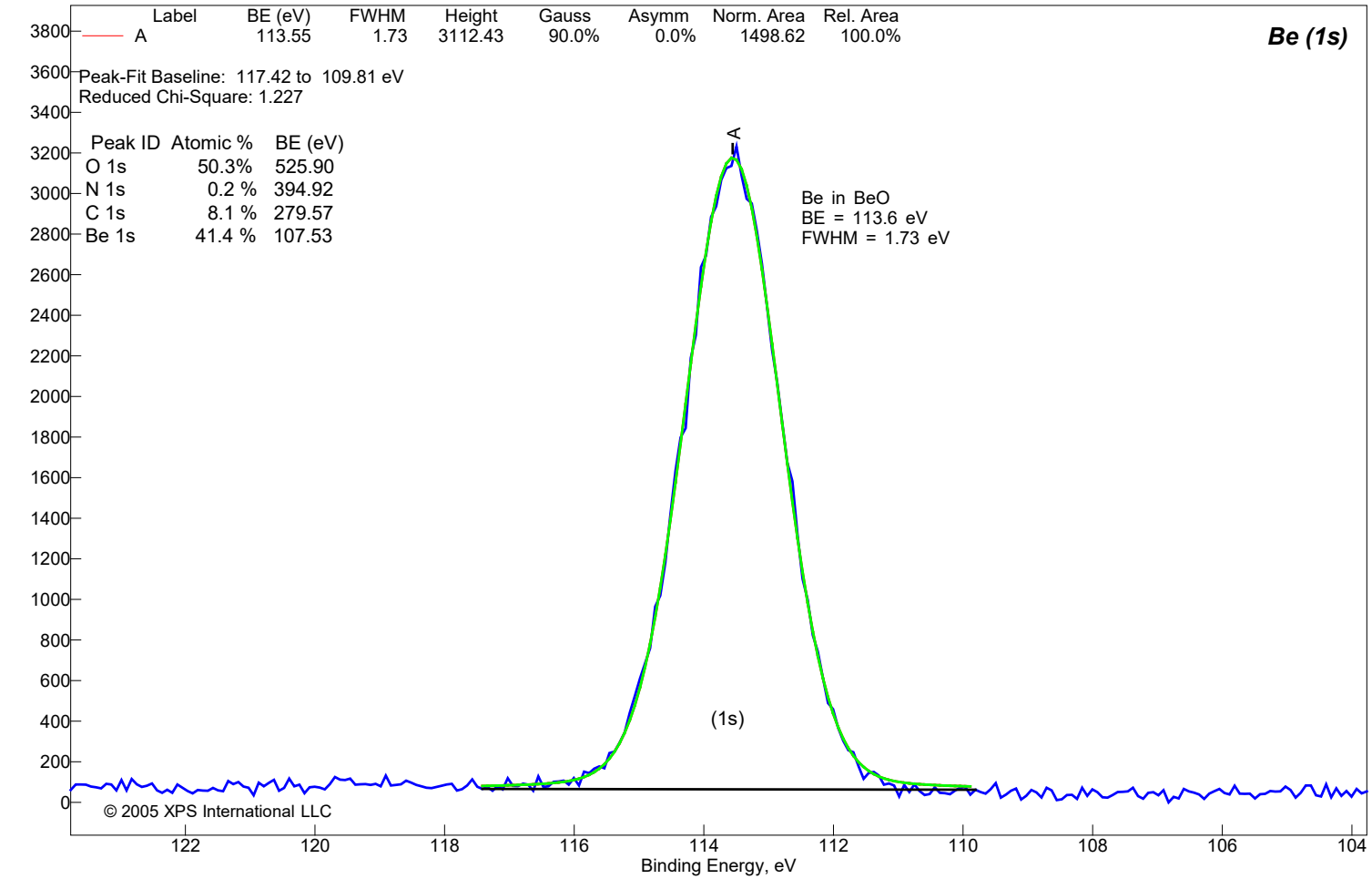


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BeO

Beryllium (II) Oxide (FW = 25.01)

Sample Description: BeO (99.99%) 3mm pellet, Aldrich lot# 00213JX, screen, 90 TOA

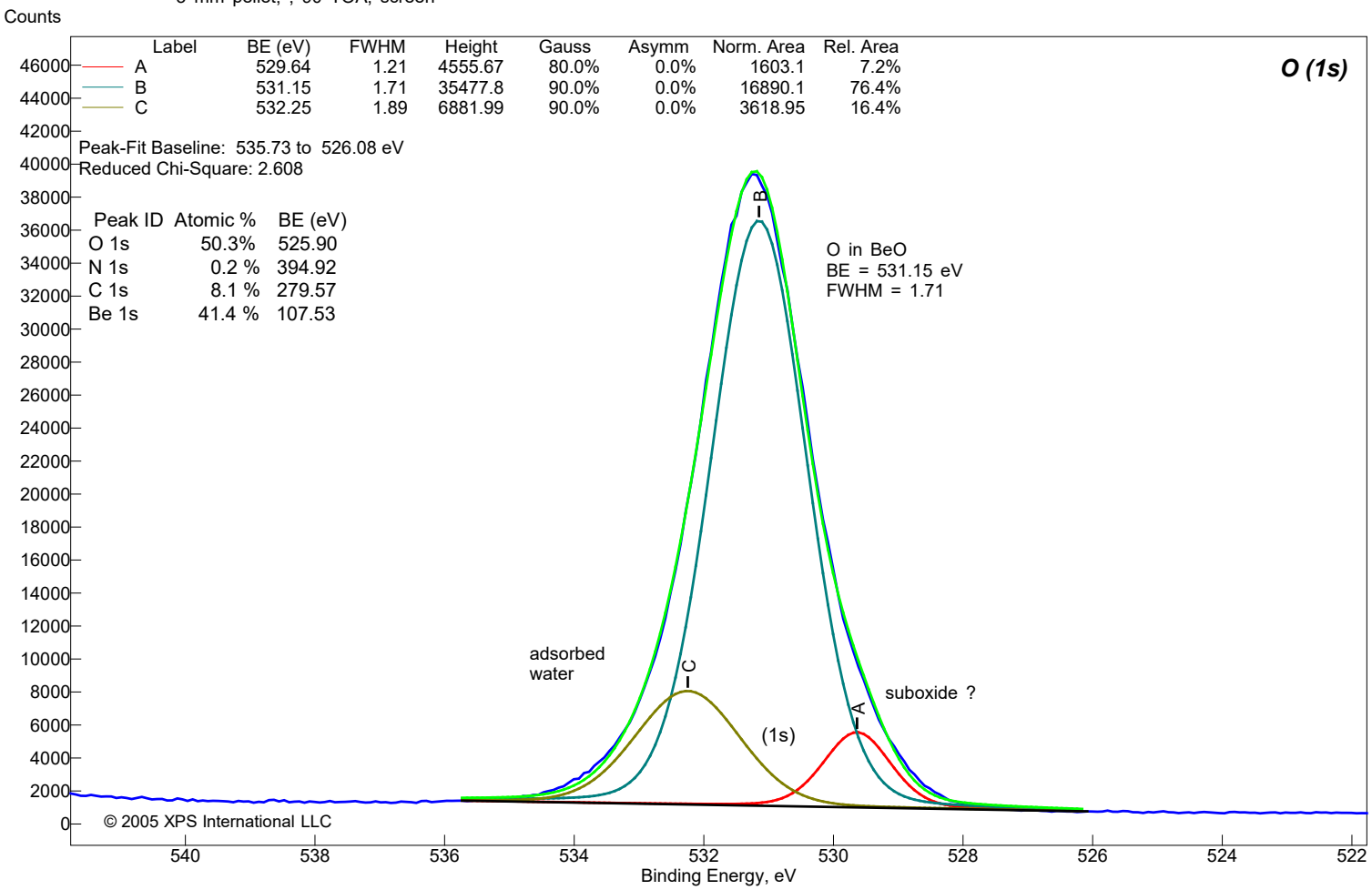


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BeO

Beryllium (II) Oxide (FW = 25.01)

Sample Description: BeO (99.99%) Aldrich Chem Co. Lot# 00213JX
3 mm pellet, , 90 TOA, screen

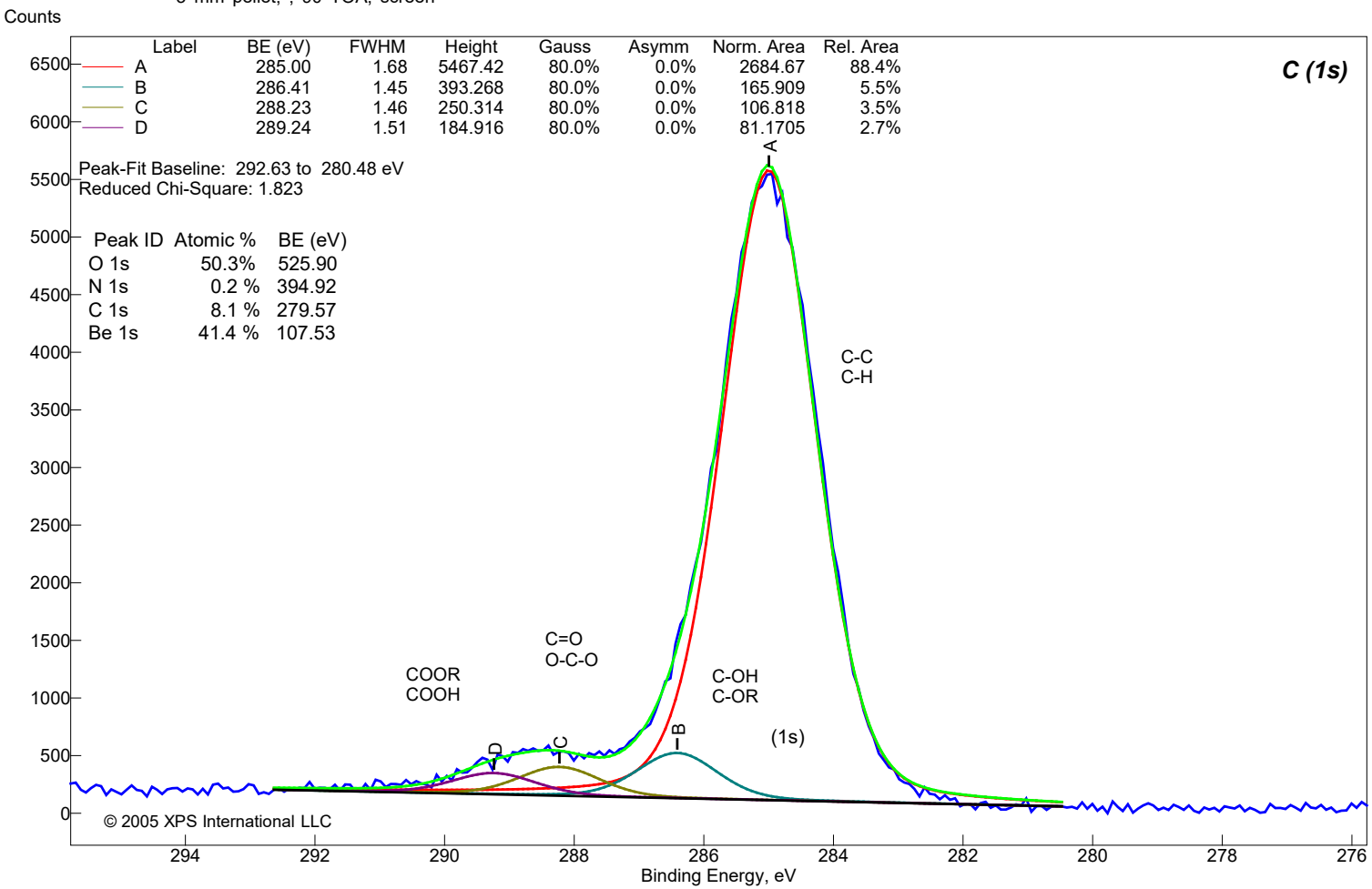


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BeO

Beryllium (II) Oxide (FW = 25.01)

Sample Description: BeO (99.99%) Aldrich Chem Co. Lot# 00213JX
3 mm pellet, , 90 TOA, screen

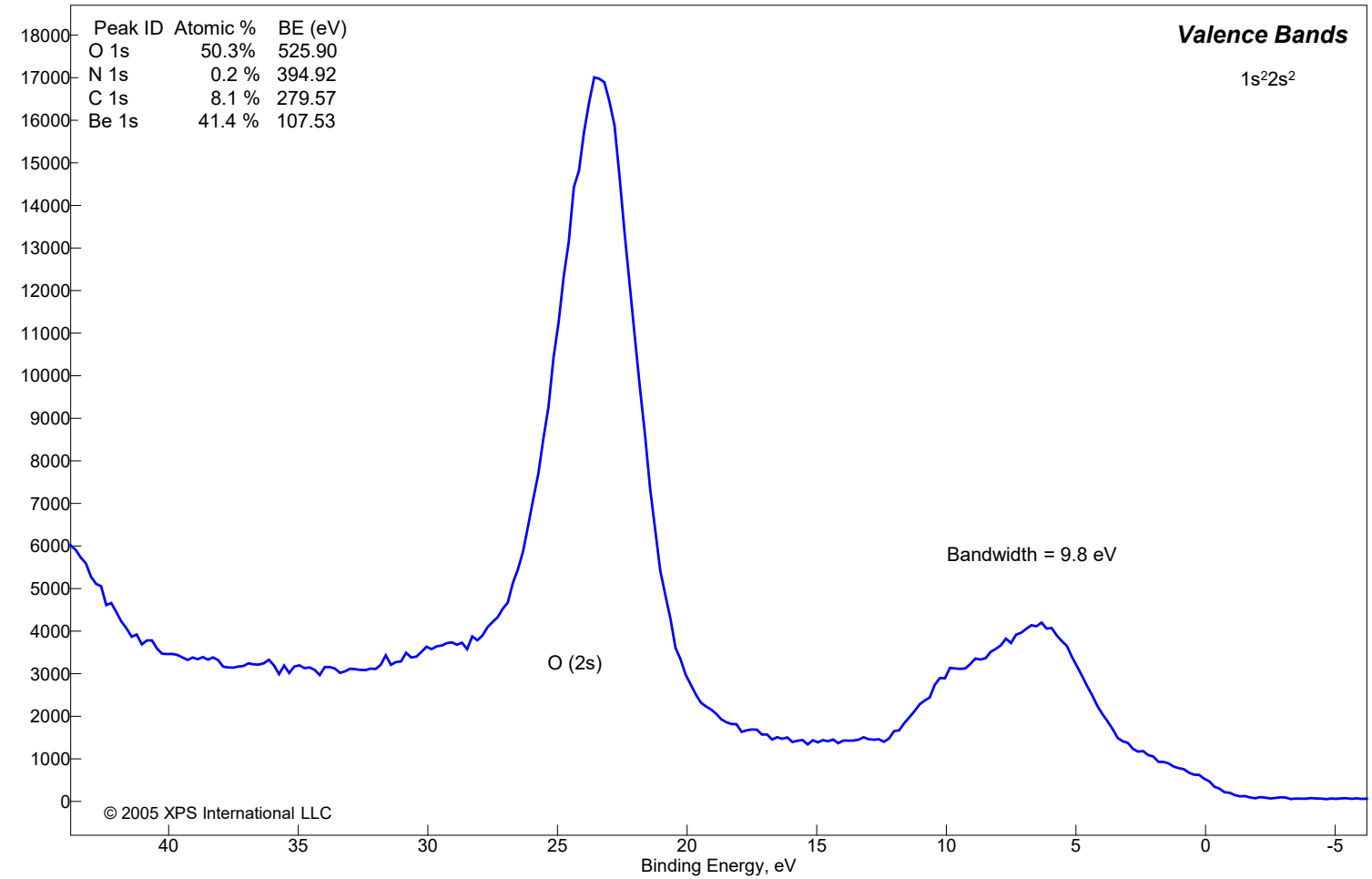


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BeO

Beryllium (II) Oxide (FW = 25.01)

Sample Description: BeO (99.99%) 3mm pellet, Aldrich lot# 00213JX, screen, 90 TOA

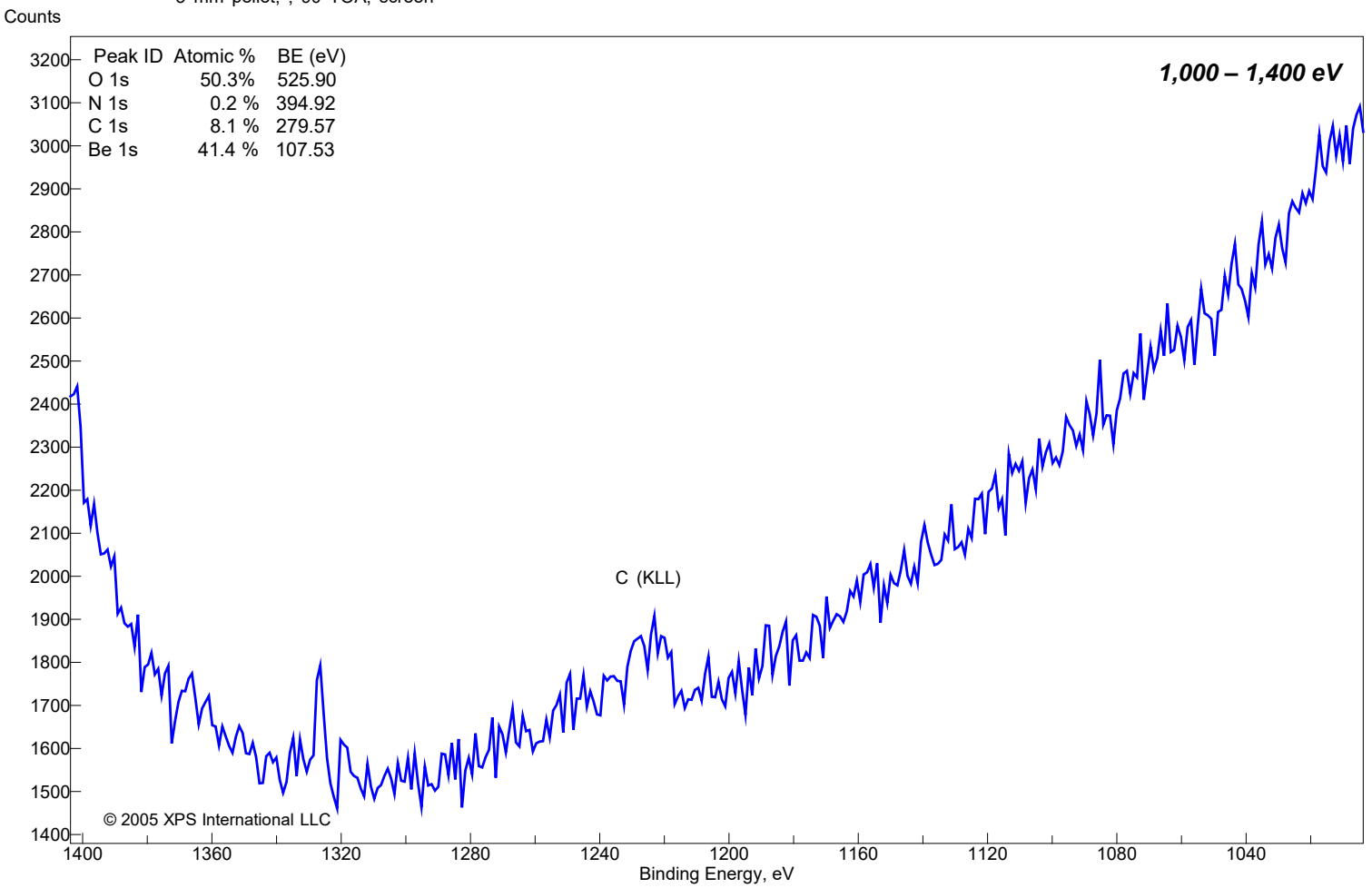


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BeO

Beryllium (II) Oxide (FW = 25.01)

Sample Description: BeO (99.99%) Aldrich Chem Co. Lot# 00213JX
3 mm pellet, , 90 TOA, screen



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Bi_2O_3

Bismuth (III) Oxide (FW = 465.96)
Surface Composition Table

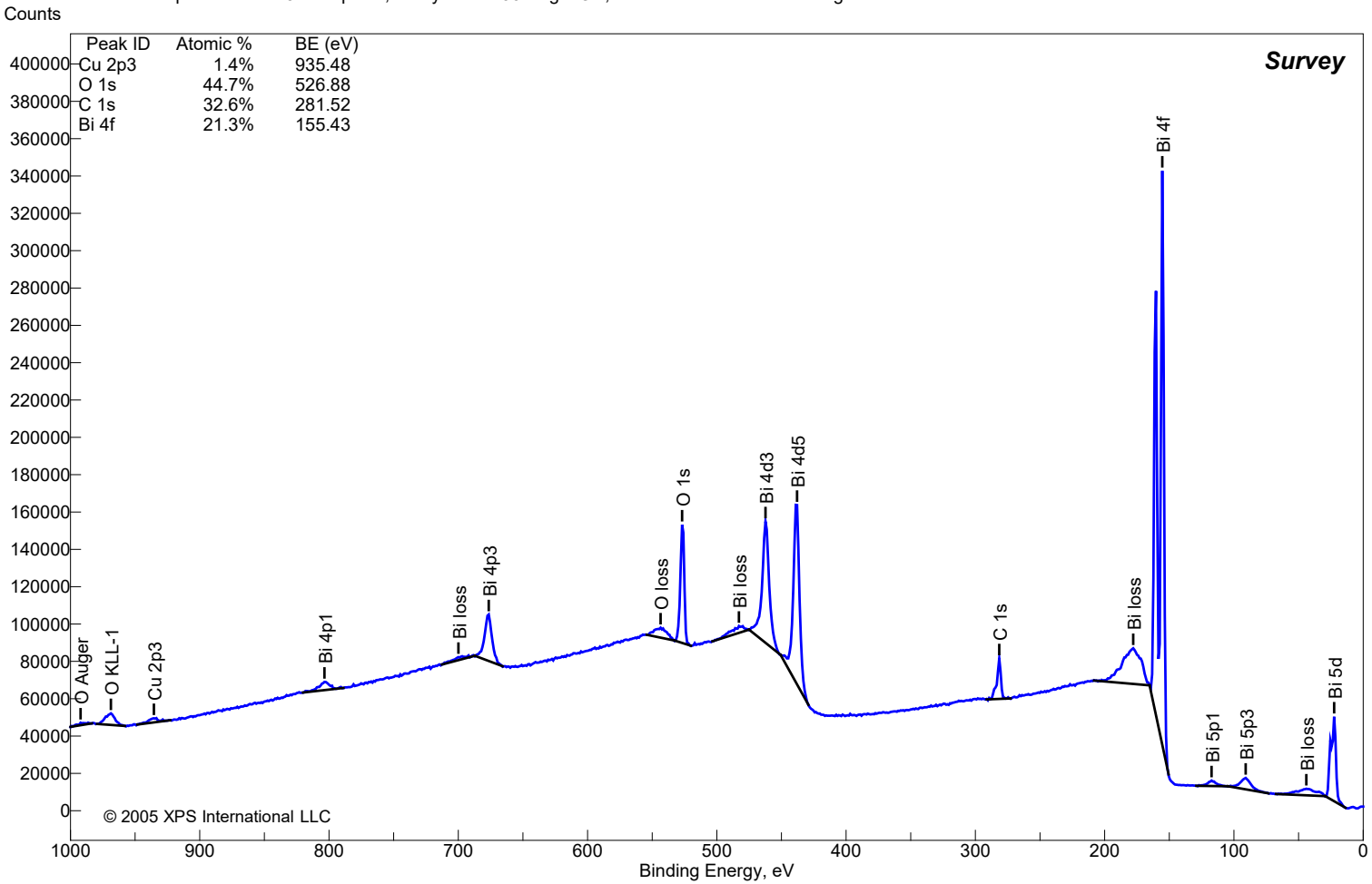
Description: Bi_2O_3 (99.999%) from Aldrich Lot# 04124HV, analyzed at 90 deg TOA, mesh at 1mm, non-conductive light gray powder pressed into 3 mm pellet, mp 817 C, d 8.9, sol in conc. HCl

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Bi 5d	26.5	22.5	3.00	1.4	35,545	
Bi loss	48.0	44.0	0.00	1.4	10,987	
Bi 5p3	94.9	90.9	1.41	1.4	10,114	
Bi 5p1	121.3	117.3	0.55	1.4	3,634	
Bi 4f	159.4	155.4	24.83	1.4	244,679	21.3%
Bi loss	181.9	177.9	0.00	1.4	54,750	
C 1s	285.5	281.5	1.00	1.4	13,159	32.6%
Bi 4d5	441.9	437.9	13.44	1.4	92,094	
Bi 4d3	466.4	462.4	9.14	1.4	71,944	
Bi loss	486.9	482.9	0.00	1.4	7,298	
O 1s	530.9	526.9	2.93	1.4	38,450	44.7%
O loss	547.5	543.5	0.00	1.4	10,382	
Bi 4p3	680.4	676.4	6.48	1.4	29,486	
Bi loss	703.9	699.9	0.00	1.4	3,584	
Bi 4p1	807.5	803.5	2.10	1.4	7,770	
Cu 2p3	939.5	935.5	16.73	1.4	3,084	1.4%
O KLL-1	972.7	968.7	0.70	1.4	9,070	
O Auger	996.2	992.2	0.00	1.4	1,843	

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Bismuth (III) Oxide (FW = 465.96)

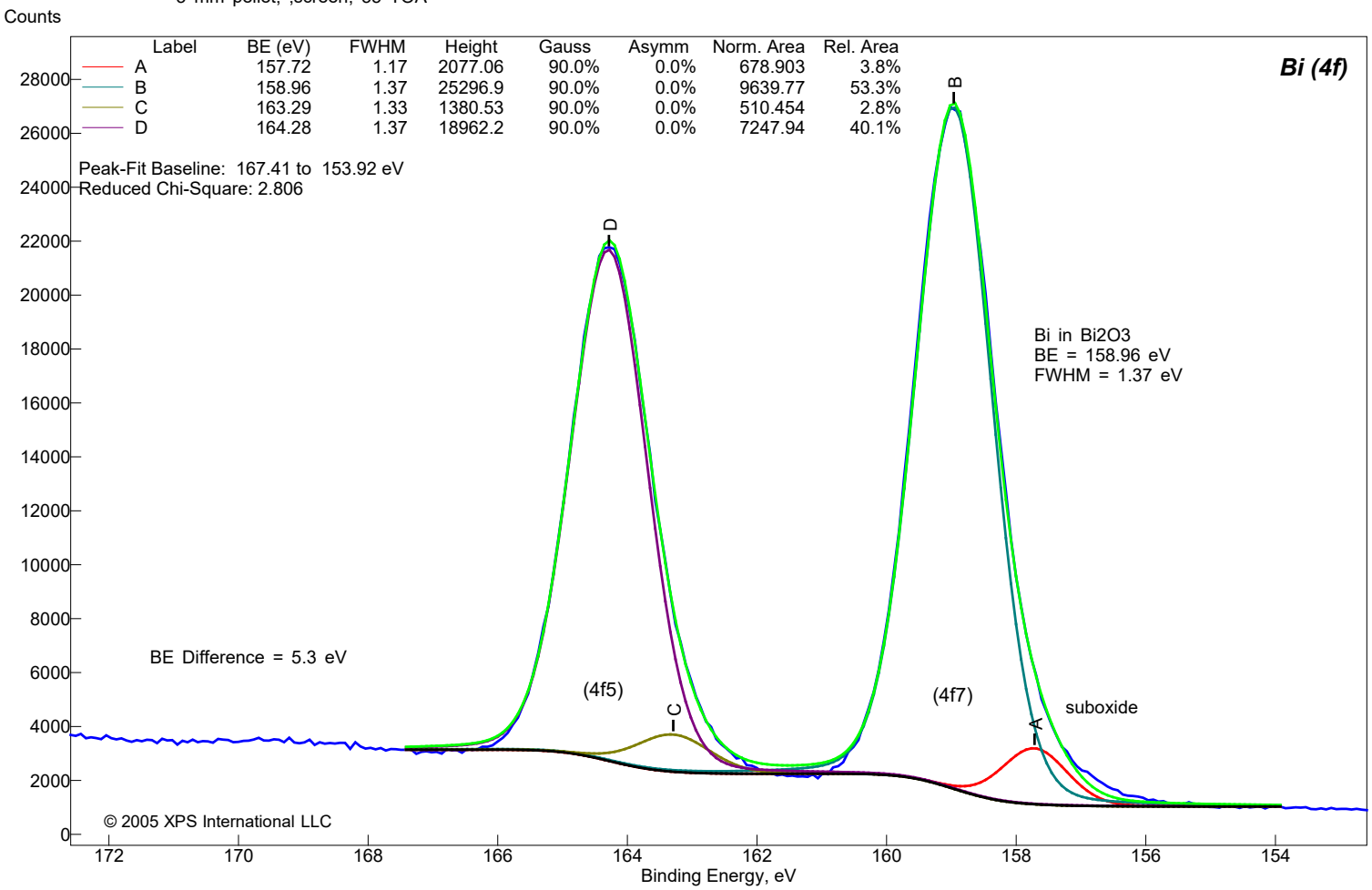
Sample Description: Bi2O3 (99.999%) from Aldrich Chem. Co. Lot# 04124HV
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Bismuth (III) Oxide (FW = 465.96)

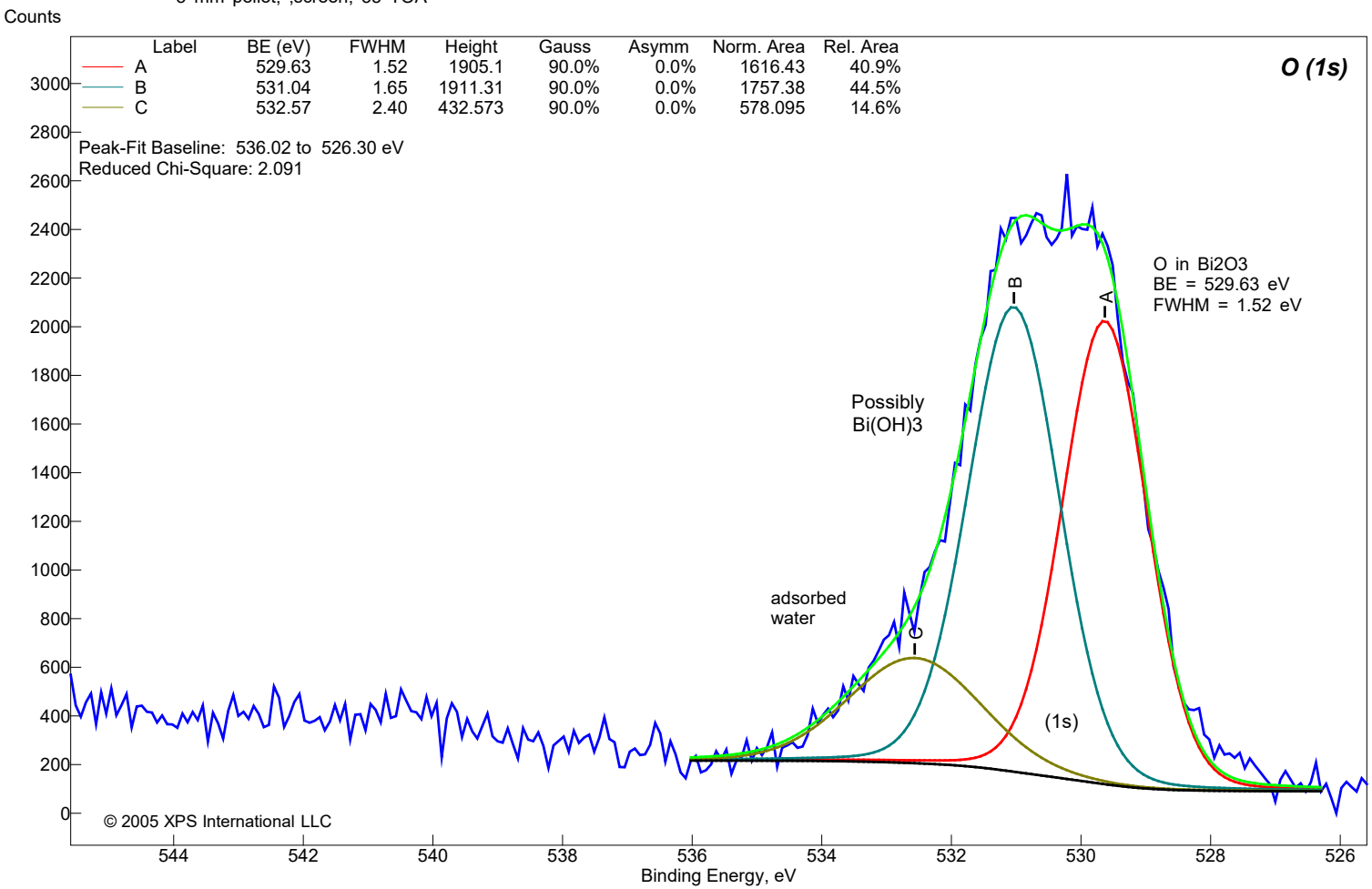
Sample Description: Bi2O3 (99.999%), Aldrich Chem Lot# 04124HV
3 mm pellet, ,screen, 35 TOA



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Bismuth (III) Oxide (FW = 465.96)

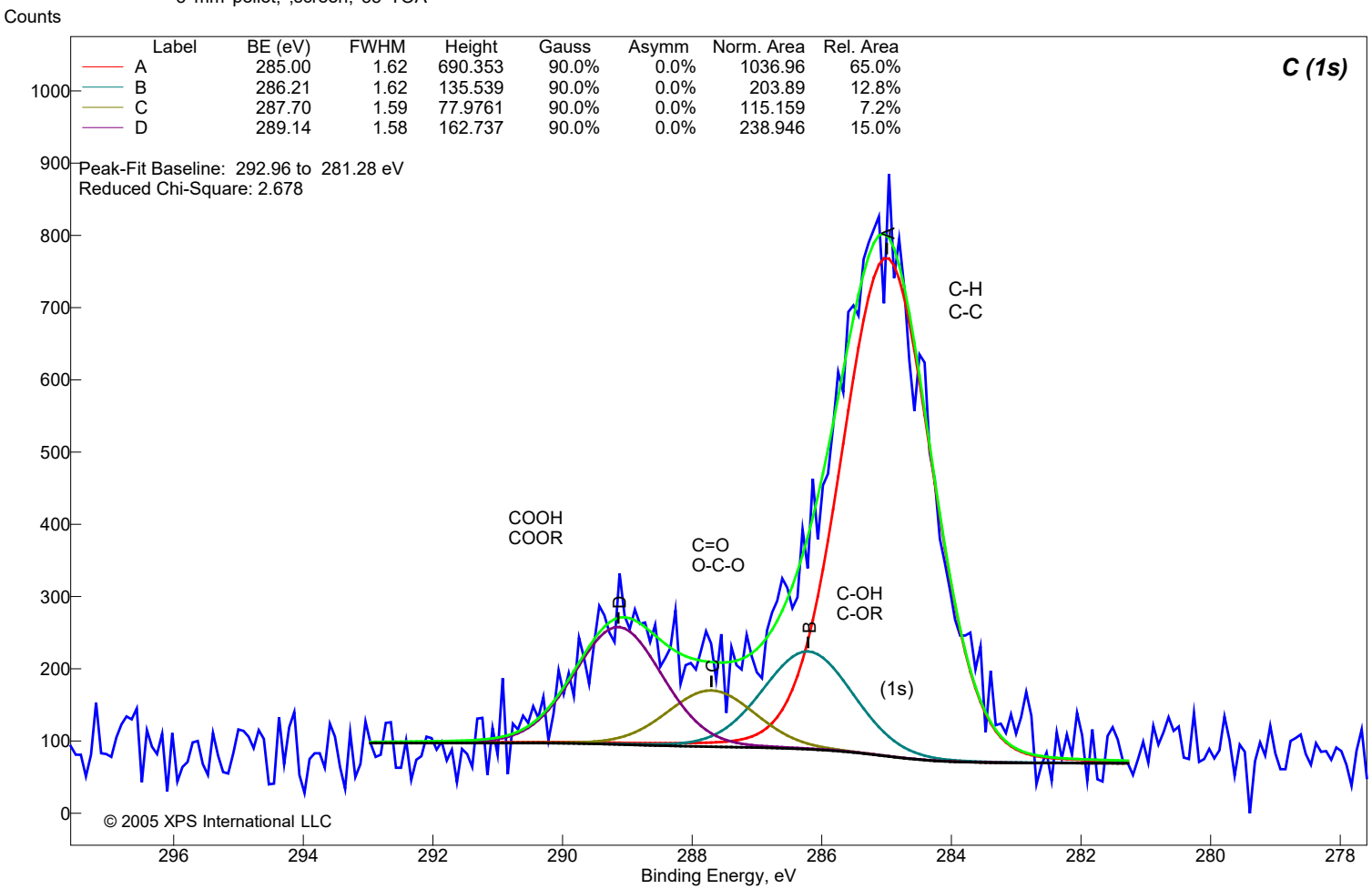
Sample Description: Bi2O3 (99.999%), Aldrich Chem Lot# 04124HV
3 mm pellet, ,screen, 35 TOA



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Bismuth (III) Oxide (FW = 465.96)

Sample Description: Bi2O3 (99.999%), Aldrich Chem Lot# 04124HV
3 mm pellet, ,screen, 35 TOA

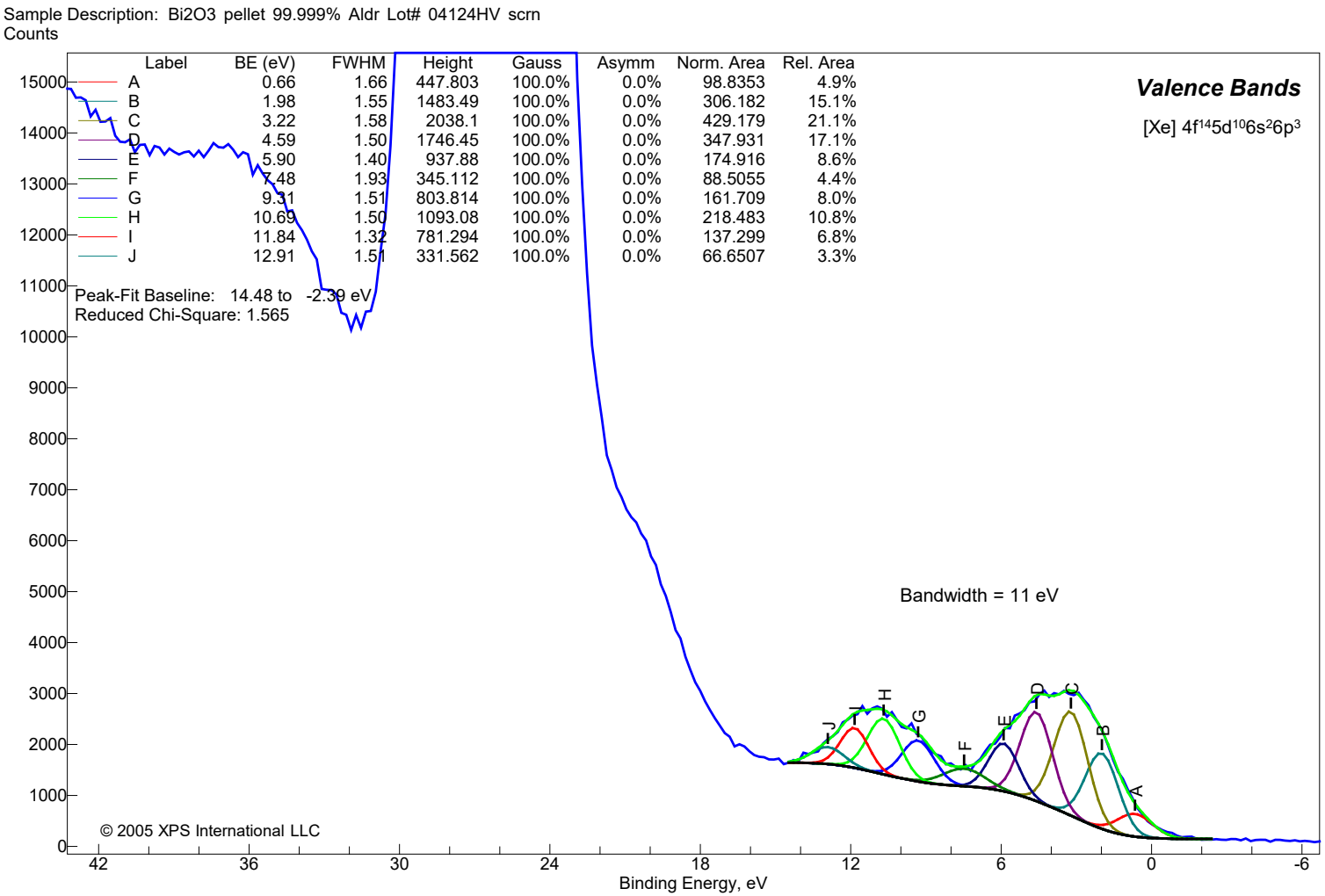


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Bi_2O_3

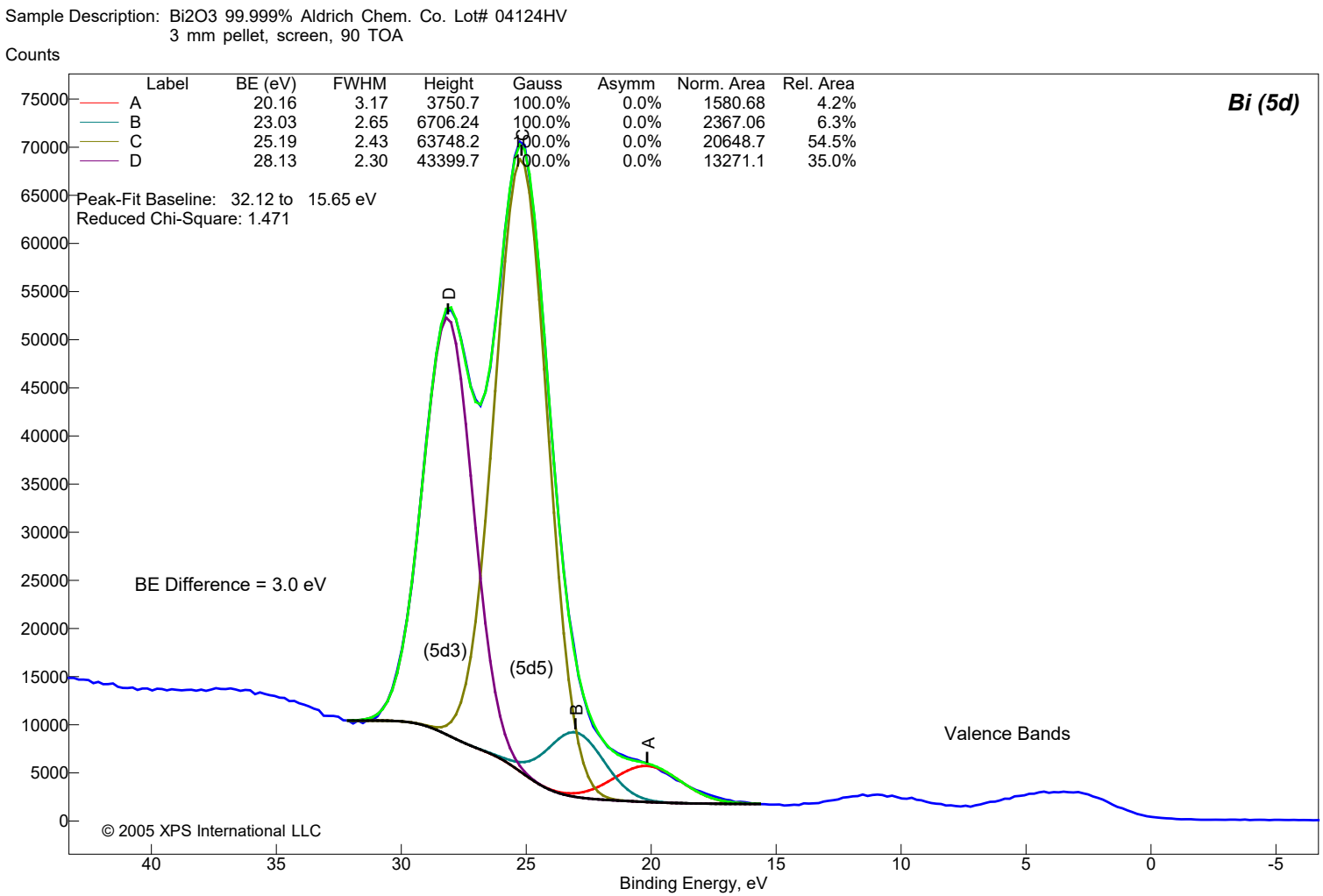
Bismuth (III) Oxide (FW = 465.96)

Sample Description: Bi2O3 pellet 99.999% Aldr Lot# 04124HV scrn



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Bismuth (III) Oxide (FW = 465.96)



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$(BiO)_2CO_3$

Bismuth (III) Carbonate Oxide (FW = 509.97)
Surface Composition Table

Description: $(BiO)_2CO_3$ (99%) from Aldrich, analyzed at 90 deg TOA, mesh at 1mm, non-conductive white powder pressed into 3 mm pellet, d 6.86, sol in conc. acids

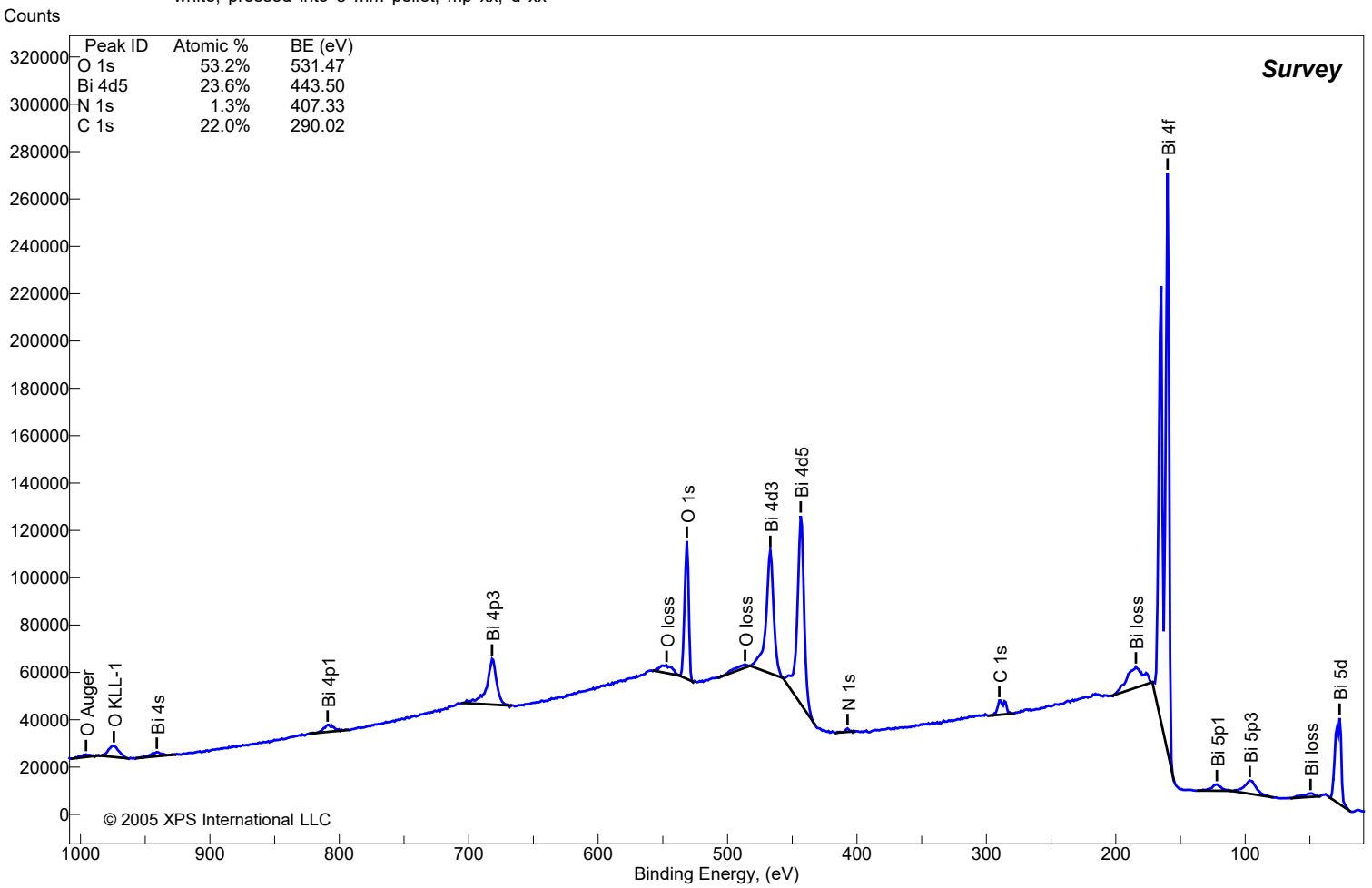
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Bi 5d	27.1	27.1	3.00	1.4	48,980	
Bi loss	49.6	49.6	0.00	1.4	4,686	
Bi 5p3	96.5	96.5	1.41	1.4	15,394	
Bi 5p1	121.9	121.9	0.55	1.4	5,381	
Bi 4f	160.0	160.0	24.83	1.4	336,231	
Bi loss	184.5	184.5	0.00	1.4	32,369	
C 1s	290.0	290.0	1.00	1.4	10,388	22.0%
N 1s	407.3	407.3	1.80	1.4	934	1.3%
Bi 4d5	443.5	443.5	13.44	1.4	123,353	23.6%
Bi 4d3	467.0	467.0	9.14	1.4	90,467	
O loss	486.5	486.5	0.00	1.4	4,607	
O 1s	531.5	531.5	2.93	1.4	53,676	53.2%
O loss	547.1	547.1	0.00	1.4	8,517	
Bi 4p3	682.0	682.0	6.48	1.4	42,249	
Bi 4p1	809.1	809.1	2.10	1.4	6,053	
Bi 4s	941.1	941.1	1.96	1.4	3,519	
O KLL-1	974.3	974.3	0.70	1.4	10,884	

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$(BiO)_2CO_3$

Bismuth (III) Carbonate Oxide (FW = 509.97)

Sample Description: (BiO)2CO3 (99%), from Aldrich Chem. Co., analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white, pressed into 3 mm pellet, mp xx, d xx

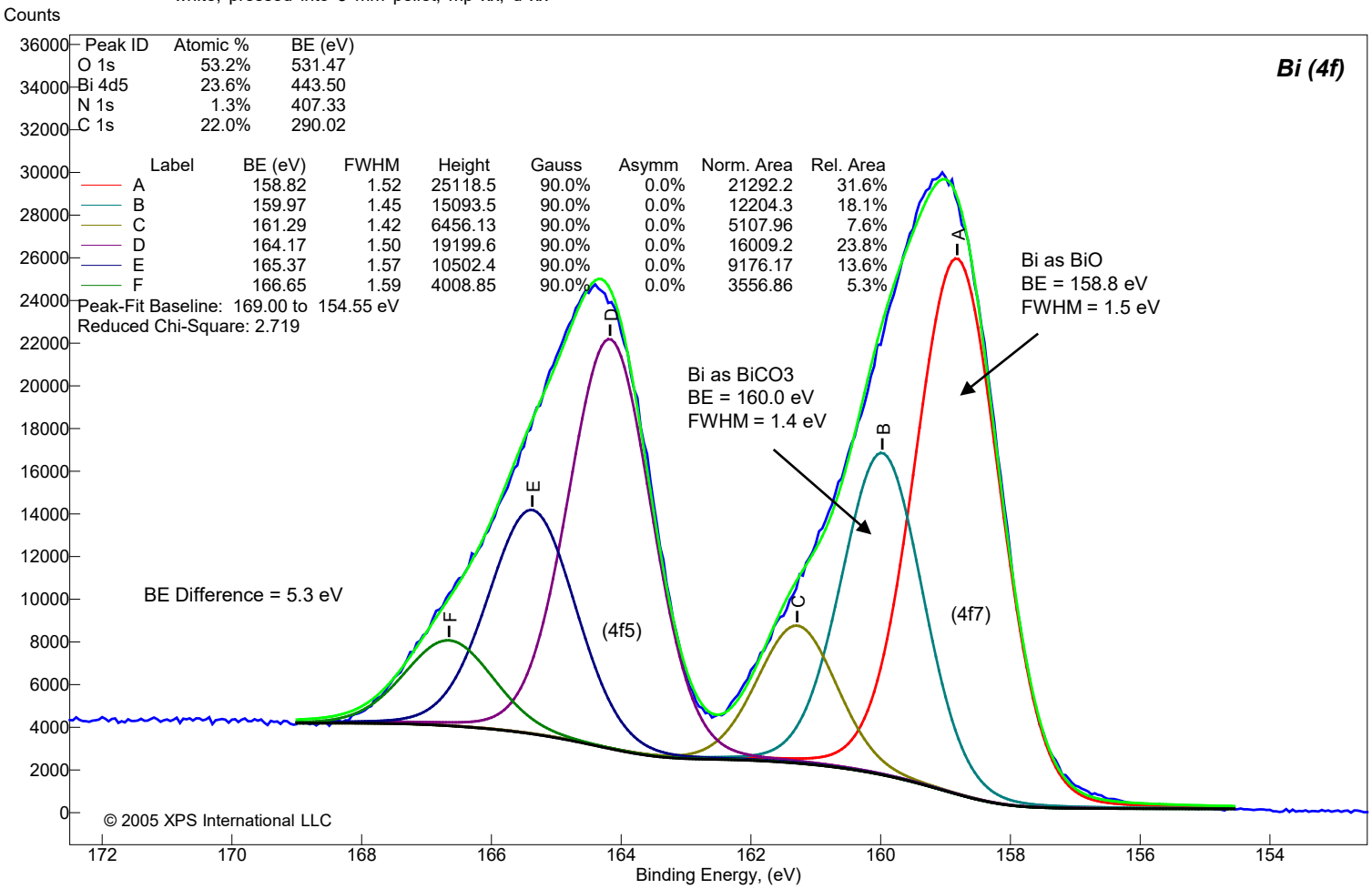


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$(BiO)_2CO_3$

Bismuth (III) Carbonate Oxide (FW = 509.97)

Sample Description: (BiO)2CO3 (99%), from Aldrich Chem. Co., analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white, pressed into 3 mm pellet, mp xx, d xx

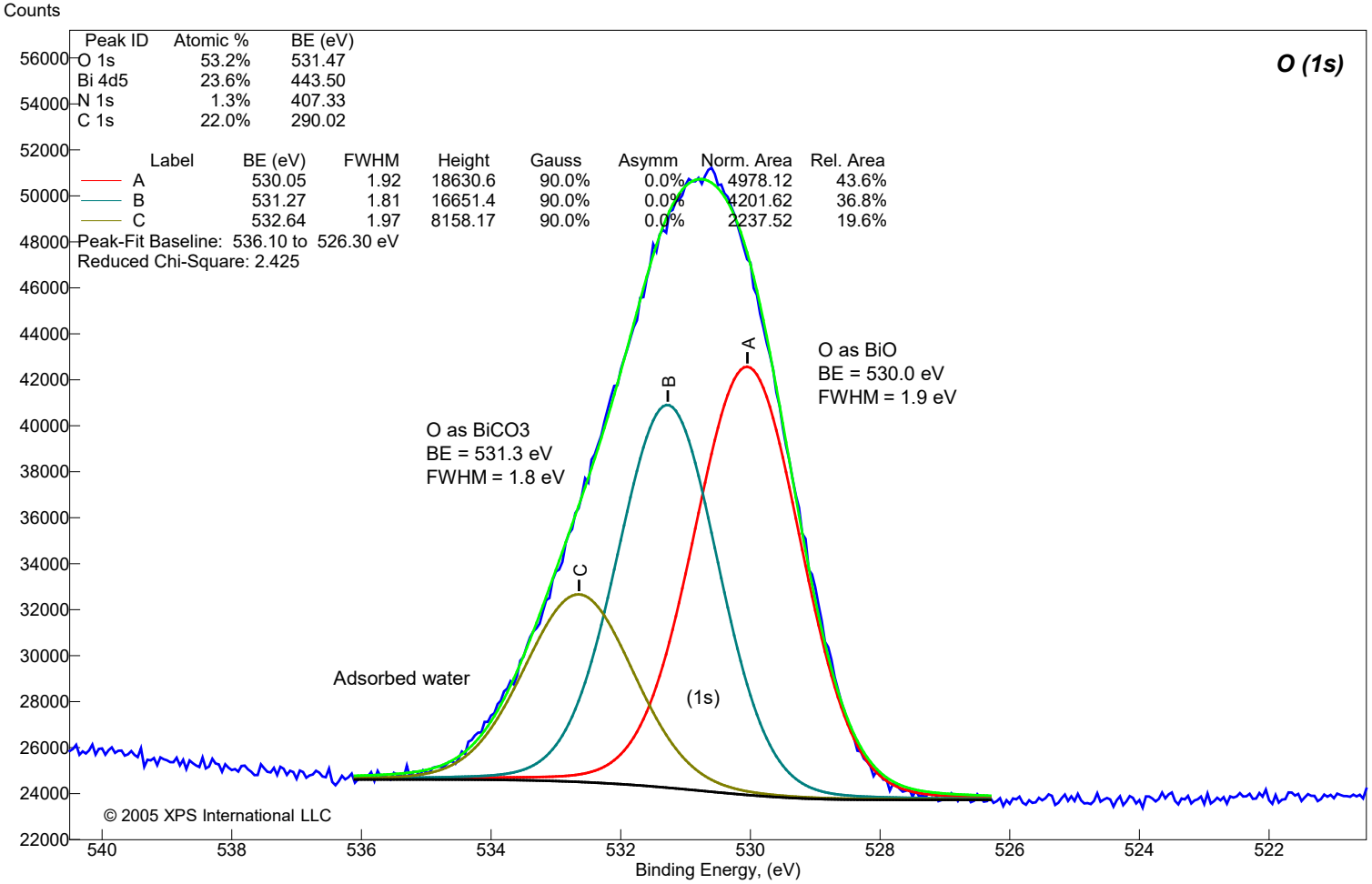


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$(BiO)_2CO_3$

Bismuth (III) Carbonate Oxide (FW = 509.97)

Sample Description: (BiO)2CO3 (99%), from Aldrich Chem. Co., analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white, pressed into 3 mm pellet, mp xx, d xx

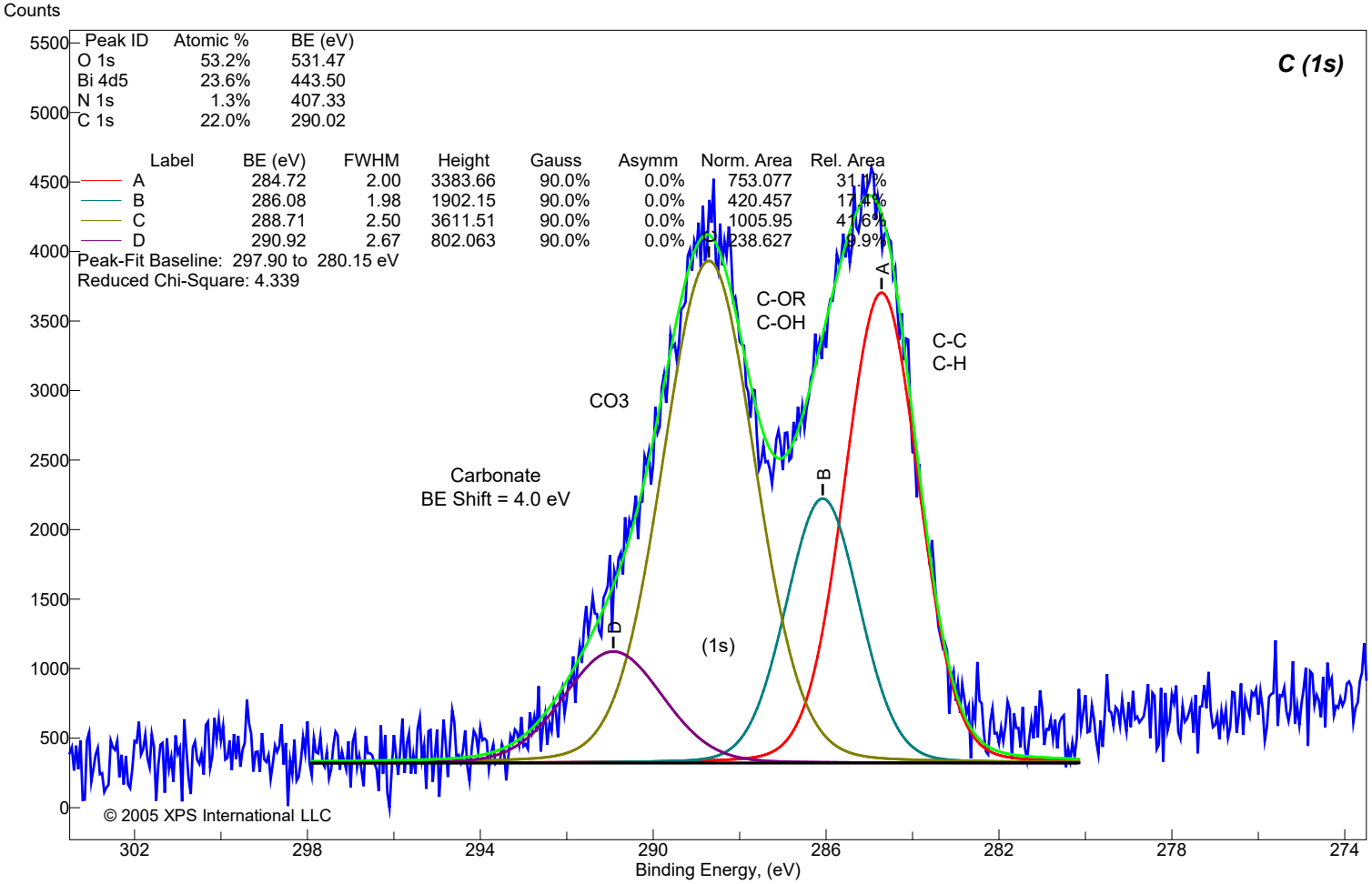


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$(BiO)_2CO_3$

Bismuth (III) Carbonate Oxide (FW = 509.97)

Sample Description: (BiO)2CO3 (99%), from Aldrich Chem. Co., analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white, pressed into 3 mm pellet, mp xx, d xx



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$(BiO)_2CO_3$

Bismuth (III) Carbonate Oxide (FW = 509.97)

Sample Description: Bismuth sub-carbonate (BiO)2CO3
(Aldrich) pellet, mesh: 1mm hgt

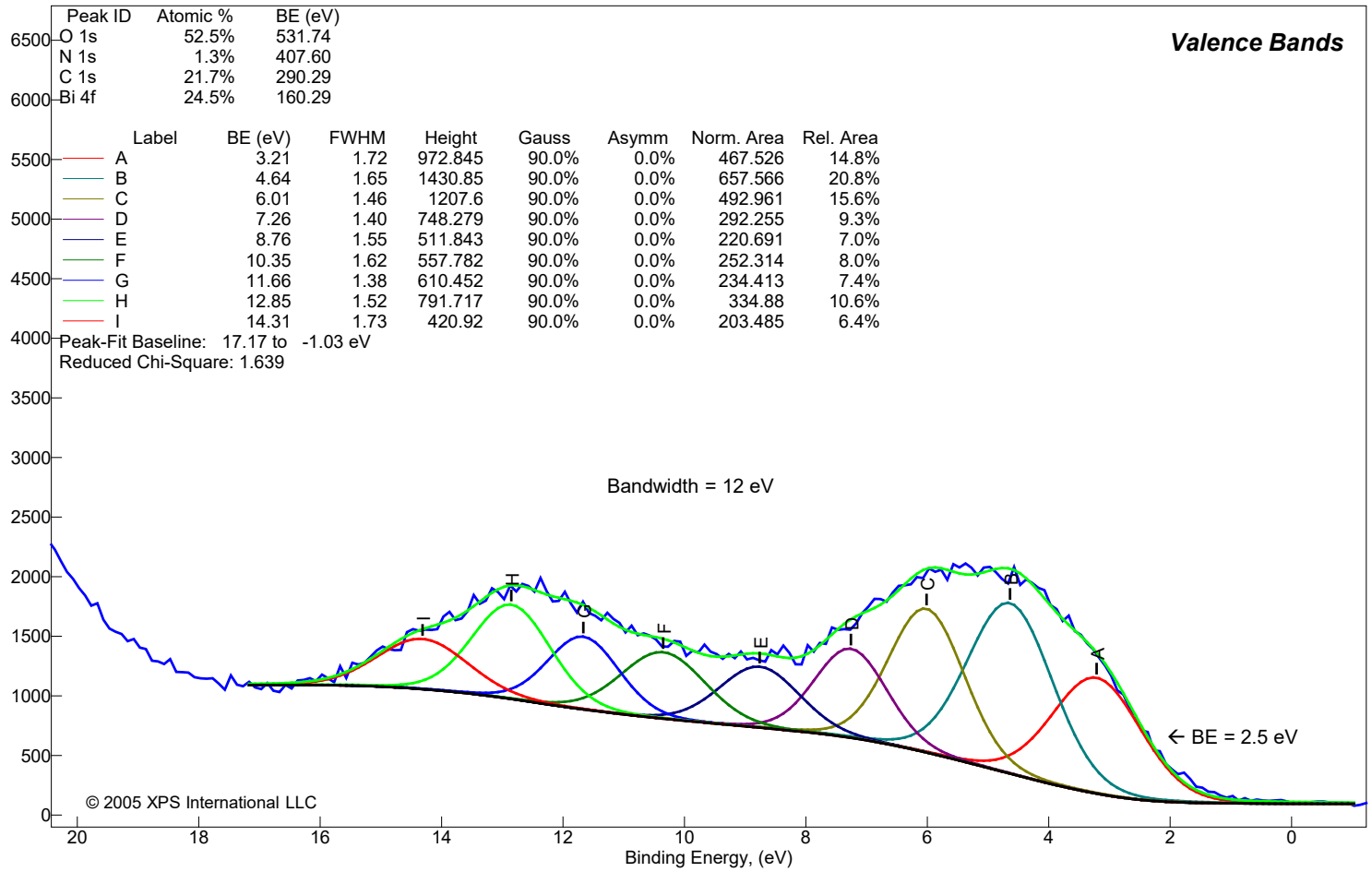
Counts

Peak ID	Atomic %	BE (eV)
O 1s	52.5%	531.74
N 1s	1.3%	407.60
C 1s	21.7%	290.29
Bi 4f	24.5%	160.29

Valence Bands

Label	BE (eV)	FWHM	Height	Gauss	Asymm	Norm. Area	Rel. Area
A	3.21	1.72	972.845	90.0%	0.0%	467.526	14.8%
B	4.64	1.65	1430.85	90.0%	0.0%	657.566	20.8%
C	6.01	1.46	1207.6	90.0%	0.0%	492.961	15.6%
D	7.26	1.40	748.279	90.0%	0.0%	292.255	9.3%
E	8.76	1.55	511.843	90.0%	0.0%	220.691	7.0%
F	10.35	1.62	557.782	90.0%	0.0%	252.314	8.0%
G	11.66	1.38	610.452	90.0%	0.0%	234.413	7.4%
H	12.85	1.52	791.717	90.0%	0.0%	334.88	10.6%
I	14.31	1.73	420.92	90.0%	0.0%	203.485	6.4%

Peak-Fit Baseline: 17.17 to -1.03 eV
Reduced Chi-Square: 1.639

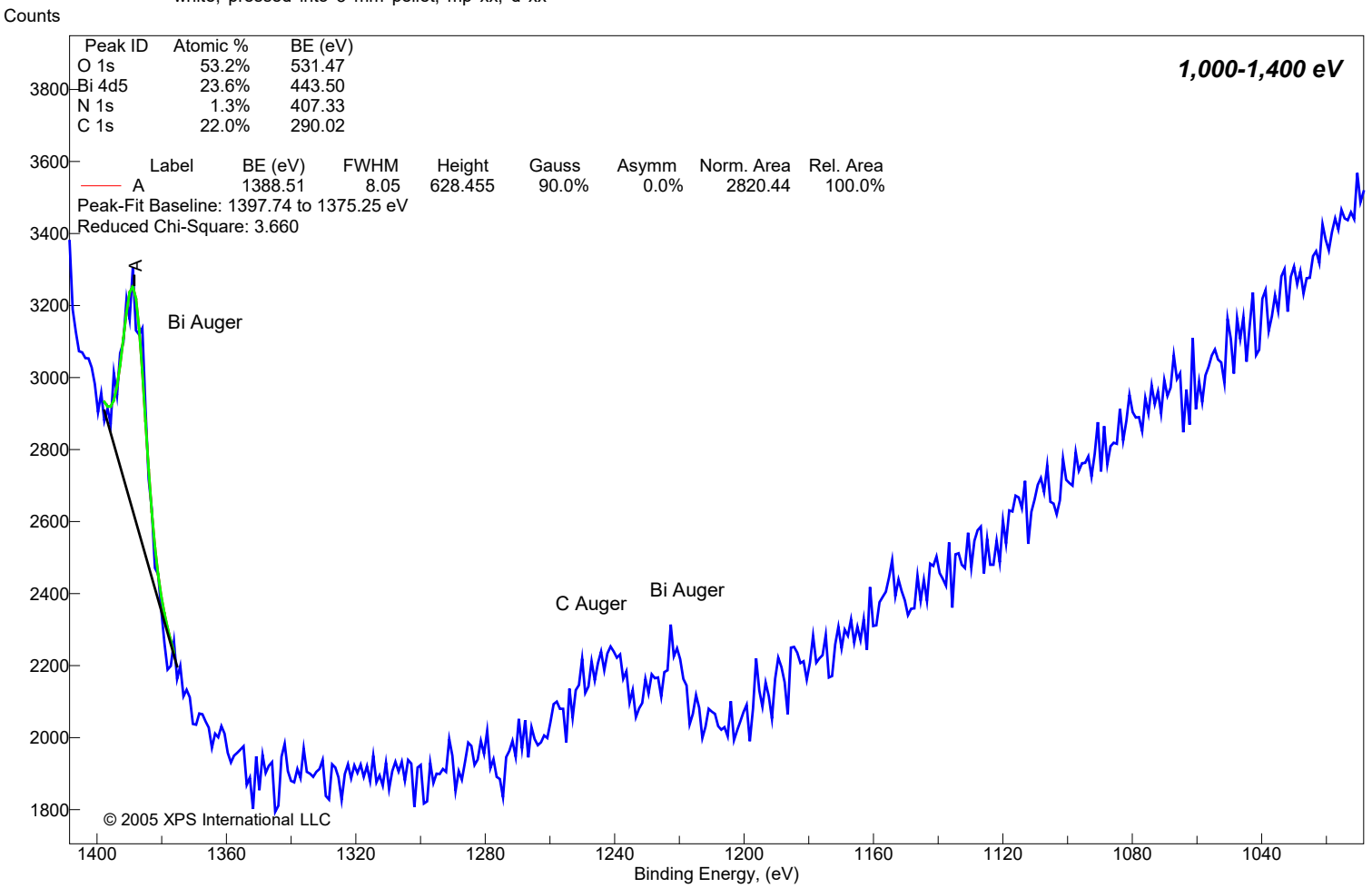


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$(BiO)_2CO_3$

Bismuth (III) Carbonate Oxide (FW = 509.97)

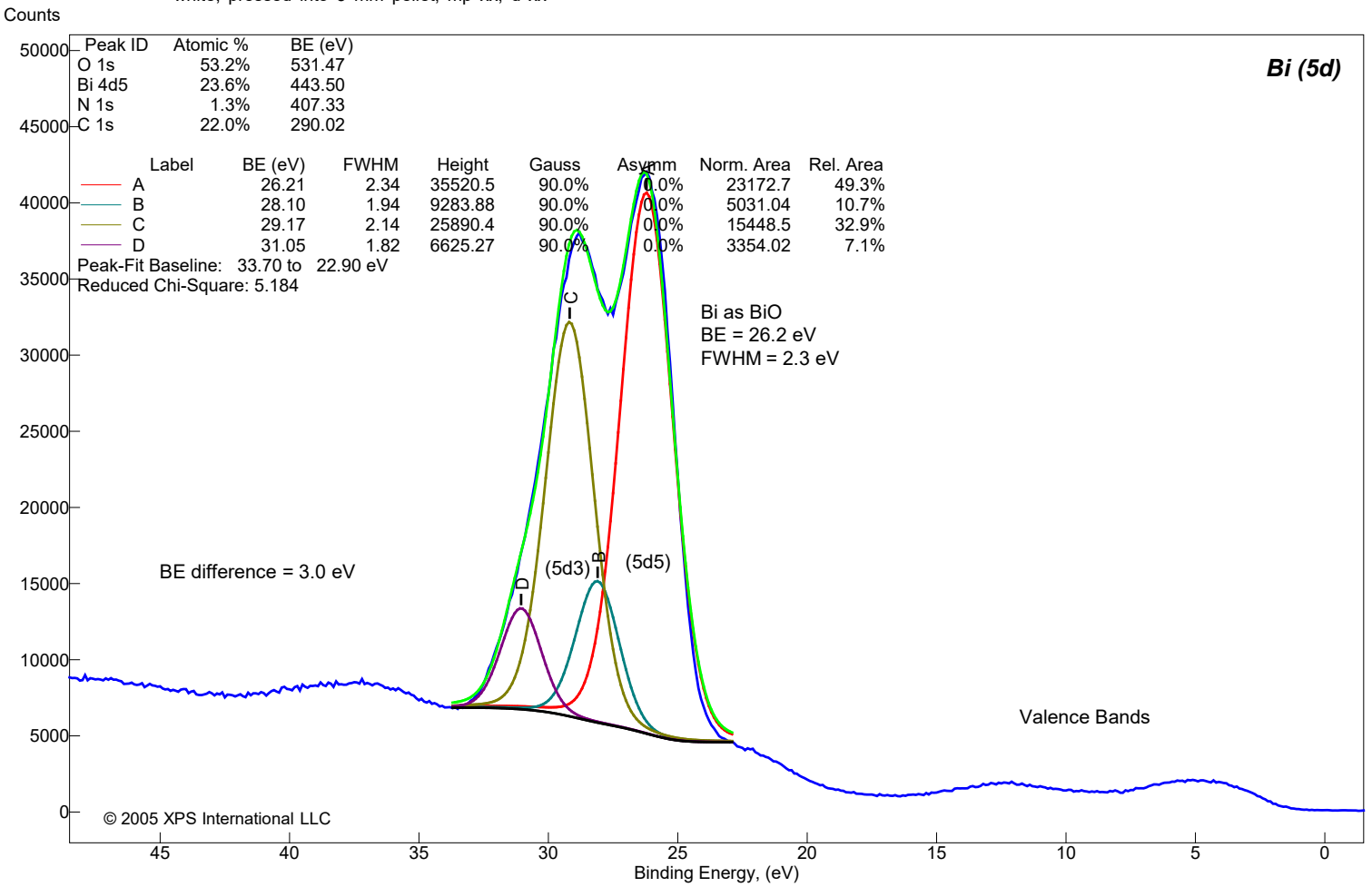
Sample Description: (BiO)2CO3 (99%), from Aldrich Chem. Co., analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white, pressed into 3 mm pellet, mp xx, d xx



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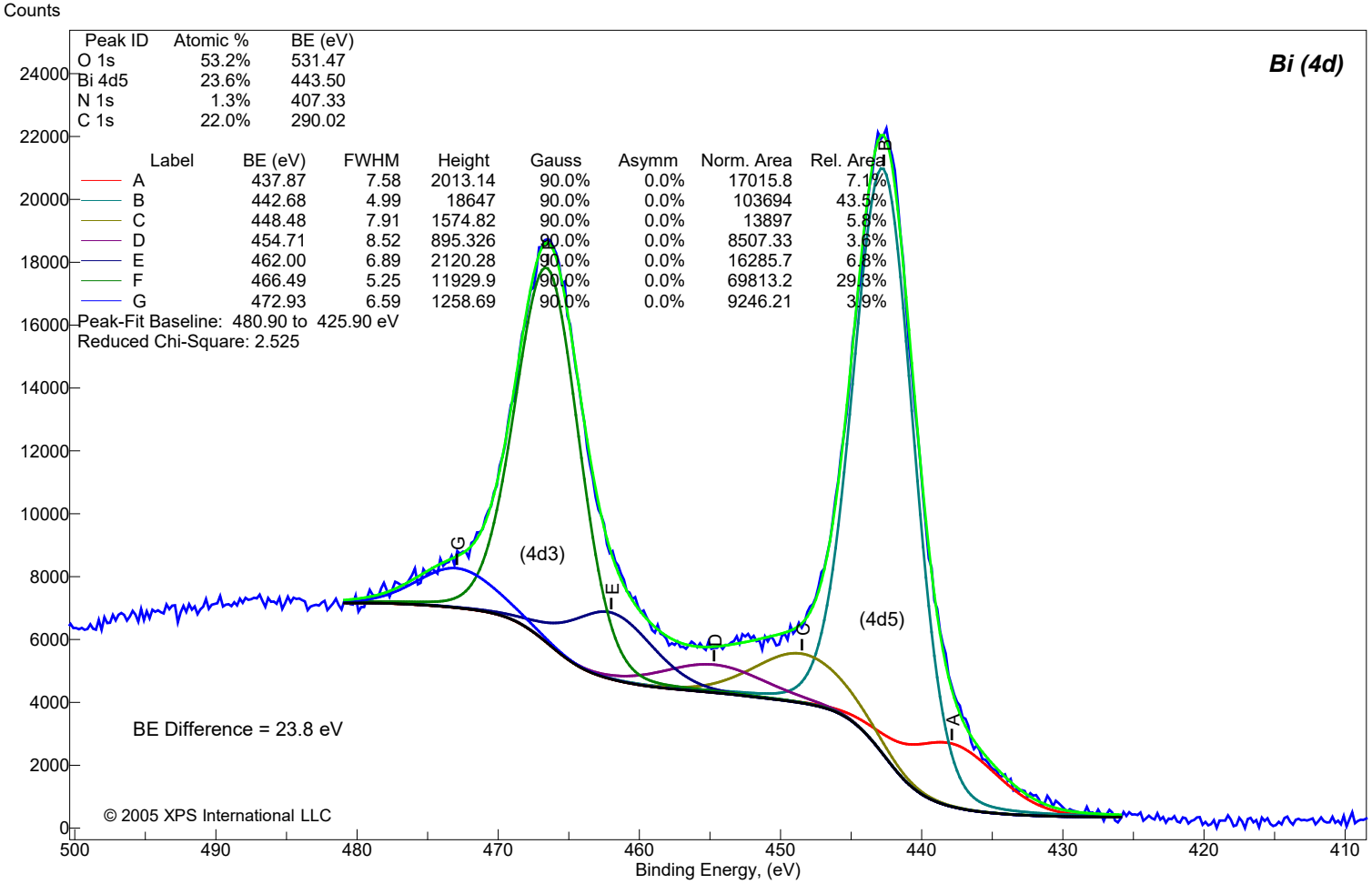
Bismuth (III) Carbonate Oxide (FW = 509.97)

Sample Description: (BiO)2CO3 (99%), from Aldrich Chem. Co., analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white, pressed into 3 mm pellet, mp xx, d xx



Bismuth (III) Carbonate Oxide (FW = 509.97)

Sample Description: (BiO)2CO3 (99%), from Aldrich Chem. Co., analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white, pressed into 3 mm pellet, mp xx, d xx

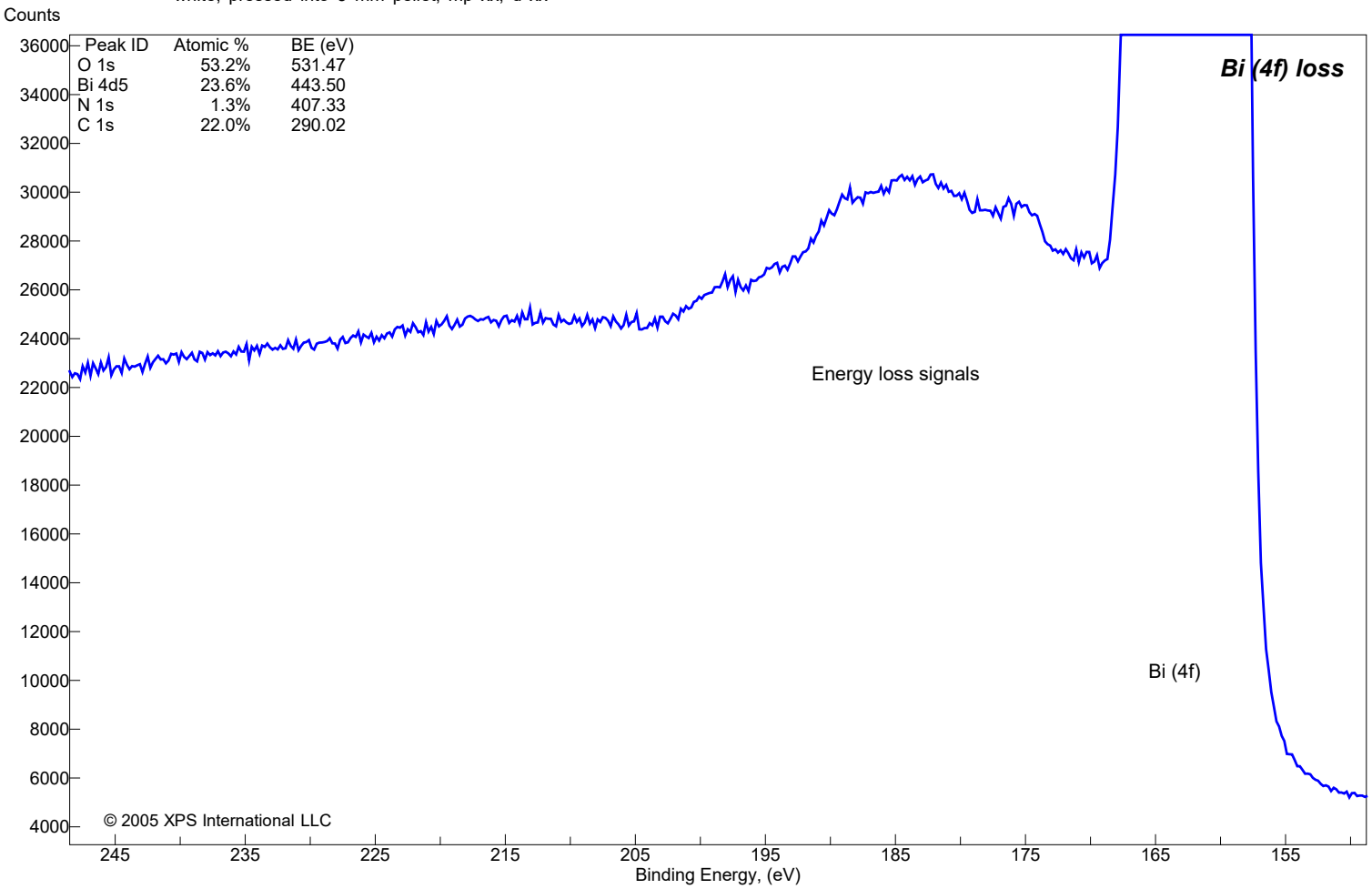


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$(BiO)_2CO_3$

Bismuth (III) Carbonate Oxide (FW = 509.97)

Sample Description: (BiO)2CO3 (99%), from Aldrich Chem. Co., analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white, pressed into 3 mm pellet, mp xx, d xx



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CaO

Calcium (II) Oxide (FW = 56.08)
Surface Composition Table

Description: CaO (99.995%) from Aldrich Lot# 01228BW, analyzed at 90 deg TOA, mesh at 1mm, non-conductive white powder pressed into 3 mm pellet, mp 2572 C, d 3.25, sol in water, acids

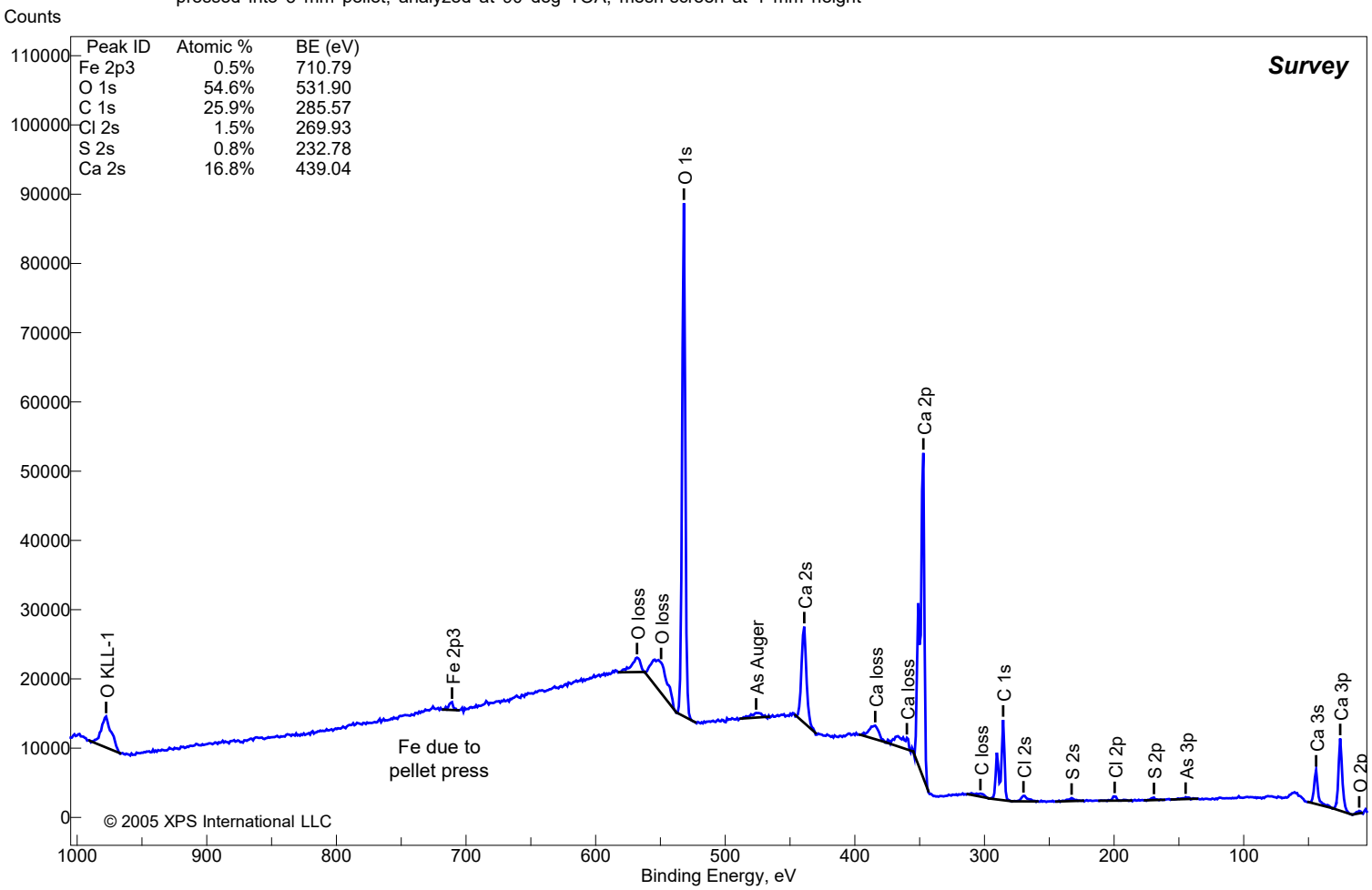
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Ca 3d	5.6	3.4	0.00	1.5	3,071	
O 2p	10.9	8.7	0.02	1.5	734	
Ca 3p	25.5	23.3	0.51	1.5	18,236	
Ca 3s	44.1	41.9	0.35	1.5	8,822	
As 3p	144.8	142.6	4.07	1.5	734	
S 2p	169.2	167.0	1.68	1.5	521	
Cl 2p	199.5	197.3	2.28	1.5	1,059	
S 2s	232.8	230.6	1.43	1.5	1,081	0.8%
Cl 2s	269.9	267.7	1.69	1.5	2,368	1.5%
C 1s	285.6	283.4	1.00	1.5	24,004	25.9%
C loss	303.2	301.0	0.00	1.5	1,730	
Ca 2p	347.2	345.0	5.07	1.5	92,904	
Ca loss	359.9	357.7	0.00	1.5	8,829	
Ca loss	384.3	382.1	0.00	1.5	9,087	
Ca 2s	439.0	436.8	2.59	1.5	32,821	16.8%
As Auger	476.2	474.0	0.00	1.5	2,239	
O 1s	531.9	529.7	2.93	1.5	105,268	54.6%
O loss	549.5	547.3	0.00	1.5	30,781	
O loss	568.1	565.9	0.00	1.5	8,857	
Fe 2p3	710.8	708.6	10.82	1.5	2,433	0.5%
O KLL-1	977.7	975.5	0.70	1.5	20,338	
Ca Auger	1195.1	1192.9	0.00	1.1	2,161	
As 2p3	1326.7	1324.5	6.00	1.1	935	

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CaO

Calcium (II) Oxide (FW = 56.08)

Sample Description: CaO (99.995%) from Aldrich lot# 01228BW
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height

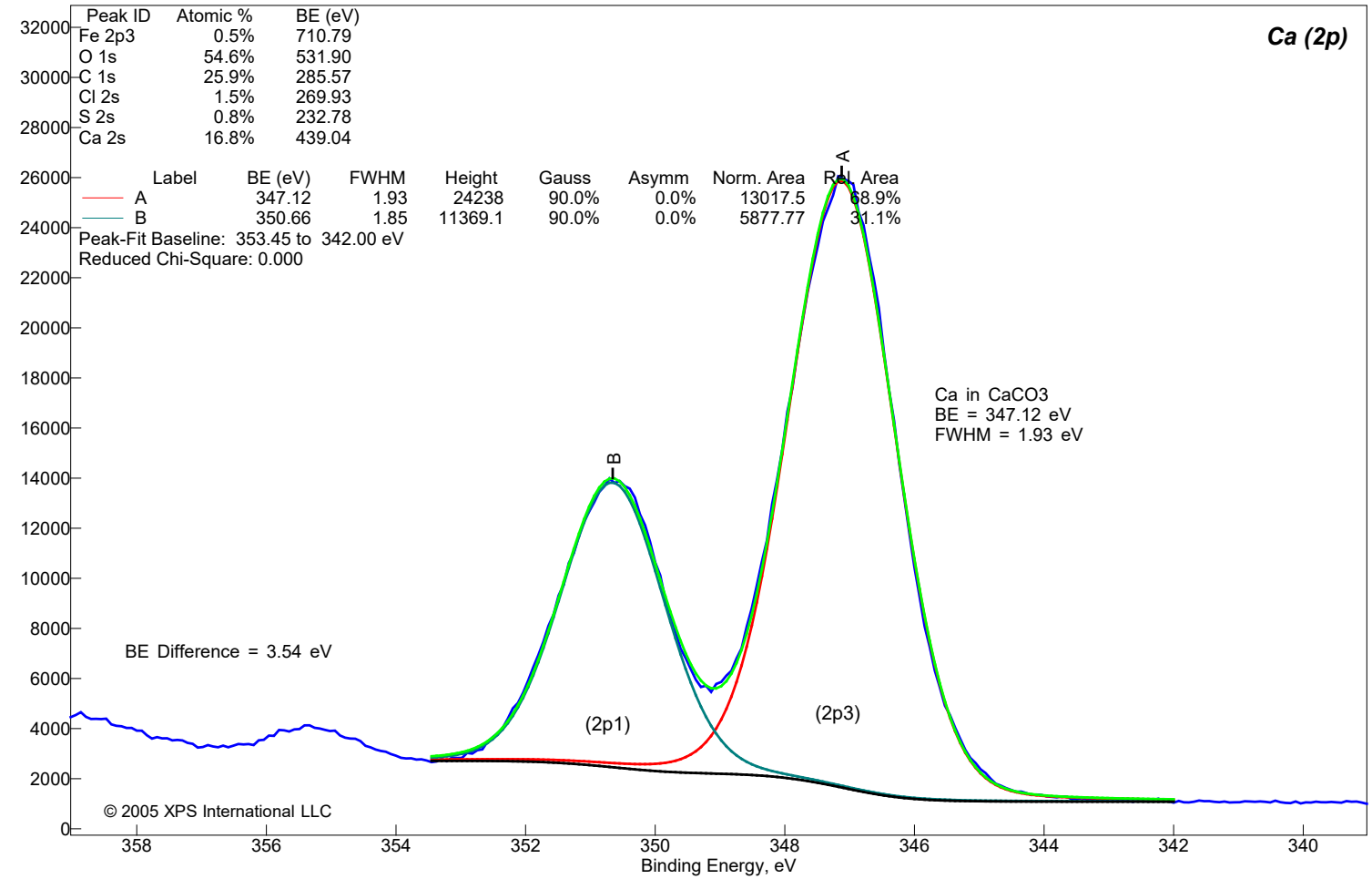


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CaO

Calcium (II) Oxide (FW = 56.08)

Sample Description: CaO (99.995%) Aldr lot# 01228BW, 3mm pellet, screen, 90 TOA

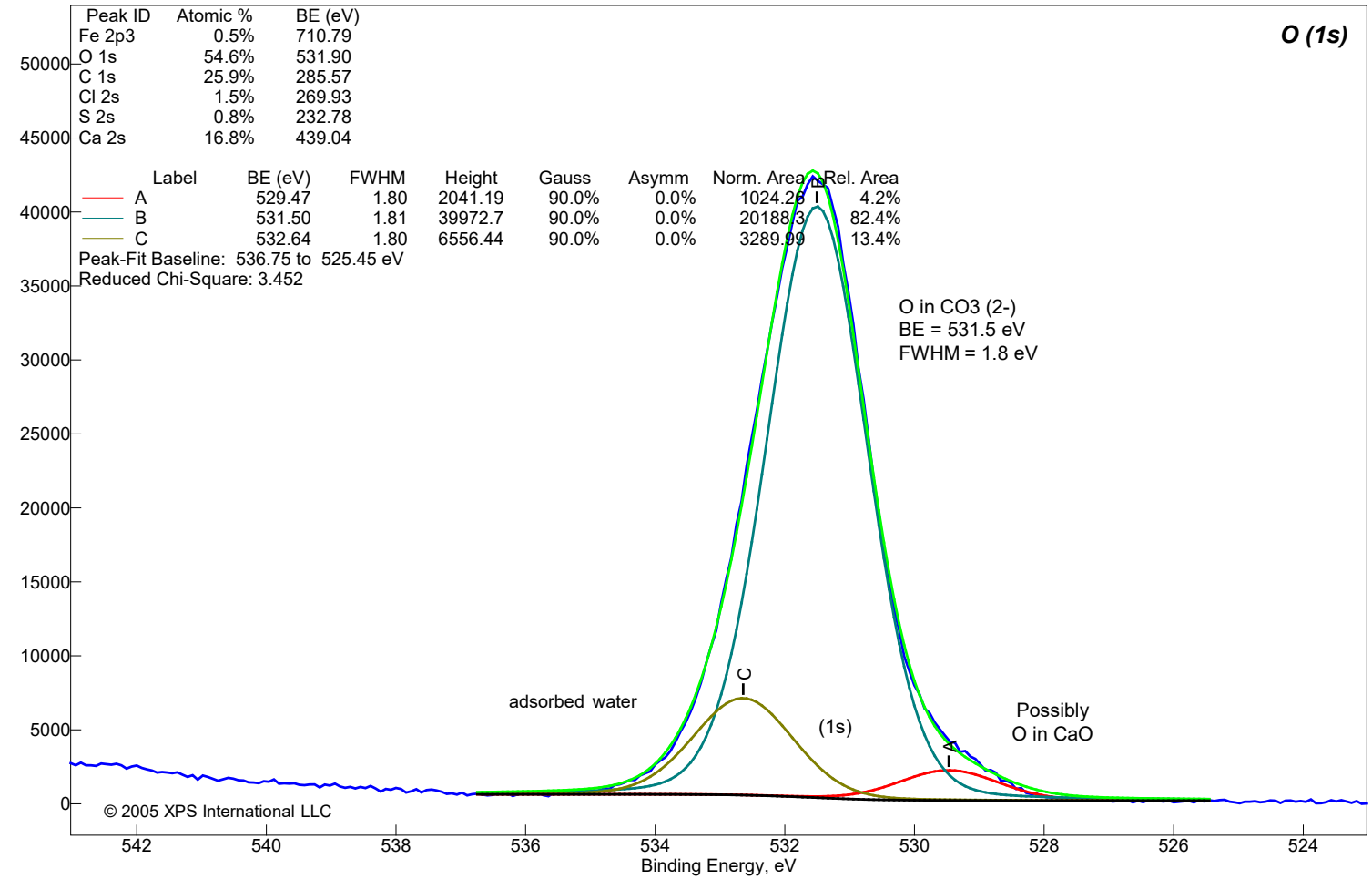


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CaO

Calcium (II) Oxide (FW = 56.08)

Sample Description: CaO (99.995%) Aldr lot# 01228BW, 3mm pellet, screen, 90 TOA

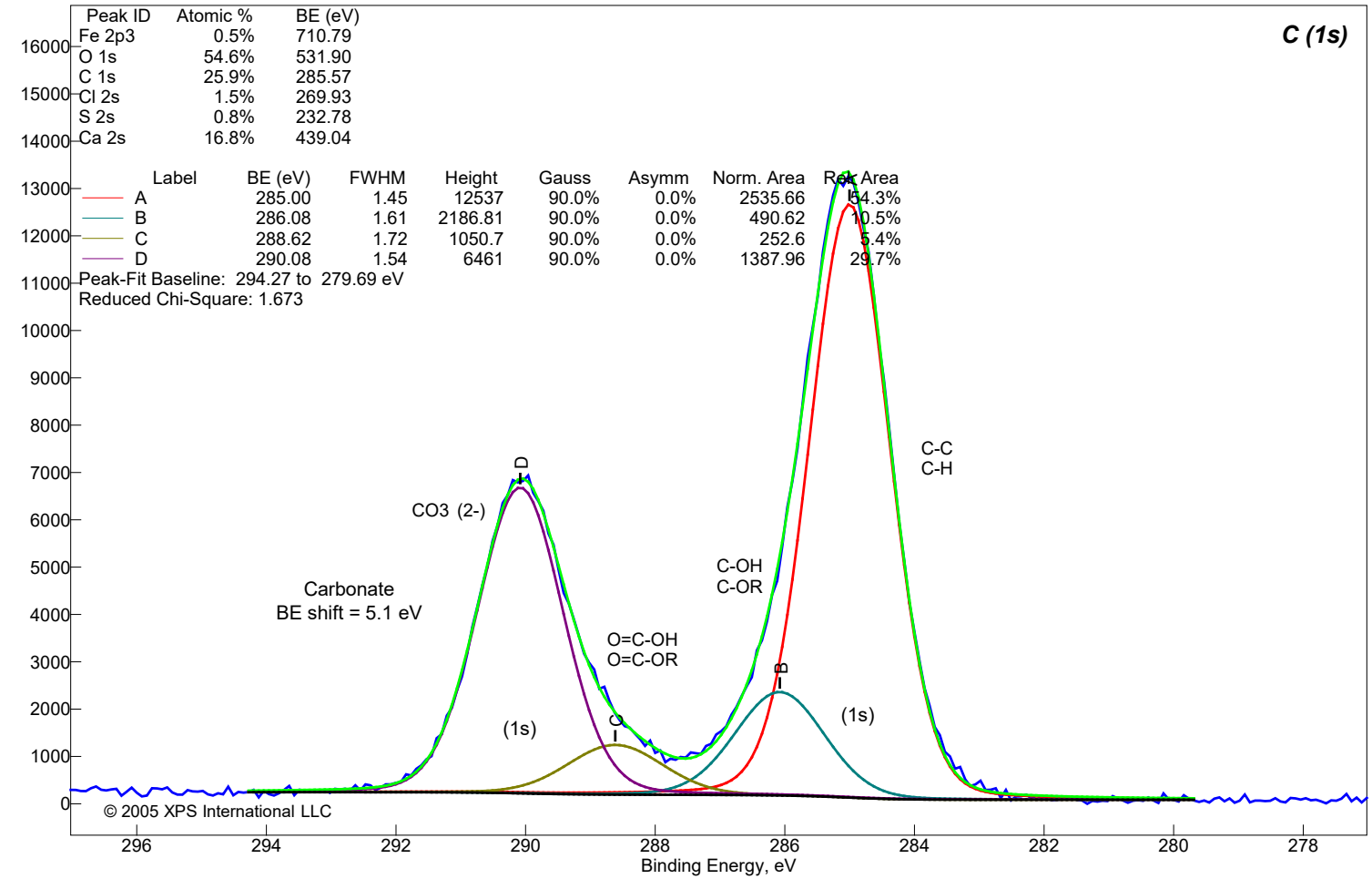


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CaO

Calcium (II) Oxide (FW = 56.08)

Sample Description: CaO (99.995%) Aldr lot# 01228BW, 3mm pellet, screen, 90 TOA

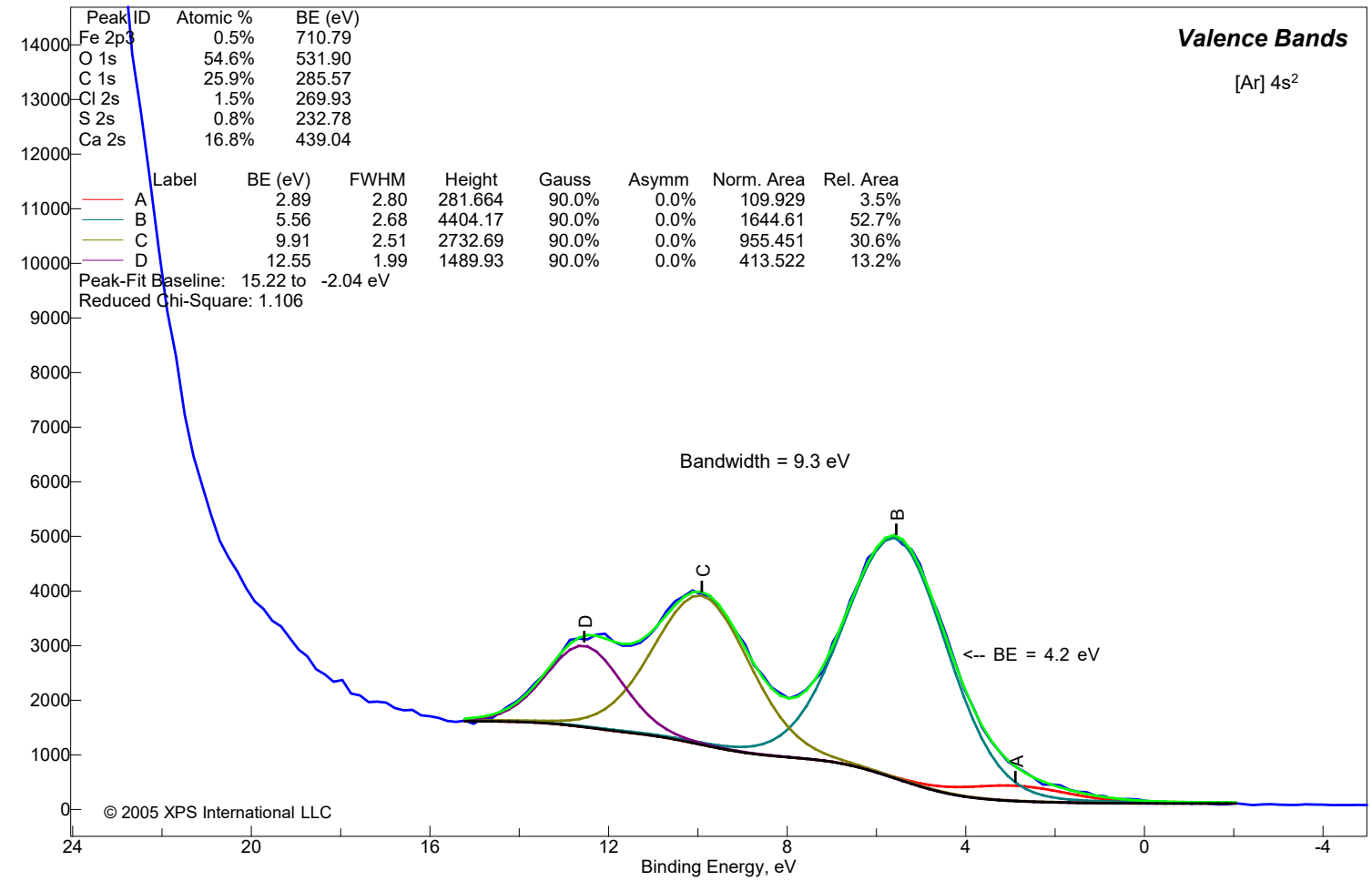


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CaO

Calcium (II) Oxide (FW = 56.08)

Sample Description: CaO (99.995%) Aldr lot# 01228BW, 3mm pellet, screen, 90 TOA

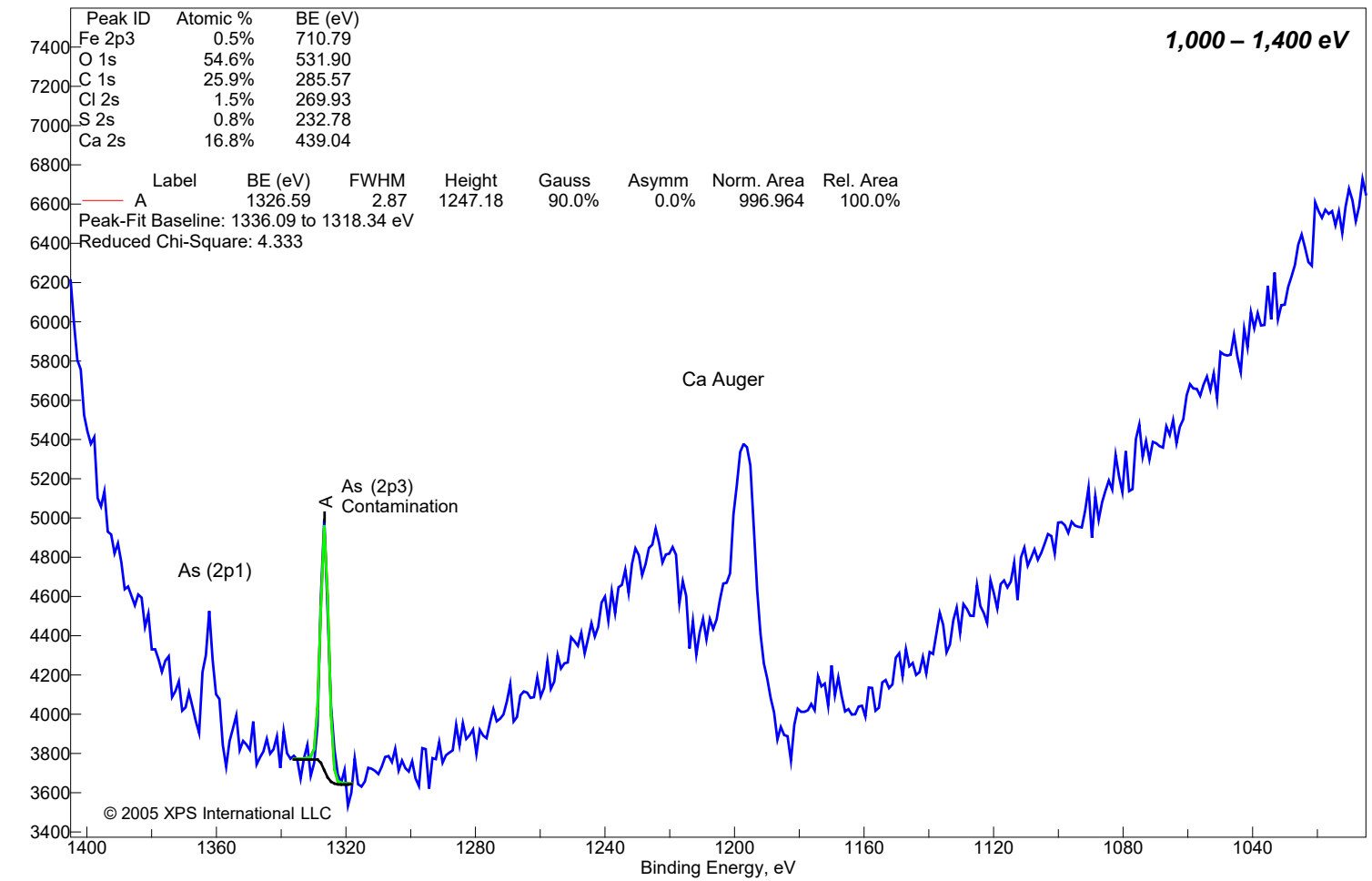


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CaO

Calcium (II) Oxide (FW = 56.08)

Sample Description: CaO (99.995%) Aldr lot# 01228BW, 3mm pellet, screen, 90 TOA



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$CaCO_3$
Calcite

Calcium (II) Carbonate (FW = 100.08)
Surface Composition Table

Description: $CaCO_3$ (99+%) from Iceland Spar (natural crystal), analyzed at 55 deg TOA, mesh at 1mm, non-conductive cleaved in air just before analysis, mp 800 C dec., d 2.93

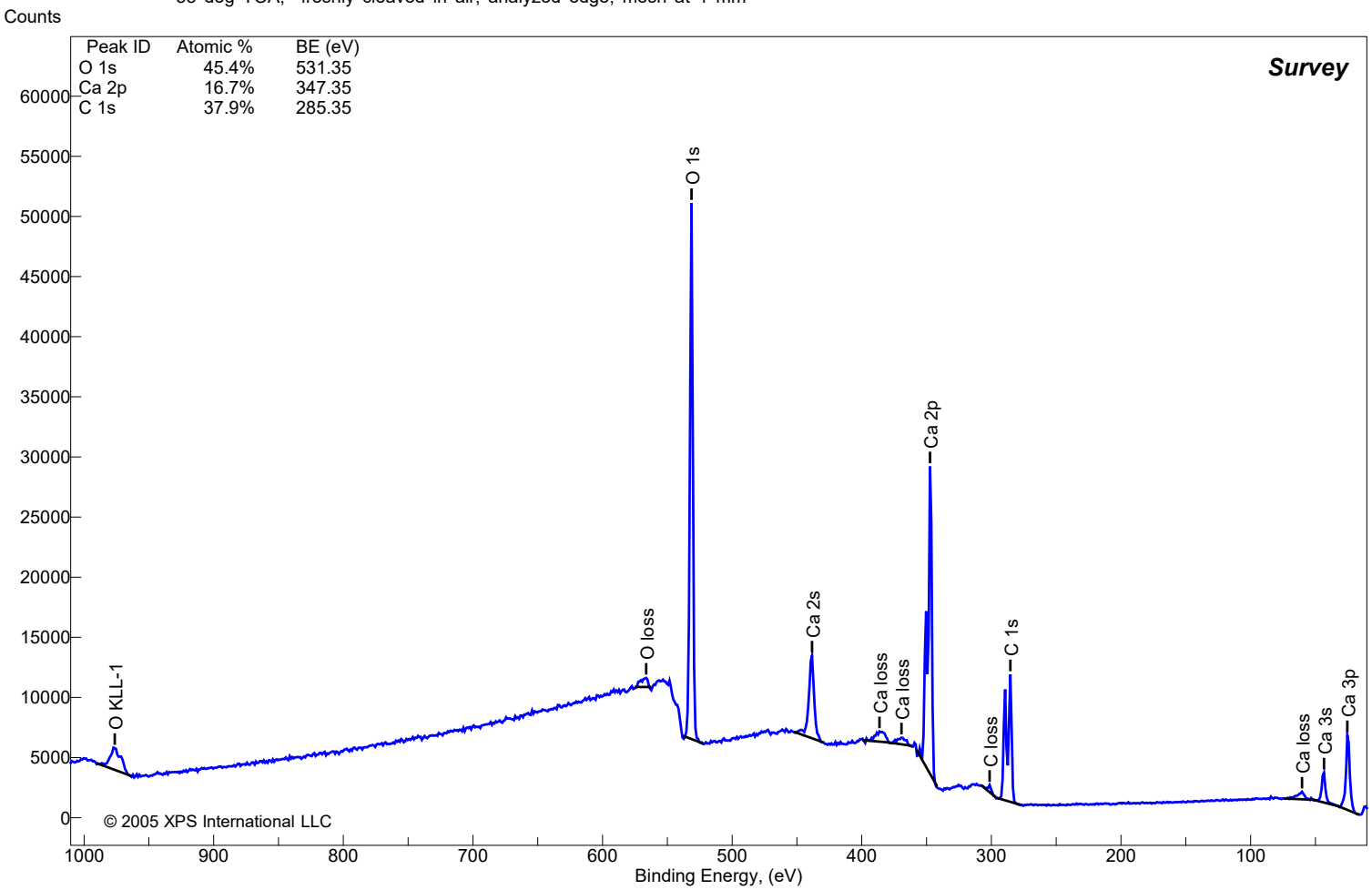
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Ca 3p	25.4	20.0	0.51	1.4	22,743	
Ca 3s	43.4	38.0	0.35	1.4	8,793	
Ca loss	60.4	55.0	0.00	1.4	4,886	
C 1s	285.4	280.0	1.00	1.6	49,560	37.9%
C loss	301.4	296.0	4.10	1.4	1,570	
Ca 2p	347.4	342.0	5.07	1.6	101,730	16.7%
Ca loss	369.4	364.0	0.00	1.4	4,152	
Ca loss	386.4	381.0	0.00	1.4	8,364	
Ca 2s	438.4	433.0	2.59	1.4	34,357	
O 1s	531.4	526.0	2.93	1.6	120,415	45.4%
O loss	566.4	561.0	0.00	1.4	5,907	
O KLL-1	976.4	971.0	0.70	1.4	17,945	

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$CaCO_3$
Calcite

Calcium (II) Carbonate (FW = 100.08)

Sample Description: Calcite (CaCO3) from Iceland Spar natural crystal
55 deg TOA, freshly cleaved in air, analyzed edge, mesh at 1 mm

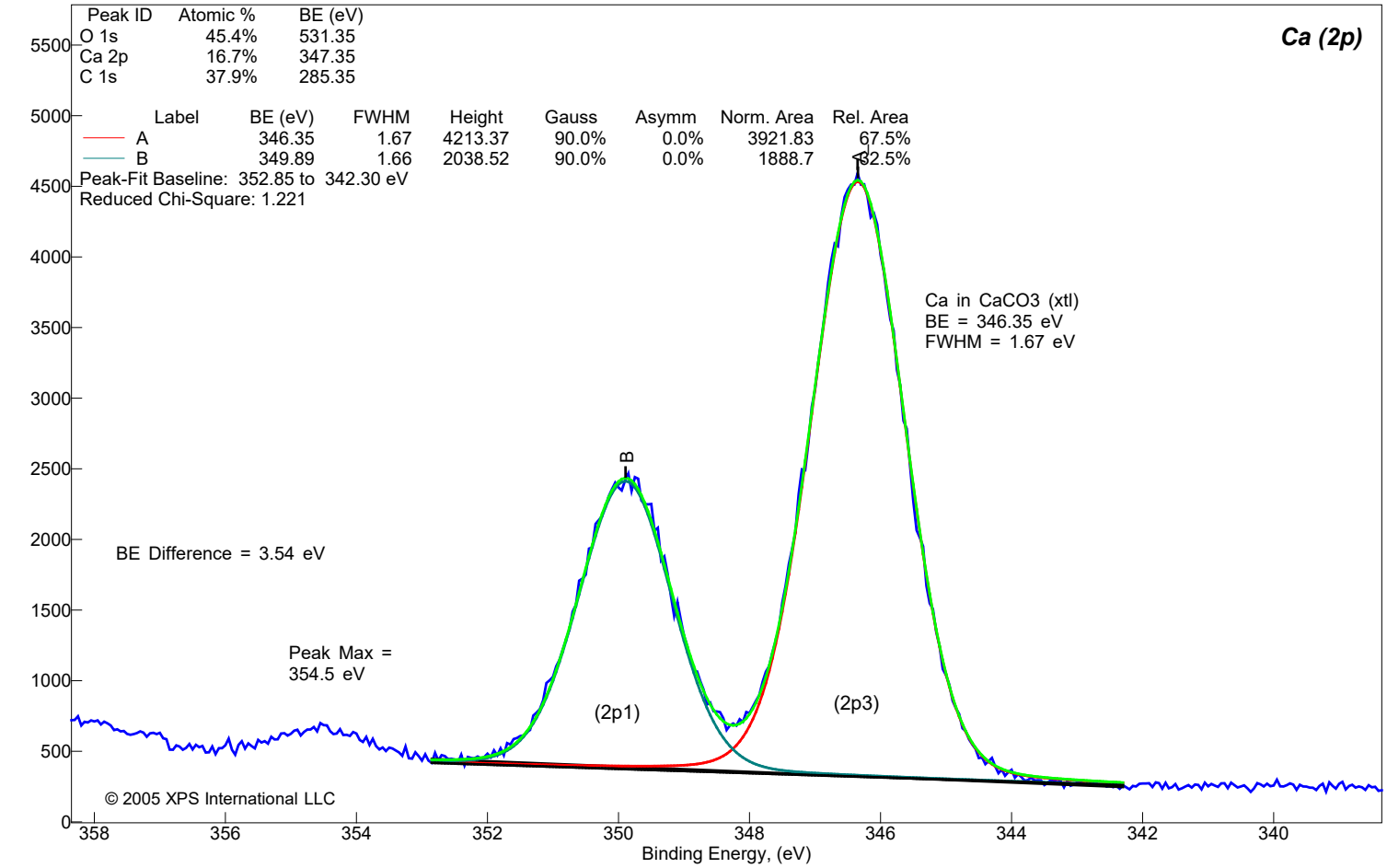


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$CaCO_3$
Calcite

Calcium (II) Carbonate (FW = 100.08)

Sample Description: Calcite (CaCO3) Iceland Spar - natural crystal
55 deg TOA, cleaved edge

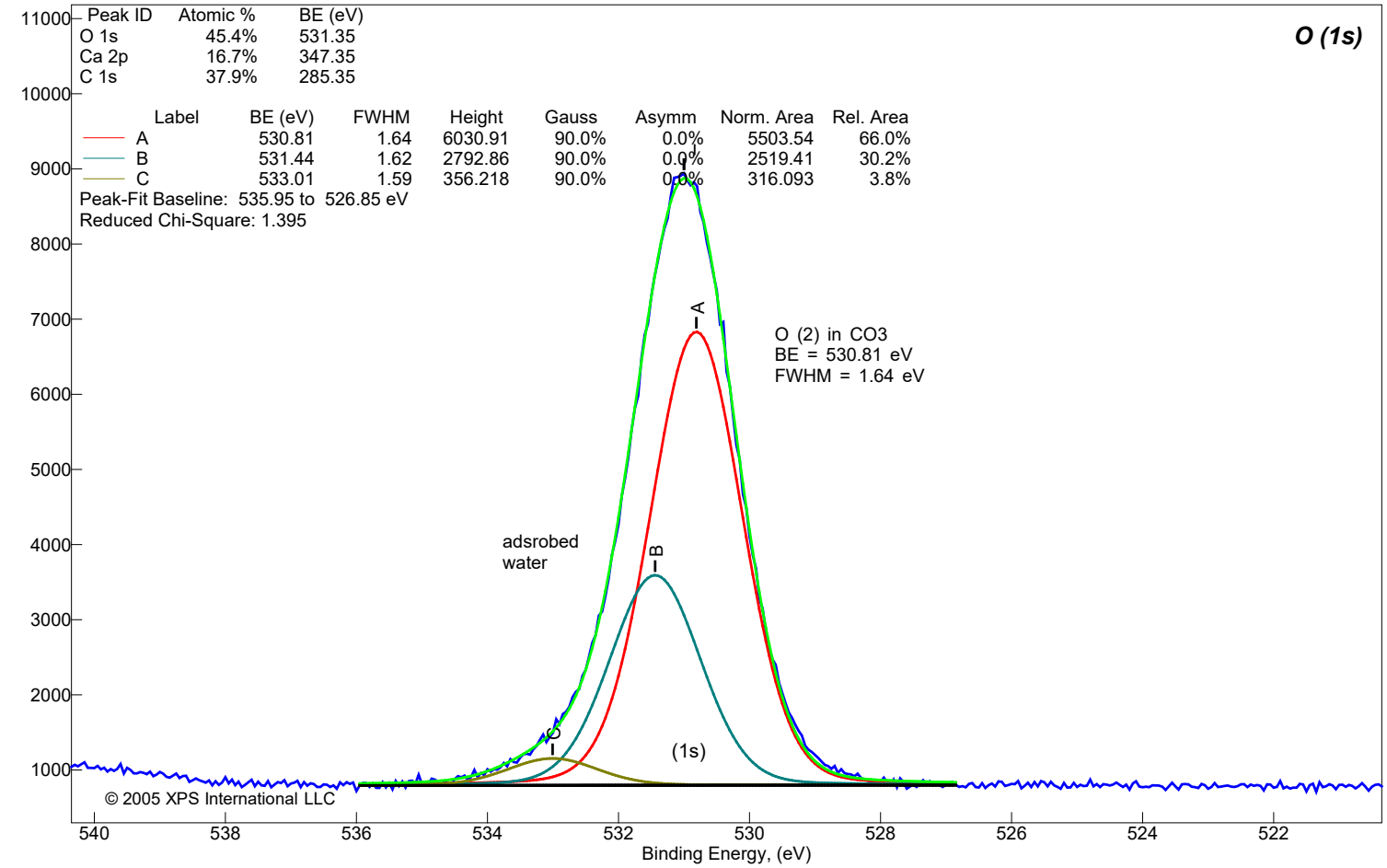


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$CaCO_3$
Calcite

Calcium (II) Carbonate (FW = 100.08)

Sample Description: Calcite (CaCO3) Iceland Spar - natural crystal
55 deg TOA, cleaved edge

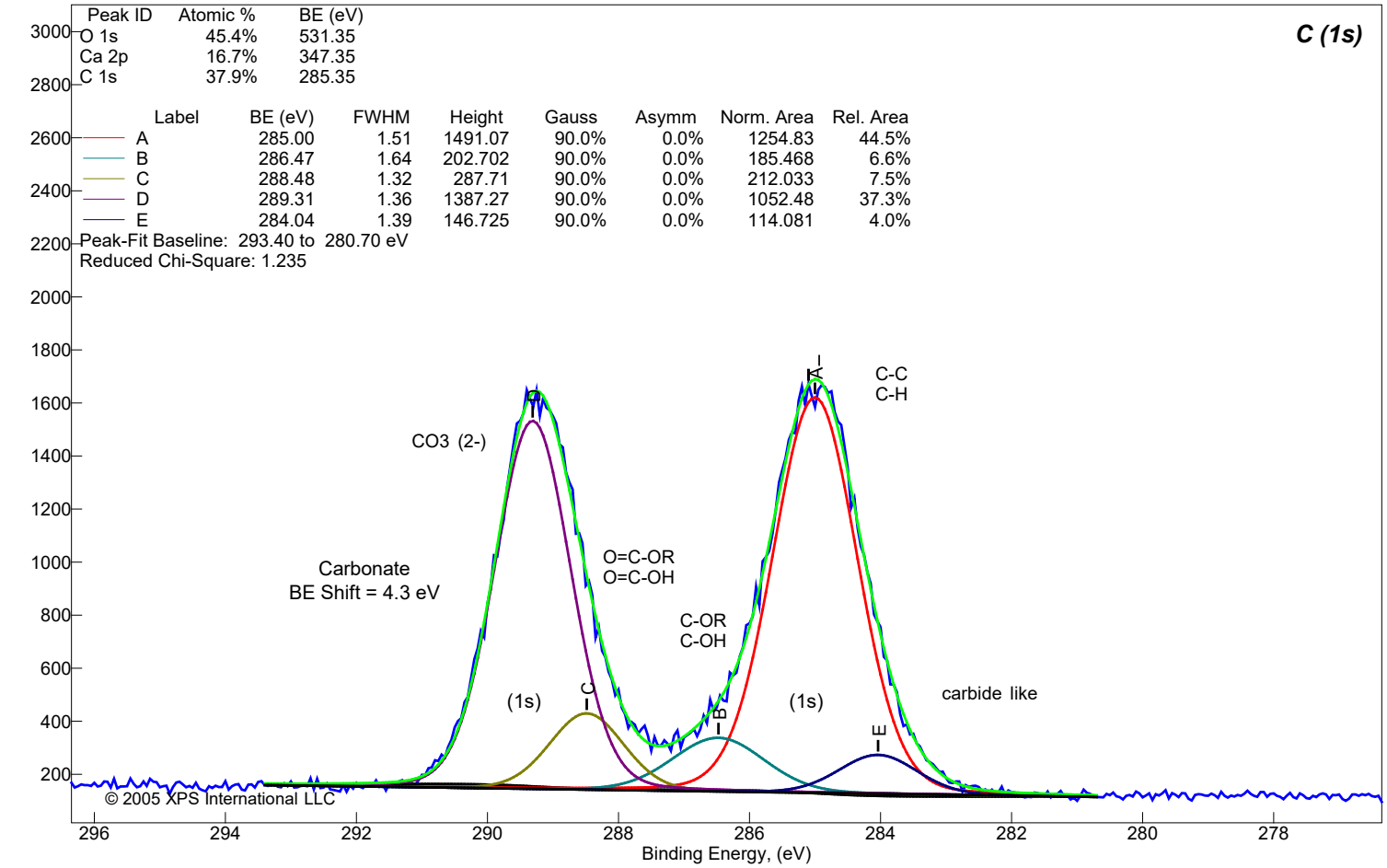


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$CaCO_3$
Calcite

Calcium (II) Carbonate (FW = 100.08)

Sample Description: Calcite (CaCO3) Iceland Spar - natural crystal
55 deg TOA, cleaved edge

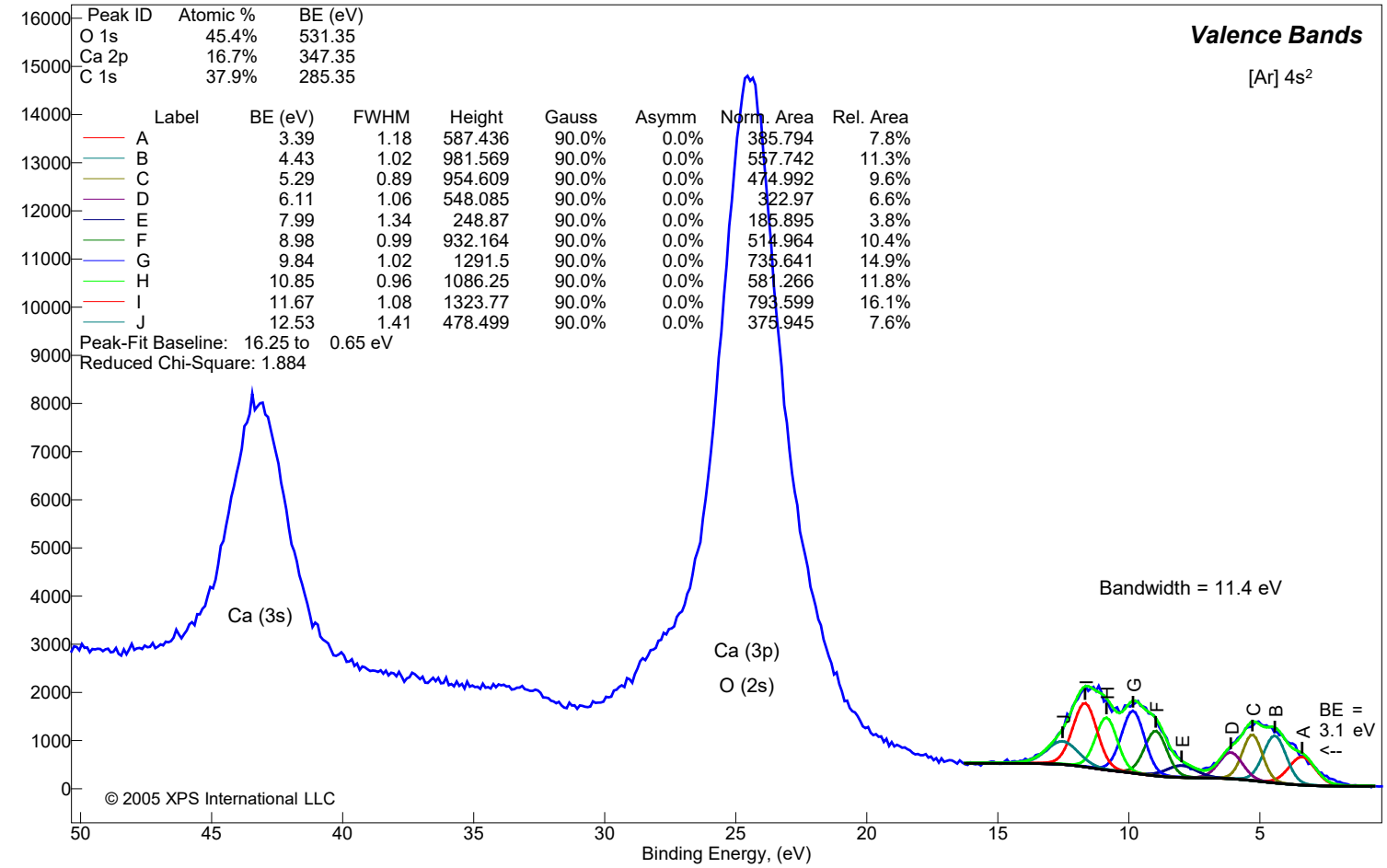


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$CaCO_3$
Calcite

Calcium (II) Carbonate (FW = 100.08)

Sample Description: Calcite (CaCO3) Iceland Spar - natural crystal
55 deg TOA, cleaved edge



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$Cd\text{-}H_2O_2$

Cadmium + H_2O_2 → CdO (FW = 128.40)
Surface Composition Table

Description: CdO analyzed at 90 deg TOA, conductive
from reaction of 3% H_2O_2 with freshly exposed Cadmium metal for 4 hr, mp 1430 C, d 8.15, sol in dil acids

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Cd 4d	10.8	10.8	1.97	1.1	50,117	
Cd loss	24.4	24.4	0.00	1.1	6,613	
Cd 4p	67.4	67.4	2.25	1.1	27,771	
Cd 4s	108.5	108.5	0.69	1.1	8,930	
C 1s	284.5	284.5	1.00	1.1	22,620	34.6%
Cd 3d	404.7	404.7	20.22	1.1	290,572	24.7%
Cd loss	426.2	426.2	0.00	1.1	28,949	
O 1s	530.8	530.8	2.93	1.1	60,469	40.7%
Cd 3p3	617.8	617.8	8.50	1.1	68,553	
Cd 3p1	652.0	652.0	4.22	1.1	37,683	
Cd 3s	770.3	770.3	3.04	1.1	11,366	
O KLL-1	974.6	974.6	0.70	1.1	14,159	

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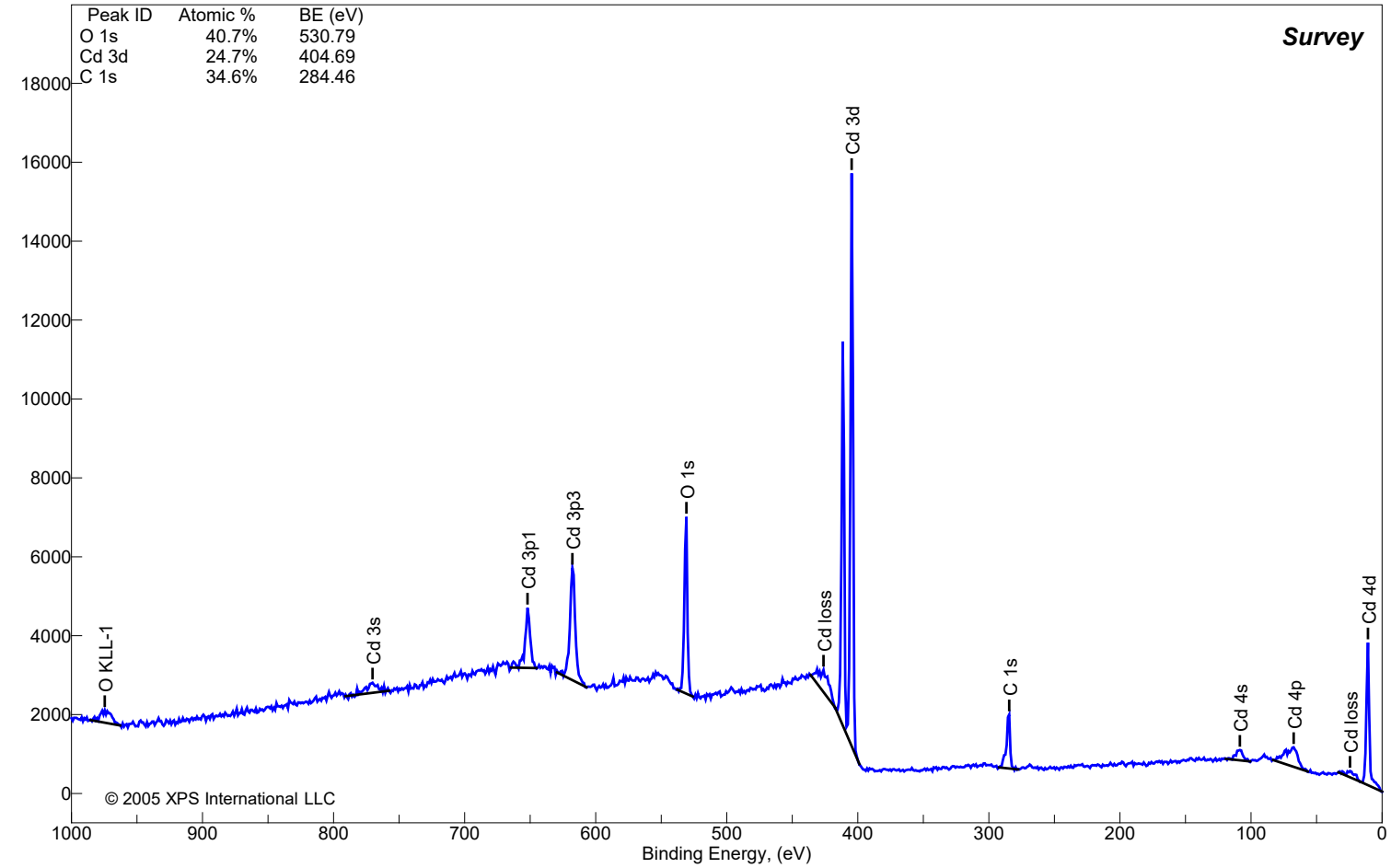
$Cd\text{-}H_2O_2$

Cadmium + H_2O_2 → CdO (FW = 128.40)

Sample Description: Fresh Cd surface exposed to H2O2 for 4 hours
90 deg TOA

Counts

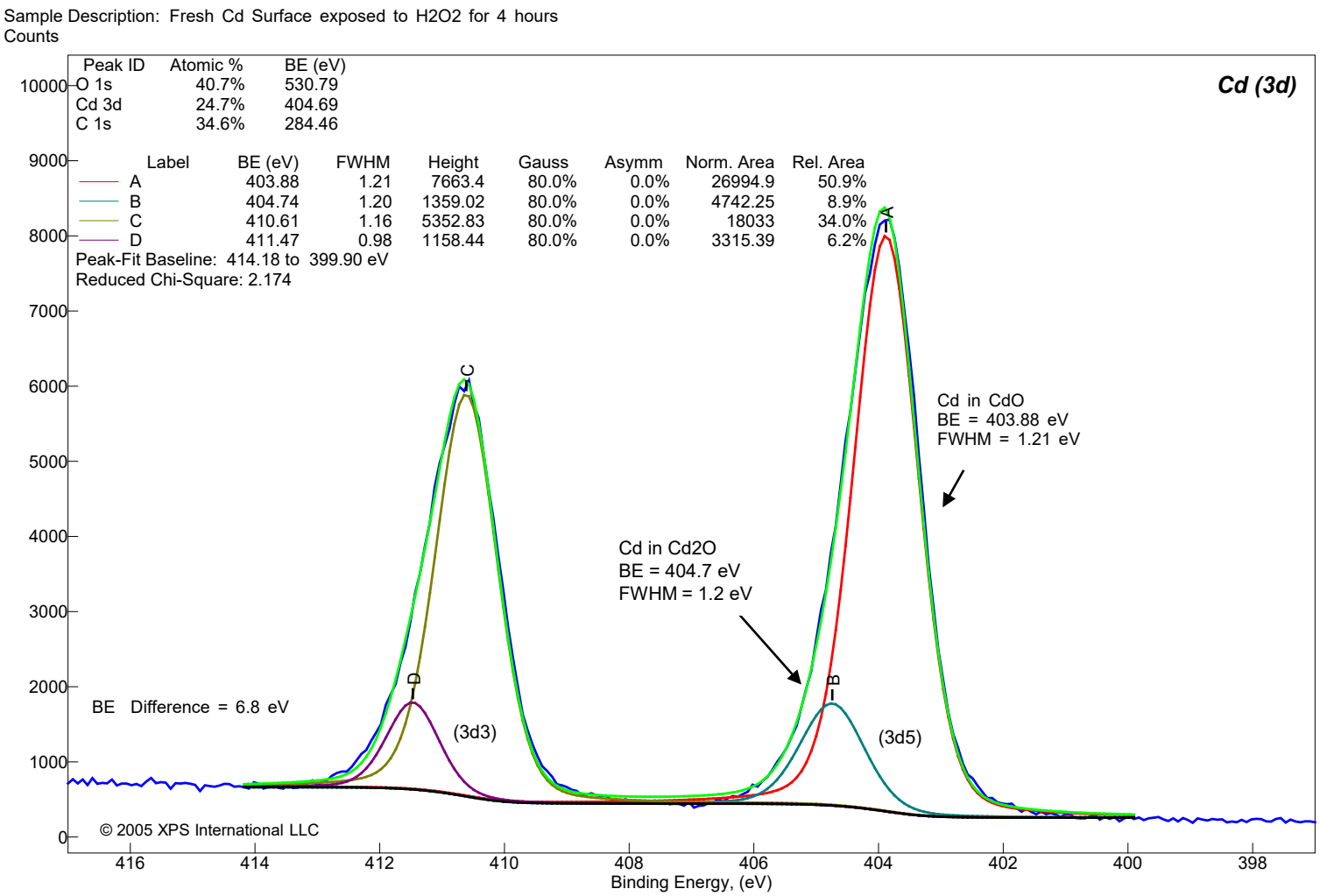
Peak ID	Atomic %	BE (eV)
O 1s	40.7%	530.79
Cd 3d	24.7%	404.69
C 1s	34.6%	284.46



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Cd-H_2O_2

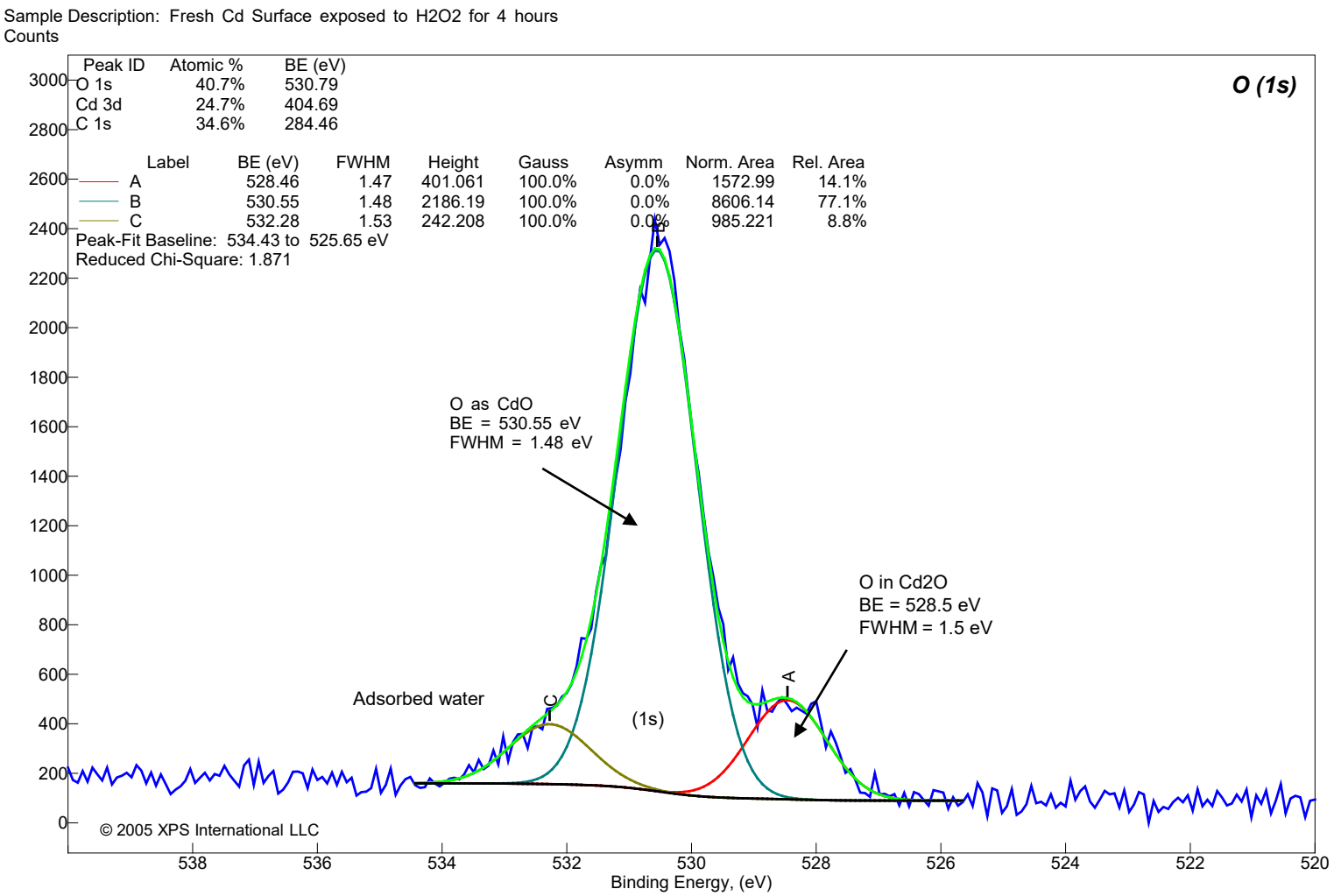
Cadmium + H_2O_2 → CdO (FW = 128.40)



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$Cd\text{-}H_2O_2$

Cadmium + H_2O_2 → CdO (FW = 128.40)

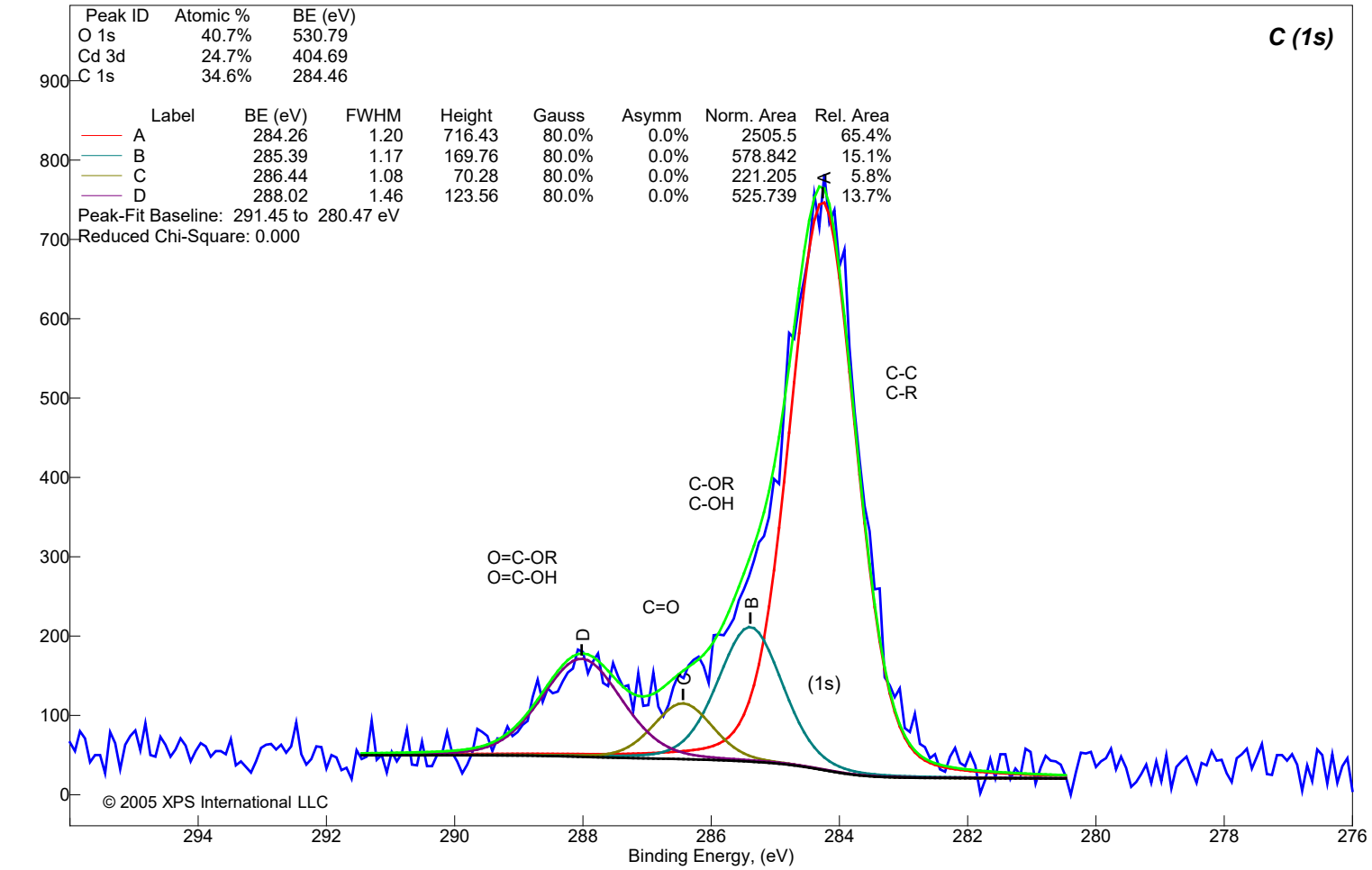


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$Cd\text{-}H_2O_2$

Cadmium + H_2O_2 → CdO (FW = 128.40)

Sample Description: Fresh Cd Surface exposed to H2O2 for 4 hours



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CdO

Cadmium (II) Oxide (FW = 128.40)
Surface Composition Table

Description: CdO (99.99+%) from Aldrich Lot# 01318EV, analyzed at 35 deg TOA, mesh at 1mm, non-conductive brown powder pressed into 3 mm pellet, mp 1430 C, d 8.15, sol in dil acids

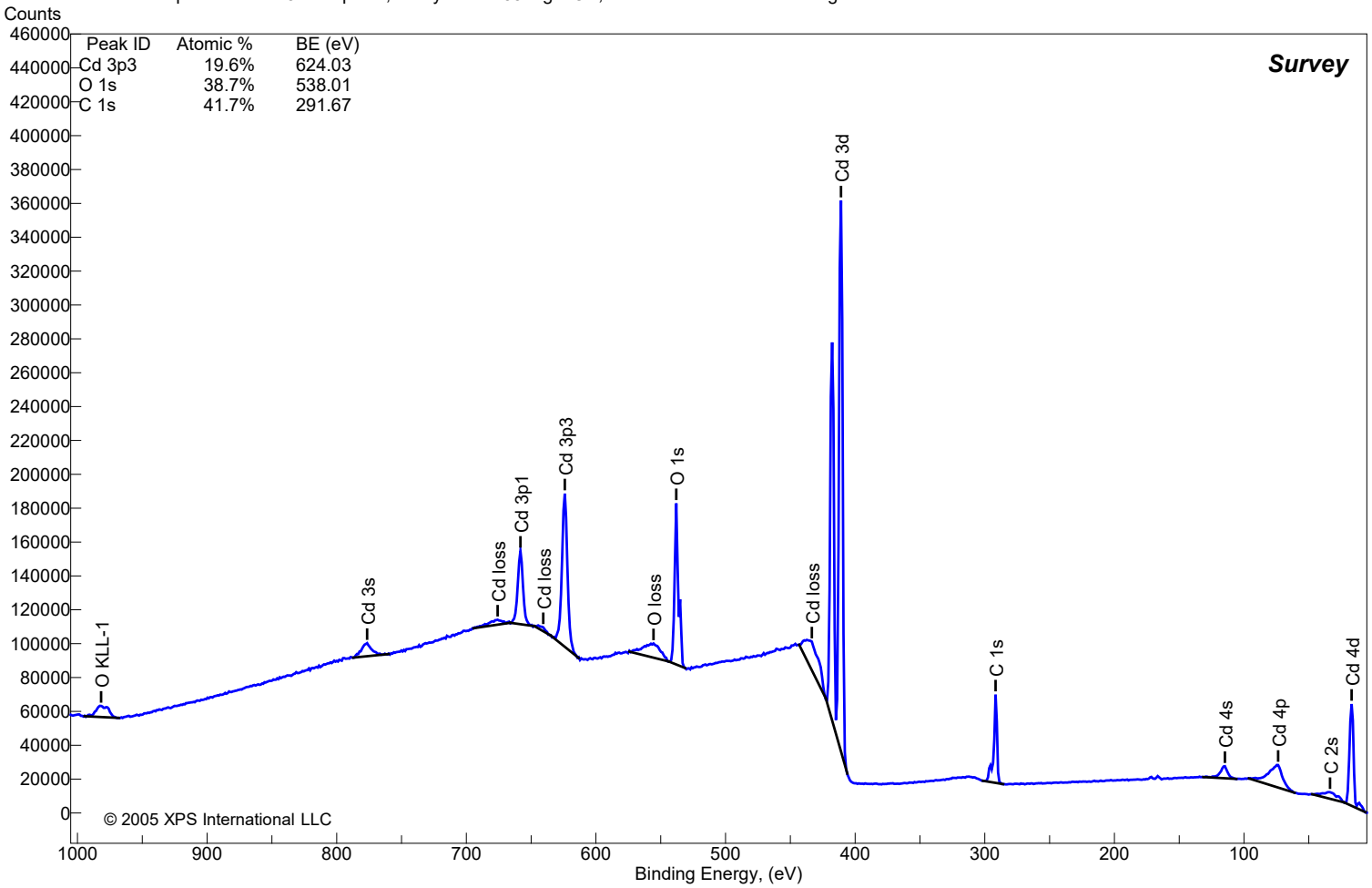
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Cd 4d	11.0	17.0	1.97	1.1	38,448	
C 2s	27.6	33.6	0.15	1.1	8,741	
Cd 4p	67.7	73.7	2.25	1.1	28,808	
Cd 4s	108.7	114.7	0.69	1.1	8,446	
C 1s	285.7	291.7	1.00	1.1	26,418	41.7%
Cd 3d	404.9	410.9	20.22	1.1	301,406	
Cd loss	427.4	433.4	0.00	1.1	36,147	
O 1s	532.0	538.0	2.93	1.1	55,814	38.7%
O loss	549.6	555.6	0.00	1.1	20,118	
Cd 3p3	618.0	624.0	8.50	1.1	73,793	19.6%
Cd loss	634.6	640.6	0.00	1.1	1,930	
Cd 3p1	652.2	658.2	4.22	1.1	34,459	
Cd loss	669.8	675.8	0.00	1.1	7,506	
Cd 3s	770.5	776.5	3.04	1.1	11,521	
O KLL-1	975.8	981.8	0.70	1.1	11,947	

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CdO

Cadmium (II) Oxide (FW = 128.40)

Sample Description: CdO (99.99+%) from Aldrich lot #01318EV
pressed into 3 mm pellet, analyzed at 35deg TOA, mesh-screen at 1 mm height

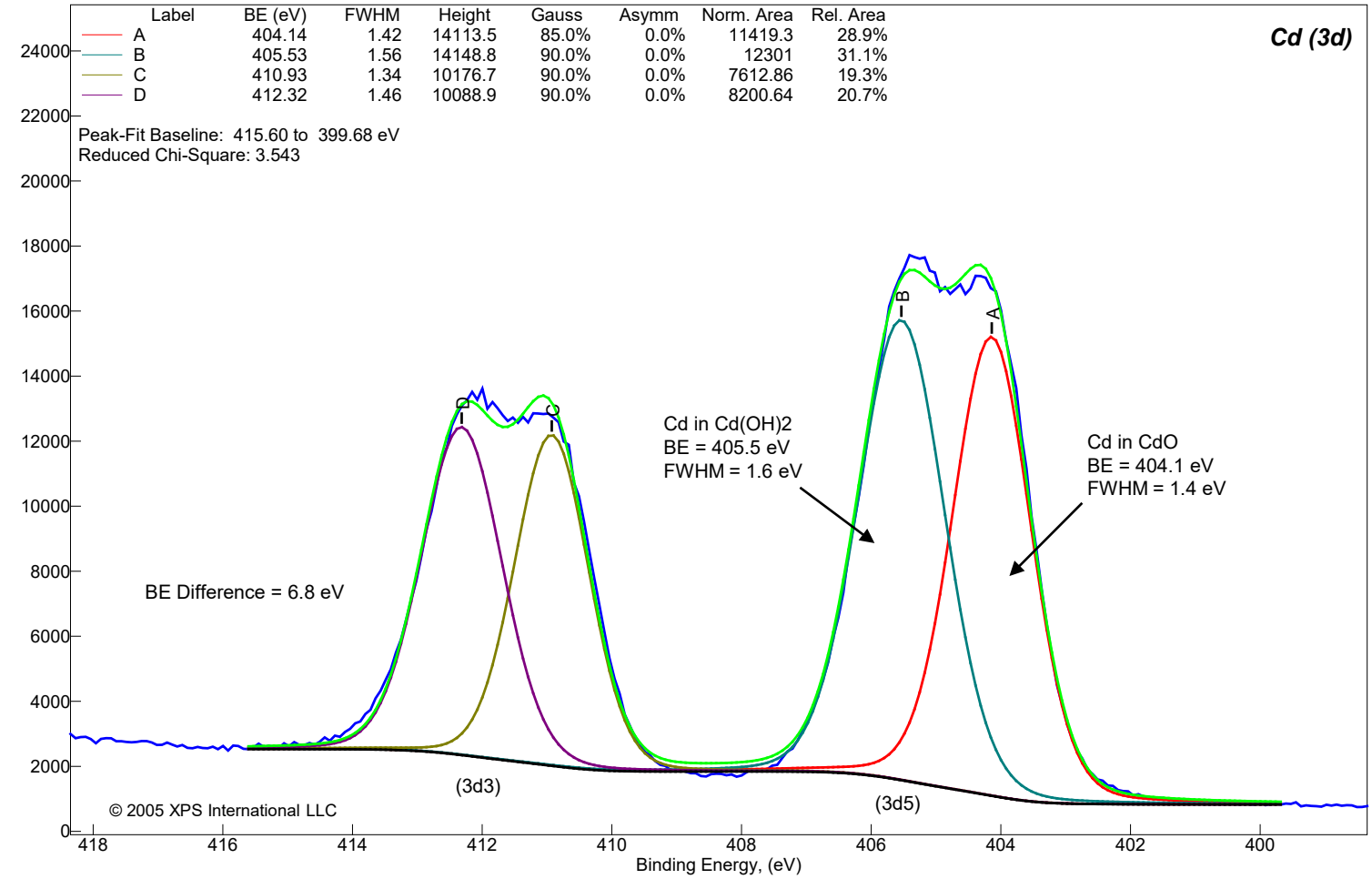


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CdO

Cadmium (II) Oxide (FW = 128.40)

Sample Description: CdO (99.99+%) Aldrich lot #01318EV, 3mm pellet, 35 TOA, screen

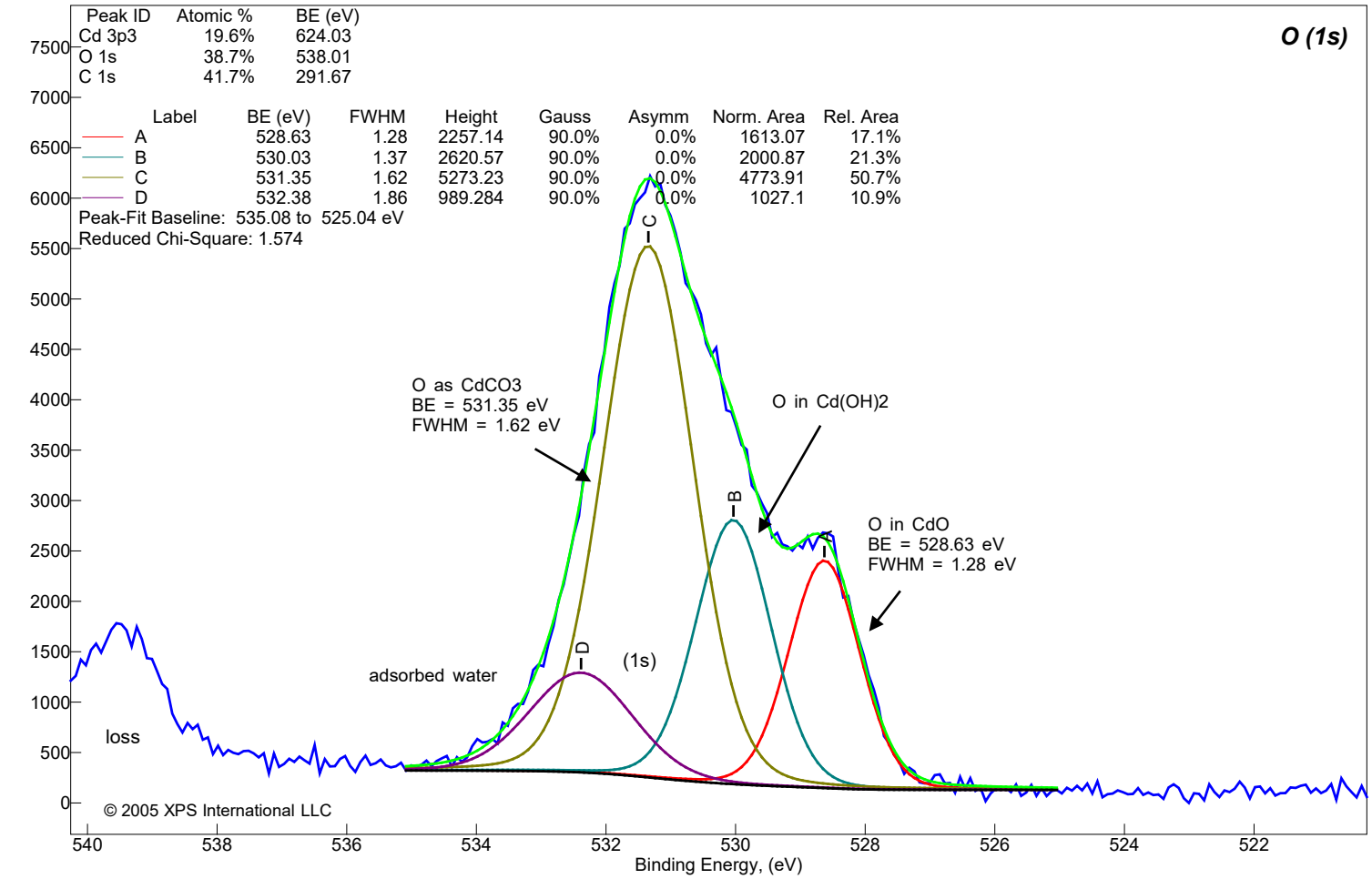


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CdO

Cadmium (II) Oxide (FW = 128.40)

Sample Description: CdO (99.99+%) Aldrich lot #01318EV, 3mm pellet, 35 TOA, screen

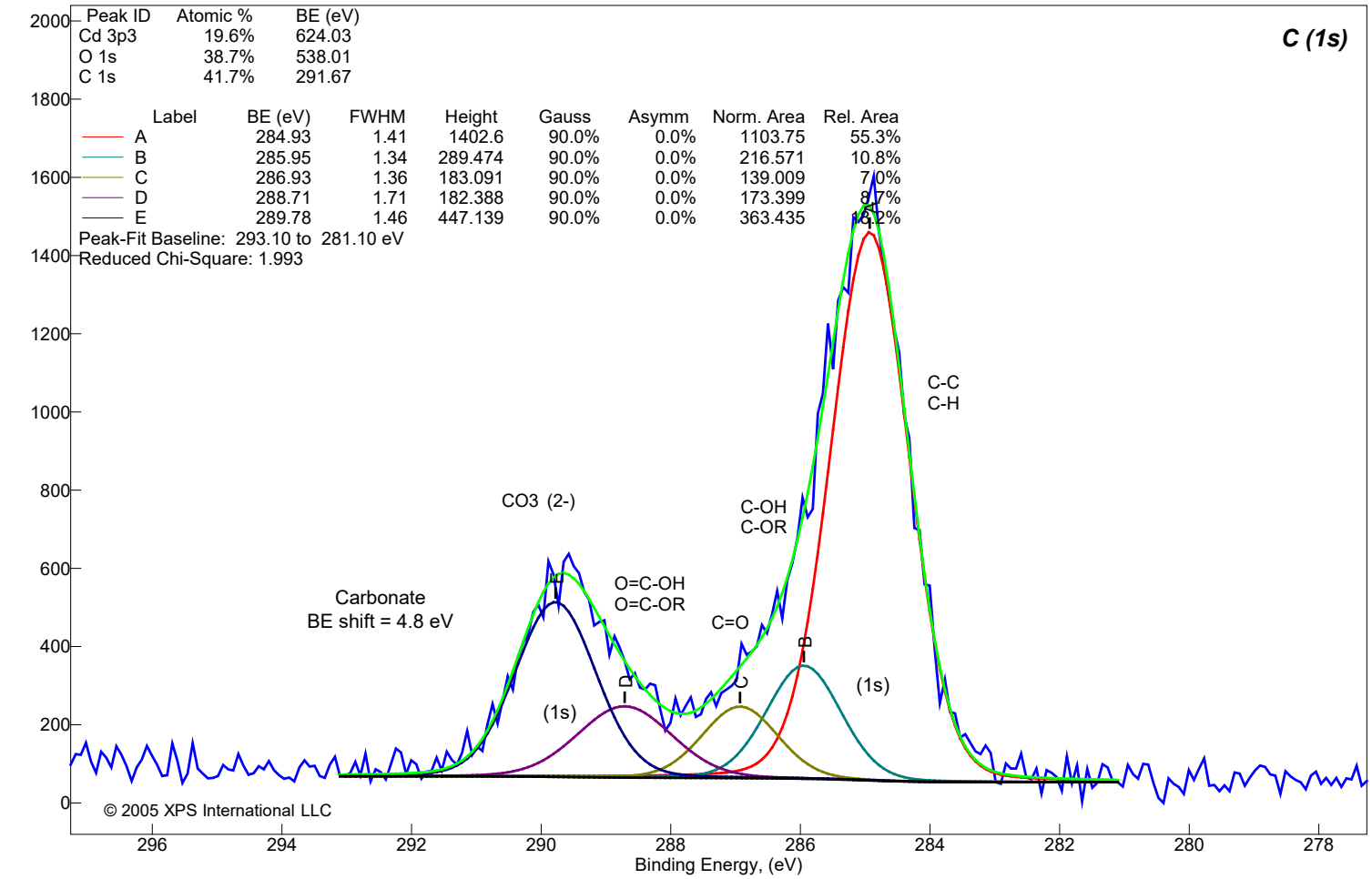


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CdO

Cadmium (II) Oxide (FW = 128.40)

Sample Description: CdO (99.99+%) Aldrich lot #01318EV, 3mm pellet, 35 TOA, screen

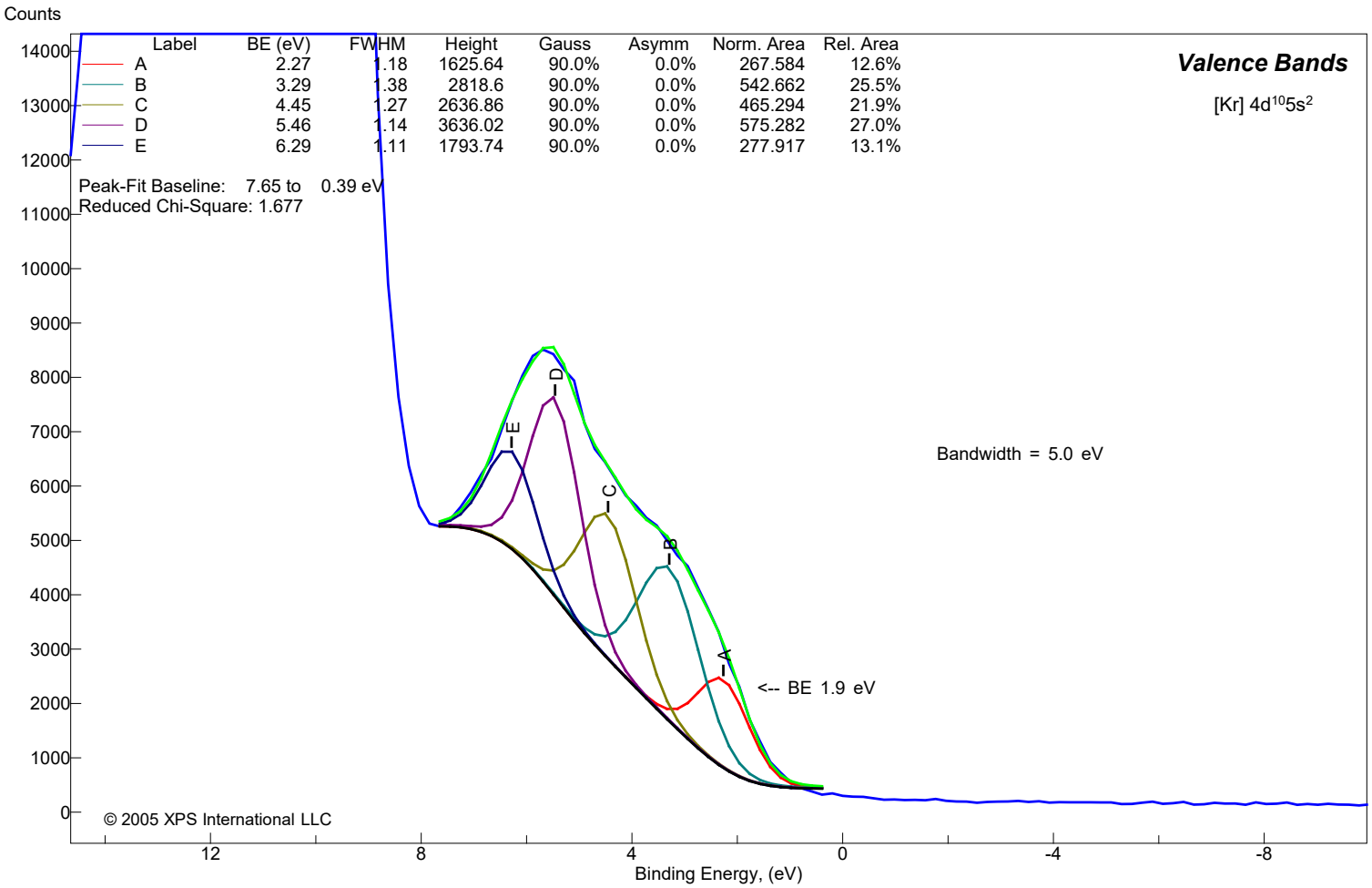


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CdO

Cadmium (II) Oxide (FW = 128.40)

Sample Description: CdO (99.99+%) Aldrich lot #0138EV 3mm pellet, 35 TOA, screen
screen



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$CdCO_3$

Cadmium (II) Carbonate (FW = 172.42)

Surface Composition Table

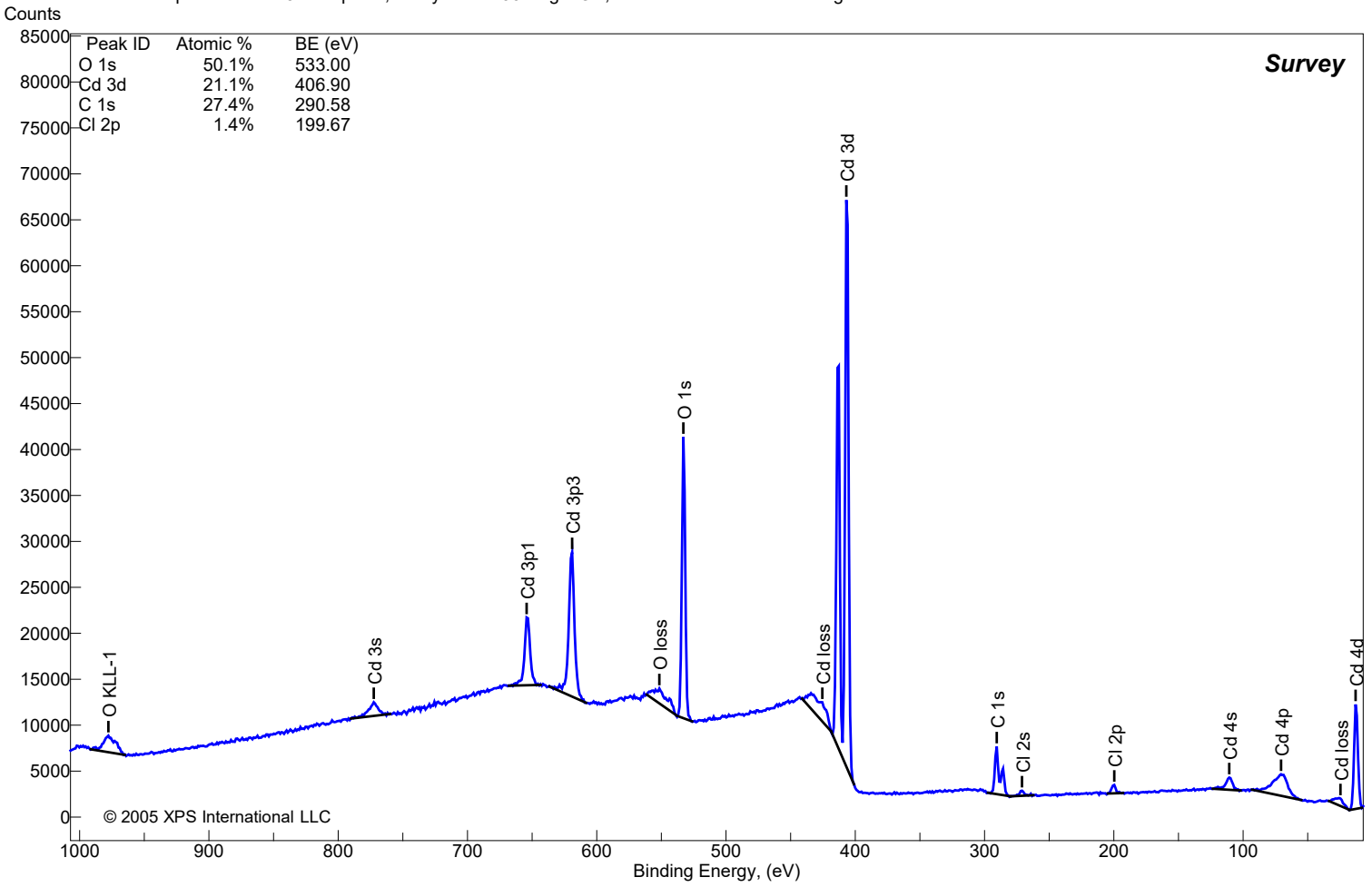
Description: $CdCO_3$ (99.999%) from Aldrich, analyzed at 90 deg TOA, mesh at 1mm, non-conductive white powder pressed into 3 mm pellet, mp 500 C dec, d 4.26, sol in dil acids

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Cd 4d	8.0	13.0	1.97	1.4	19,671	
Cd loss	19.7	24.7	0.00	1.4	3,366	
Cd 4p	65.6	70.6	2.25	1.4	16,278	
Cd 4s	105.7	110.7	0.69	1.4	4,323	
Cl 2p	194.7	199.7	2.28	1.4	1,578	1.4%
Cl 2s	266.0	271.0	1.69	1.4	1,117	
C 1s	285.6	290.6	1.00	1.4	12,082	27.4%
Cd 3d	401.9	406.9	20.22	1.4	162,581	21.1%
Cd loss	420.5	425.5	0.00	1.4	14,786	
O 1s	528.0	533.0	2.93	1.4	47,058	50.1%
O loss	546.6	551.6	0.00	1.4	10,789	
Cd 3p3	614.0	619.0	8.50	1.4	41,407	
Cd 3p1	649.2	654.2	4.22	1.4	18,442	
Cd 3s	767.5	772.5	3.04	1.4	5,926	
O KLL-1	972.8	977.8	0.70	1.4	10,110	

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Cadmium (II) Carbonate (FW = 172.42)

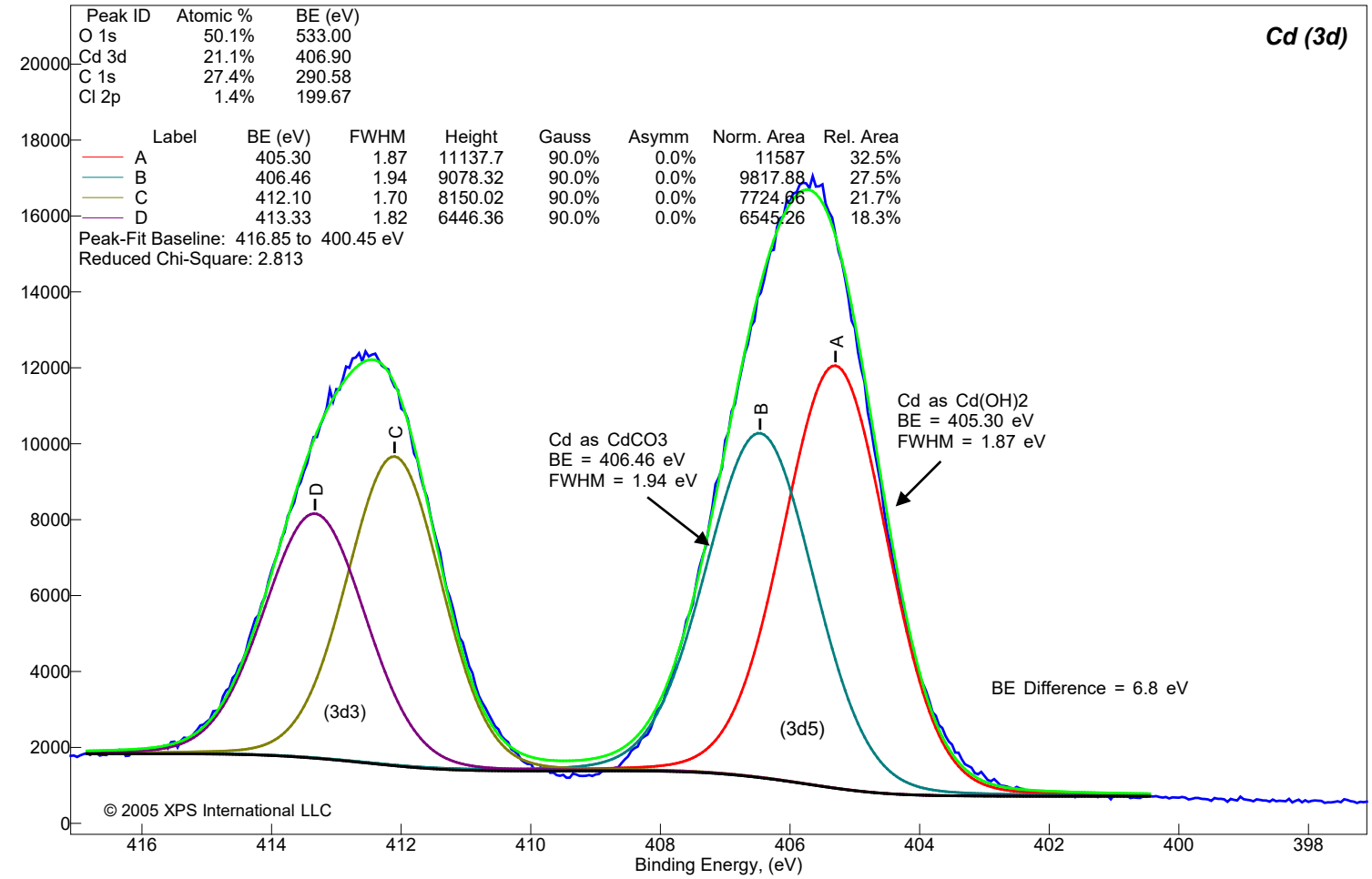
Sample Description: CdCO3 (99.999%) from Aldrich
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



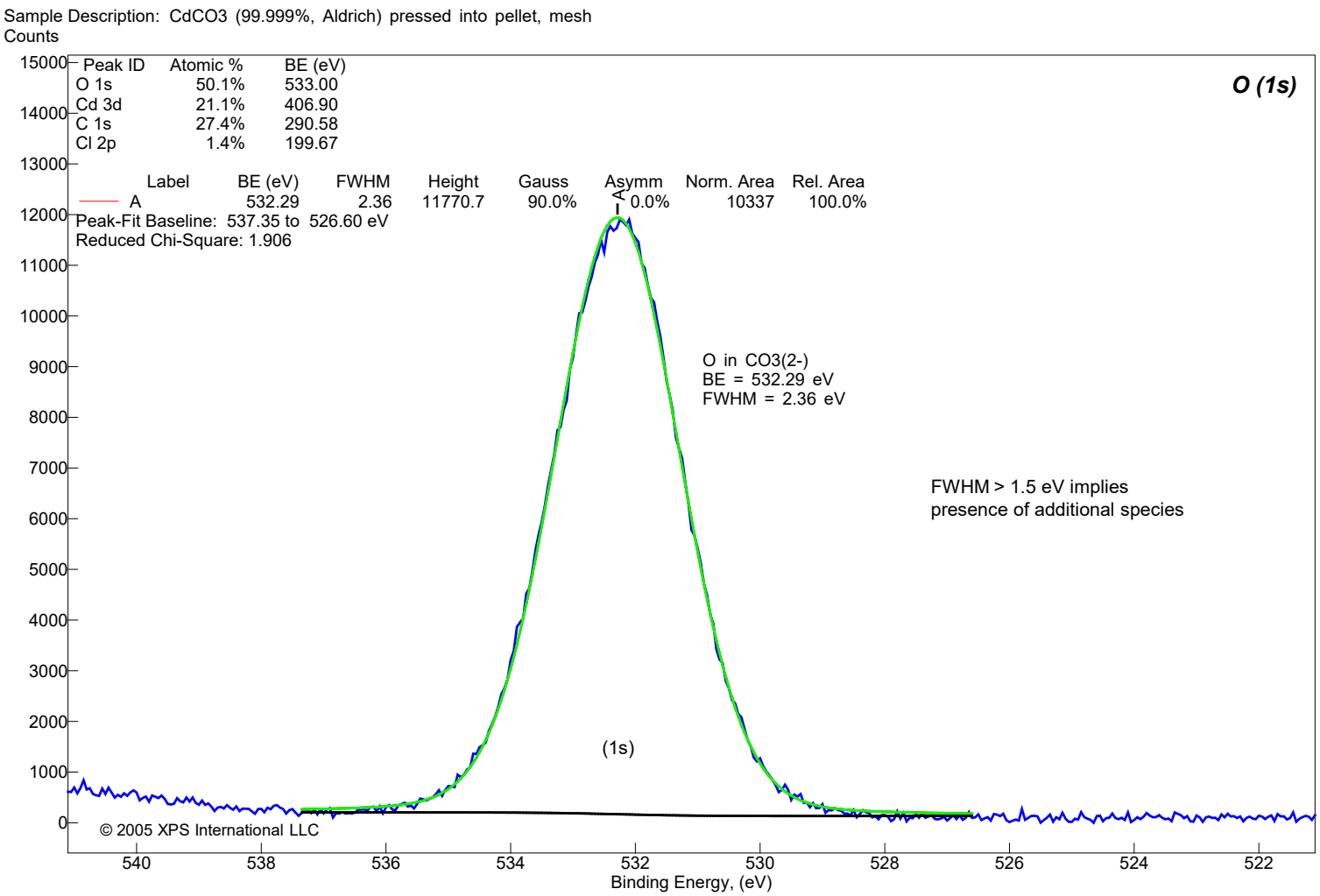
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Cadmium (II) Carbonate (FW = 172.42)

Sample Description: CdCO3 (99.999%, Aldrich) pressed into pellet, mesh



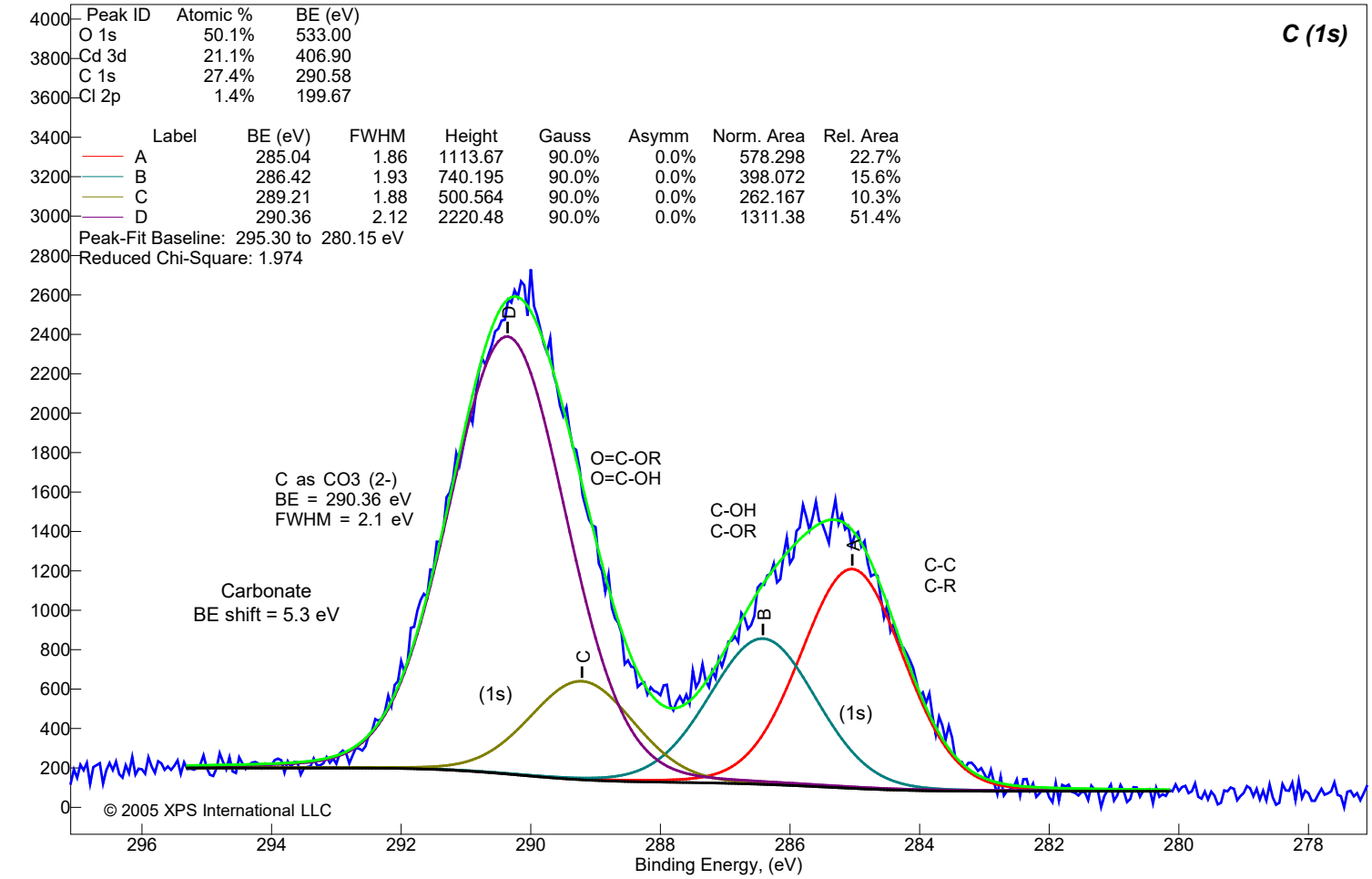
Cadmium (II) Carbonate (FW = 172.42)



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Cadmium (II) Carbonate (FW = 172.42)

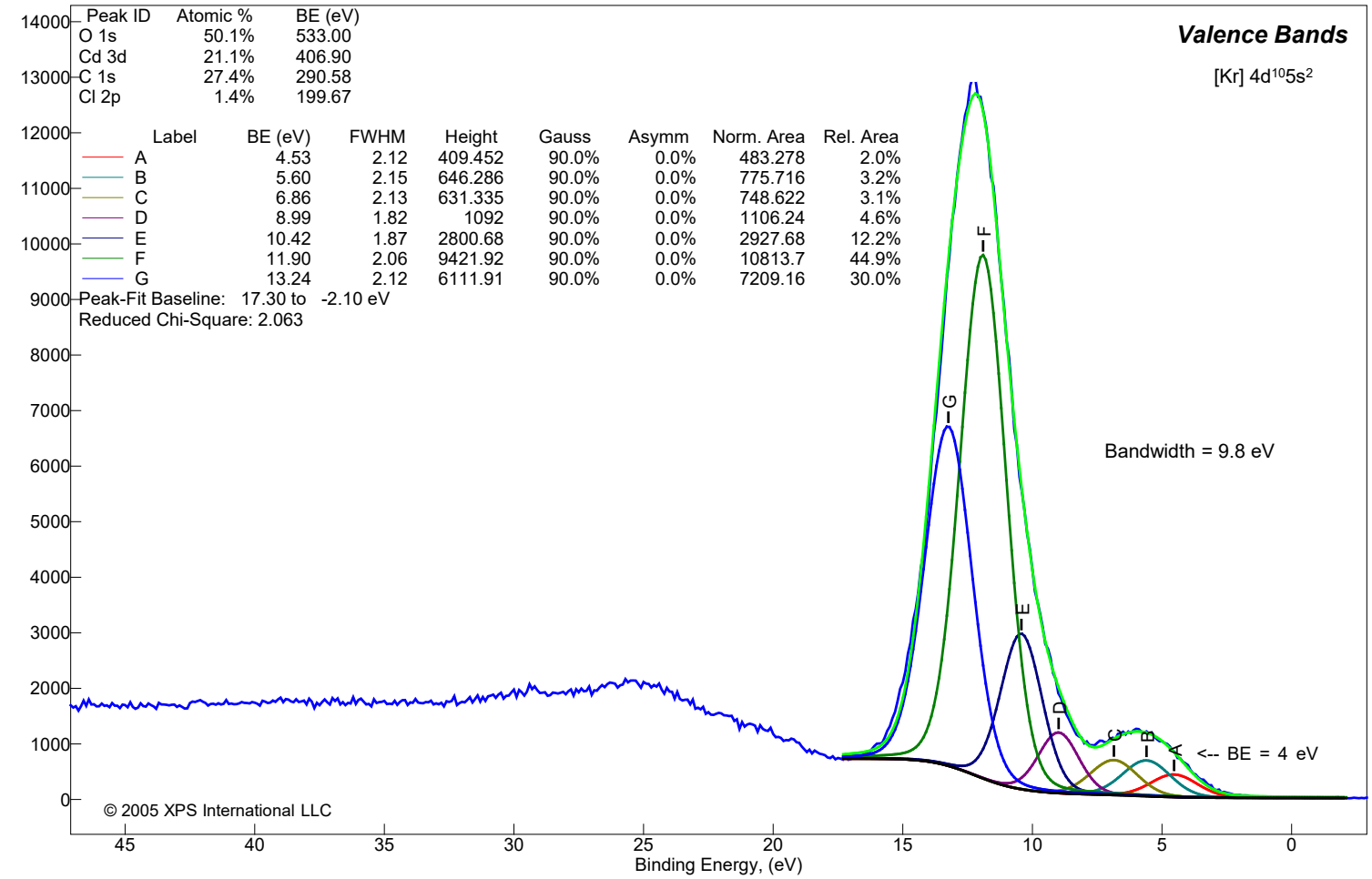
Sample Description: CdCO3 (99.999%, Aldrich) pressed into pellet, mesh



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Cadmium (II) Carbonate (FW = 172.42)

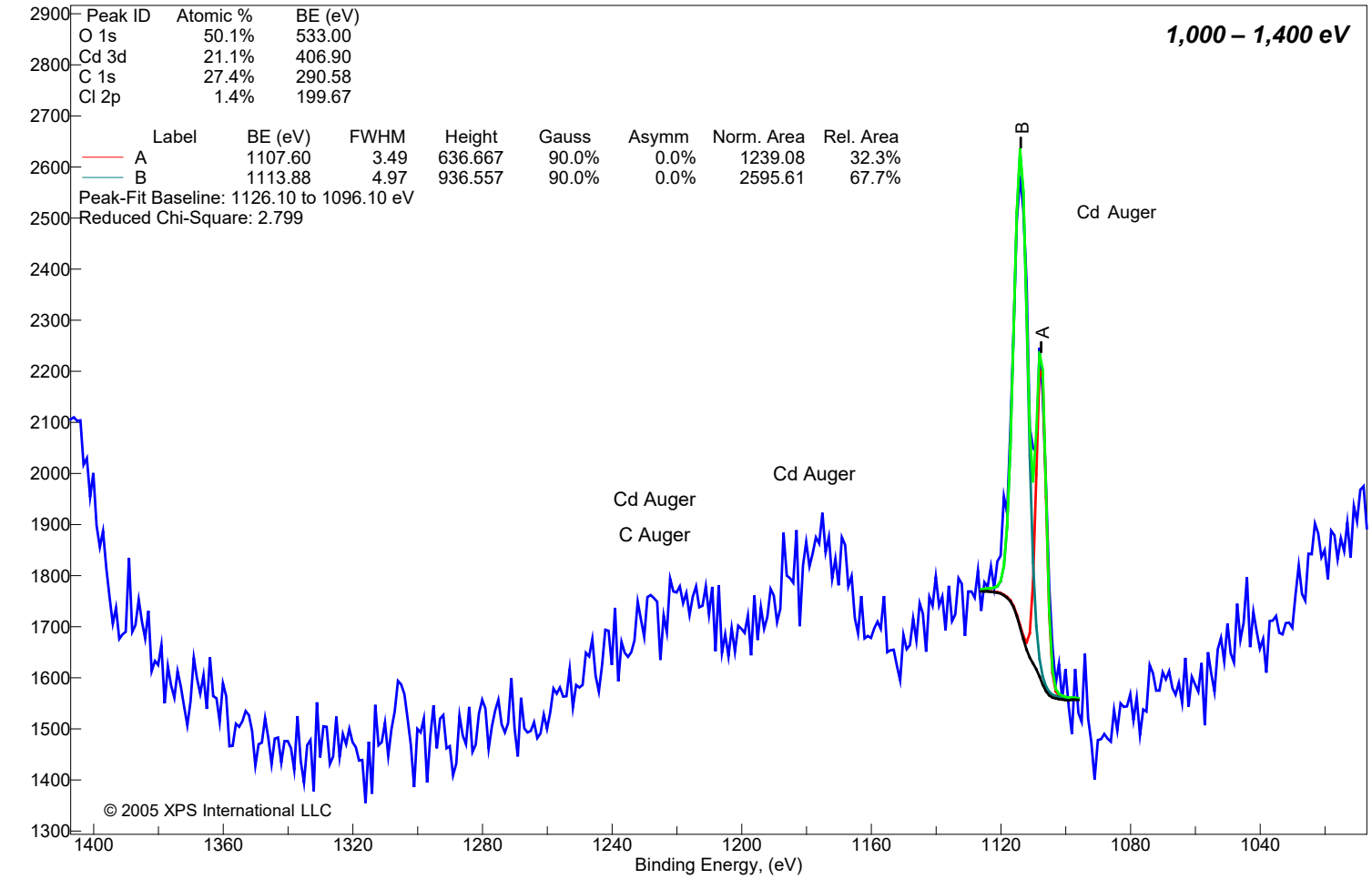
Sample Description: CdCO3 (99.999%, Aldrich) pressed into pellet, mesh



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Cadmium (II) Carbonate (FW = 172.42)

Sample Description: CdCO3 (99.999%, Aldrich) pressed into pellet, mesh



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CeO_2

Cerium (IV) Oxide (FW = 172.12)
Surface Composition Table

Description: CeO_2 (99%) from Rare Metallics Co. Lot# 70202-13, analyzed at 90 deg TOA, mesh at 1mm, non-conductive yellow-white powder pressed into 3 mm pellet, mp 2600 C, d 7.13, sol in H_2SO_4 and HNO_3

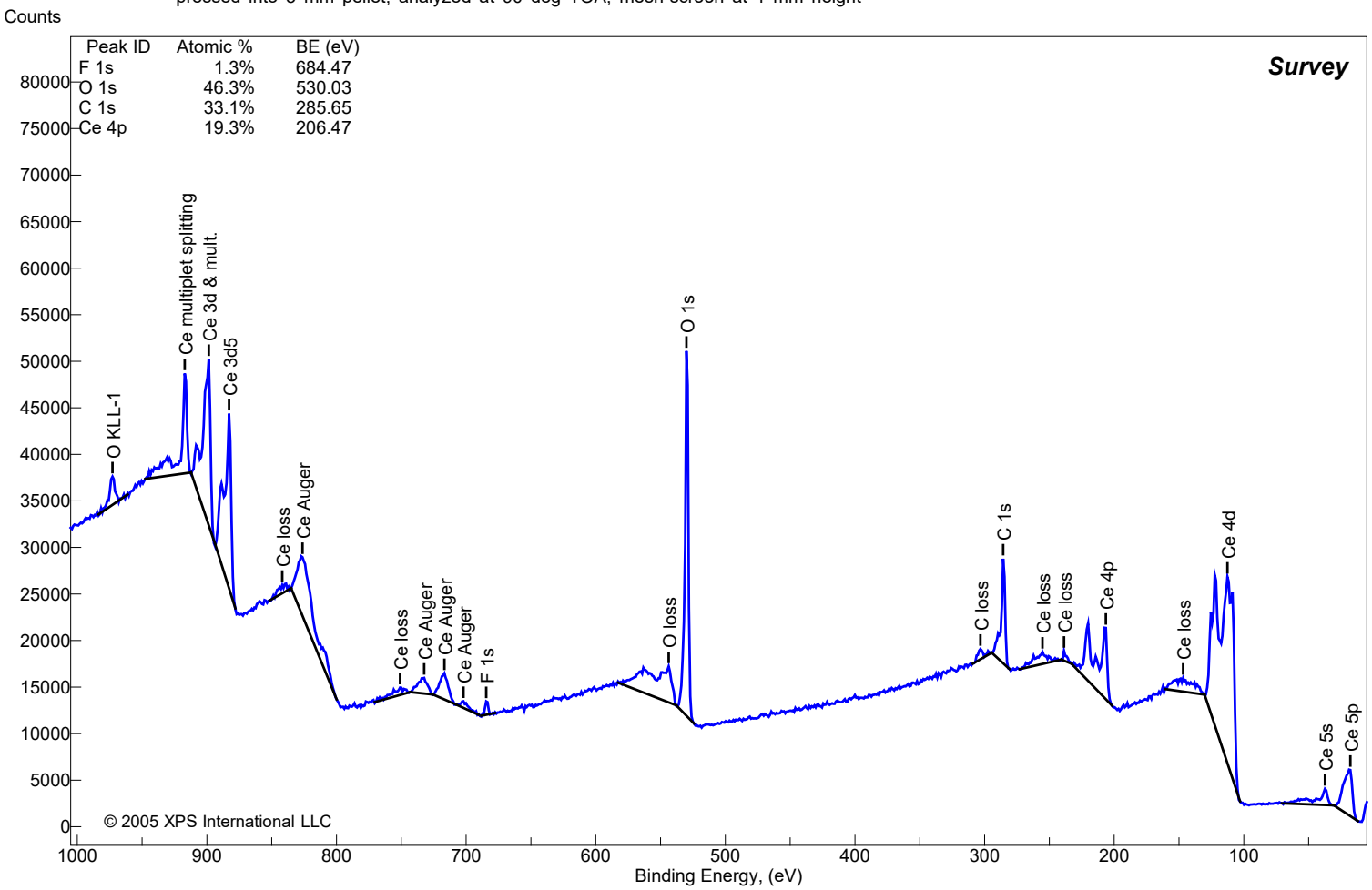
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Ce 5p	17.8	13.6	0.66	1.4	19,464	
Ce 5s	37.4	33.2	0.23	1.4	8,719	
Ce 4d	112.6	108.4	6.93	1.6	149,897	
Ce loss	146.8	142.6	0.00	1.4	11,919	
Ce 4p	206.5	202.3	3.03	1.4	40,843	19.3%
Ce loss	238.7	234.5	0.00	1.4	1,335	
Ce loss	255.3	251.1	0.00	1.4	7,336	
C 1s	285.6	281.4	1.00	1.4	21,120	33.1%
C loss	303.2	299.0	0.00	1.4	2,865	
O 1s	530.0	525.8	2.93	1.4	62,822	46.3%
O loss	543.7	539.5	0.00	1.4	39,375	
F 1s	684.5	680.3	4.43	1.4	2,050	1.3%
Ce Auger	702.1	697.9	0.00	1.4	1,990	
Ce Auger	716.7	712.5	0.00	1.4	10,732	
Ce Auger	732.4	728.2	0.00	1.4	7,470	
Ce loss	750.9	746.7	0.00	1.4	5,543	
Ce Auger	826.2	822.0	0.00	1.4	46,812	
Ce loss	841.9	837.7	0.00	1.4	3,198	
Ce 3d5	882.9	878.7	30.50	1.4	59,993	
Ce 3d & multiplet	898.6	894.4	21.12	1.4	62,235	
Ce multiplet splitting	917.1	912.9	0.00	1.4	33,938	
O KLL-1	972.8	968.6	0.70	1.4	7,787	

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CeO_2

Cerium (IV) Oxide (FW = 172.12)

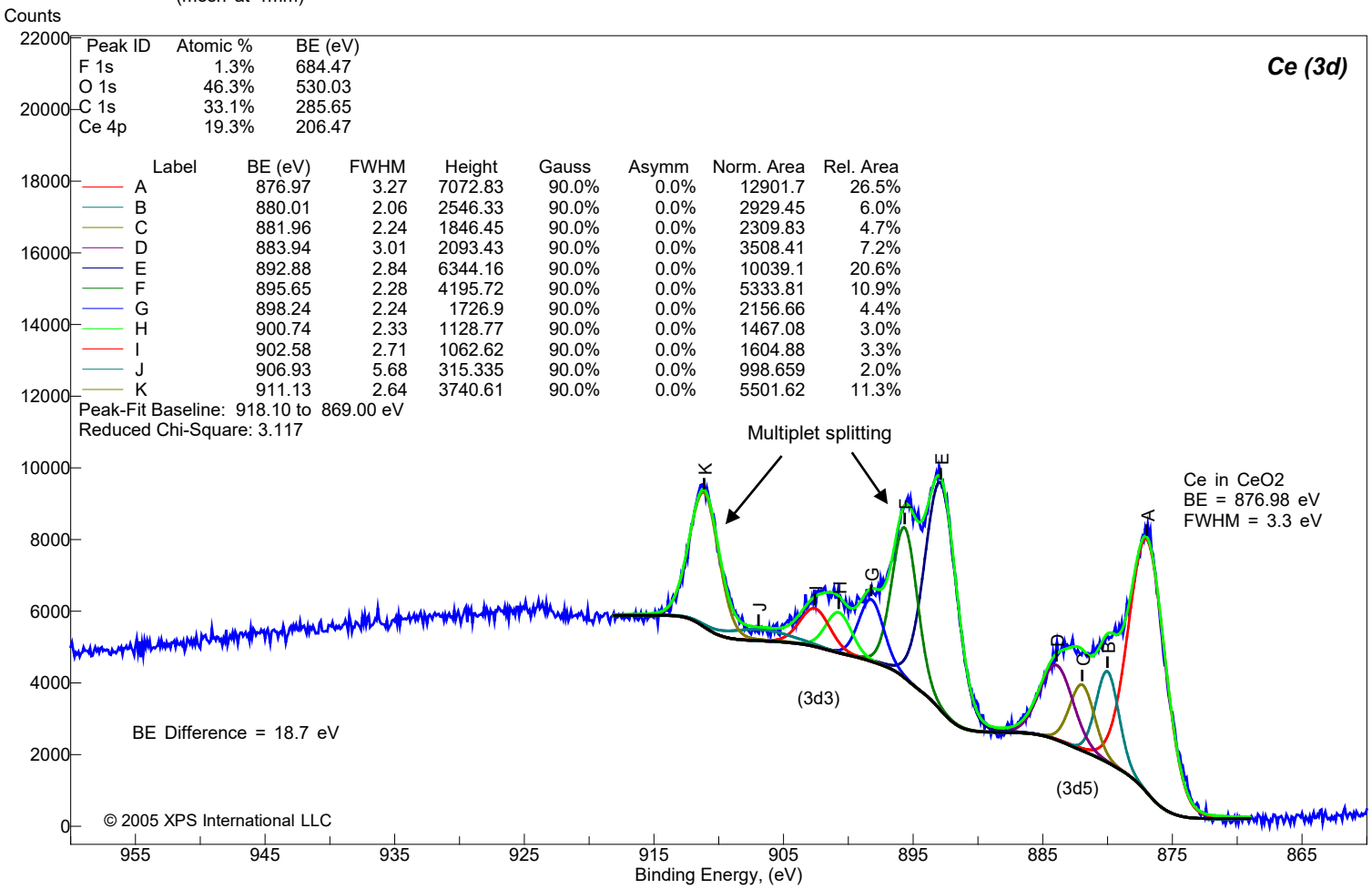
Sample Description: CeO2 (99%) from Rare Metallic Corp. lot# 70202-13
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Cerium (IV) Oxide (FW = 172.12)

Sample Description: CeO2 RMC 3mm plt 90 TOA #70202-13
(mesh at 1mm)



Cerium (IV) Oxide (FW = 172.12)

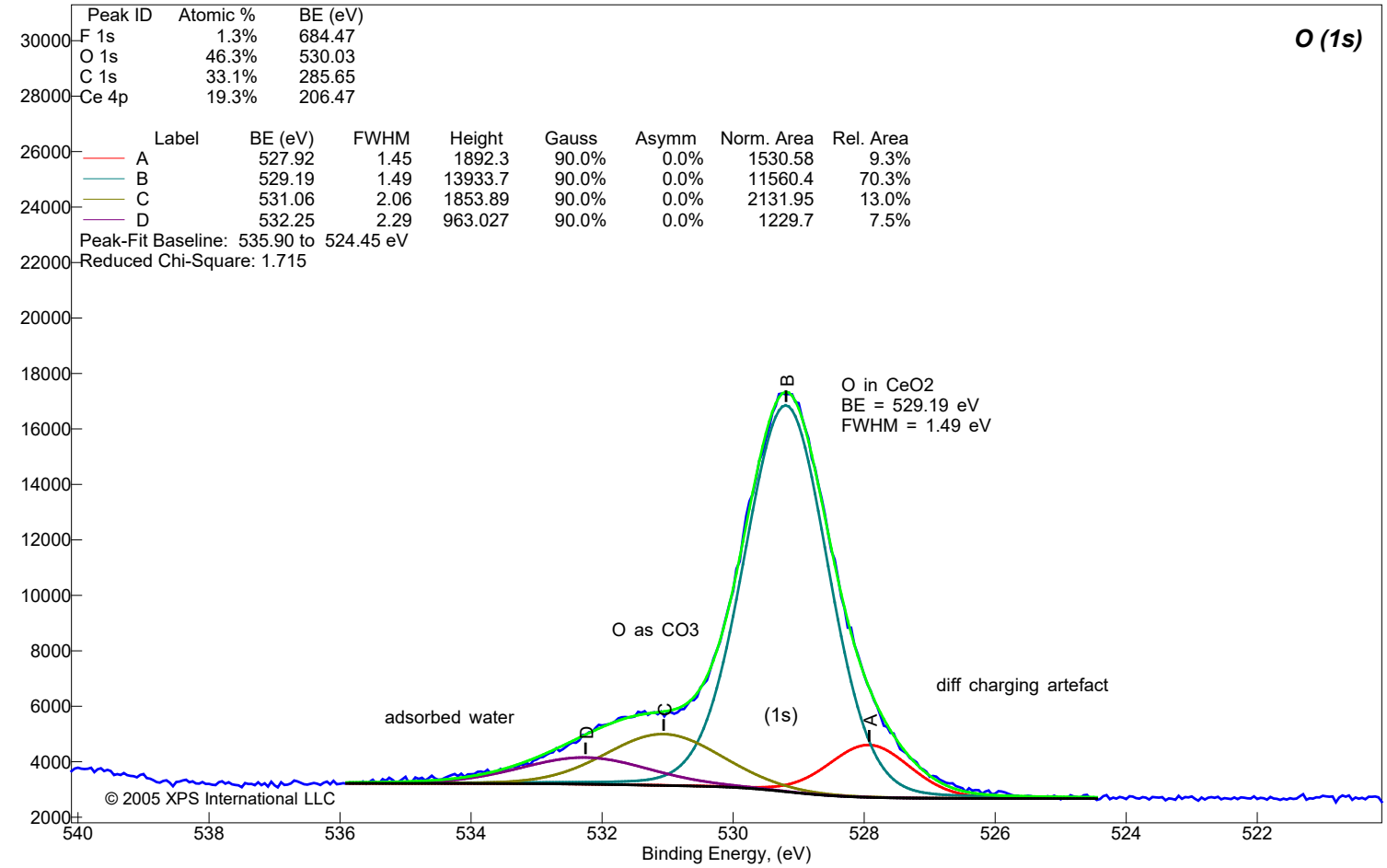
Sample Description: CeO2 RMC 3mm plt 90 TOA #70202-13
(mesh at 1mm)

Counts

Peak ID	Atomic %	BE (eV)
F 1s	1.3%	684.47
O 1s	46.3%	530.03
C 1s	33.1%	285.65
Ce 4p	19.3%	206.47

Label	BE (eV)	FWHM	Height	Gauss	Asymm	Norm. Area	Rel. Area
A	527.92	1.45	1892.3	90.0%	0.0%	1530.58	9.3%
B	529.19	1.49	13933.7	90.0%	0.0%	11560.4	70.3%
C	531.06	2.06	1853.89	90.0%	0.0%	2131.95	13.0%
D	532.25	2.29	963.027	90.0%	0.0%	1229.7	7.5%

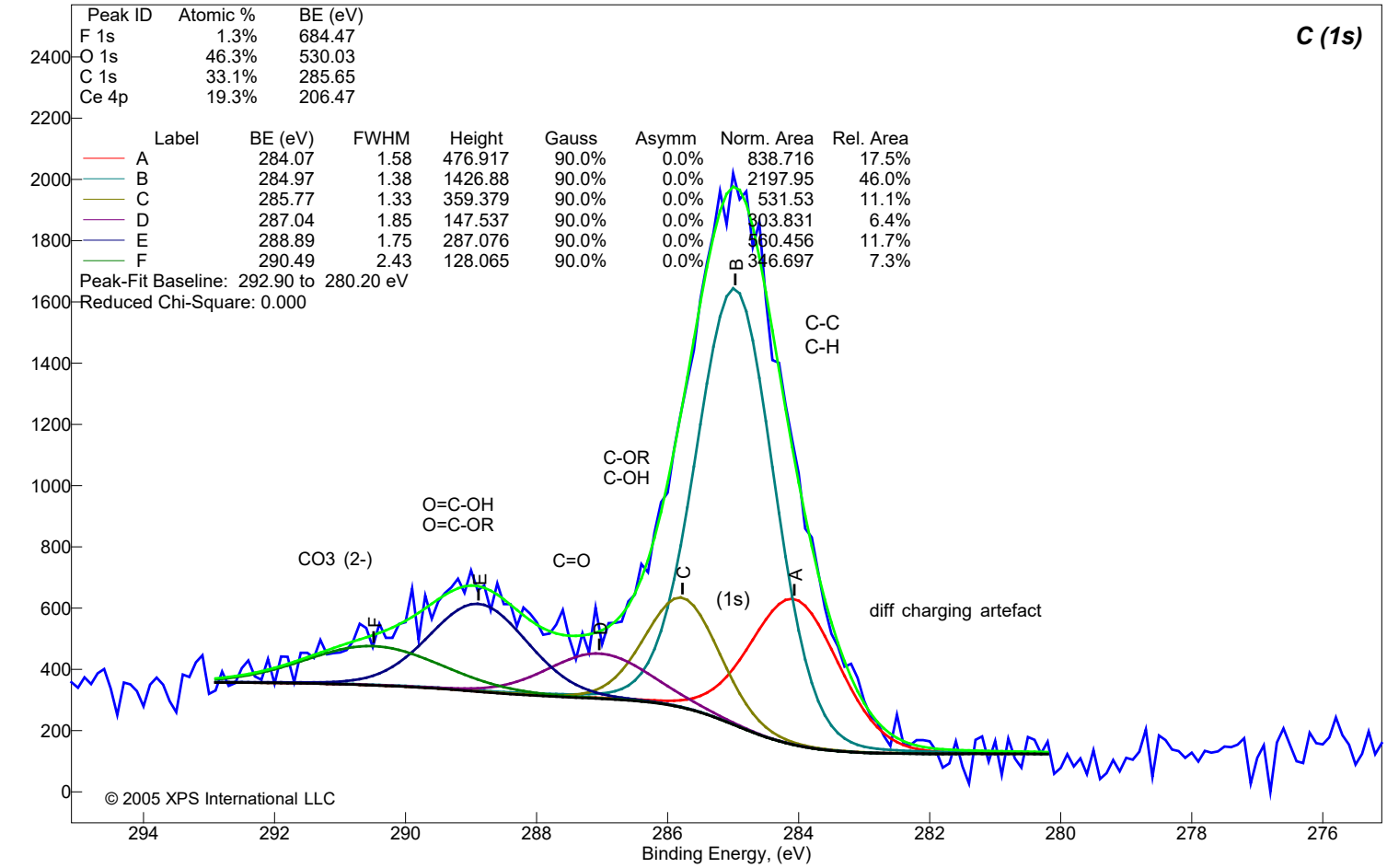
Peak-Fit Baseline: 535.90 to 524.45 eV
Reduced Chi-Square: 1.715



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Cerium (IV) Oxide (FW = 172.12)

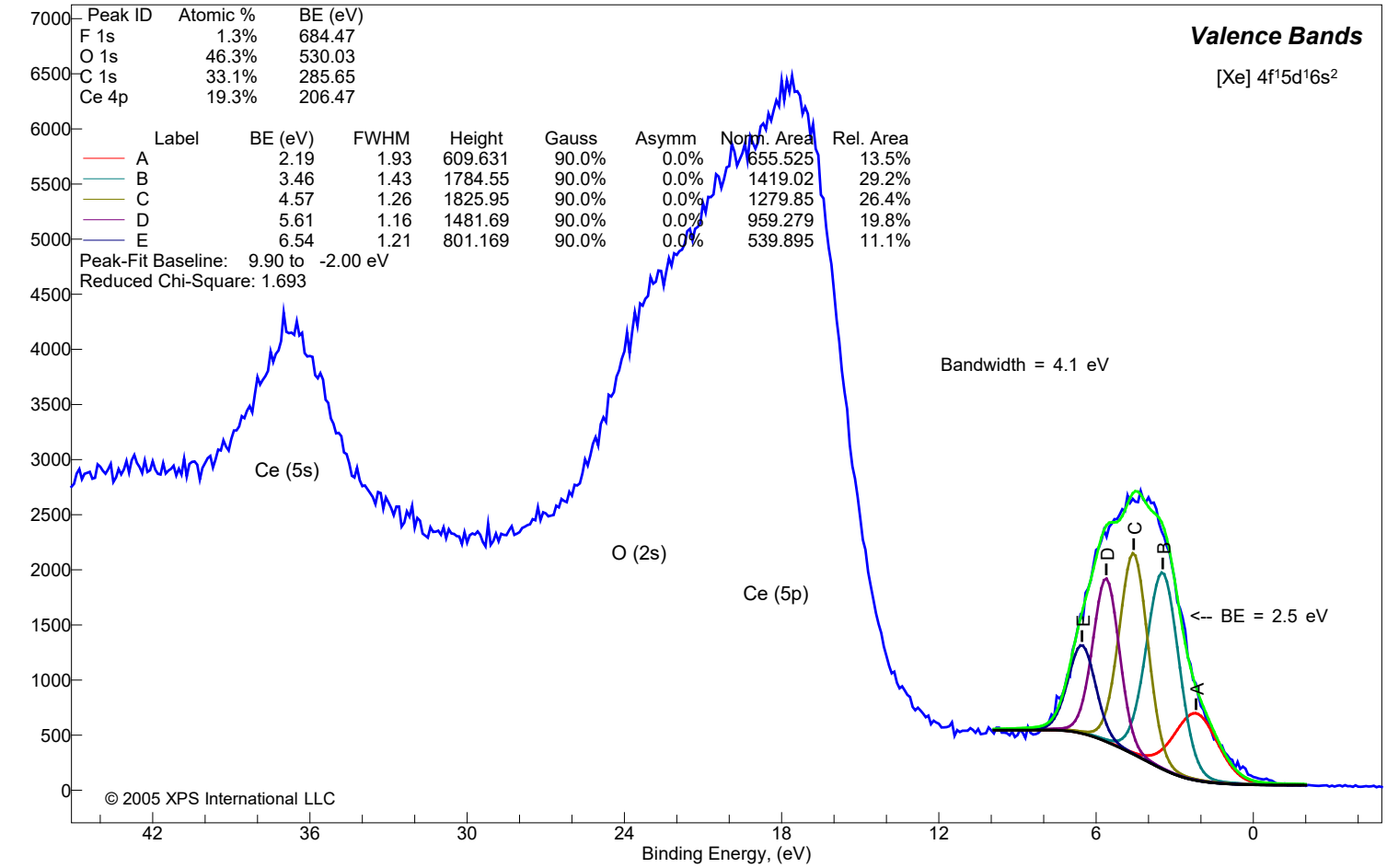
Sample Description: CeO2 RMC 3mm plt 90 TOA #70202-13
(mesh at 1mm)



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Cerium (IV) Oxide (FW = 172.12)

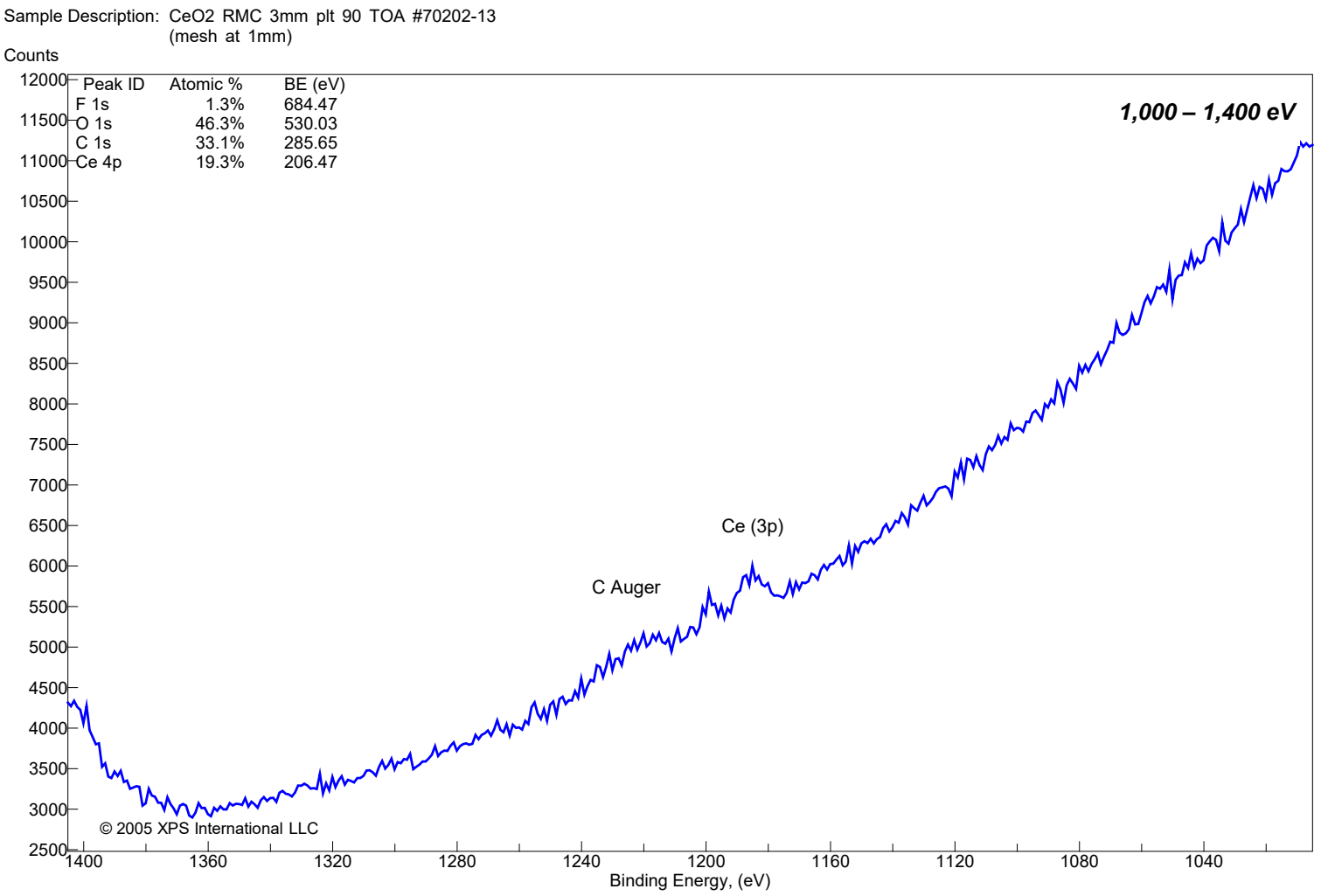
Sample Description: CeO2 RMC 3mm plt 90 TOA #70202-13
(mesh at 1mm)



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CeO_2

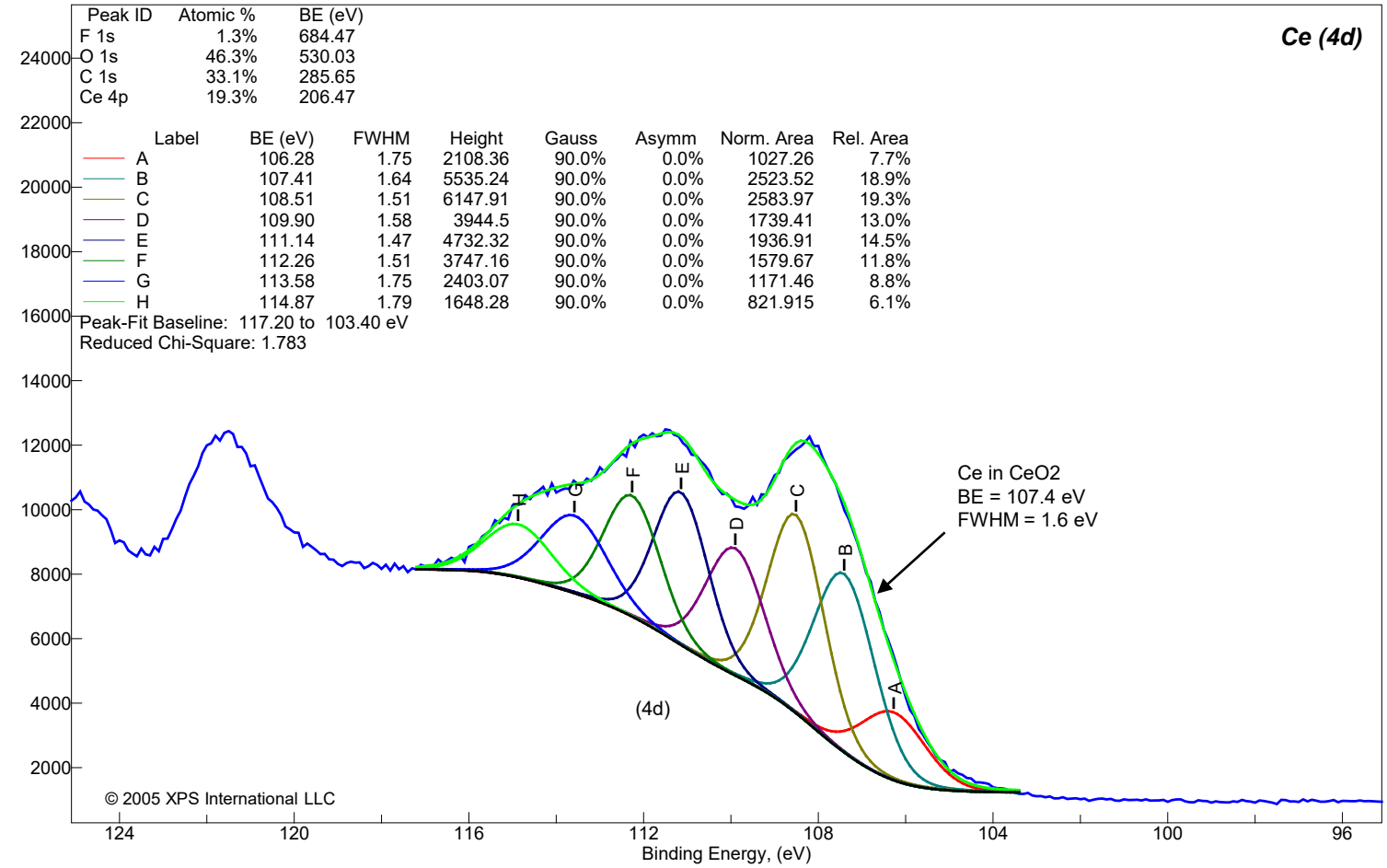
Cerium (IV) Oxide (FW = 172.12)



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Cerium (IV) Oxide (FW = 172.12)

Sample Description: CeO2 RMC 3mm plt 90 TOA #70202-13
(mesh at 1mm)



CoO

Cobalt (II) Oxide (FW = 74.93)
Surface Composition Table

Description: CoO (99+%) from Aldrich Co. Lot# 10029MX, analyzed at 90 deg TOA, mesh at 1mm, conductive brown-black powder pressed into 3 mm pellet, mp 1935 C, d 6.45, sol in H2SO4 and HNO3

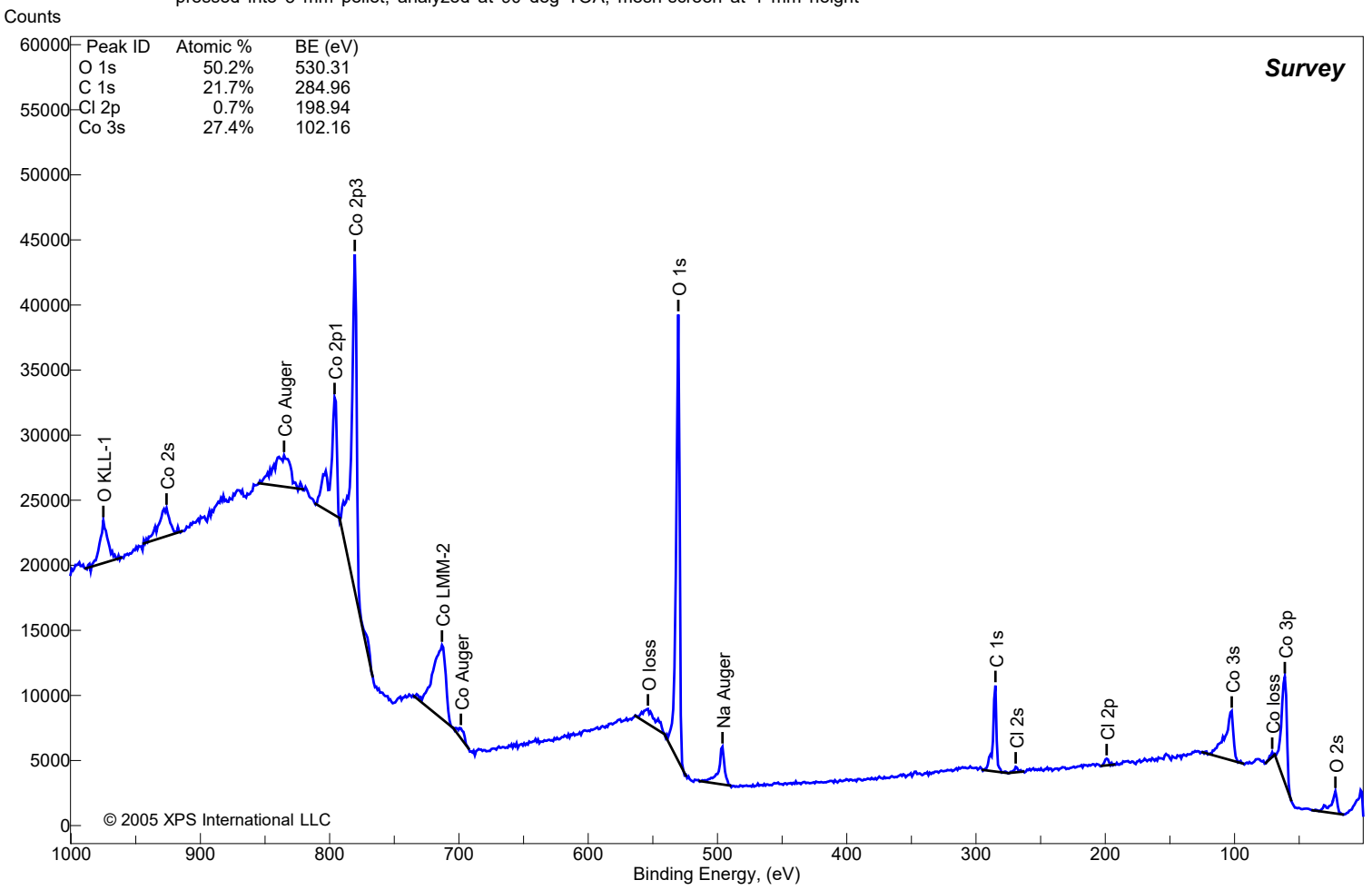
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	22.0	22.0	0.14	1.5	8,289	
Co 3p	61.1	61.1	1.93	1.5	32,453	
Co loss	70.9	70.9	0.00	1.5	776	
Co 3s	102.2	102.2	0.82	1.5	24,317	26.3%
Cl 2p	198.9	198.9	2.28	1.5	1,608	0.7%
Cl 2s	269.3	269.3	1.69	1.5	1,219	
C 1s	285.0	285.0	1.00	1.5	19,012	20.8%
Na Auger	496.1	496.1	5.00	1.5	13,368	3.9%
O 1s	530.3	530.3	2.93	1.5	91,536	48.2%
O loss	553.8	553.8	0.00	1.5	10,486	
Co Auger	698.4	698.4	0.00	1.5	3,425	
Co LMM-2	713.1	713.1	0.44	1.5	54,194	
Co 2p3	780.6	780.6	12.62	1.5	110,613	
Co 2p1	796.2	796.2	6.54	1.5	48,413	
Co Auger	835.3	835.3	0.00	1.5	33,093	
Co 2s	926.2	926.2	4.88	1.5	15,691	
O KLL-1	975.1	975.1	0.70	1.5	18,621	

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CoO

Cobalt (II) Oxide (FW = 74.93)

Sample Description: CoO (99+%) from Aldrich lot# 10029MX, conductive
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height

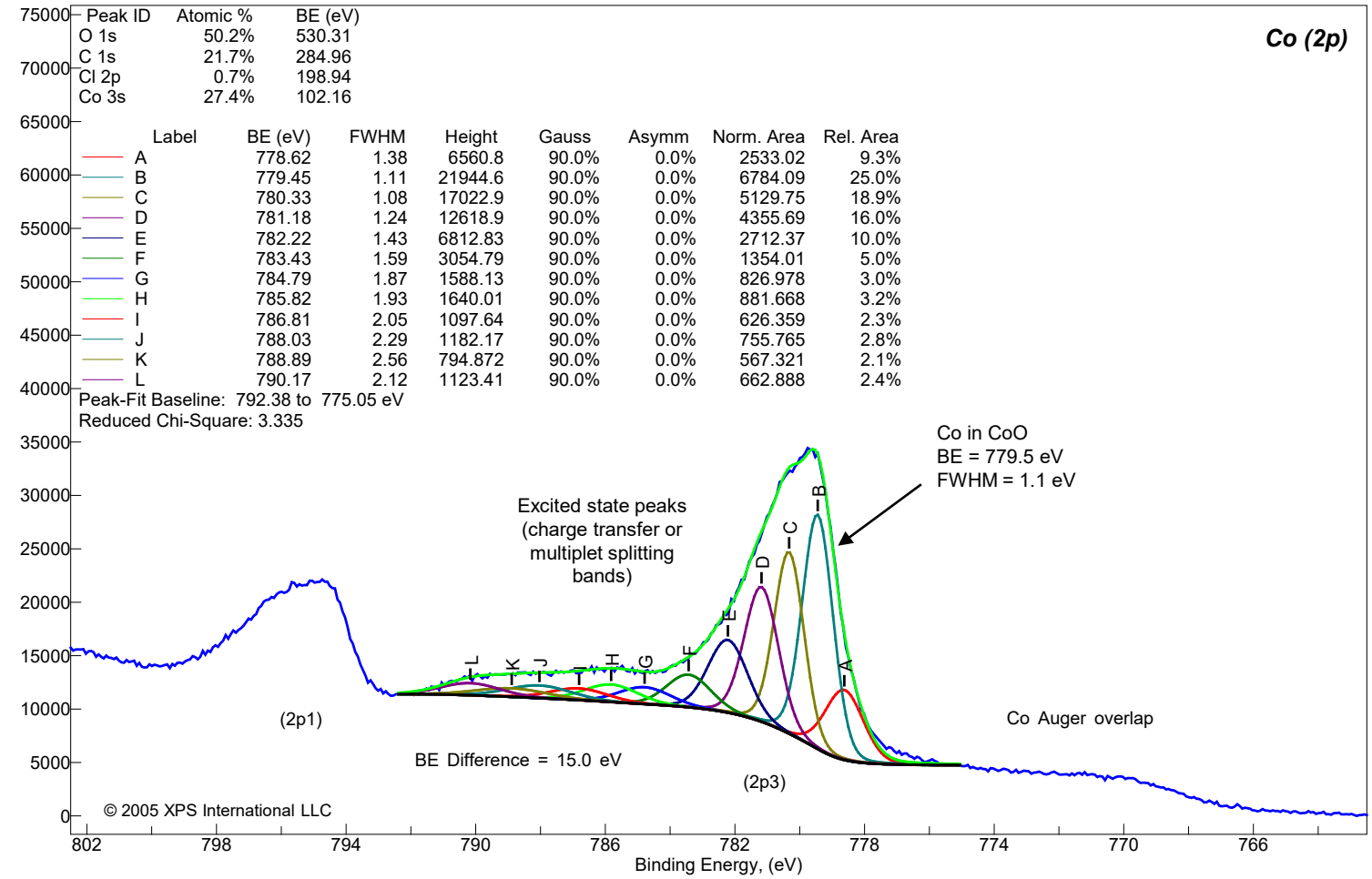


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CoO

Cobalt (II) Oxide (FW = 74.93)

Sample Description: CoO (99+%) Aldrich lot#10029MX, 3mm pellet, Conductive, 90 TOA

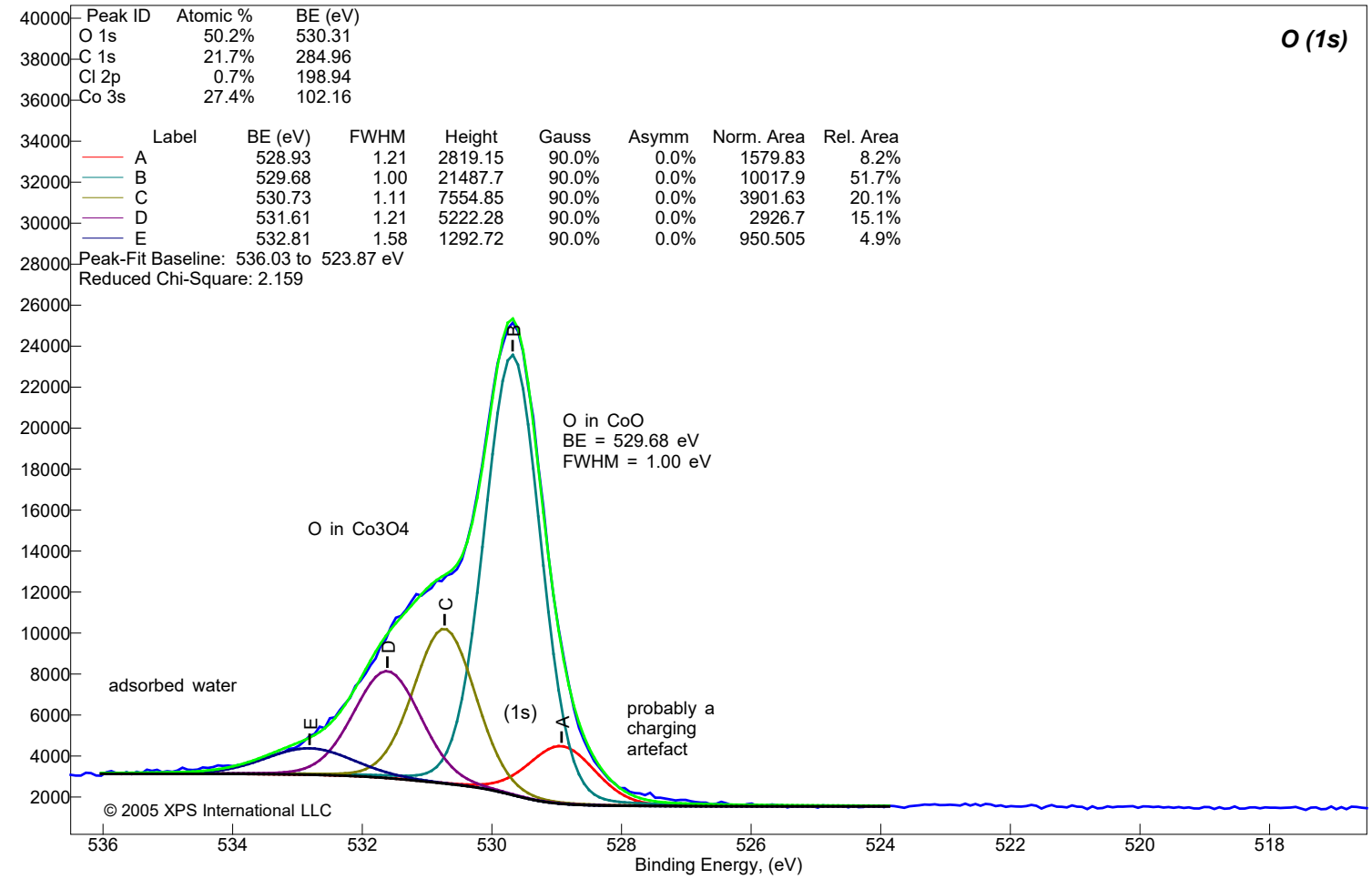


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CoO

Cobalt (II) Oxide (FW = 74.93)

Sample Description: CoO (99+%) Aldrich lot#10029MX, 3mm pellet, Conductive, 90 TOA

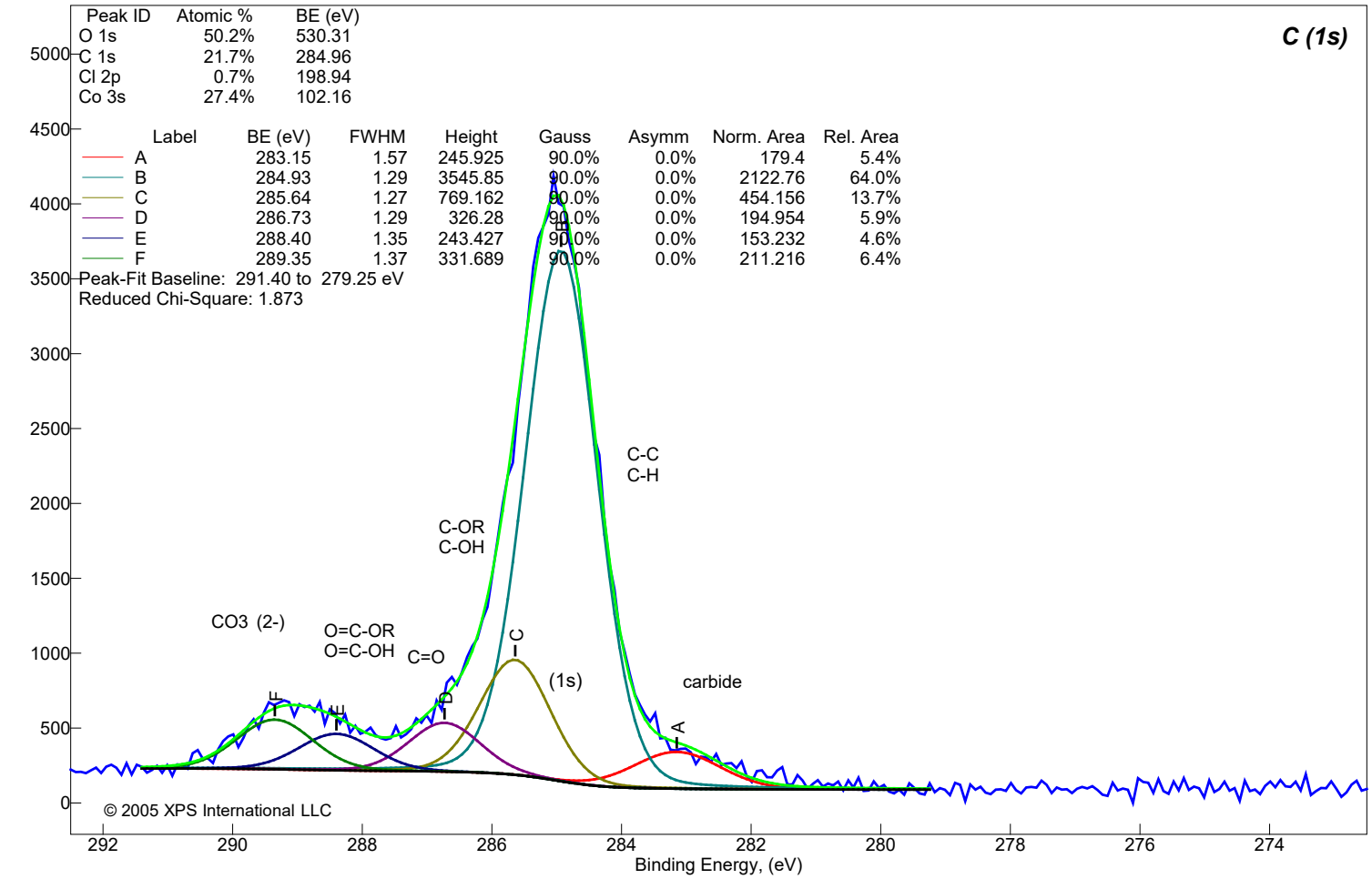


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CoO

Cobalt (II) Oxide (FW = 74.93)

Sample Description: CoO (99+%) Aldrich lot#10029MX, 3mm pellet, Conductive, 90 TOA

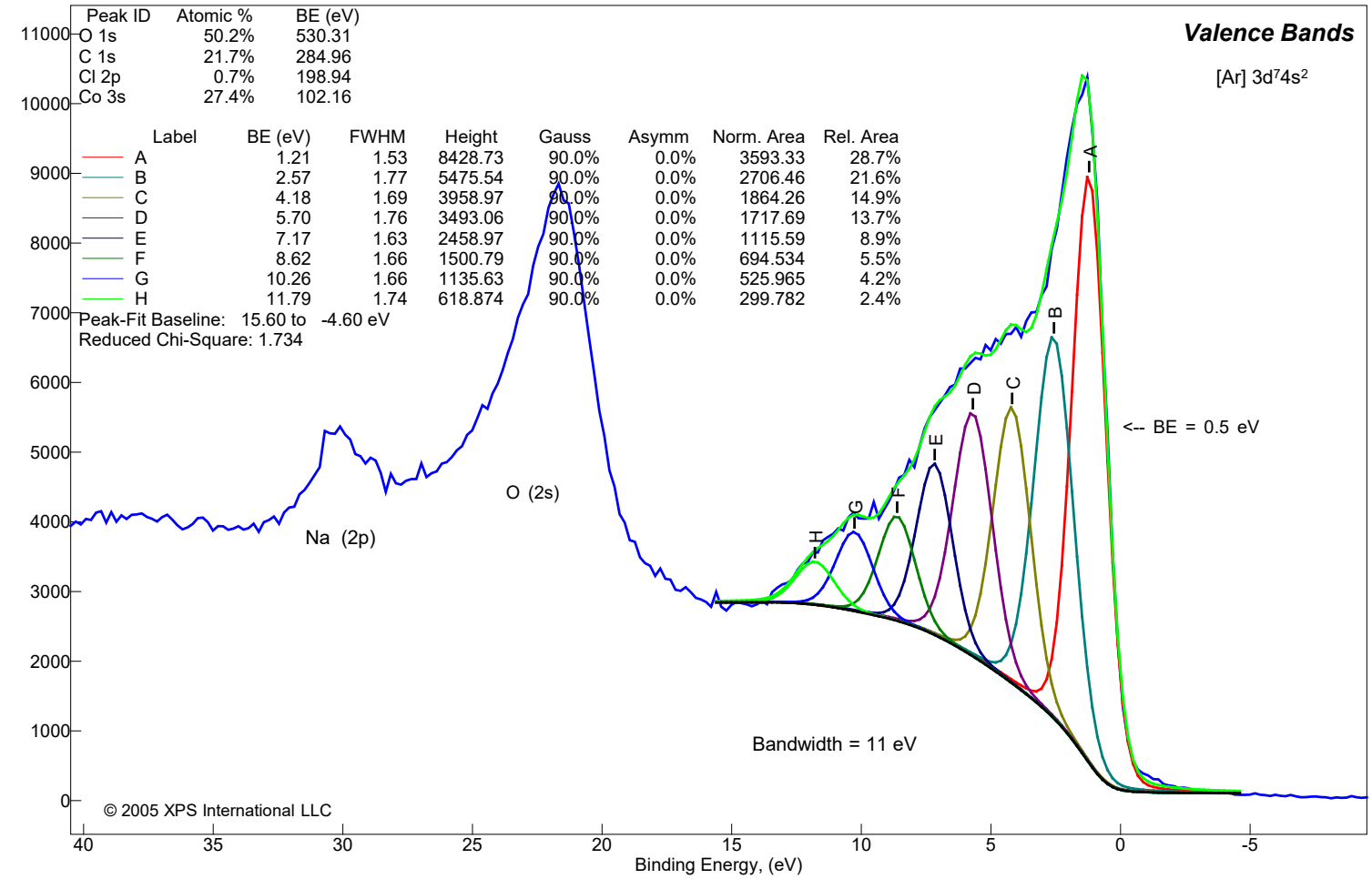


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CoO

Cobalt (II) Oxide (FW = 74.93)

Sample Description: CoO (99+%) Aldrich lot#10029MX, 3mm pellet, Conductive, 90 TOA

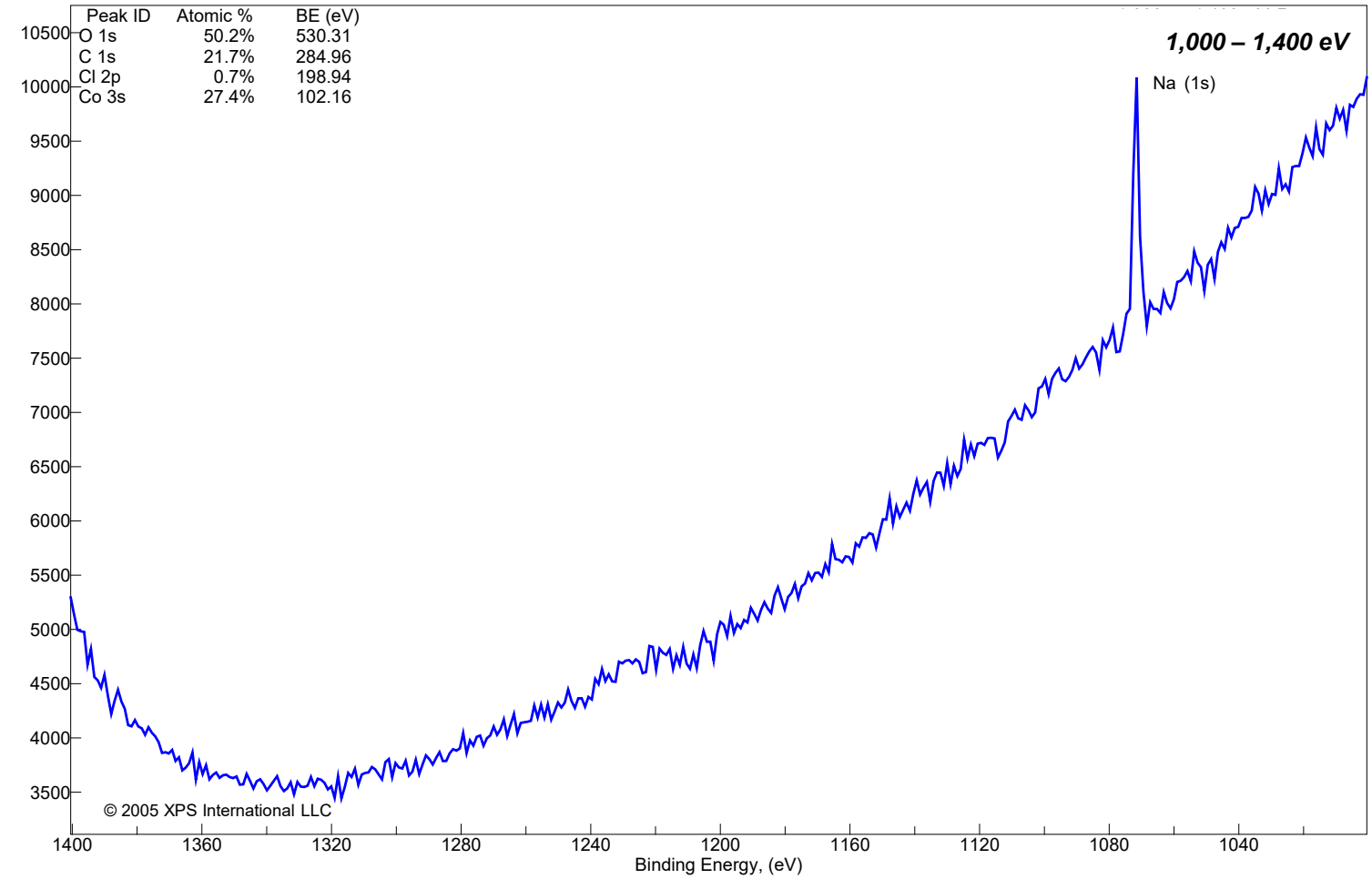


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CoO

Cobalt (II) Oxide (FW = 74.93)

Sample Description: CoO (99+%) Aldrich lot#10029MX, 3mm pellet, Conductive, 90 TOA

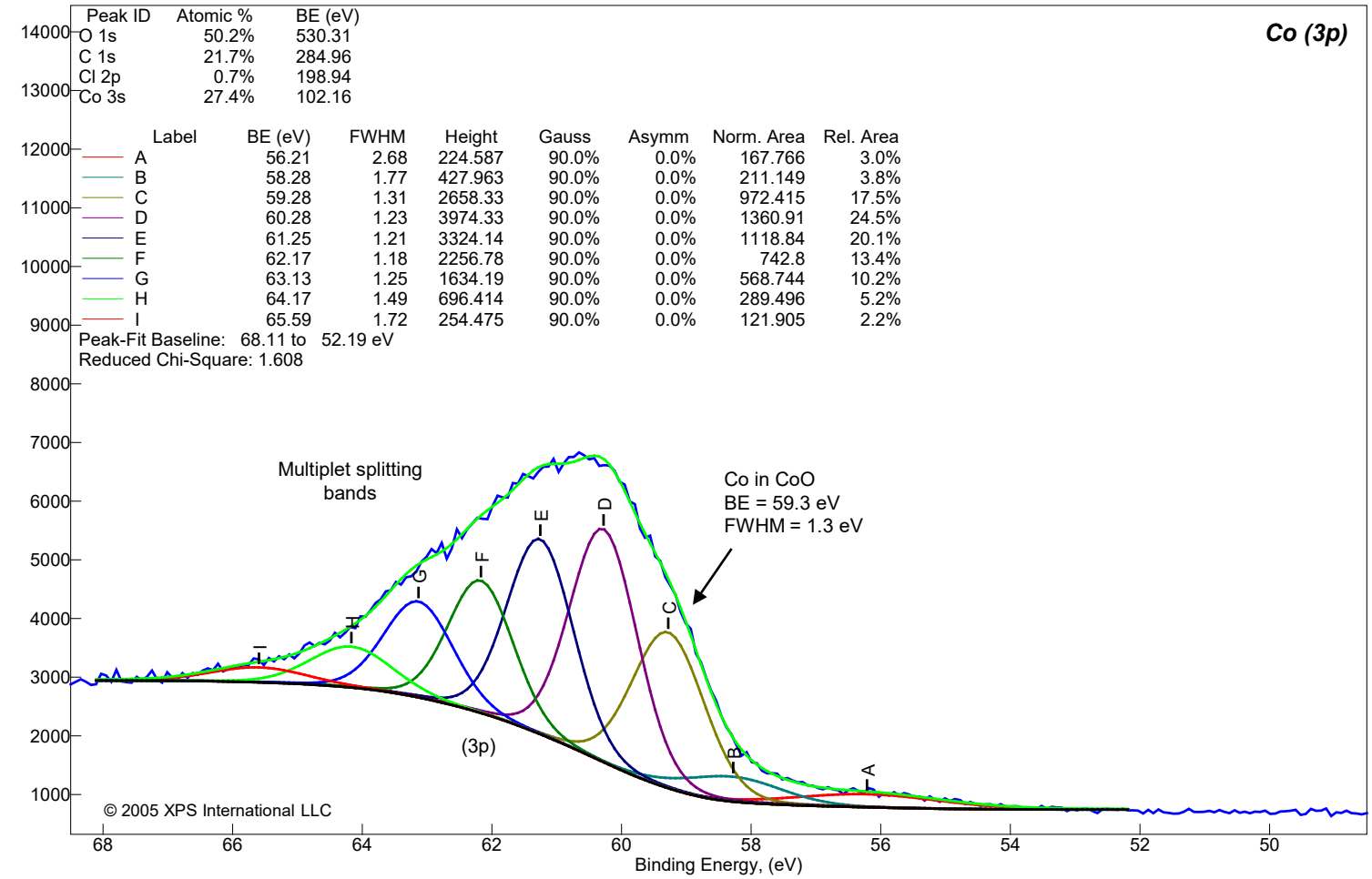


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CoO

Cobalt (II) Oxide (FW = 74.93)

Sample Description: CoO (99+%) Aldrich lot#10029MX, 3mm pellet, Conductive, 90 TOA



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Co_3O_4

Cobalt (II, III) Oxide (FW = 240.80)
Surface Composition Table

Description: Co_3O_4 (99.995%) from Aldrich Co. Lot# 01325AX, analyzed at 90 deg TOA, mesh at 1mm, conductive black powder pressed into 3 mm pellet, mp 900 C dec, d 6.11, sol in H_2SO_4 and HNO_3 and alkalies

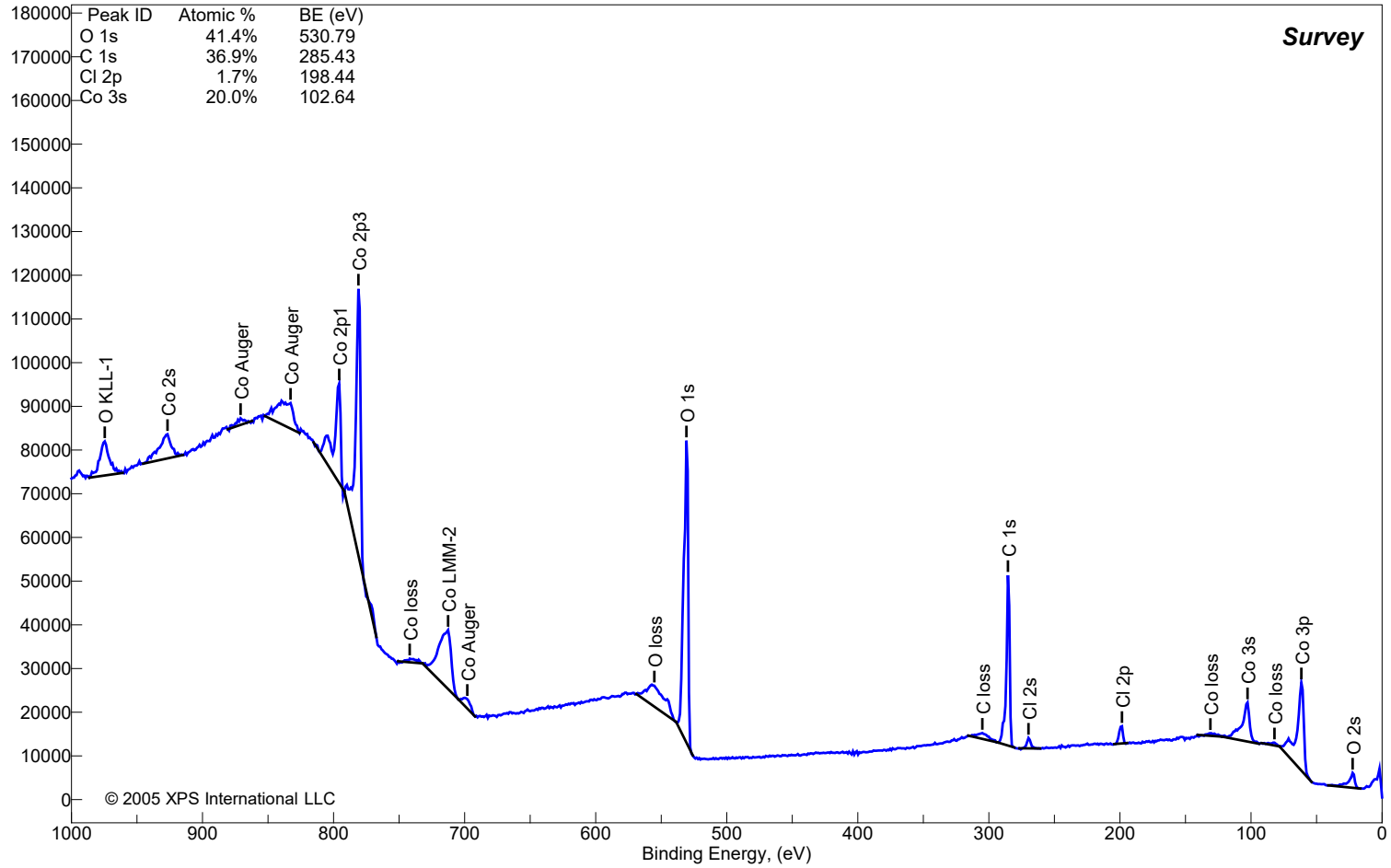
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	22.5	22.5	0.14	1.5	4,839	
Co 3p	61.6	61.6	1.93	1.5	32,328	
Co loss	82.1	82.1	0.00	1.5	830	
Co 3s	102.6	102.6	0.82	1.5	16,027	20.0%
Co loss	131.0	131.0	0.00	1.5	1,073	
Cl 2p	198.4	198.4	2.28	1.5	3,374	1.7%
Cl 2s	269.8	269.8	1.69	1.5	2,035	
C 1s	285.4	285.4	1.00	1.5	29,273	36.9%
C loss	305.0	305.0	0.00	1.5	3,384	
O 1s	530.8	530.8	2.93	1.5	68,216	41.4%
O loss	555.2	555.2	0.00	1.5	20,207	
Co Auger	697.9	697.9	0.00	1.5	3,668	
Co LMM-2	712.6	712.6	0.44	1.5	36,779	
Co loss	741.9	741.9	0.00	1.5	1,677	
Co 2p3	781.0	781.0	12.62	1.5	70,362	
Co 2p1	795.7	795.7	6.54	1.5	33,921	
Co Auger	832.8	832.8	0.00	1.5	21,227	
Co Auger	871.0	871.0	0.00	1.5	2,470	
Co 2s	926.7	926.7	4.88	1.5	15,736	
O KLL-1	974.6	974.6	0.70	1.5	17,268	

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Co_3O_4

Cobalt (II, III) Oxide (FW = 240.80)

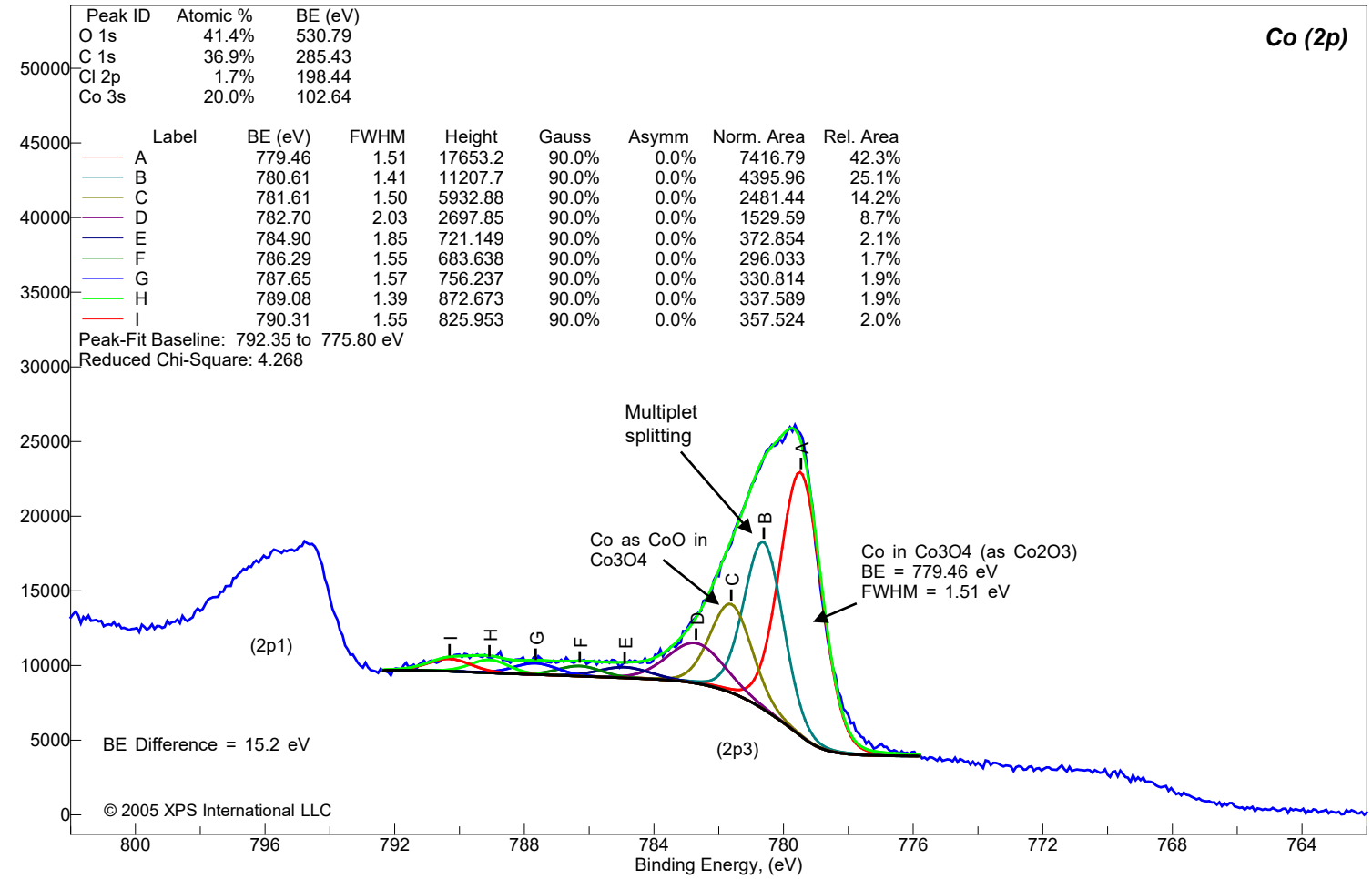
Sample Description: Co3O4 (99.995%) from Aldrich lot# 01325AX, conductive
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Cobalt (II, III) Oxide (FW = 240.80)

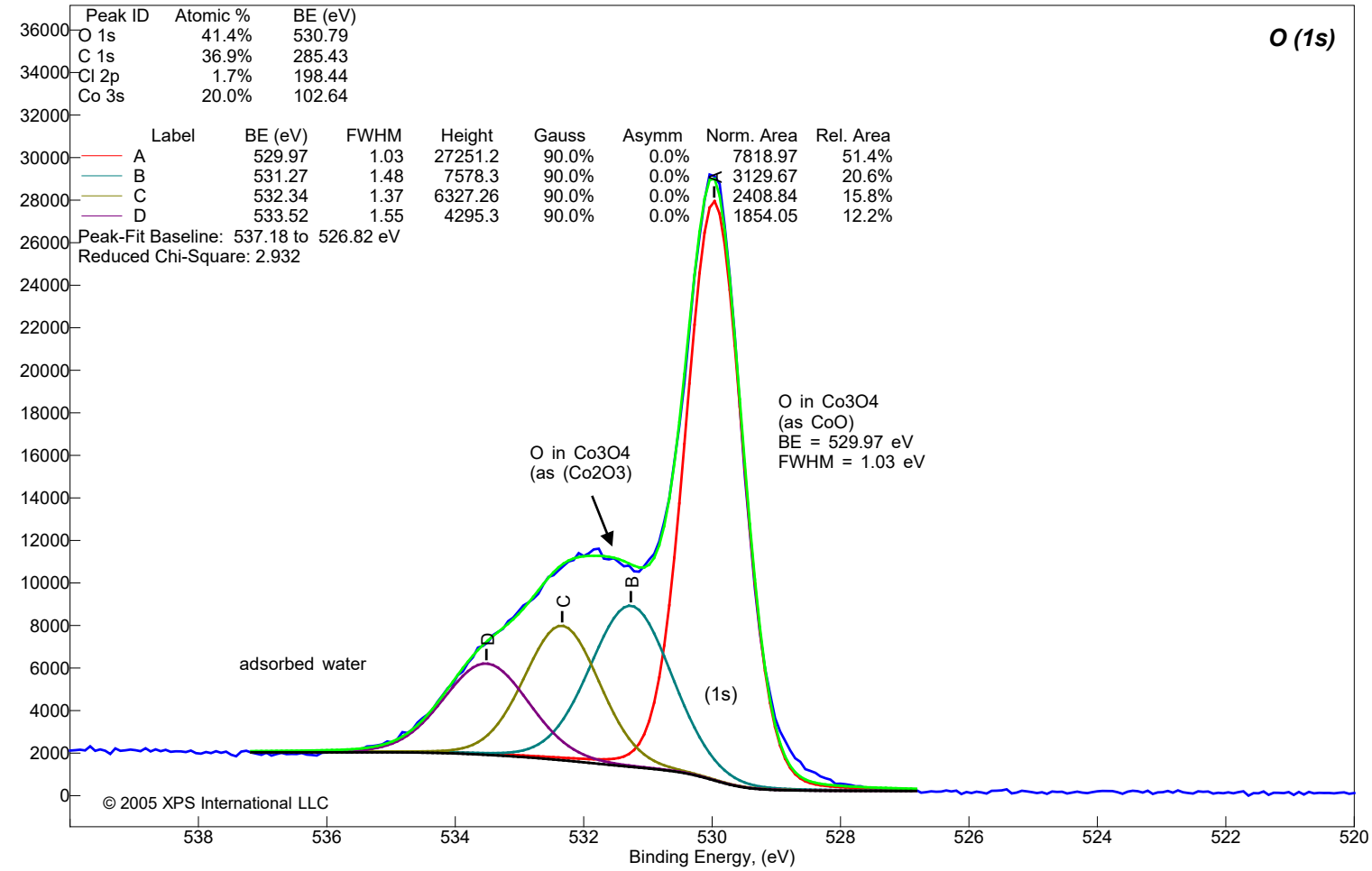
Sample Description: Co3O4 (99.995%) Aldrich lot# 01325AX, 3mm pellet, Conductive, 90 TOA



Co_3O_4

Cobalt (II, III) Oxide (FW = 240.80)

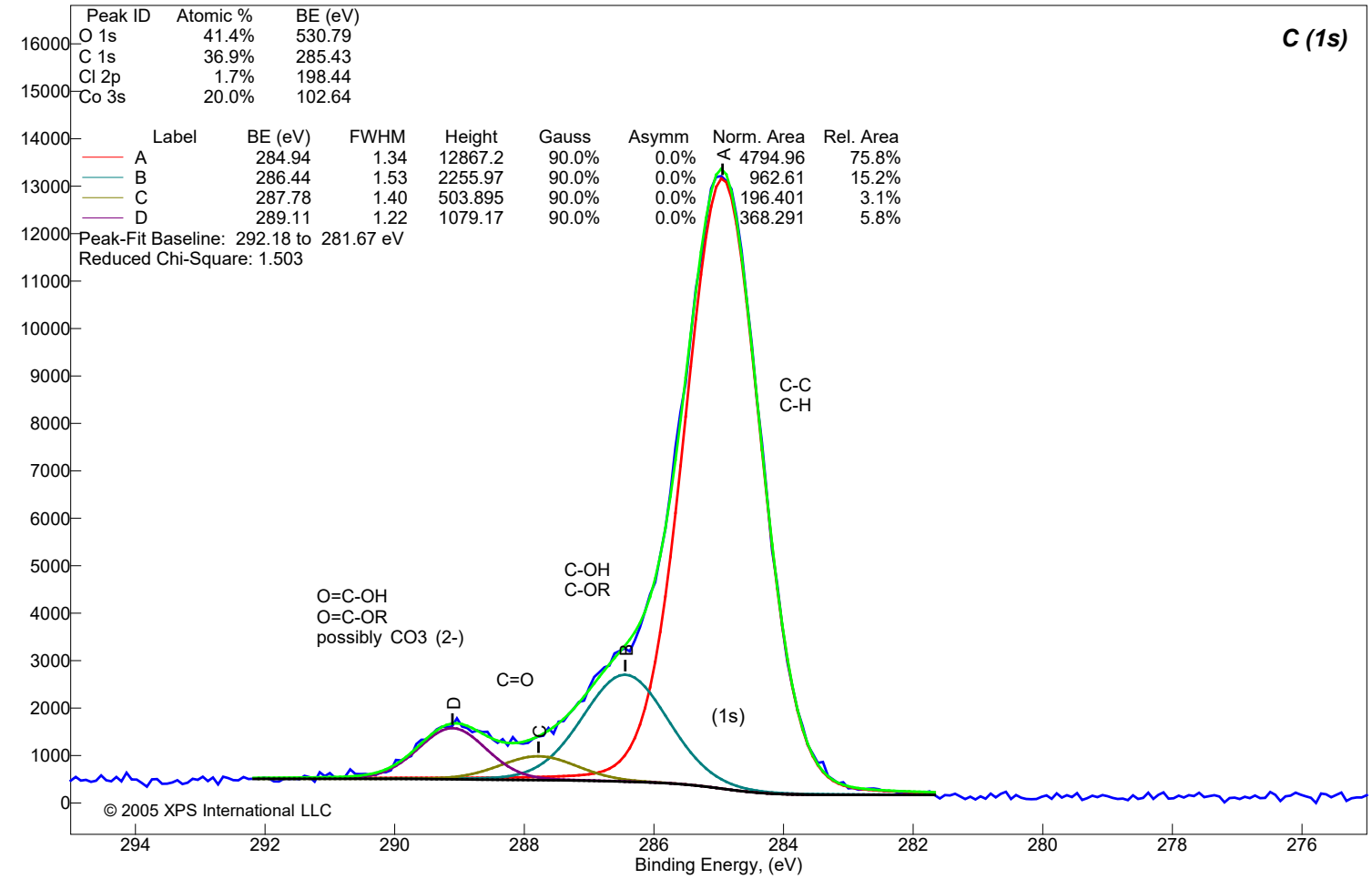
Sample Description: Co3O4 (99.995%) Aldrich lot# 01325AX, 3mm pellet, Conductive, 90 TOA



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Cobalt (II, III) Oxide (FW = 240.80)

Sample Description: Co3O4 (99.995%) Aldrich lot# 01325AX, 3mm pellet, Conductive, 90 TOA

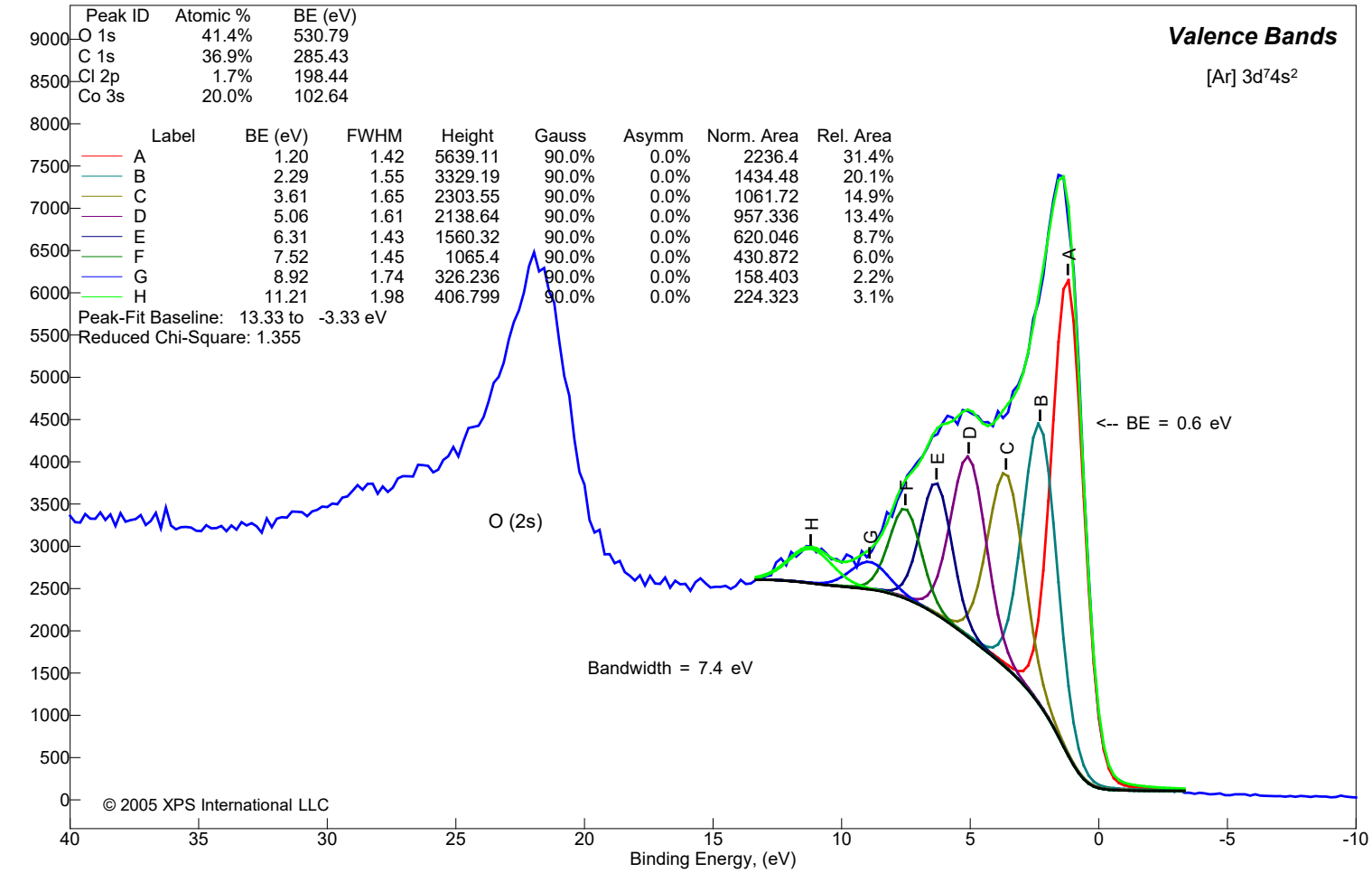


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Co_3O_4

Cobalt (II, III) Oxide (FW = 240.80)

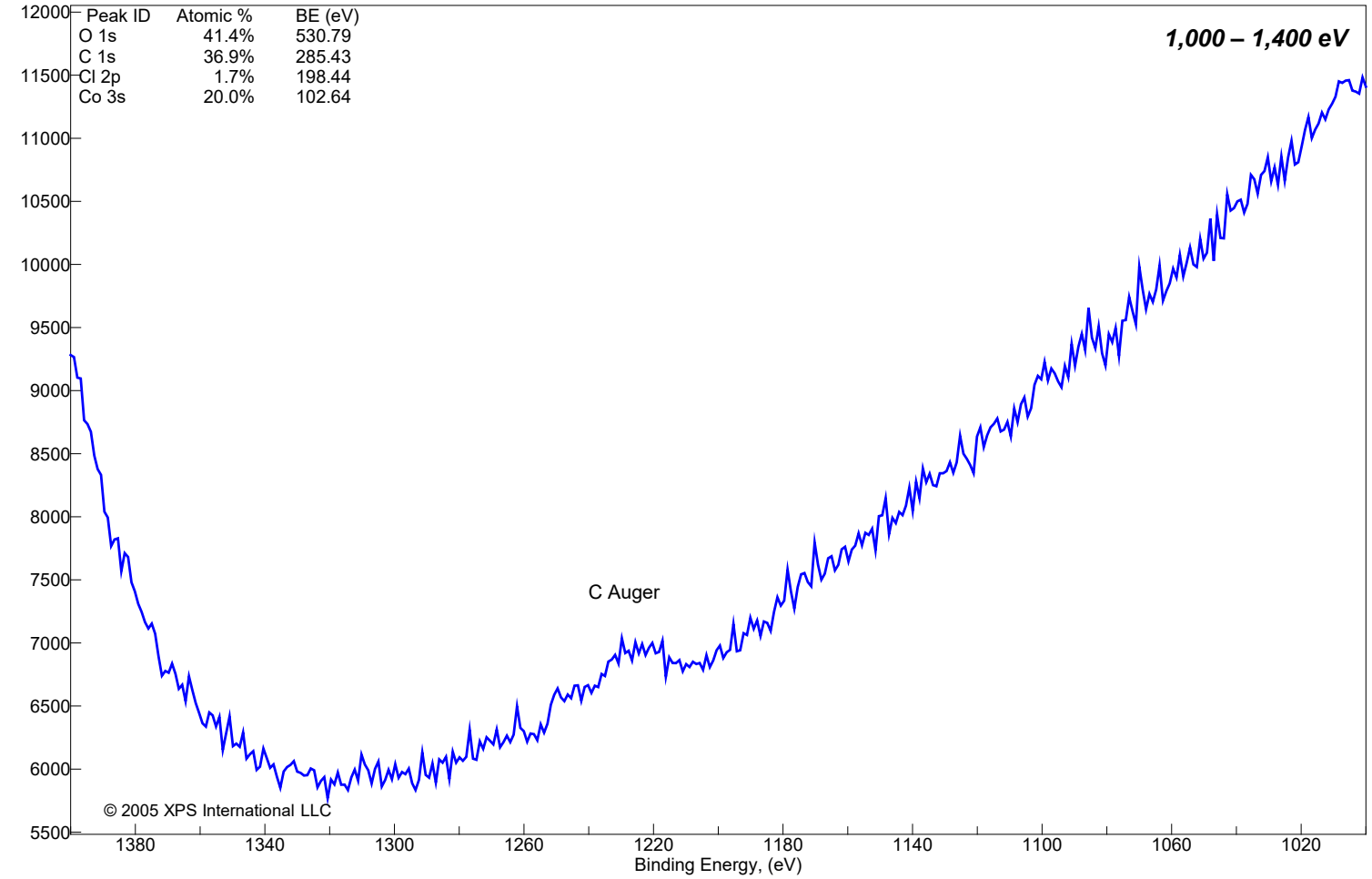
Sample Description: Co3O4 (99.995%) Aldrich lot# 01325AX, 3mm pellet, Conductive, 90 TOA



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Cobalt (II, III) Oxide (FW = 240.80)

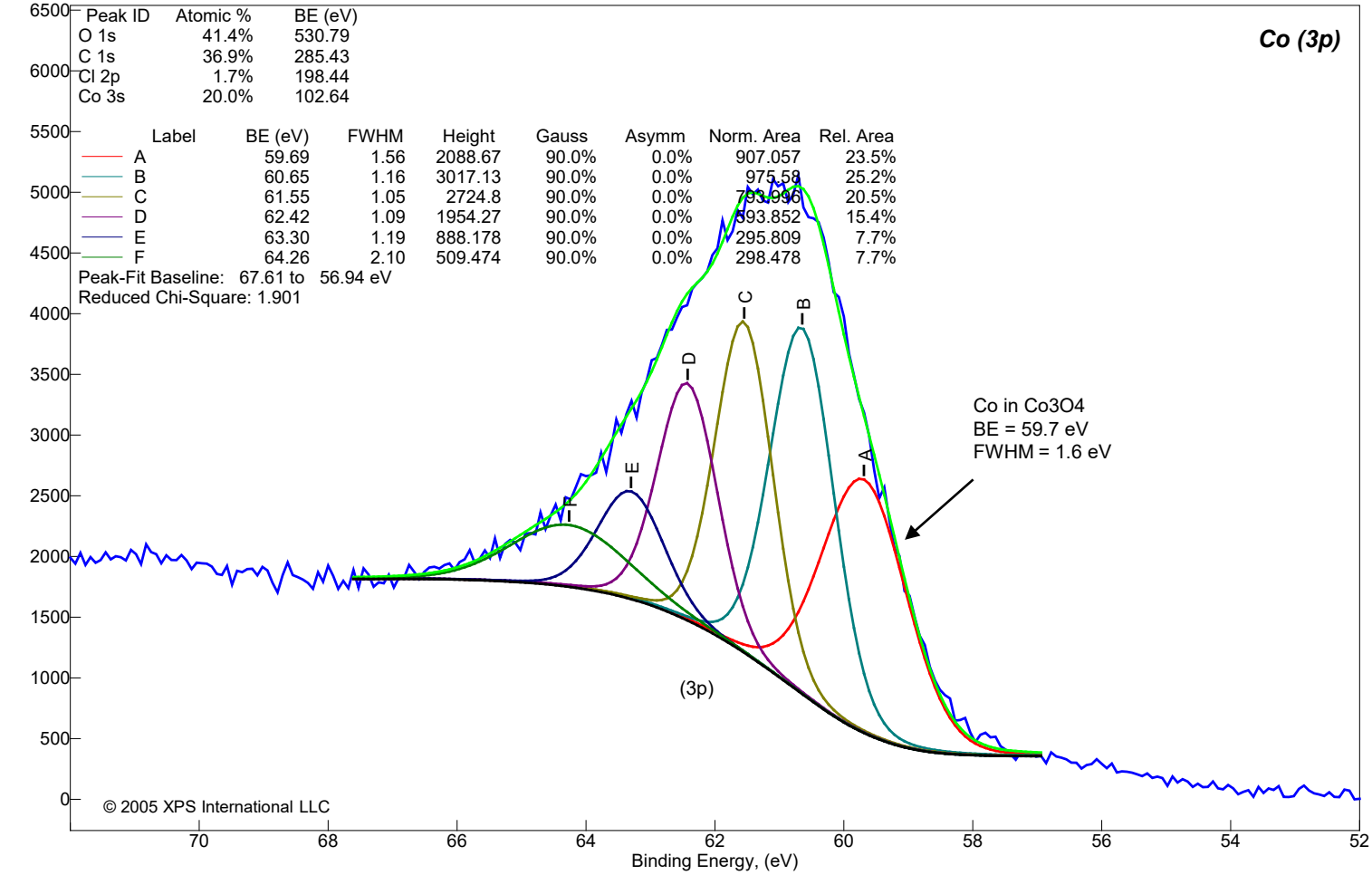
Sample Description: Co3O4 (99.995%) Aldrich lot# 01325AX, 3mm pellet, Conductive, 90 TOA



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Cobalt (II, III) Oxide (FW = 240.80)

Sample Description: Co3O4 (99.995%) Aldrich lot# 01325AX, 3mm pellet, Conductive, 90 TOA



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$Co(OH)_2$

Cobalt (II) Hydroxide (FW = 92.95)
Surface Composition Table

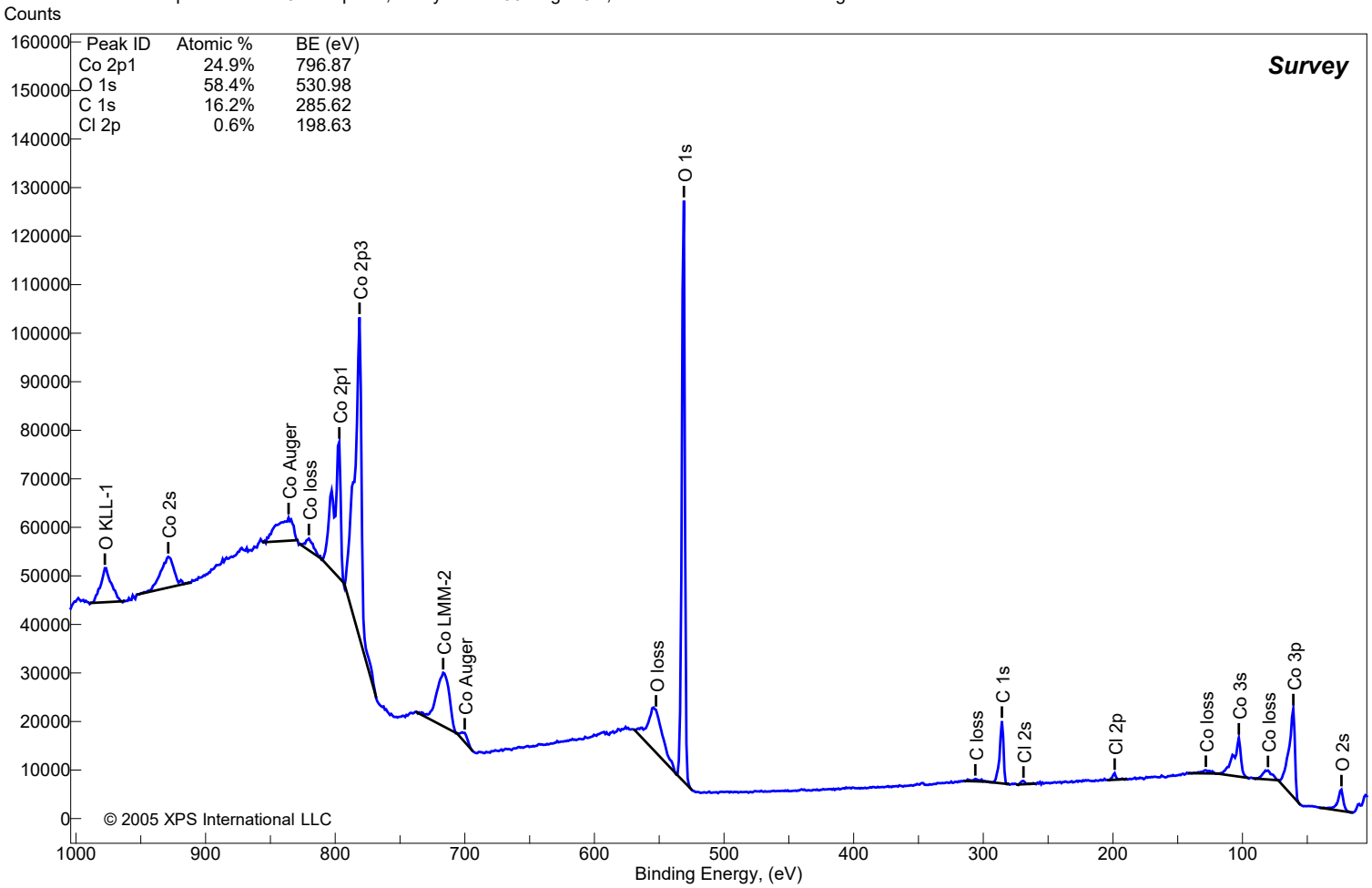
Description: $Co(OH)_2$ (95%) from Aldrich Co. Lot# 00820HW, analyzed at 90 deg TOA, mesh at 1mm, conductive rose-red powder pressed into 3 mm pellet, mp dec, d 3.6, sol in H_2SO_4 and HNO_3

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	23.7	23.7	0.14	1.5	11,427	
Co 3p	60.8	60.8	1.93	1.5	50,132	
Co loss	80.3	80.3	0.00	1.5	7,623	
Co 3s	102.8	102.8	0.82	1.5	26,950	
Co loss	128.2	128.2	0.00	1.5	2,399	
Cl 2p	198.6	198.6	2.28	1.5	1,909	0.6%
Cl 2s	269.0	269.0	1.69	1.5	1,479	
C 1s	285.6	285.6	1.00	1.5	22,112	16.2%
C loss	306.2	306.2	0.00	1.5	1,973	
O 1s	531.0	531.0	2.93	1.5	166,364	58.4%
O loss	552.5	552.5	0.00	1.5	60,917	
Co Auger	700.1	700.1	0.00	1.5	5,209	
Co LMM-2	716.7	716.7	0.44	1.5	62,261	
Co 2p3	781.2	781.2	12.62	1.5	215,205	
Co 2p1	796.9	796.9	6.54	1.5	97,102	24.9%
Co loss	820.3	820.3	0.00	1.5	9,121	
Co Auger	836.0	836.0	0.00	1.5	35,173	
Co 2s	928.8	928.8	4.88	1.5	38,449	
O KLL-1	977.7	977.7	0.70	1.5	32,525	

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Cobalt (II) Hydroxide (FW = 92.95)

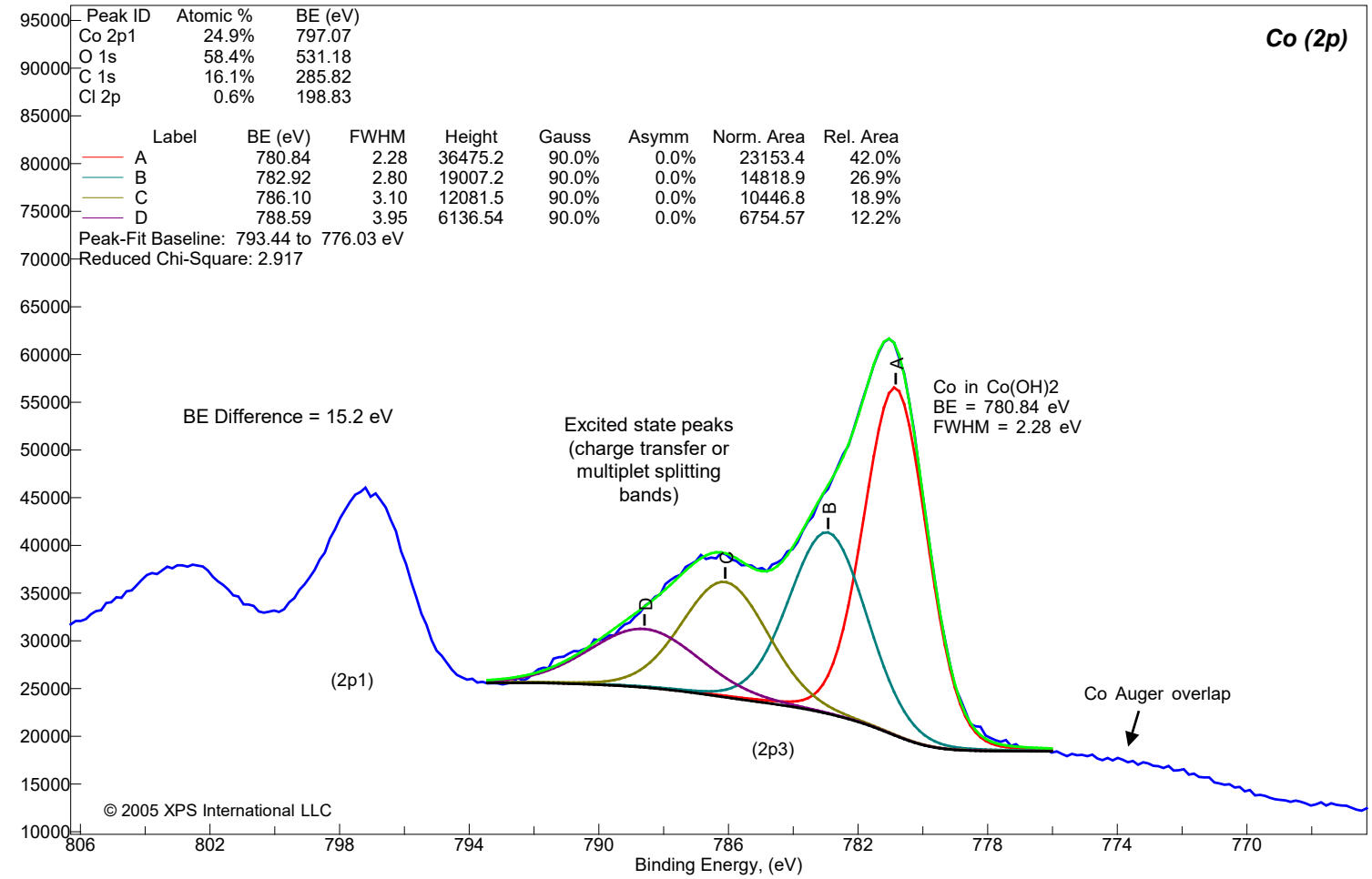
Sample Description: Co(OH)2 (95%) from Aldrich lot# 00820HW
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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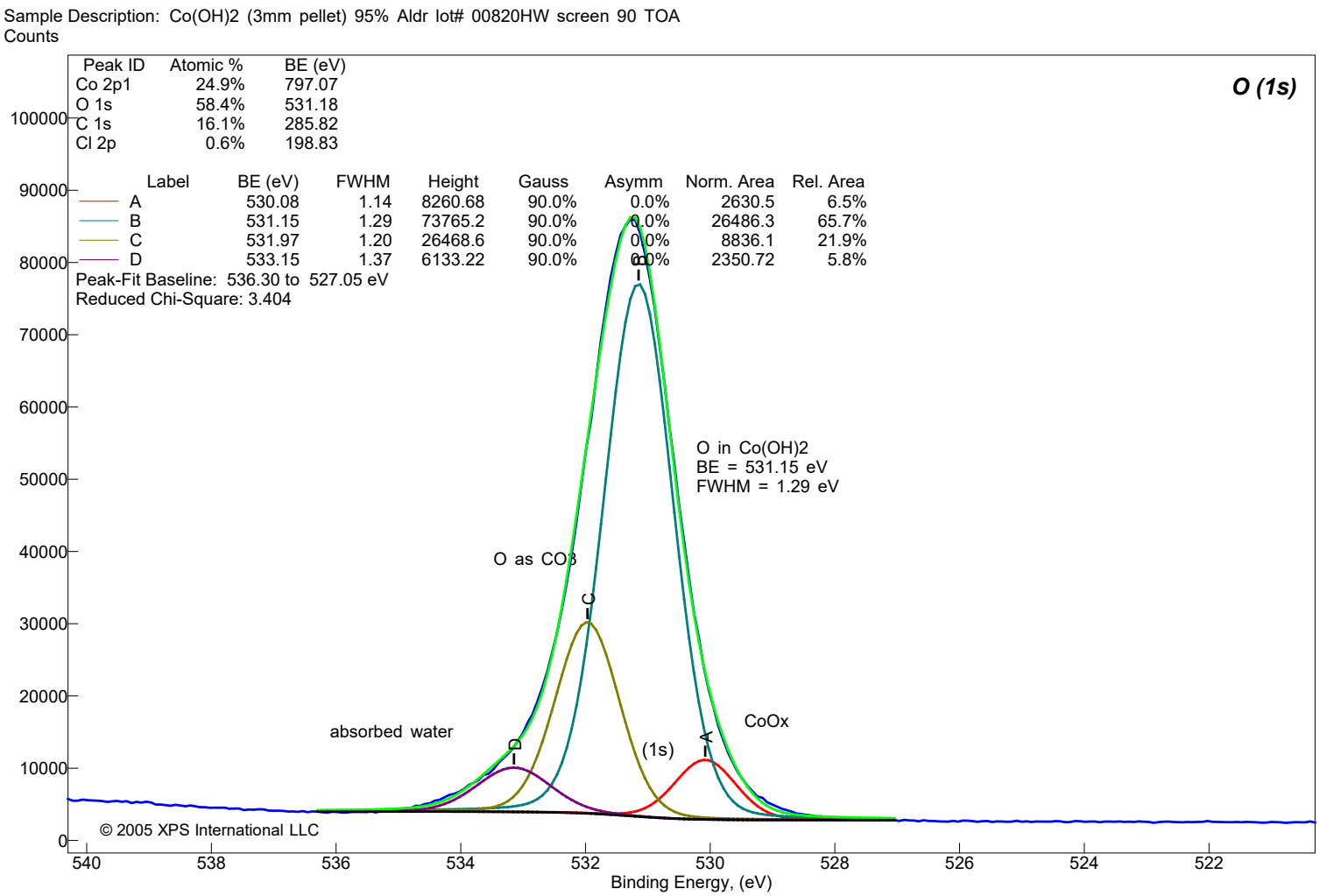
Cobalt (II) Hydroxide (FW = 92.95)

Sample Description: Co(OH)2 (3mm pellet) 95% Aldr lot# 00820HW screen 90 TOA



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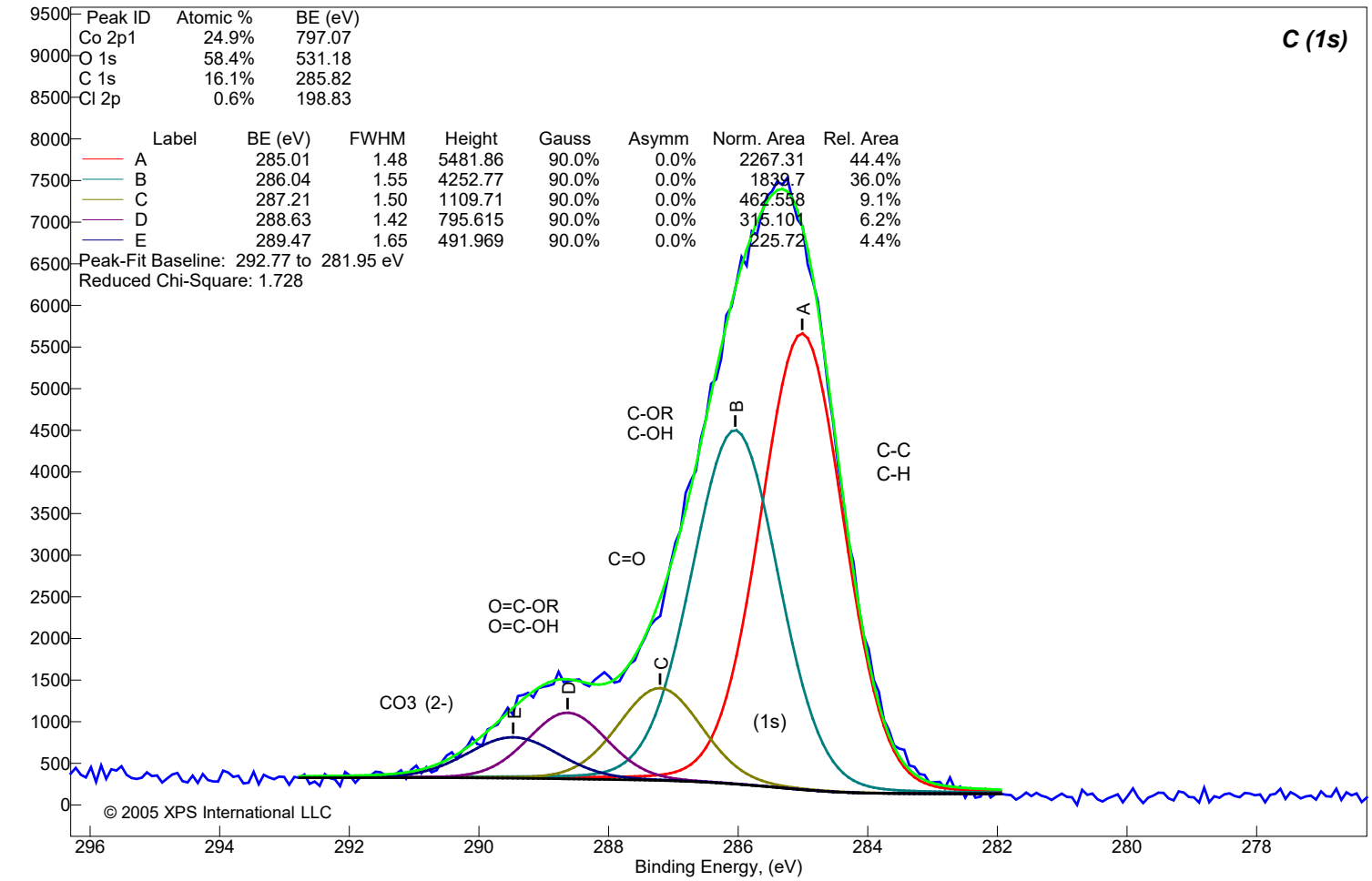
Cobalt (II) Hydroxide (FW = 92.95)



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Cobalt (II) Hydroxide (FW = 92.95)

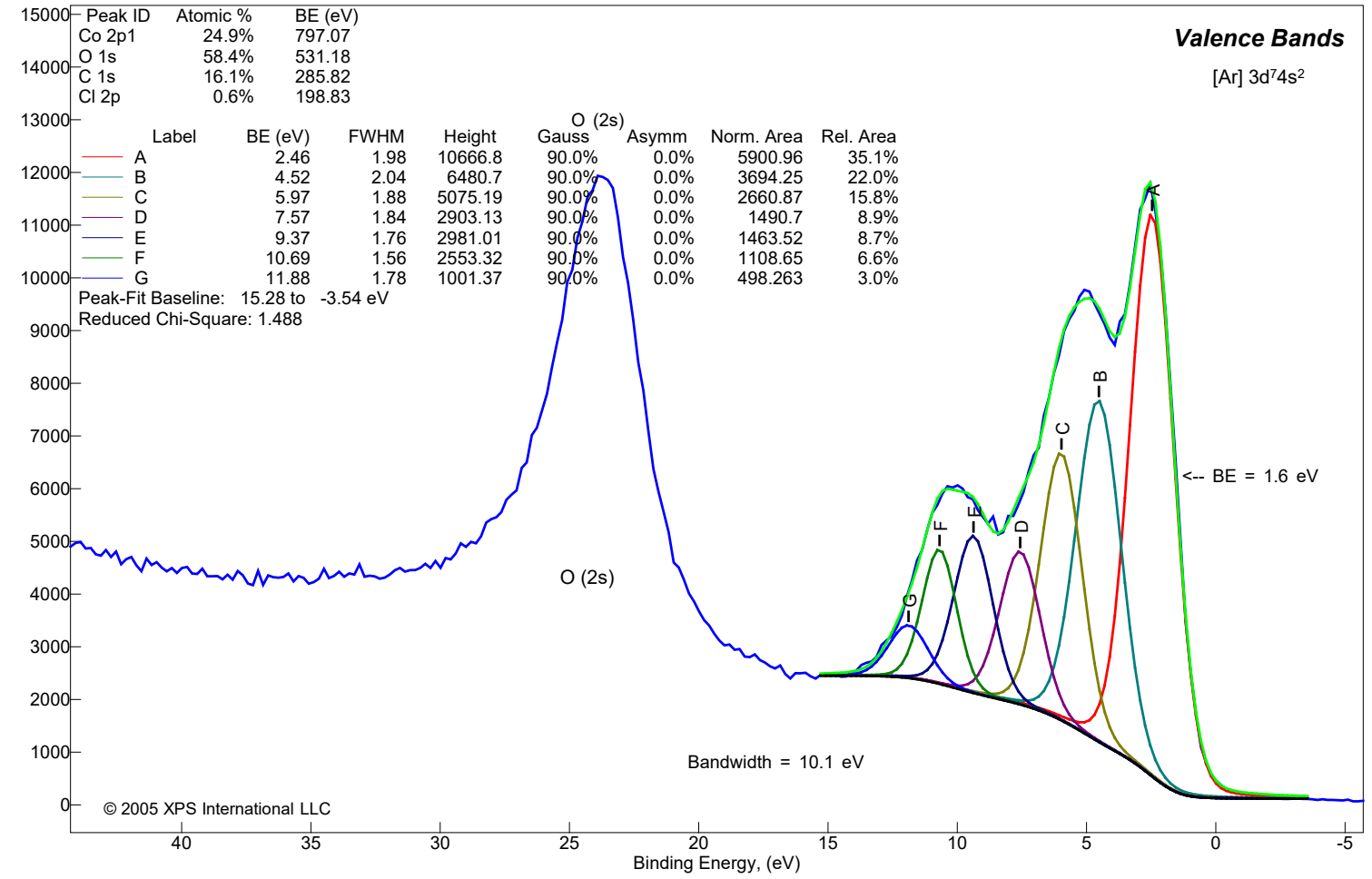
Sample Description: Co(OH)2 (3mm pellet) 95% Aldr lot# 00820HW screen 90 TOA



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Cobalt (II) Hydroxide (FW = 92.95)

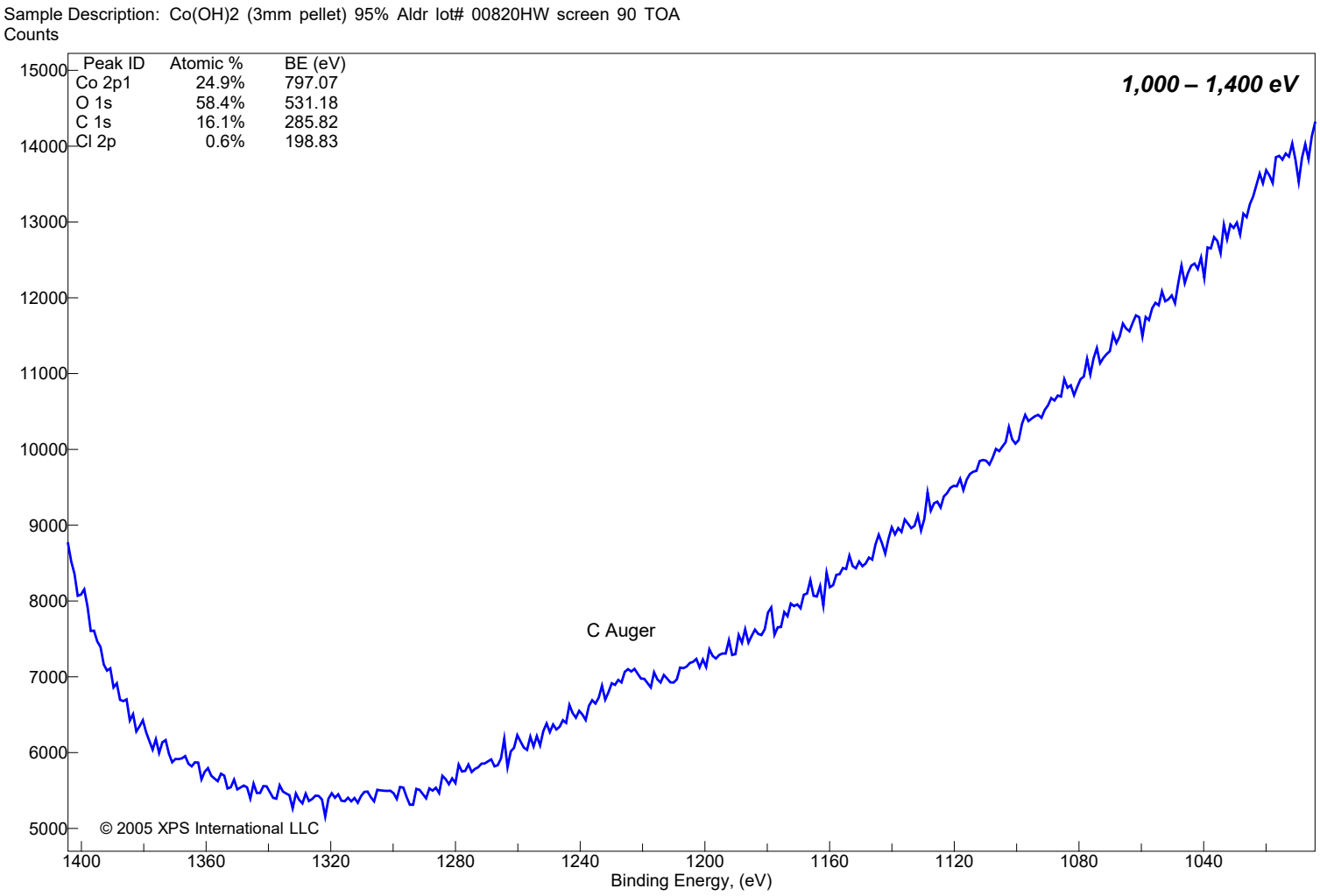
Sample Description: Co(OH)2 (3mm pellet) 95% Aldr lot# 00820HW screen 90 TOA



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Cobalt (II) Hydroxide (FW = 92.95)

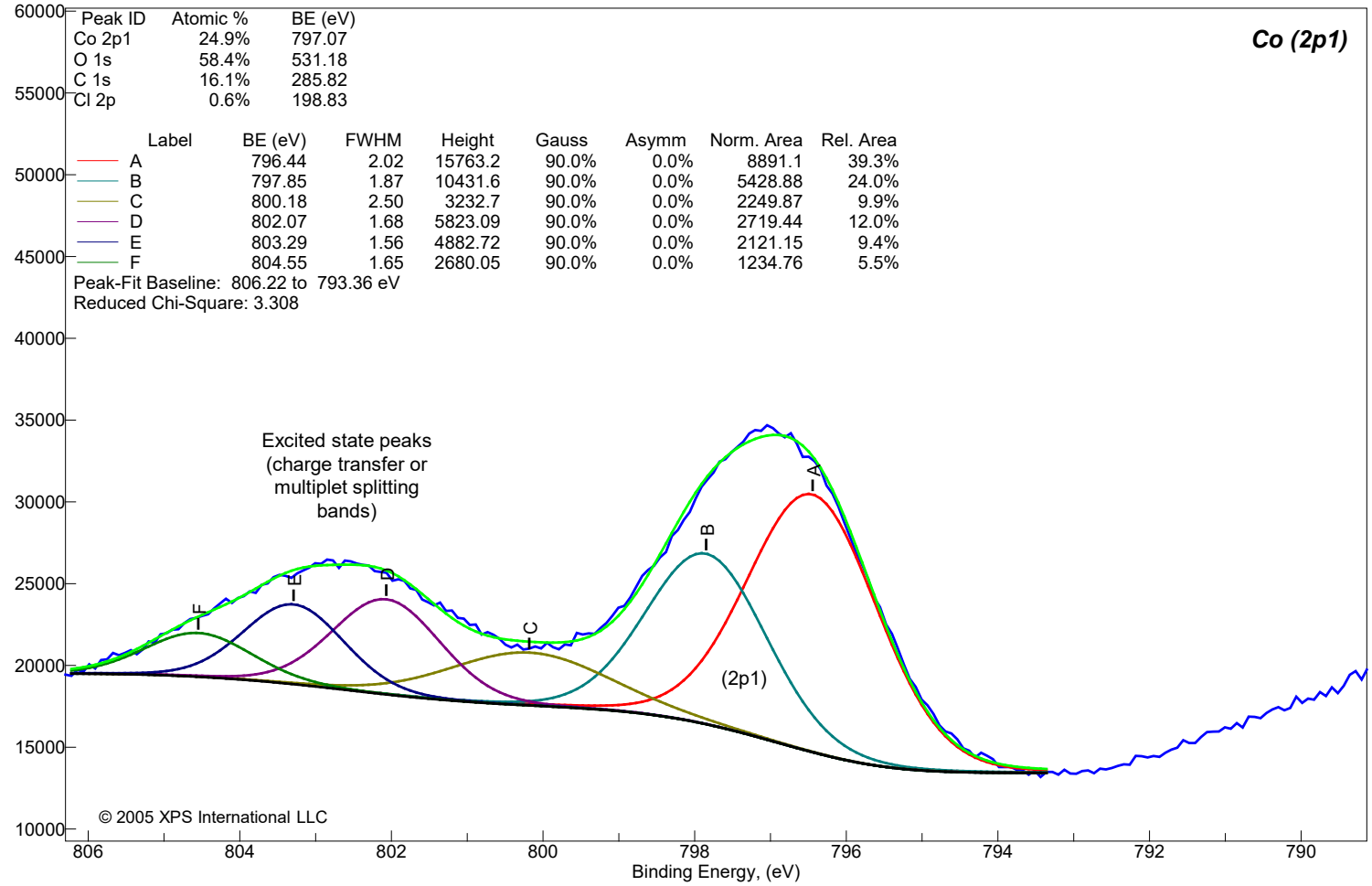
Sample Description: Co(OH)2 (3mm pellet) 95% Aldr lot# 00820HW screen 90 TOA



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Cobalt (II) Hydroxide (FW = 92.95)

Sample Description: Co(OH)2 (3mm pellet) 95% Aldr lot# 00820HW screen 90 TOA



CrO_3

Chromium (VI) Oxide (FW = 99.99)
Surface Composition Table

Description: CrO_3 (99.9%) from Aldrich Co. Lot# 05227, analyzed at 90 deg TOA, mesh at 1mm, conductive dark red powder pressed into 3 mm pellet, mp 196 C, d 2.7, sol in water and H_2SO_4

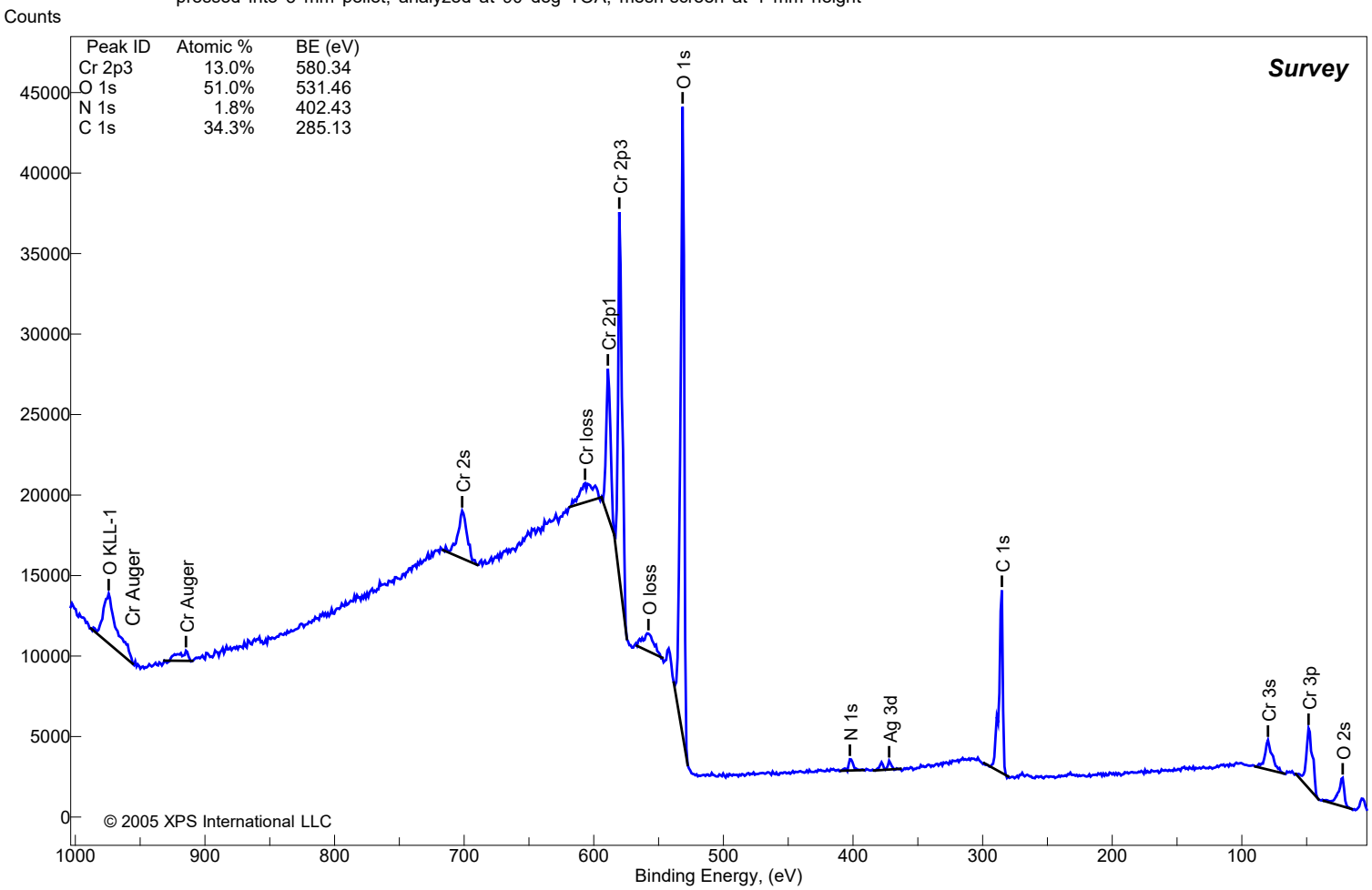
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	22.2	22.2	0.14	1.2	6,013	
Cr 3p	48.6	48.6	1.17	1.2	13,483	
Cr 3s	79.8	79.8	0.60	1.2	7,681	
C 1s	285.1	285.1	1.00	1.2	24,432	34.3%
Ag 3d	372.1	372.1	18.04	1.2	1,912	
N 1s	402.4	402.4	1.80	1.2	1,984	1.8%
O 1s	531.5	531.5	2.93	1.2	80,685	51.0%
O loss	557.9	557.9	0.00	1.2	6,906	
Cr 2p3	580.3	580.3	7.69	1.2	50,534	13.0%
Cr 2p1	589.1	589.1	3.98	1.2	22,261	
Cr loss	606.7	606.7	0.00	1.2	9,113	
Cr 2s	701.5	701.5	3.91	1.2	15,562	
O KLL-1	974.3	974.3	0.70	1.2	23,394	

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CrO_3

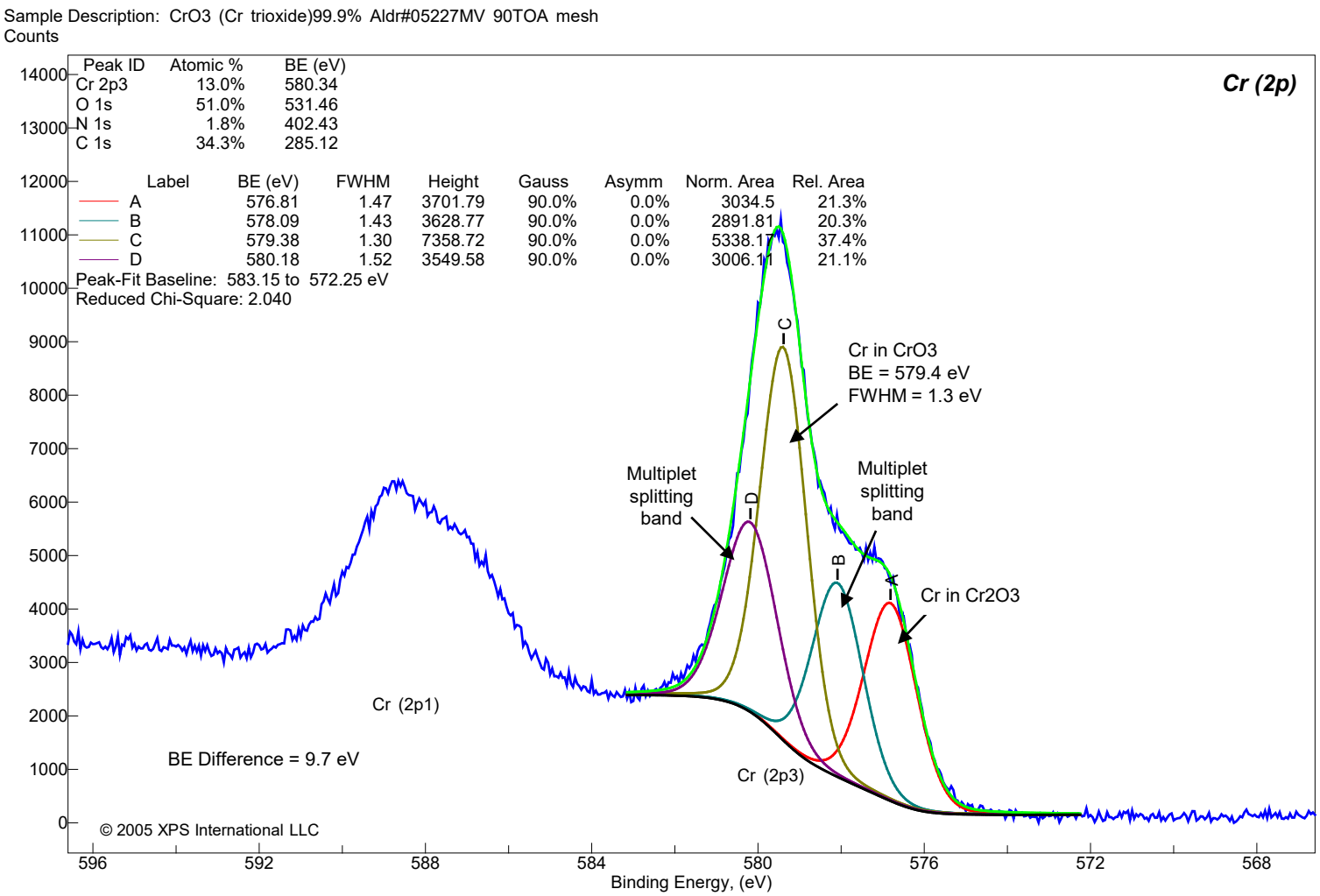
Chromium (VI) Oxide (FW = 99.99)

Sample Description: CrO3 (99.9%) from Aldrich lot# 05227MV
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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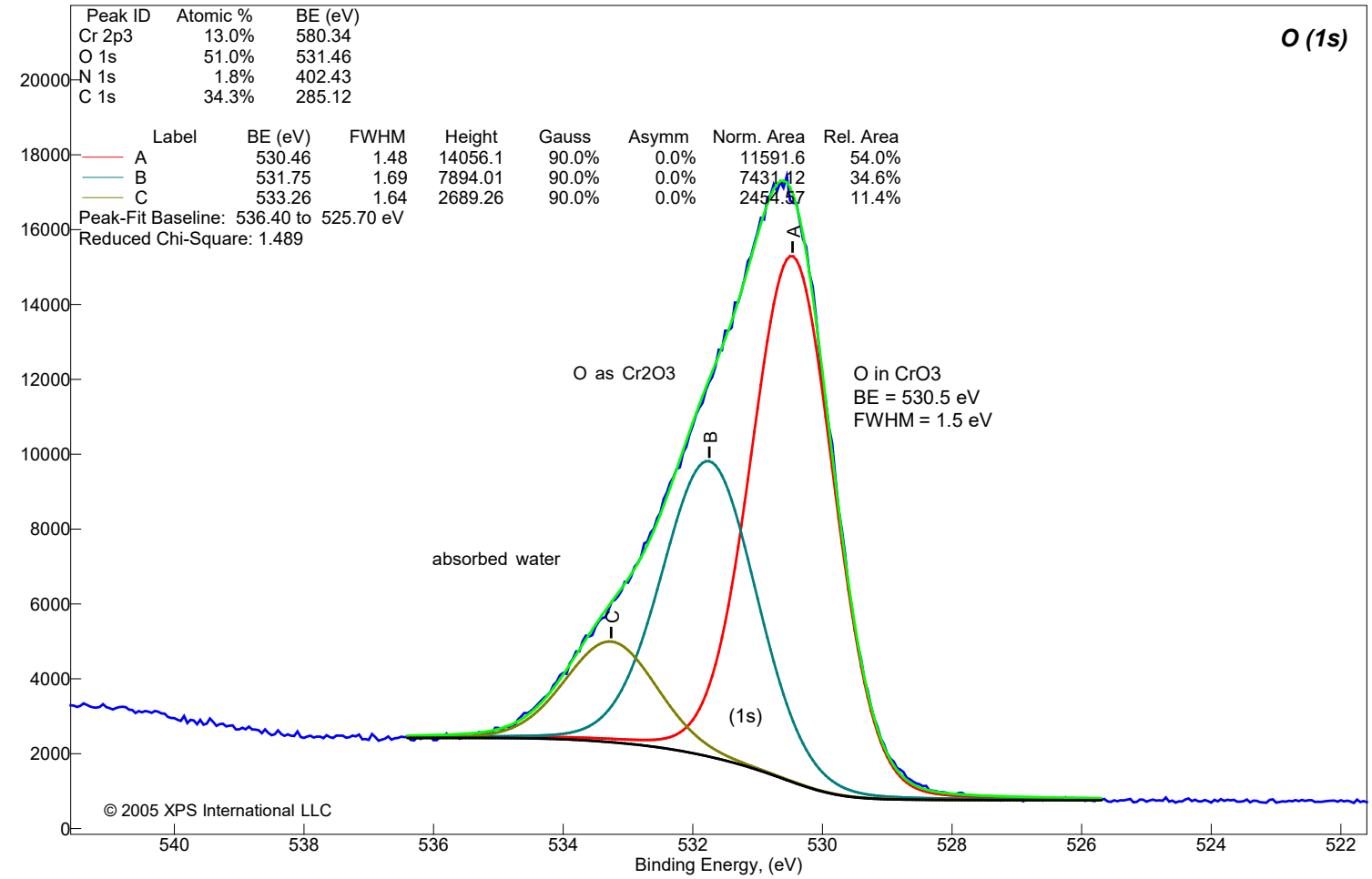
Chromium (VI) Oxide (FW = 99.99)



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Chromium (VI) Oxide (FW = 99.99)

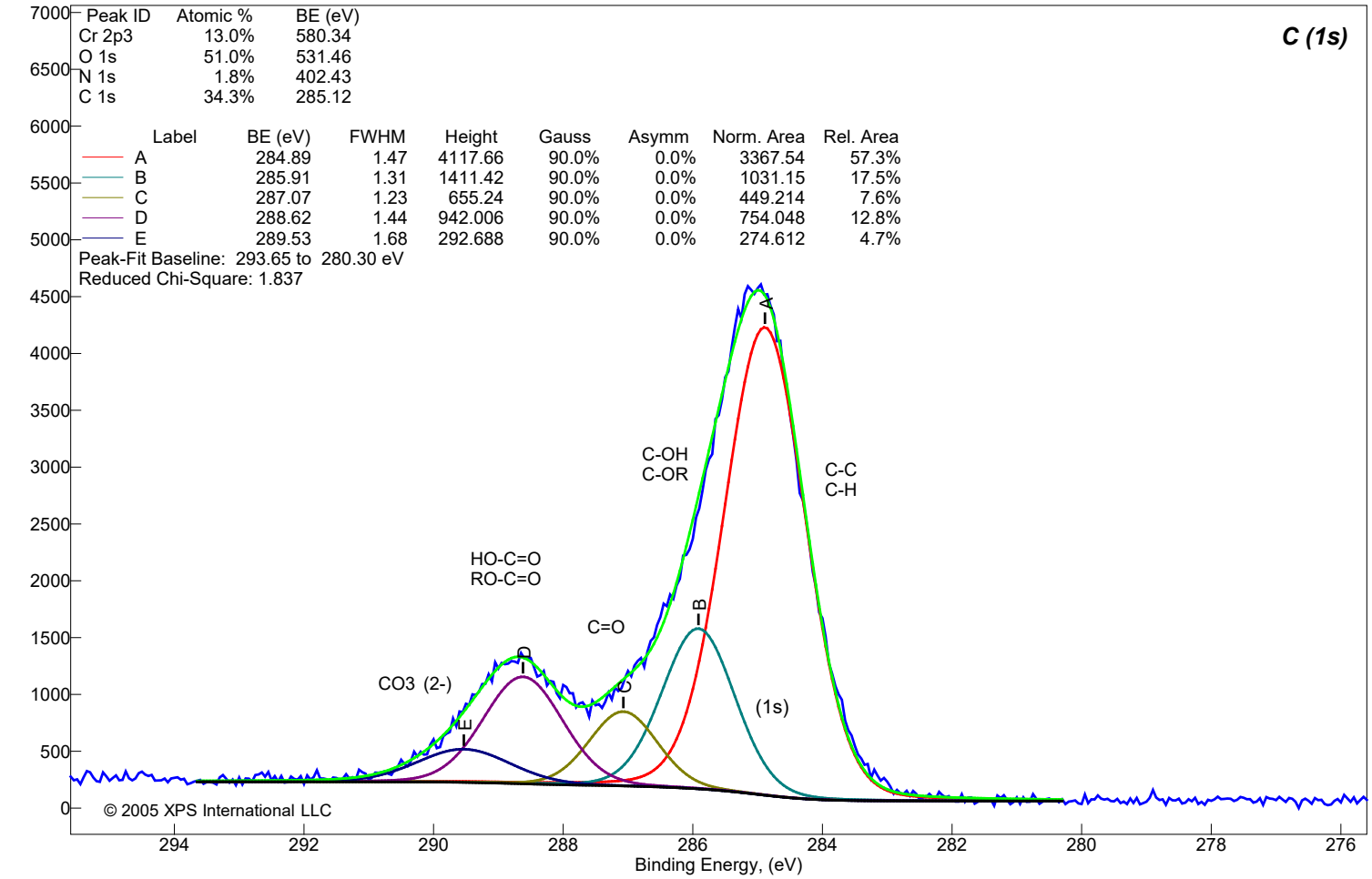
Sample Description: CrO3 (Cr trioxide)99.9% Aldr#05227MV 90TOA mesh



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Chromium (VI) Oxide (FW = 99.99)

Sample Description: CrO3 (Cr trioxide)99.9% Aldr#05227MV 90TOA mesh



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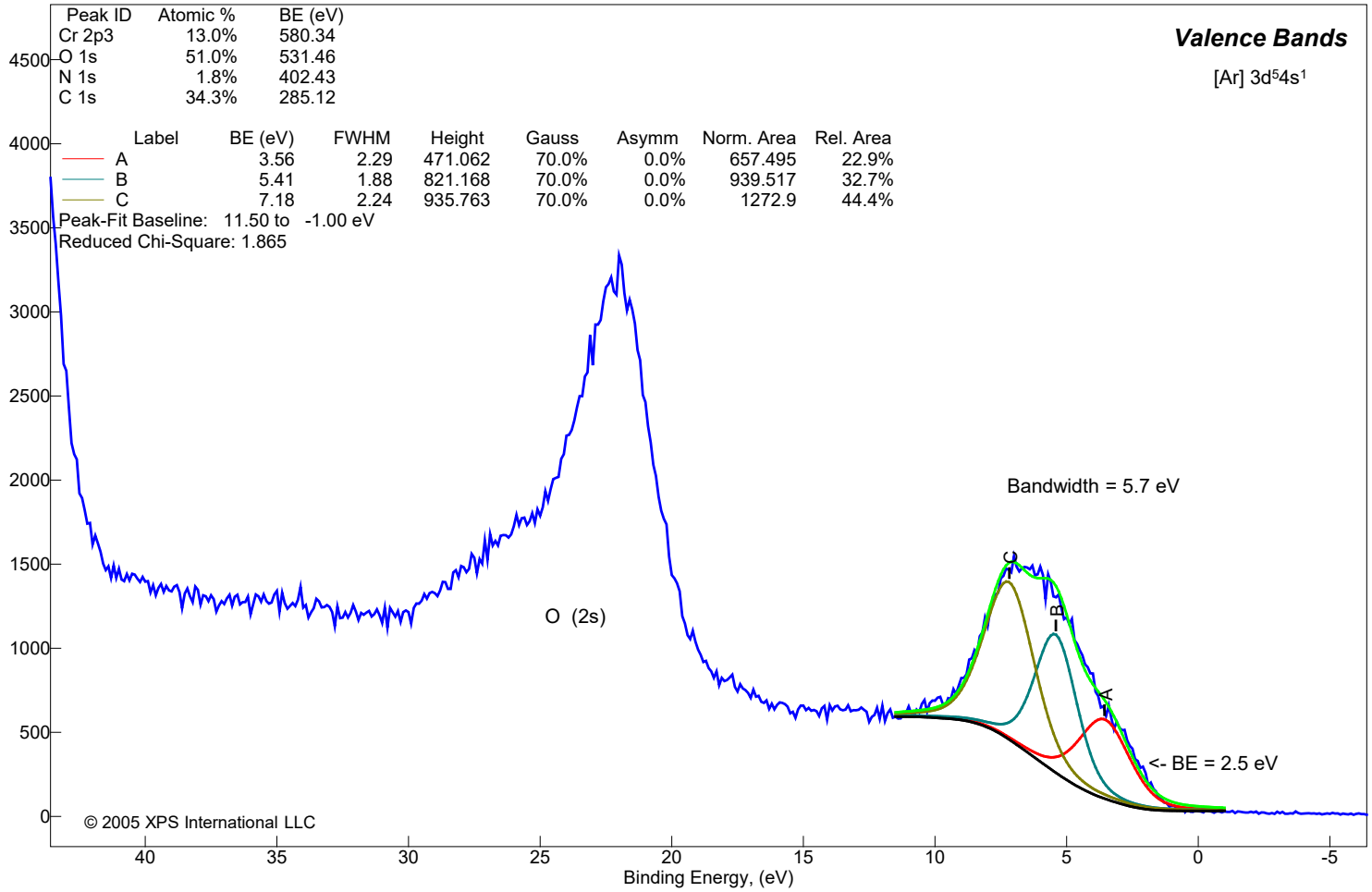
Chromium (VI) Oxide (FW = 99.99)

Sample Description: CrO3 (Cr trioxide)99.9% Aldr#05227MV 90TOA mesh
Counts

Peak ID	Atomic %	BE (eV)
Cr 2p3	13.0%	580.34
O 1s	51.0%	531.46
N 1s	1.8%	402.43
C 1s	34.3%	285.12

Label	BE (eV)	FWHM	Height	Gauss	Asymm	Norm. Area	Rel. Area
A	3.56	2.29	471.062	70.0%	0.0%	657.495	22.9%
B	5.41	1.88	821.168	70.0%	0.0%	939.517	32.7%
C	7.18	2.24	935.763	70.0%	0.0%	1272.9	44.4%

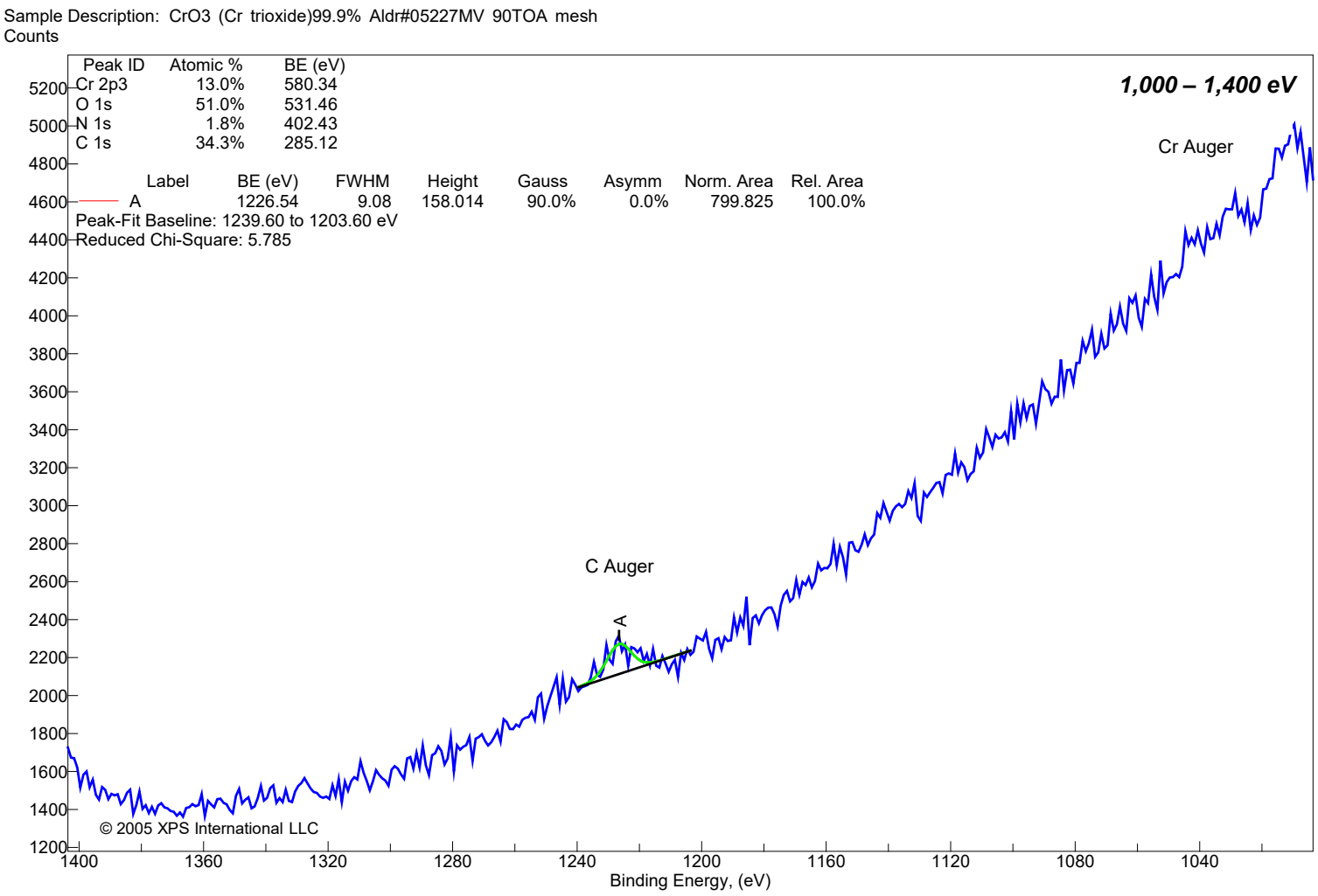
Peak-Fit Baseline: 11.50 to -1.00 eV
Reduced Chi-Square: 1.865



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CrO_3

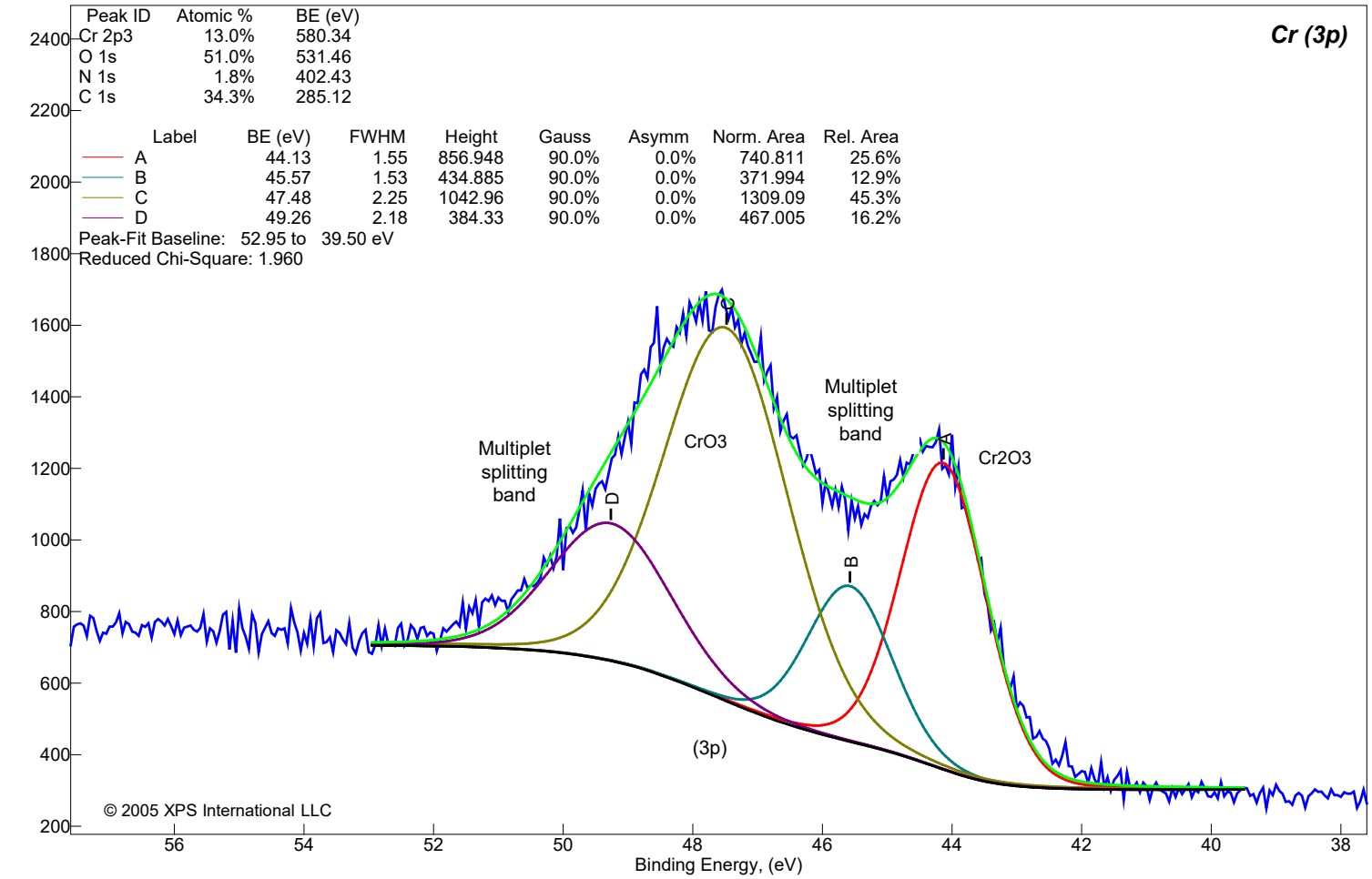
Chromium (VI) Oxide (FW = 99.99)



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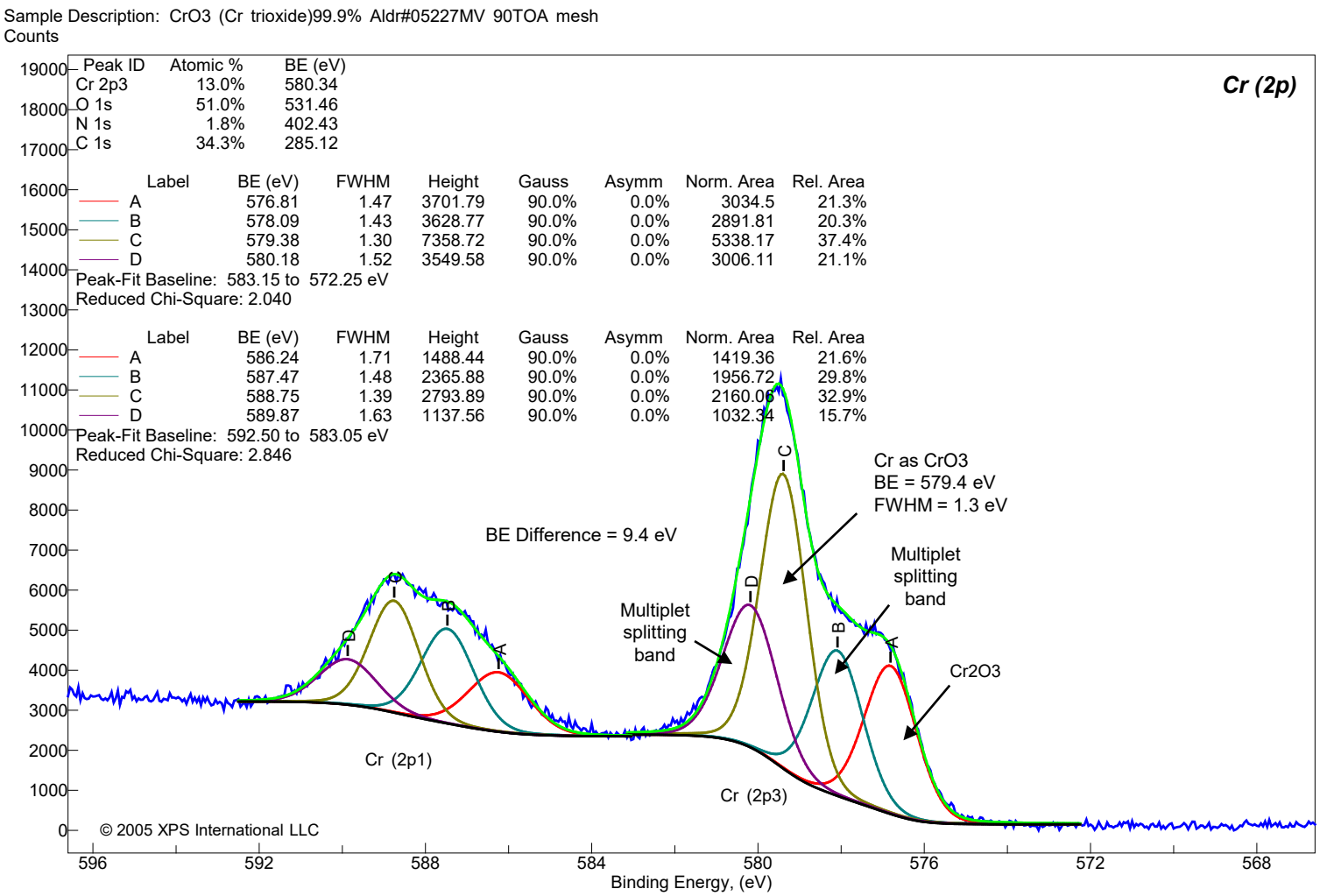
Chromium (VI) Oxide (FW = 99.99)

Sample Description: CrO3 (Cr trioxide)99.9% Aldr#05227MV 90TOA mesh

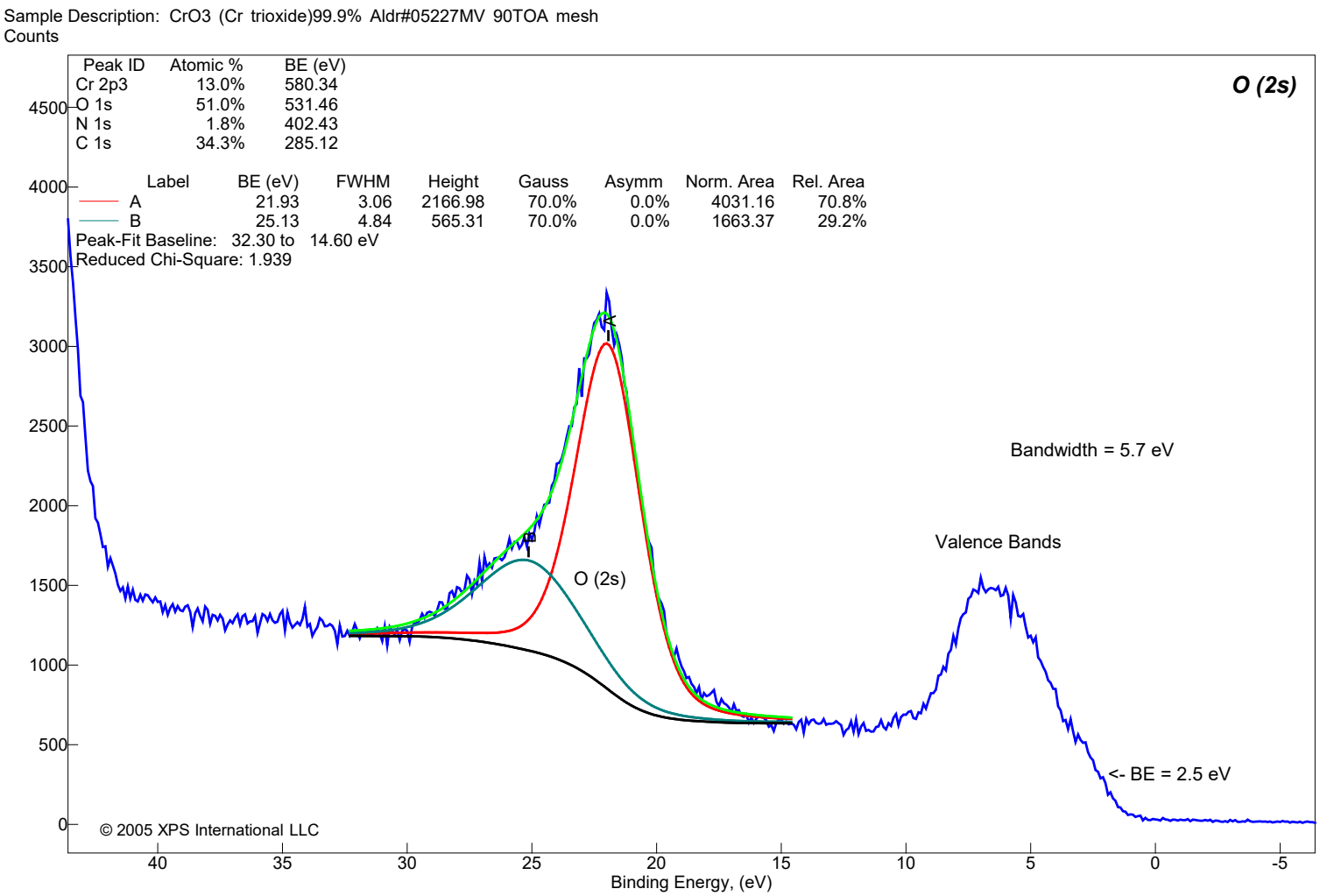


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Chromium (VI) Oxide (FW = 99.99)



Chromium (VI) Oxide (FW = 99.99)



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Cr_2O_3

Chromium (III) Oxide (FW = 152.00)

Surface Composition Table

Description: Cr_2O_3 (99.999%) from Aldrich Co. Lot# 06417HV, analyzed at 90 deg TOA, mesh at 1mm, semi-conductive green powder pressed into 3 mm pellet, mp 2435 C, d 5.22, slightly sol in acids and alkalies

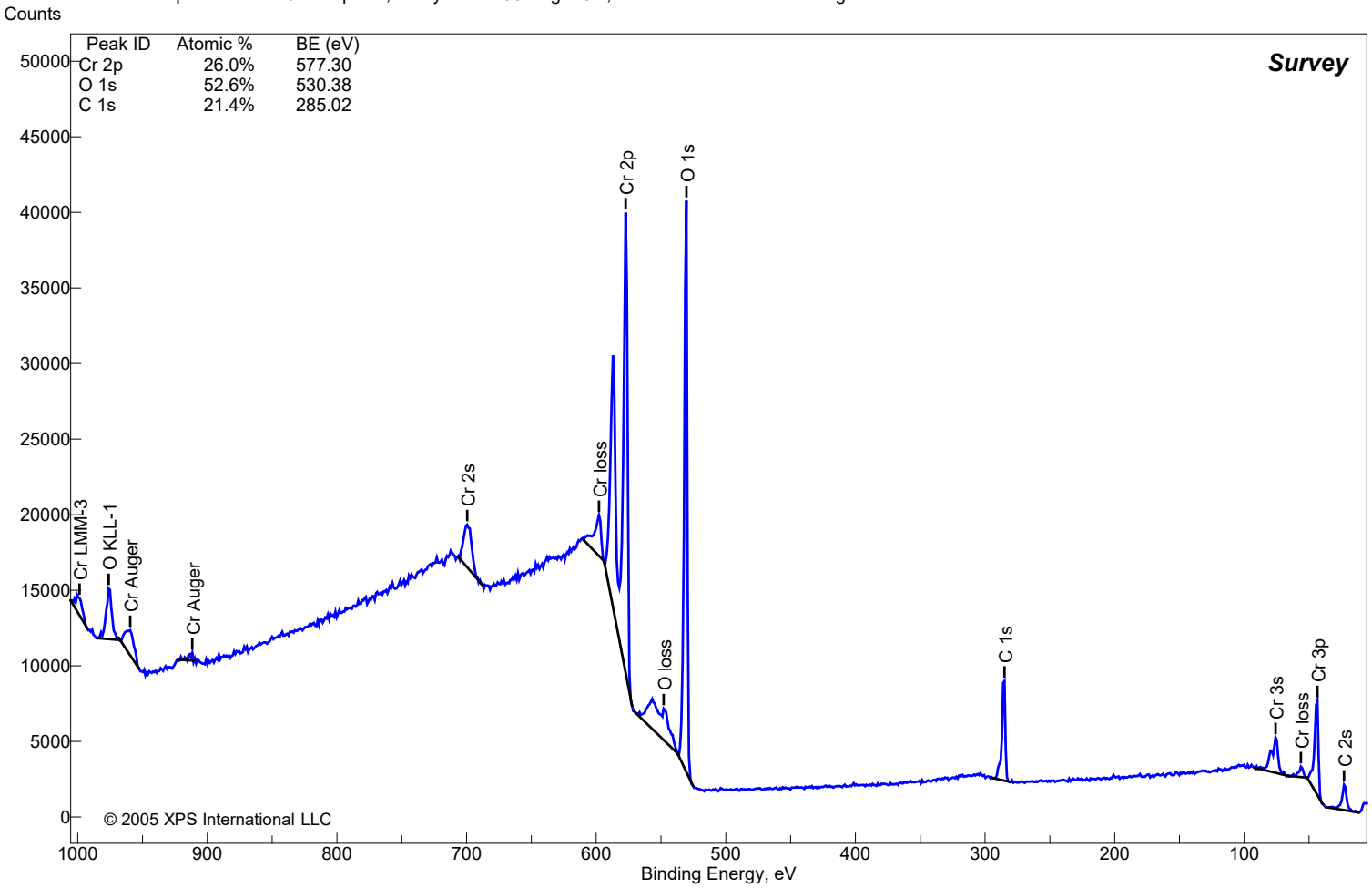
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Cr 3d	2.1	2.1	0.07	1.5	6,731	
C 2s	23.0	23.0	0.15	1.5	9,313	
Cr 3p	43.5	43.5	1.17	1.1	5,513	
Cr 3p	43.6	43.6	1.17	1.5	28,352	
Cr loss	56.3	56.3	0.00	1.5	3,282	
Cr 3s	75.8	75.8	0.60	1.5	17,292	
C 1s	285.0	285.0	1.00	1.5	26,126	21.4%
O 1s	530.4	530.4	2.93	1.5	133,496	52.6%
O loss	548.0	548.0	0.00	1.5	44,155	
Cr 2p	576.7	576.7	11.67	1.1	29,632	
Cr 2p	577.3	577.3	11.67	1.5	244,028	26.0%
Cr 2p1	586.4	586.4	3.98	1.1	16,206	
Cr loss	597.8	597.8	0.00	1.5	21,712	
Cr 2s	699.5	699.5	3.91	1.5	23,931	
Cr Auger	911.6	911.6	0.00	1.5	1,513	
Cr Auger	959.5	959.5	0.00	1.5	16,035	
Cr Auger	975.4	975.4	0.00	1.1	17,782	
O KLL-1	976.1	976.1	0.70	1.5	22,956	
Cr LMM-3	998.6	998.6	0.36	1.5	8,932	

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Cr_2O_3

Chromium (III) Oxide (FW = 152.00)

Sample Description: Cr2O3 (99.999%) from Aldrich lot# 06417HV, semi-conductive
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height

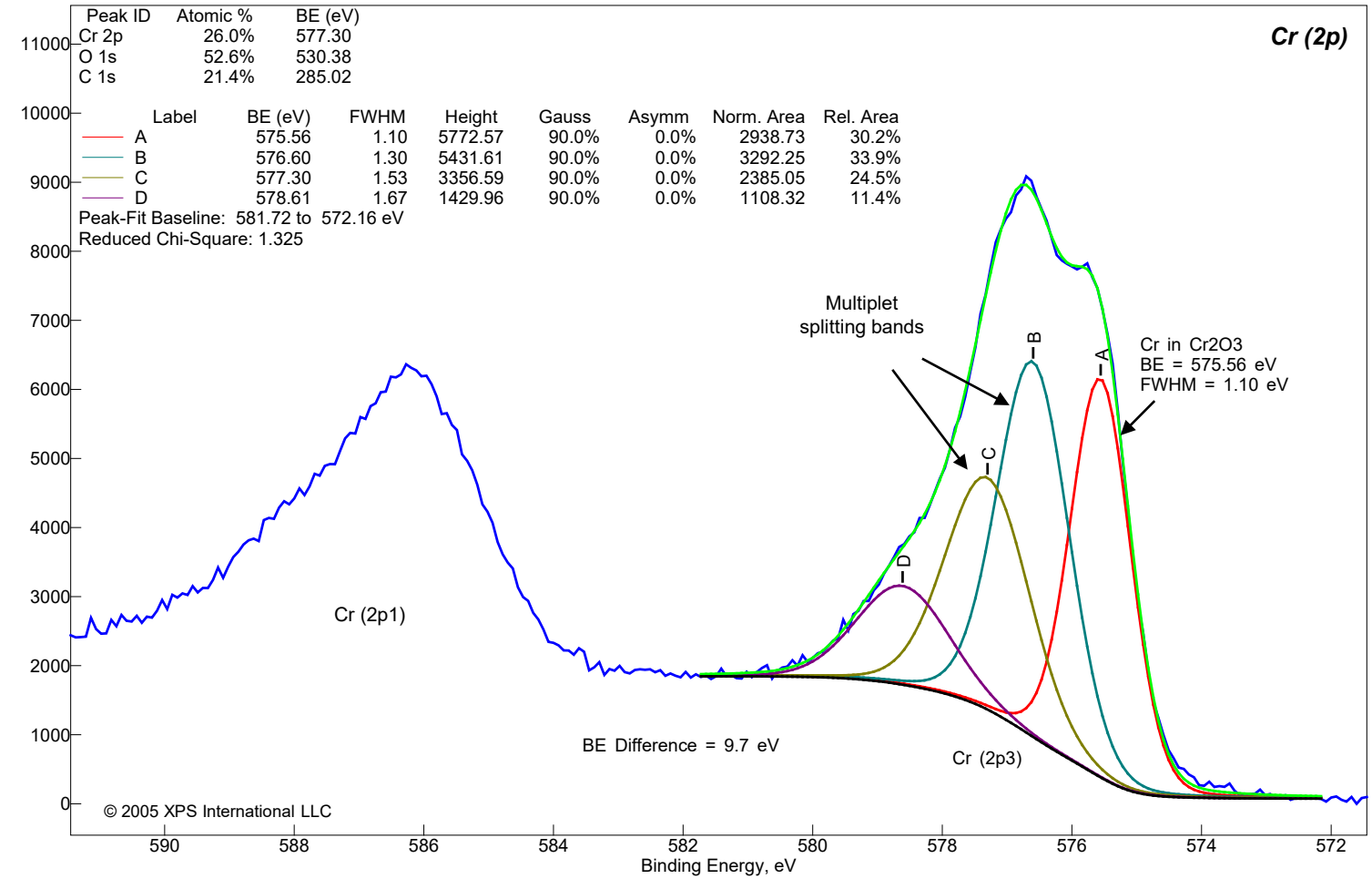


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Cr_2O_3

Chromium (III) Oxide (FW = 152.00)

Sample Description: Cr2O3 (99.999%) Aldr lot# 06417HV, 3mm pellet, Semi-conductive, scrn 90 TOA

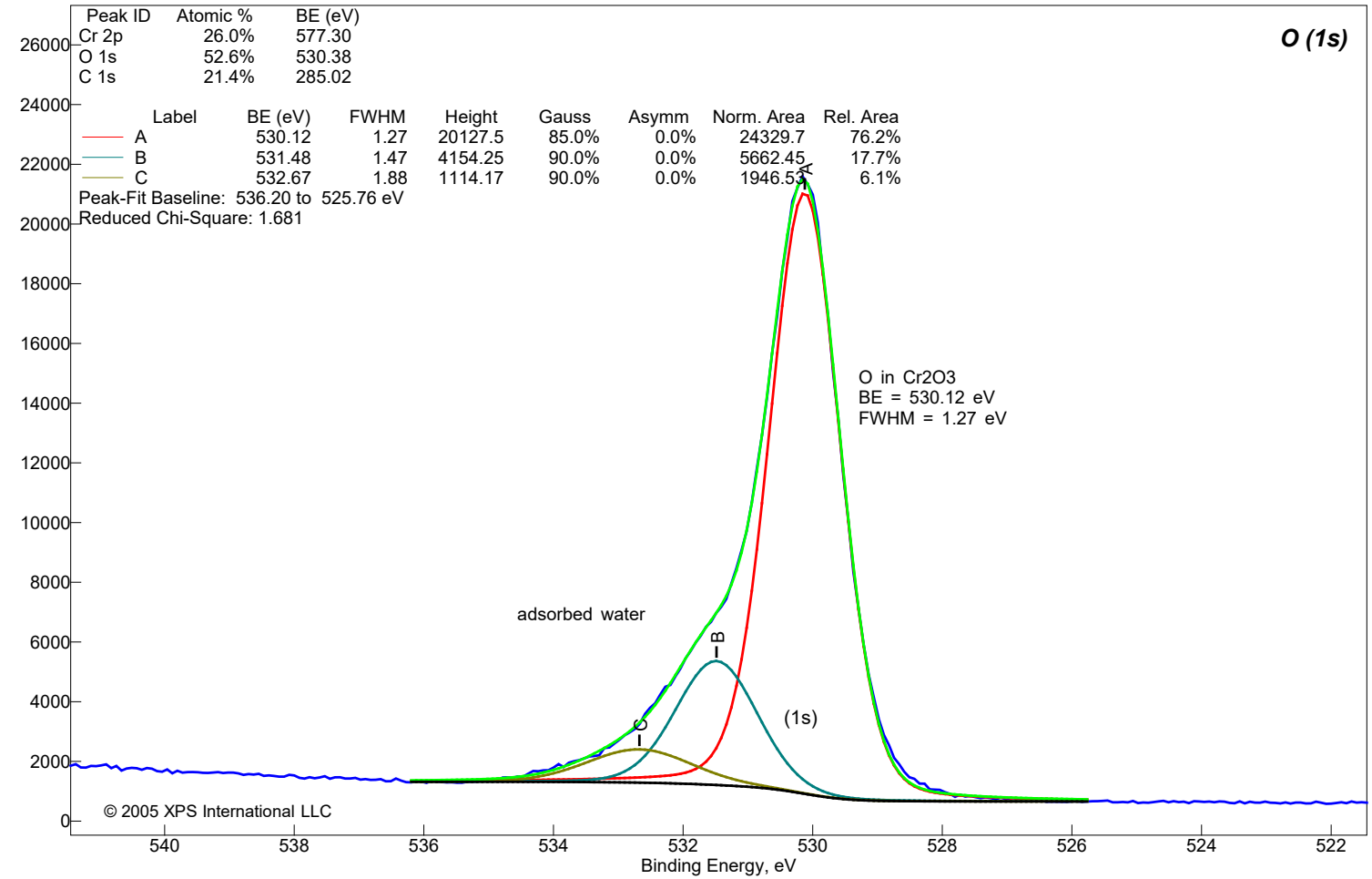


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Cr_2O_3

Chromium (III) Oxide (FW = 152.00)

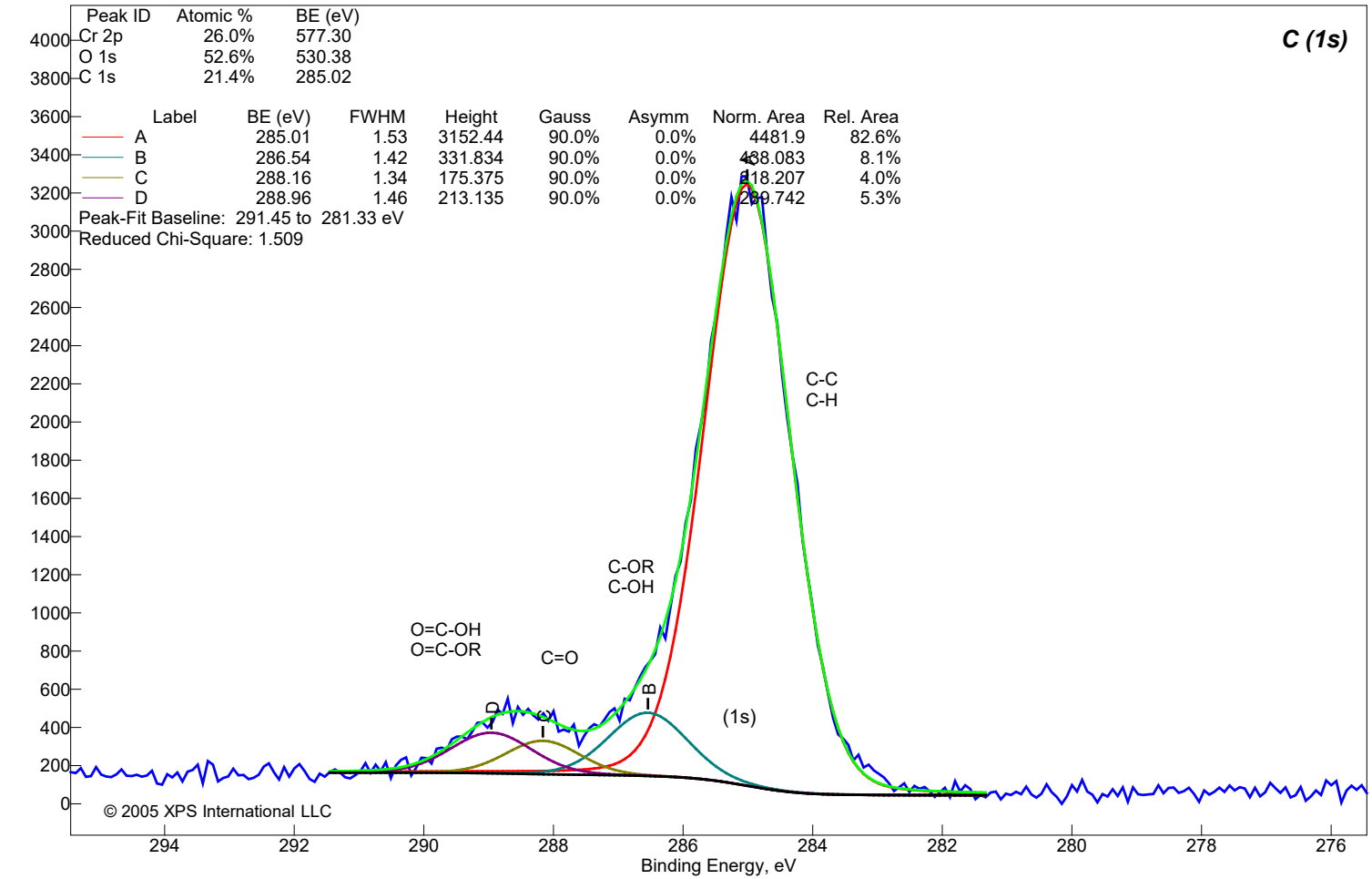
Sample Description: Cr2O3 (99.999%) Aldr lot# 06417HV, 3mm pellet, Semi-conductive, scrn 90 TOA



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Chromium (III) Oxide (FW = 152.00)

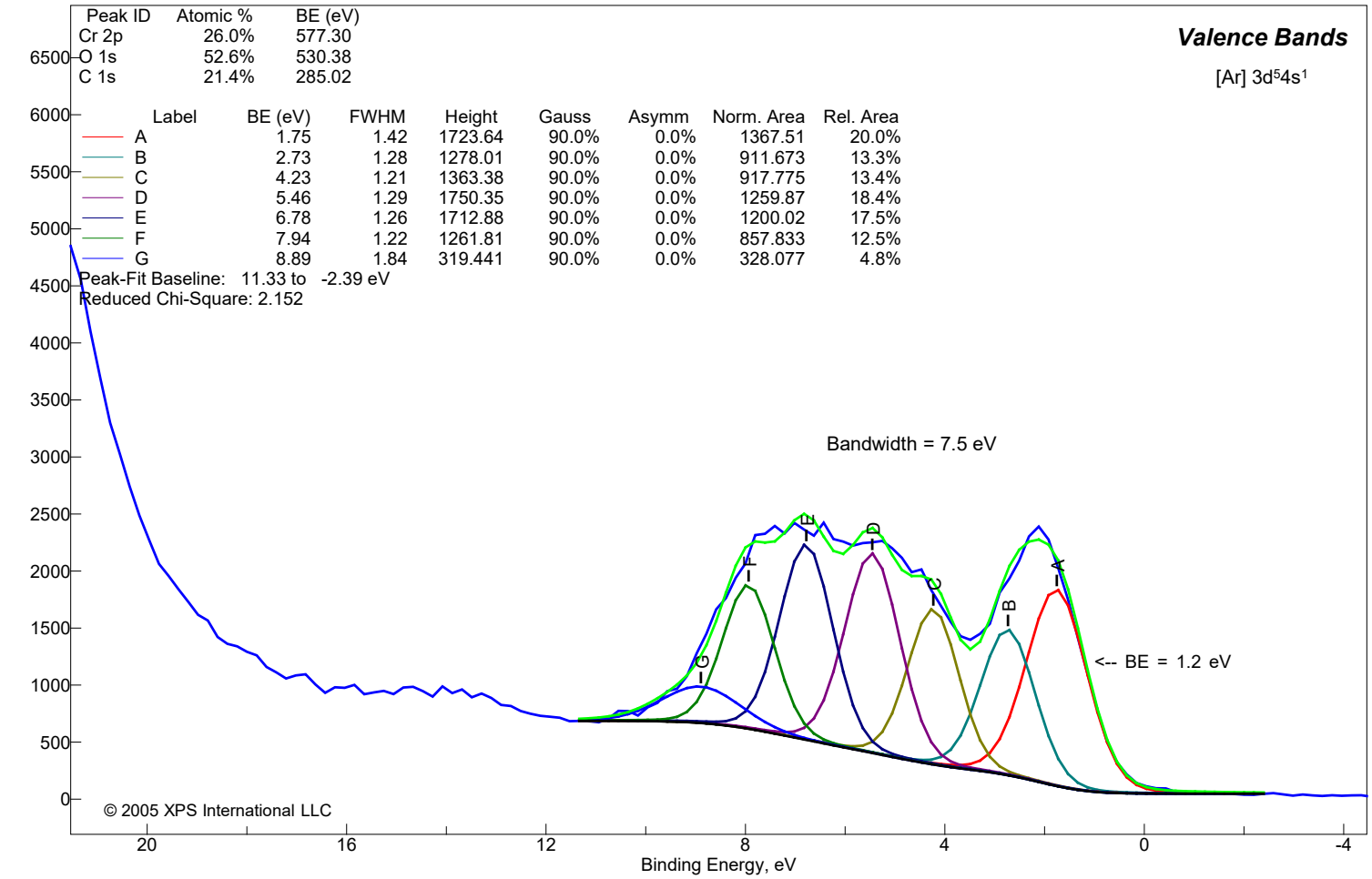
Sample Description: Cr2O3 (99.999%) Aldr lot# 06417HV, 3mm pellet, Semi-conductive, scrn 90 TOA



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Chromium (III) Oxide (FW = 152.00)

Sample Description: Cr2O3 (99.999%) Aldr lot# 06417HV, 3mm pellet, Semi-conductive, scrn 90 TOA

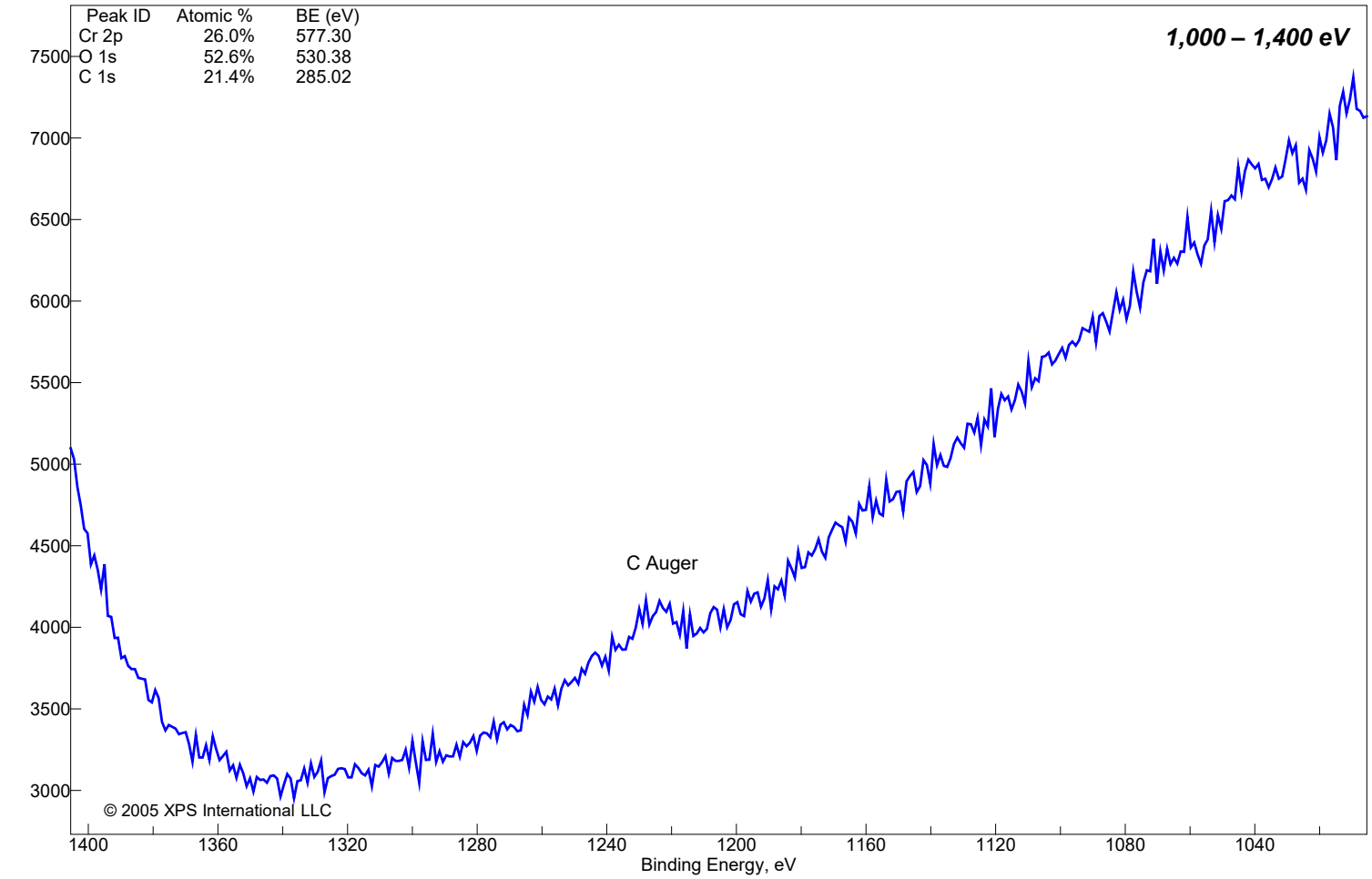


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Cr_2O_3

Chromium (III) Oxide (FW = 152.00)

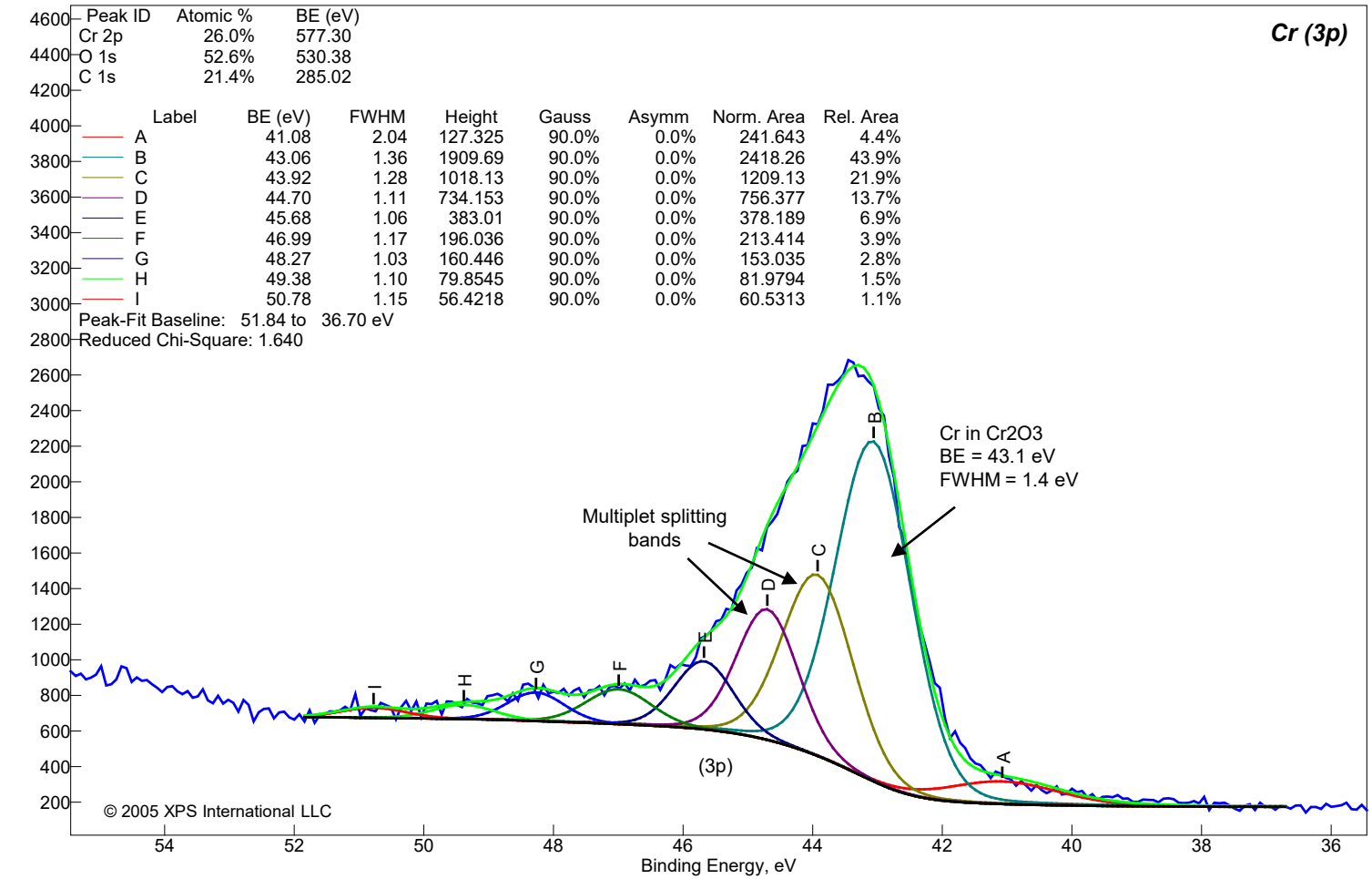
Sample Description: Cr2O3 (99.999%) Aldr lot# 06417HV, 3mm pellet, Semi-conductive, scrn 90 TOA



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Chromium (III) Oxide (FW = 152.00)

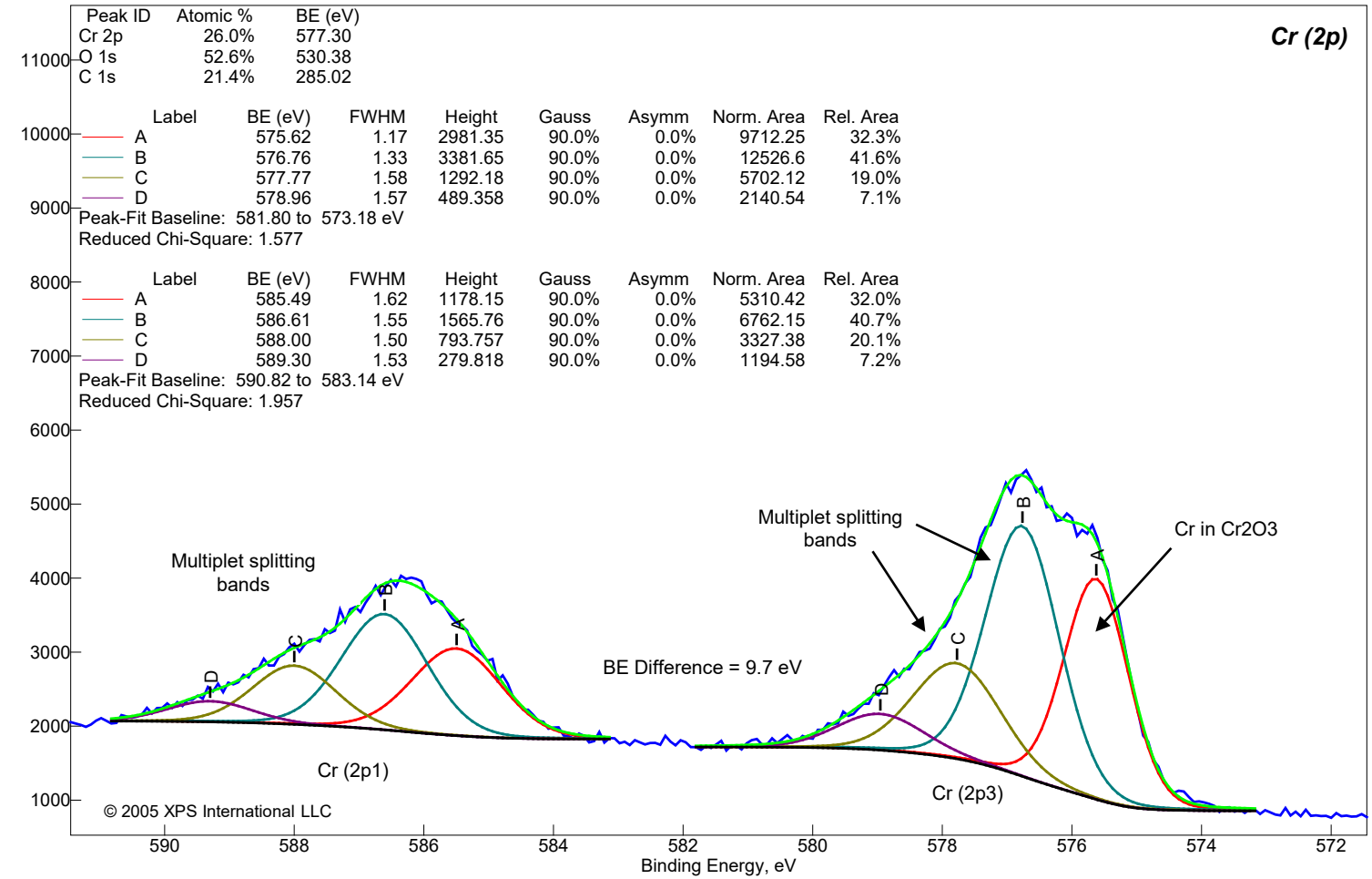
Sample Description: Cr2O3 (99.999%) Aldr lot# 06417HV, 3mm pellet, Semi-conductive, scrn 90 TOA



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Chromium (III) Oxide (FW = 152.00)

Sample Description: Cr2O3 (99.999%) Aldr lot# 06417HV, 3mm pellet, Semi-conductive, scrn 90 TOA

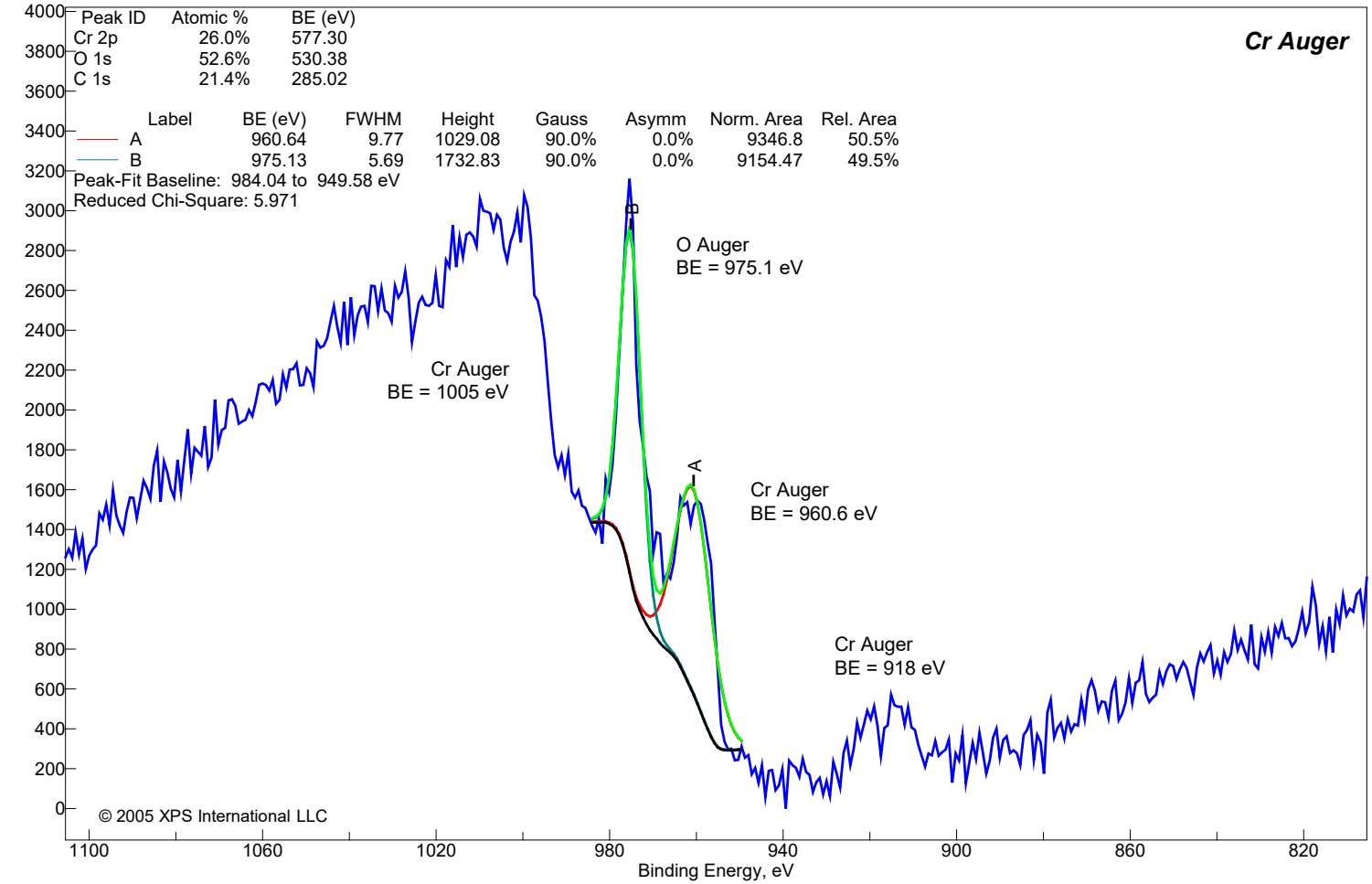


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Cr_2O_3

Chromium (III) Oxide (FW = 152.00)

Sample Description: Cr2O3 (99.999%) Aldr lot# 06417HV, 3mm pellet, Semi-conductive, scrn 90 TOA



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Cs_2O

Cesium (II) Oxide (FW = 281.82)
Surface Composition Table

Description: Cs_2O in a translucent lump of synthetic Cs_2O:SiO_2 (75:25) glass (Okayama Univ, Japan)
bulk freshly exposed before analysis, analyzed at 90 deg TOA, mesh at 1mm, non-conductive

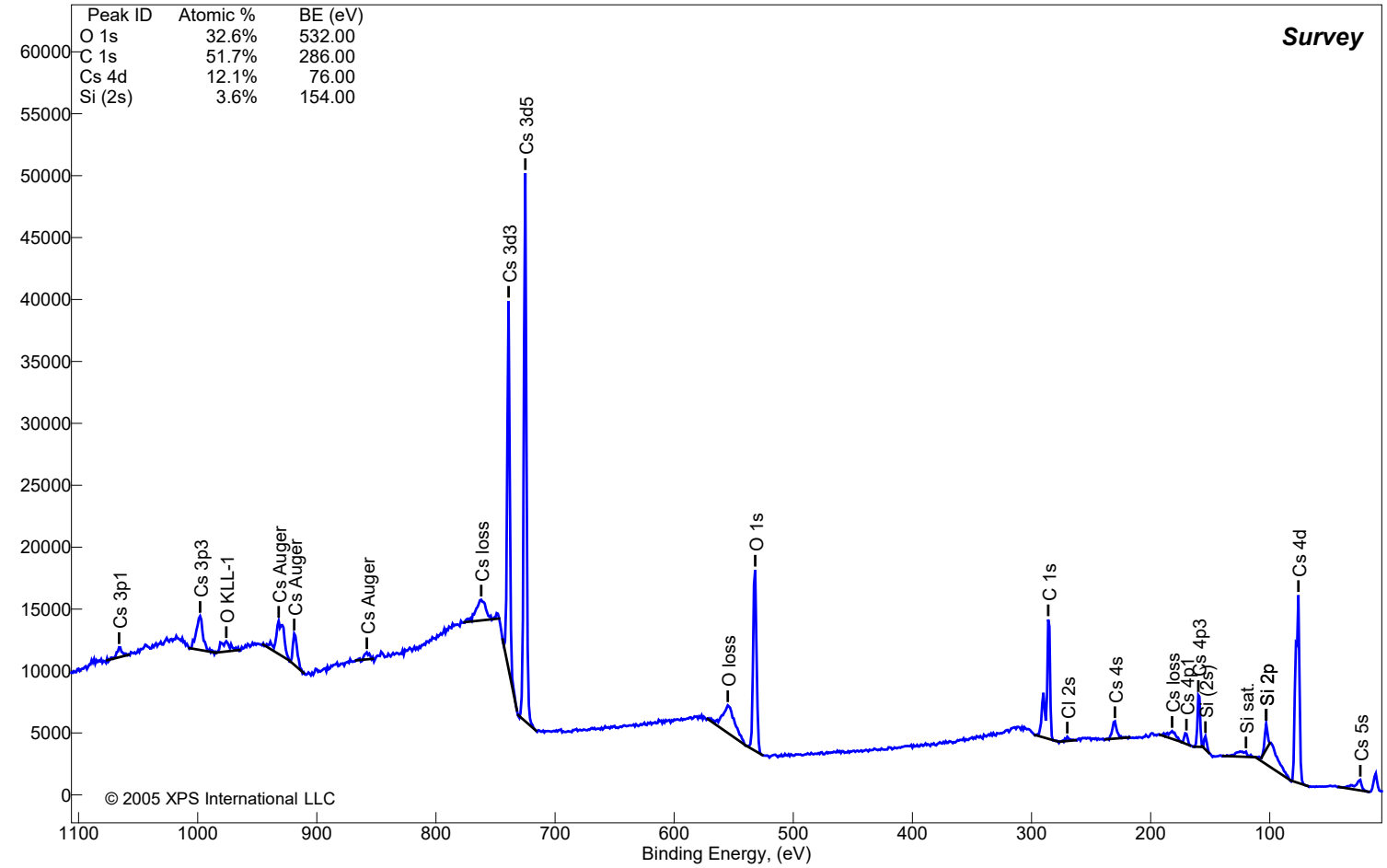
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Cs 5s	24.0	24.0	0.18	1.4	3,463	
Cs 4d	76.0	76.0	5.25	1.4	35,749	12.1%
Si 2p	103.0	103.0	0.82	1.4	18,701	
Si sat.	120.0	120.0	0.00	1.4	2,689	
Si (2s)	154.0	154.0	0.96	1.4	1,784	3.6%
Cs 4p3	160.0	160.0	2.56	1.4	7,055	
Cs 4p1	170.0	170.0	1.27	1.4	1,770	
Cs loss	182.0	182.0	0.00	1.4	3,285	
Cs 4s	230.0	230.0	1.08	1.4	3,583	
Cl 2s	270.0	270.0	1.69	1.4	563	
C 1s	286.0	286.0	1.00	1.4	23,183	51.7%
O 1s	532.0	532.0	2.93	1.4	31,052	32.6%
O loss	555.0	555.0	0.00	1.4	17,456	
Cs 3d5	725.0	725.0	23.76	1.4	73,080	
Cs 3d3	739.0	739.0	16.46	1.4	47,588	
Cs loss	762.0	762.0	0.00	1.4	11,029	
Cs Auger	858.0	858.0	0.00	1.4	1,019	
Cs Auger	919.0	919.0	0.00	1.4	6,681	
Cs Auger	932.0	932.0	0.00	1.4	13,342	
O KLL-1	976.0	976.0	0.70	1.4	4,745	
Cs 3p3	998.0	998.0	11.38	1.4	10,990	
Cs 3p1	1066.0	1066.0	5.29	1.4	1,417	

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Cs_2O

Cesium (II) Oxide (FW = 281.82)

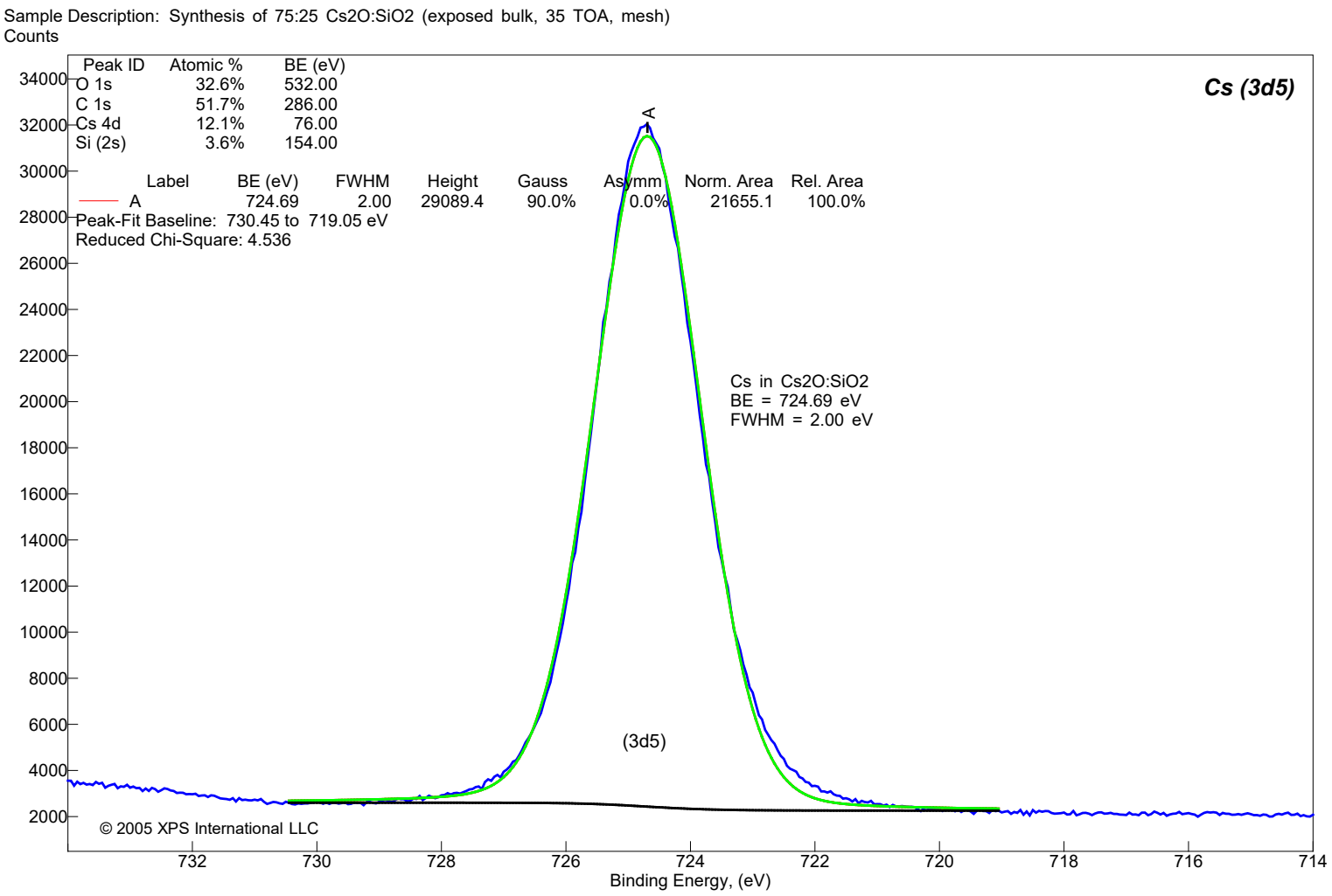
Sample Description: Cs2O:SiO2 (75:25) lump, synthesized by Okayama University, Japan
freshly exposed bulk, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Cs_2O

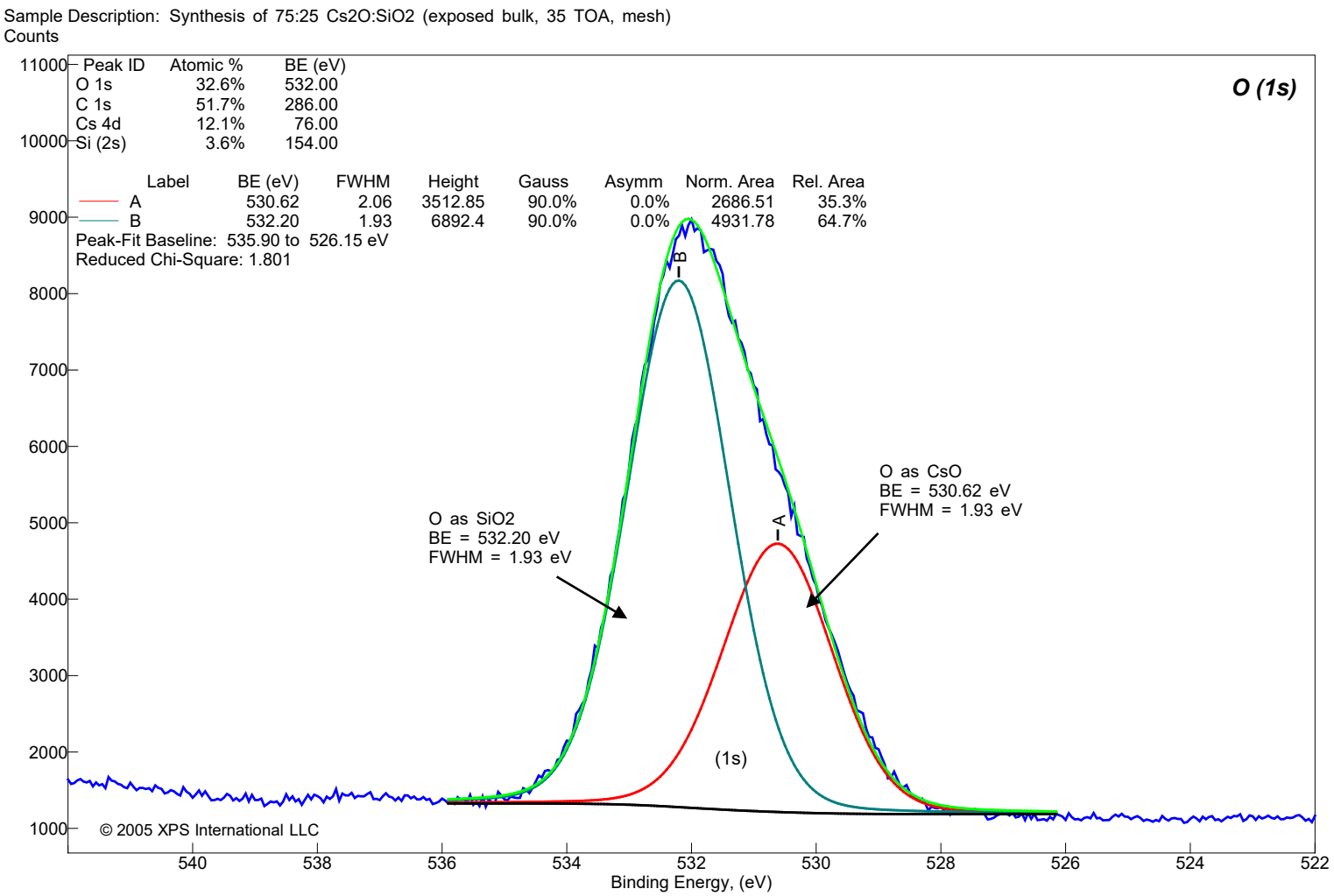
Cesium (II) Oxide (FW = 281.82)



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Cs_2O

Cesium (II) Oxide (FW = 281.82)

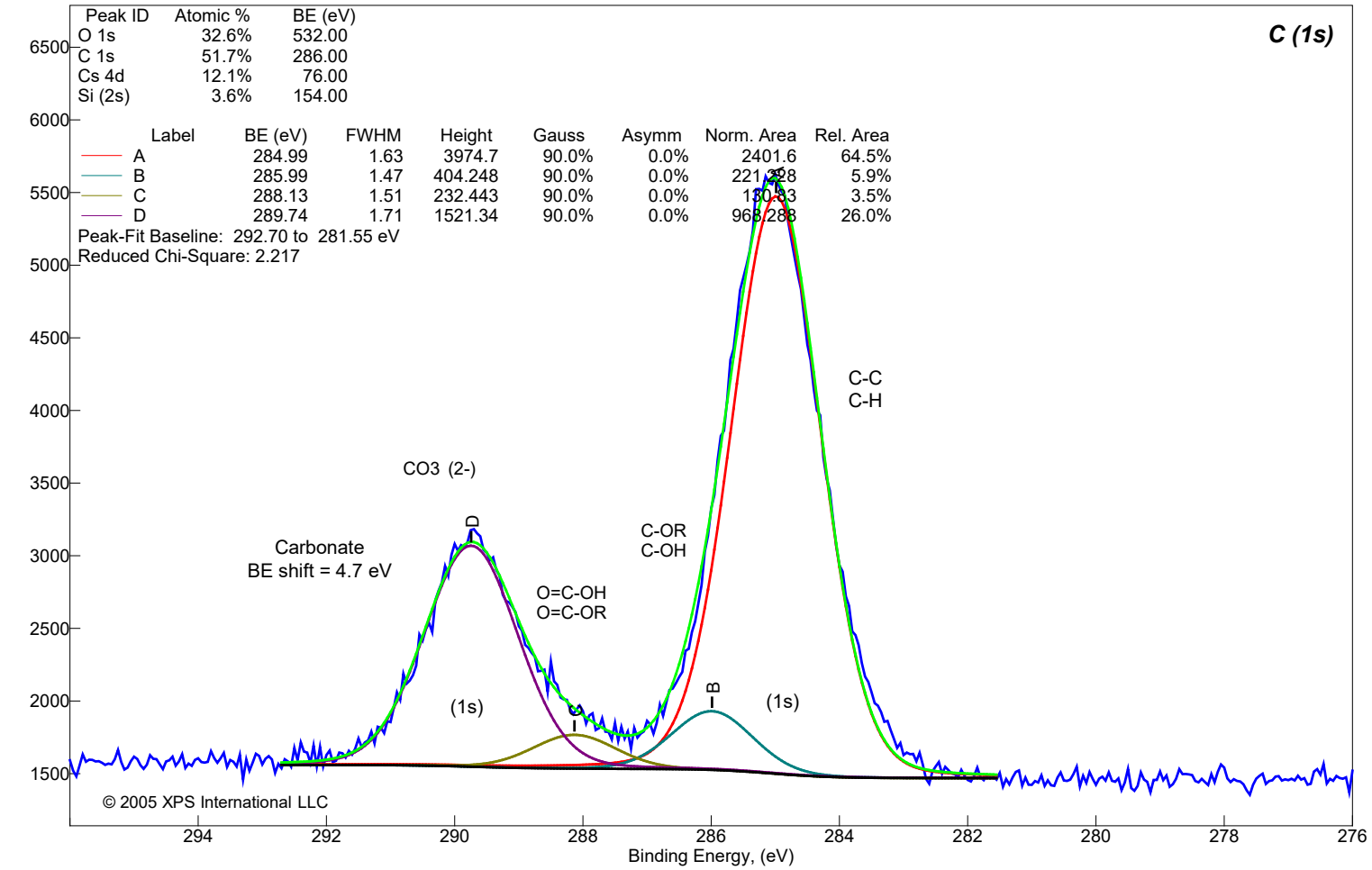


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Cs_2O

Cesium (II) Oxide (FW = 281.82)

Sample Description: Synthesis of 75:25 Cs2O:SiO2 (exposed bulk, 35 TOA, mesh)

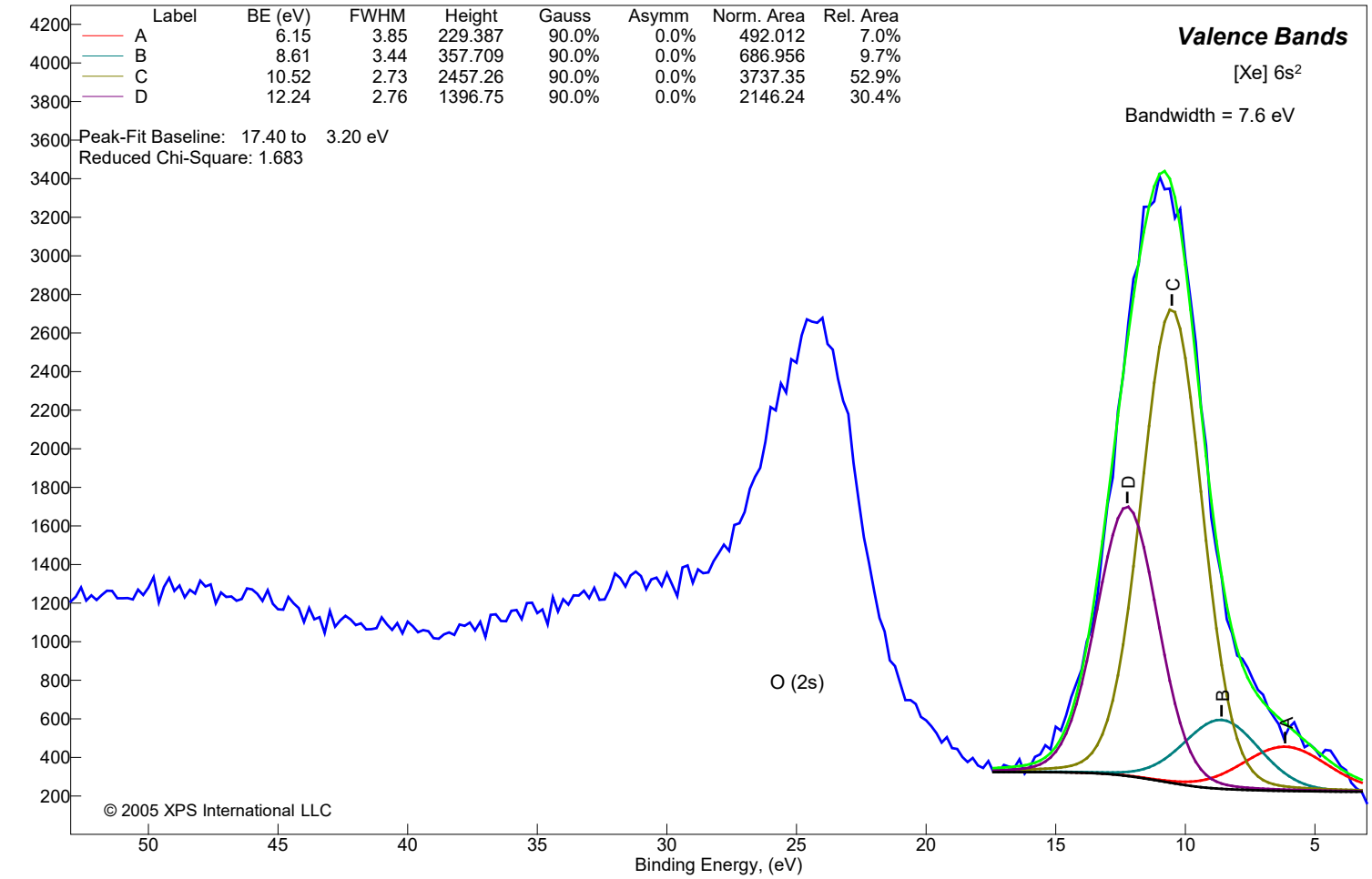


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Cs_2O

Cesium (II) Oxide (FW = 281.82)

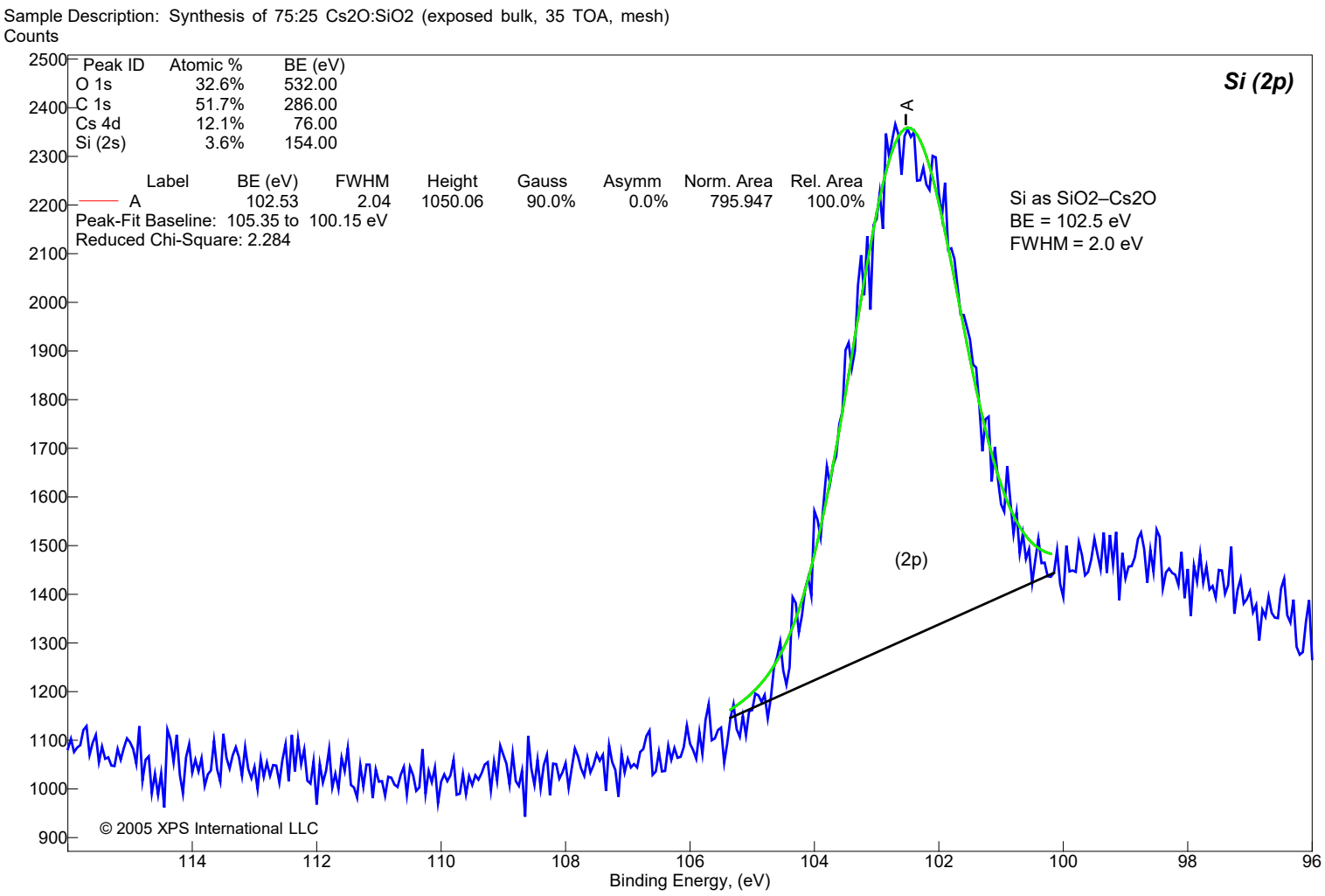
Sample Description: 75:25 Cs2O:SiO2 ion etched 1min 3KV (with mesh)



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Cs_2O

Cesium (II) Oxide (FW = 281.82)



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CuO

Copper (II) Oxide (FW = 79.55)
Surface Composition Table

Description: CuO (99.99%) from Rare Metallics Chem. Co. Lot# 70924-43, analyzed at 90 deg TOA, mesh at 1mm, conductive black powder pressed into 3 mm pellet, mp 1326 C, d 6.3, sol in dil acids

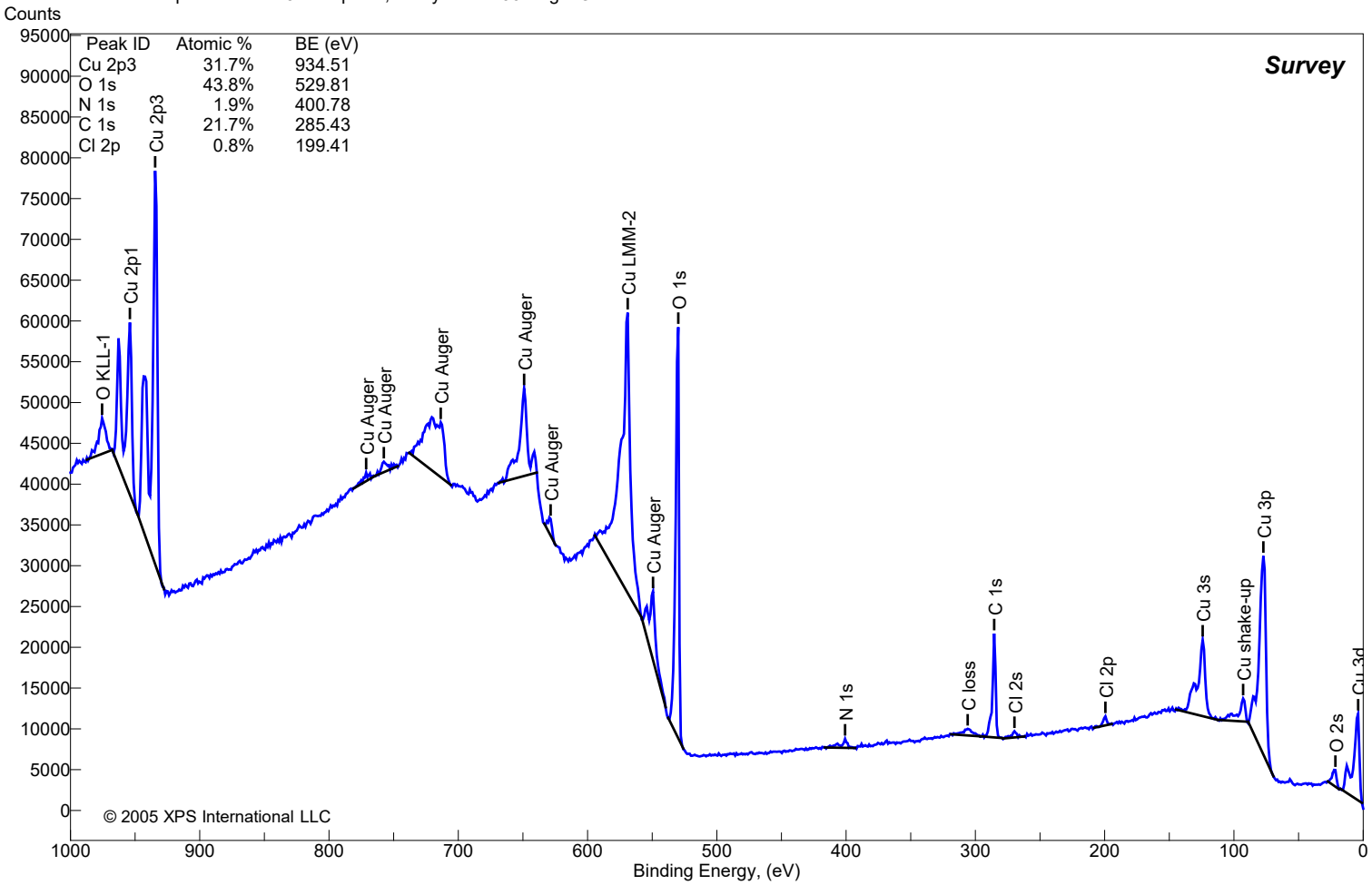
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Cu 3d	3.9	3.9	0.59	1.5	37,016	
O 2s	21.5	21.5	0.14	1.5	4,984	
Cu 3p	77.2	77.2	2.48	1.5	98,755	
Cu loss	92.9	92.9	0.00	1.5	12,757	
Cu 3s	124.1	124.1	0.96	1.5	42,218	
Cl 2p	199.4	199.4	2.28	1.5	2,168	0.8%
Cl 2s	269.8	269.8	1.69	1.5	2,314	
C 1s	285.4	285.4	1.00	1.5	23,728	21.7%
C loss	306.0	306.0	0.00	1.5	4,688	
N 1s	400.8	400.8	1.80	1.5	3,281	1.9%
O 1s	529.8	529.8	2.93	1.5	99,667	43.8%
Cu Auger	549.4	549.4	0.00	1.5	33,946	
Cu LMM-2	568.9	568.9	0.68	1.5	201,271	
Cu Auger	628.5	628.5	0.00	1.5	4,761	
Cu Auger	649.1	649.1	0.00	1.5	50,781	
Cu Auger	713.6	713.6	0.00	1.5	72,534	
Cu Auger	757.6	757.6	0.00	1.5	6,103	
Cu Auger	771.3	771.3	0.00	1.5	3,274	
Cu 2p3	934.5	934.5	16.73	1.5	180,798	31.7%
Cu 2p1	954.1	954.1	8.66	1.5	90,118	
O KLL-1	975.6	975.6	0.70	1.5	16,437	

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CuO

Copper (II) Oxide (FW = 79.55)

Sample Description: CuO (99.99%) Rare Metallics Co. Lot# 70924-43, Conductive pressed into 3 mm pellet, analyzed at 90 deg TOA

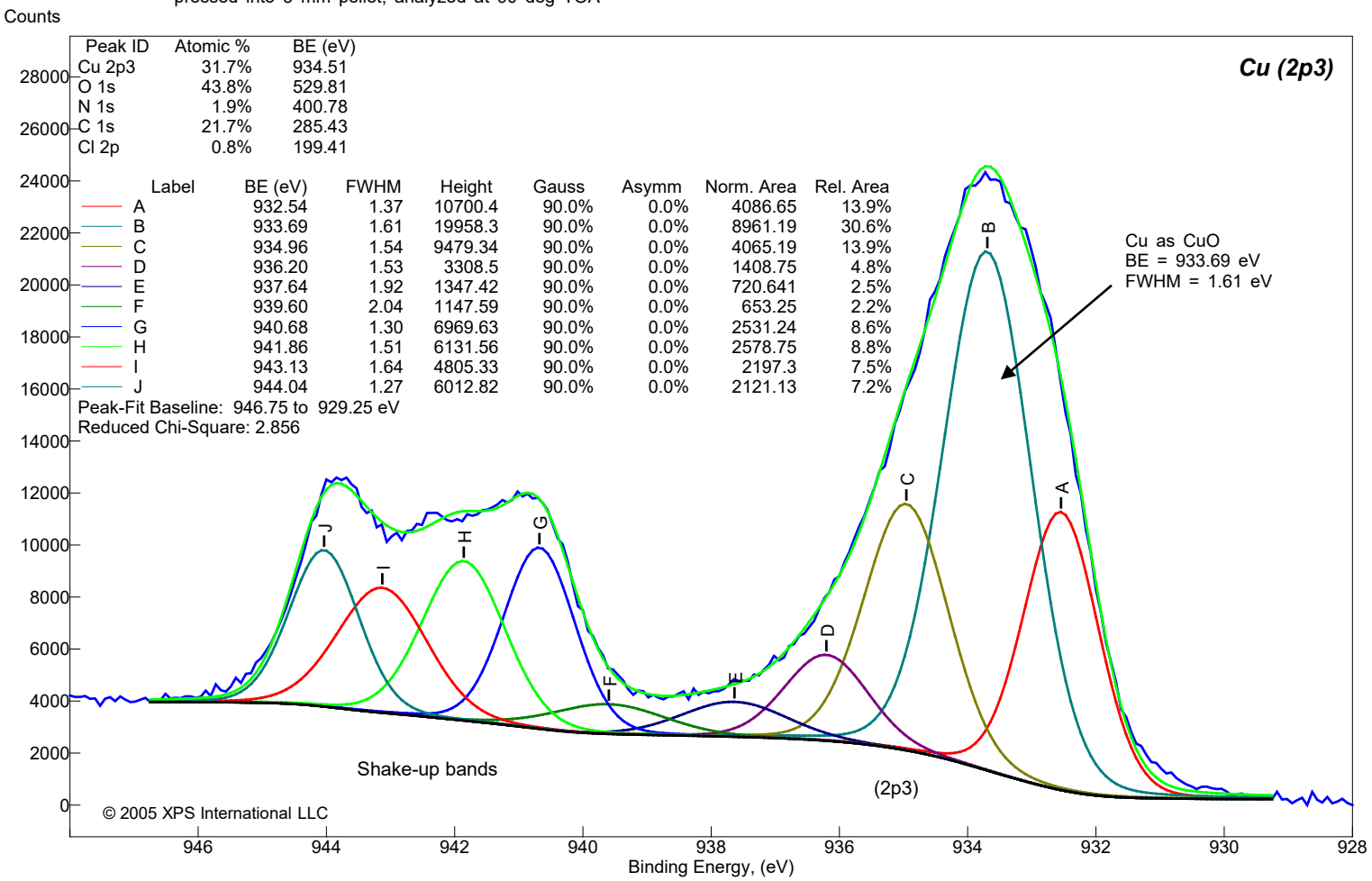


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CuO

Copper (II) Oxide (FW = 79.55)

Sample Description: CuO (99.99%) Rare Metallics Co. Lot# 70924-43, Conductive pressed into 3 mm pellet, analyzed at 90 deg TOA

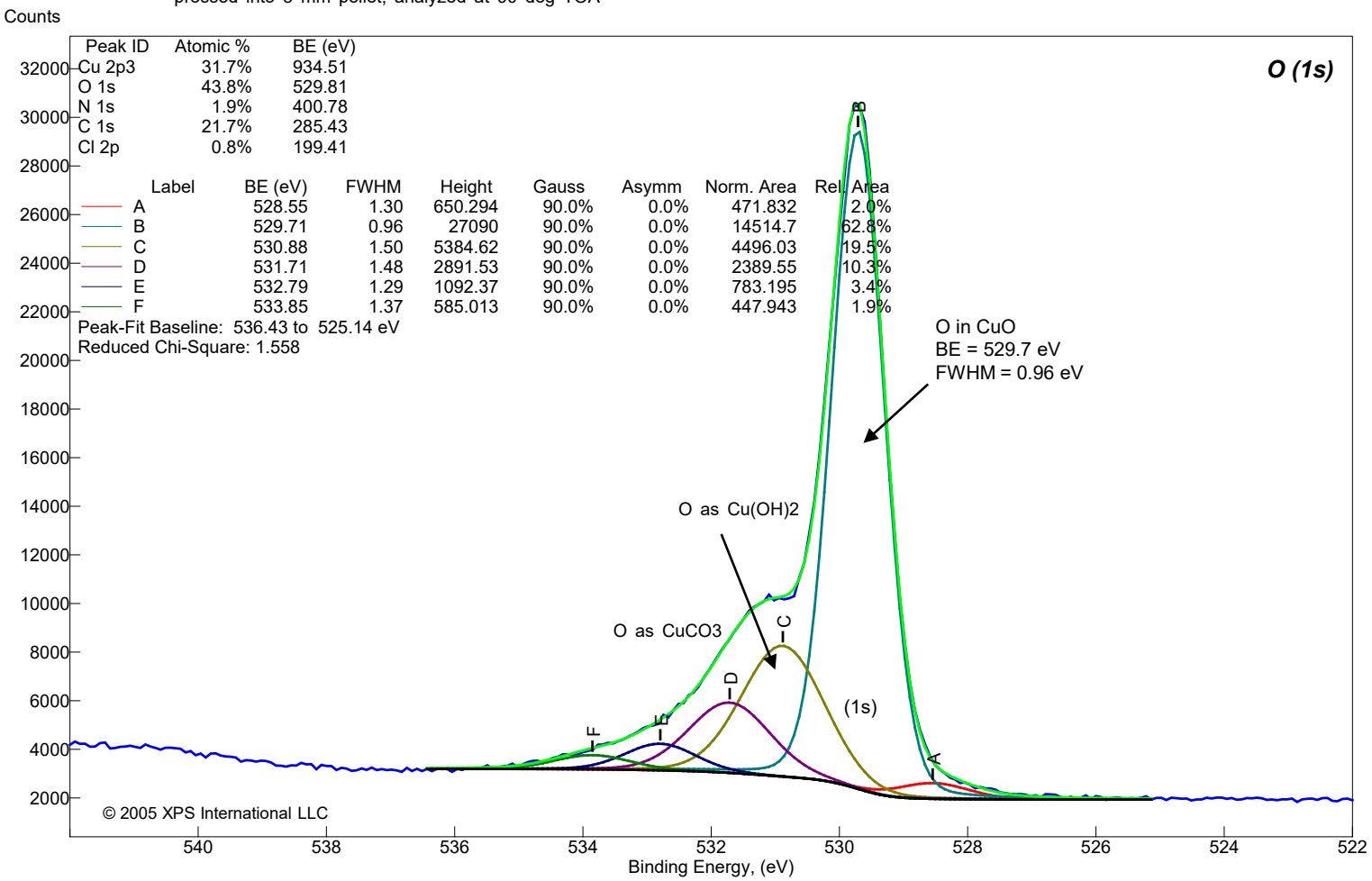


© 2019, XPS International LLC

CuO

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Sample Description: CuO (99.99%) Rare Metallics Co. Lot# 70924-43, Conductive pressed into 3 mm pellet, analyzed at 90 deg TOA

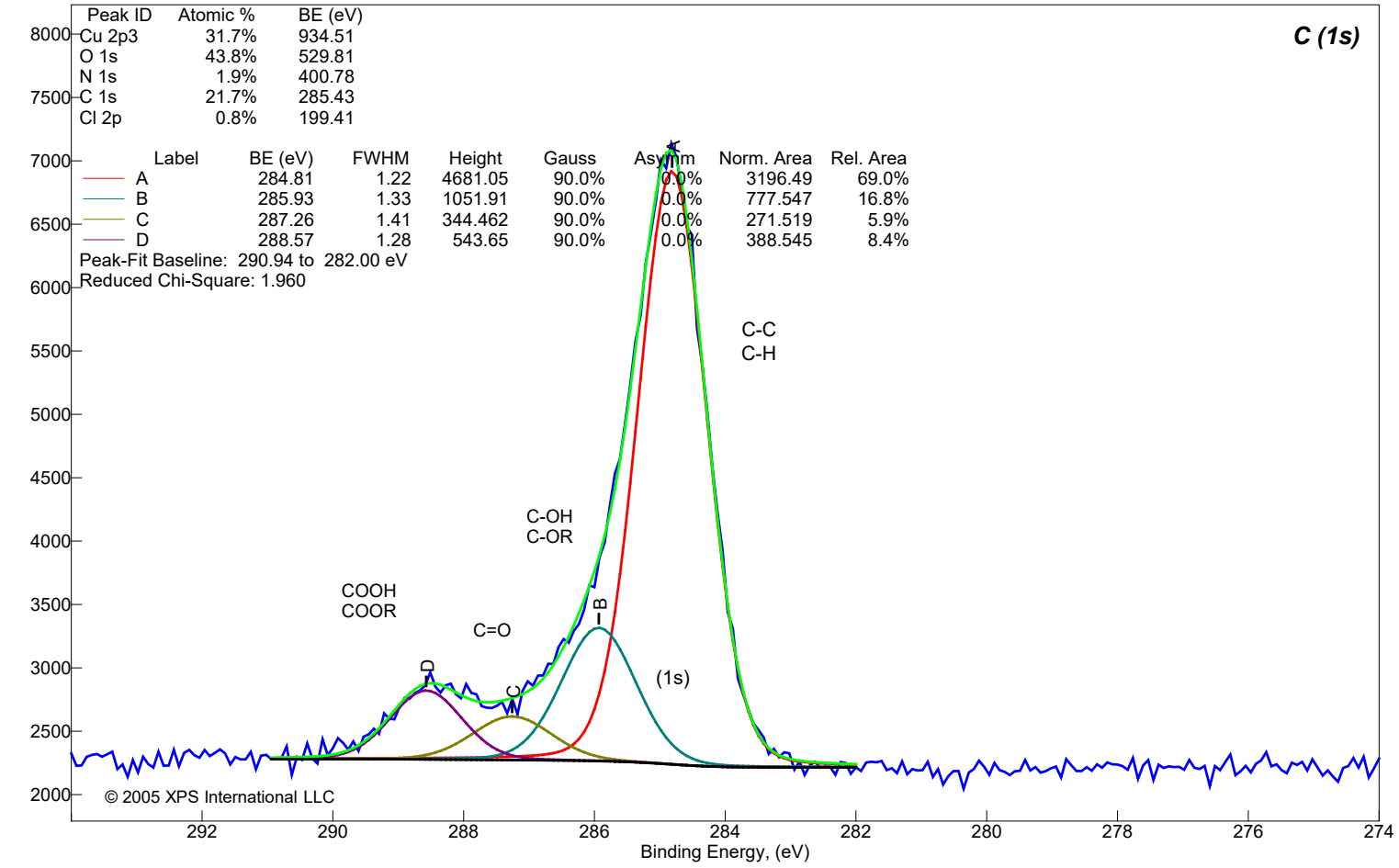


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CuO

Copper (II) Oxide (FW = 79.55)

Sample Description: CuO (99.99%) Rare Metallics Co. Lot# 70924-43, Conductive pressed into 3 mm pellet, analyzed at 90 deg TOA

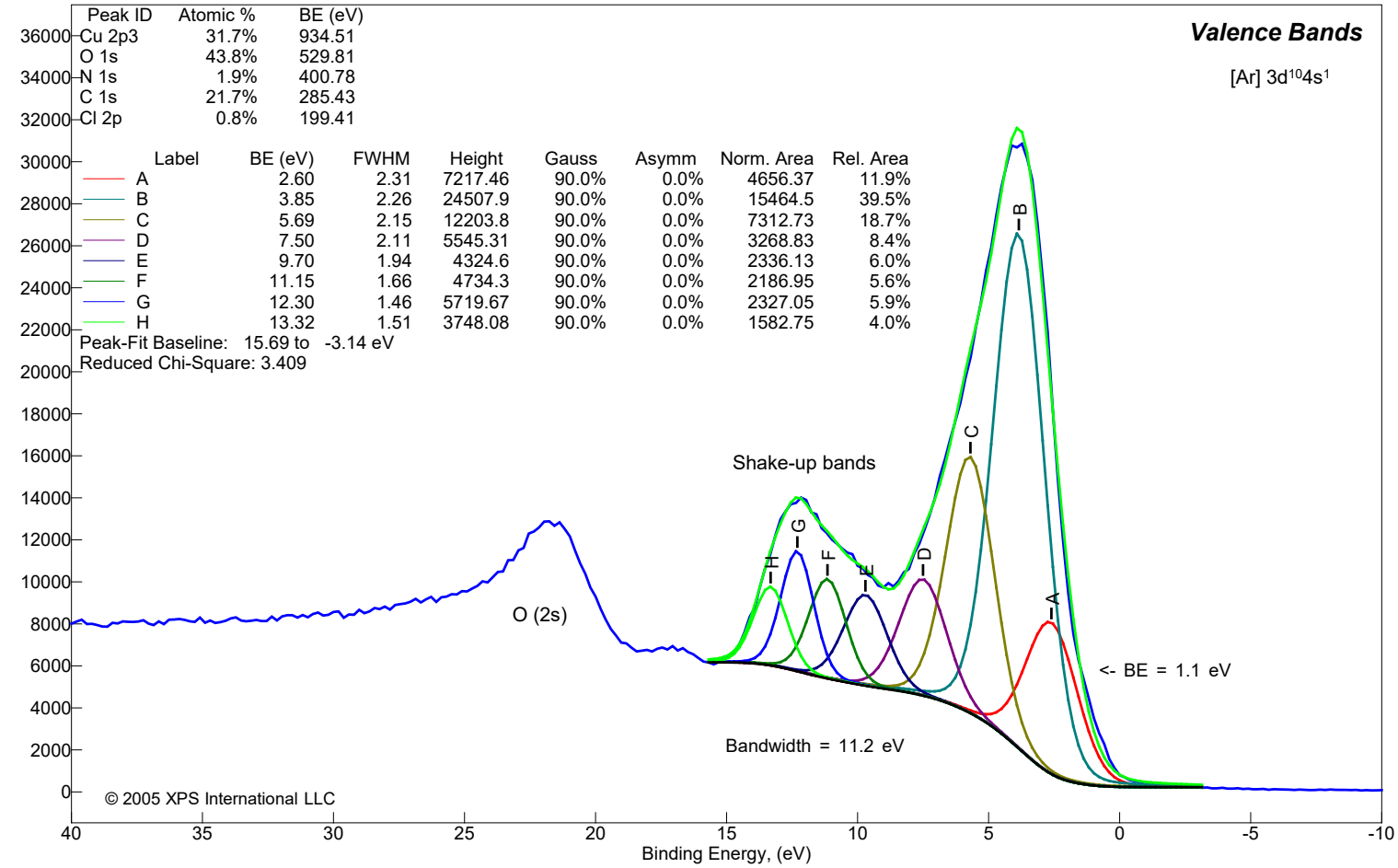


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CuO

Copper (II) Oxide (FW = 79.55)

Sample Description: CuO (99.99%) Rare Metallics Co. Lot# 70924-43, Conductive pressed into 3 mm pellet, analyzed at 90 deg TOA

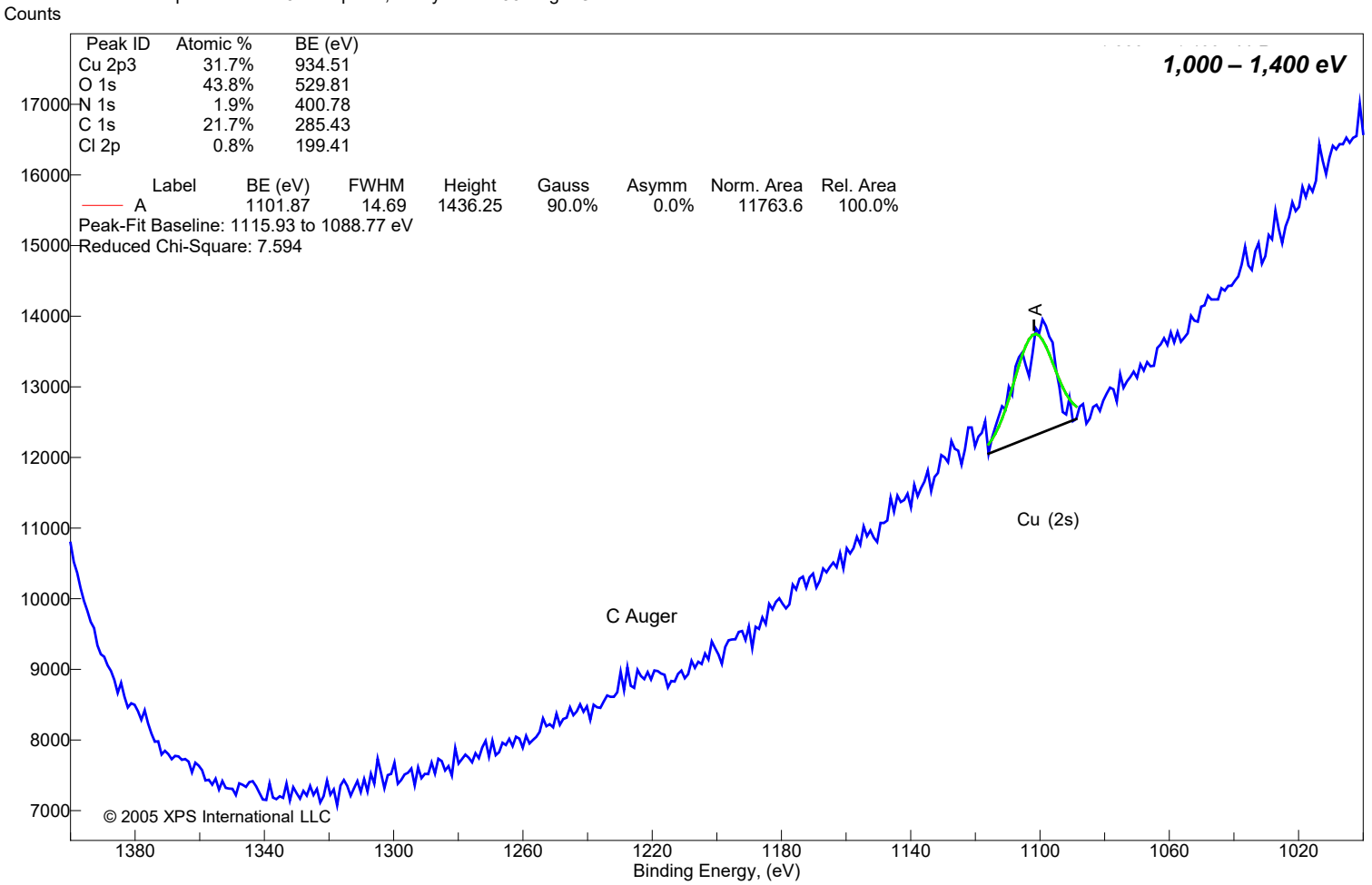


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CuO

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Sample Description: CuO (99.99%) Rare Metallics Co. Lot# 70924-43, Conductive pressed into 3 mm pellet, analyzed at 90 deg TOA

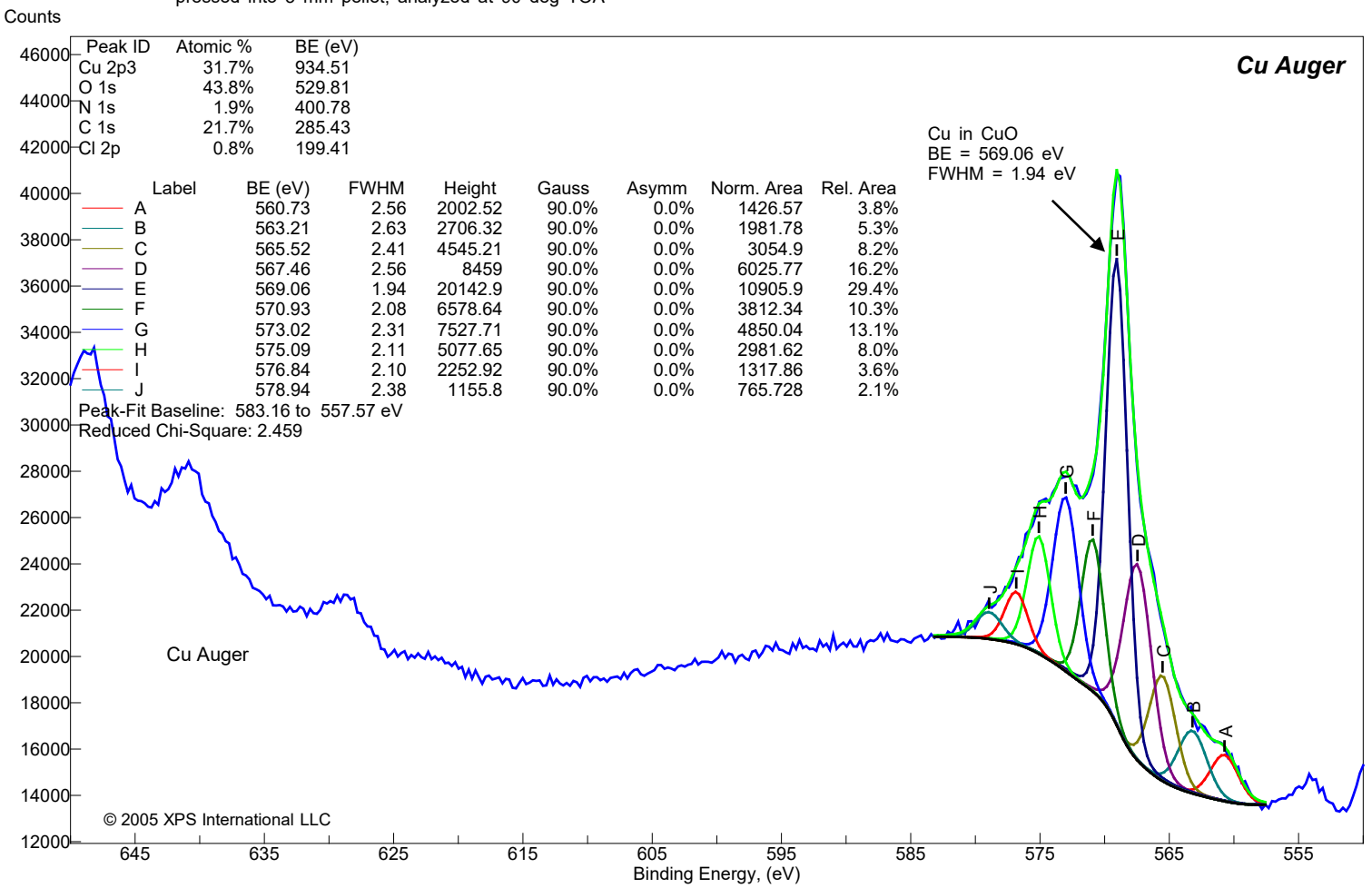


© 2019, XPS International LLC

CuO

Copper (II) Oxide (FW = 79.55)

Sample Description: CuO (99.99%) Rare Metallics Co. Lot# 70924-43, Conductive pressed into 3 mm pellet, analyzed at 90 deg TOA



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Cu_2O
Cuprite

Copper (I) Oxide (FW = 143.08)
Surface Composition Table

Description: Cu_2O (99+%) from African Cuprite (natural crystal), analyzed at 90 deg TOA, conductive deep red transparent crystal cleaved in air just before analysis, mp 1235 C dec., d 6.0

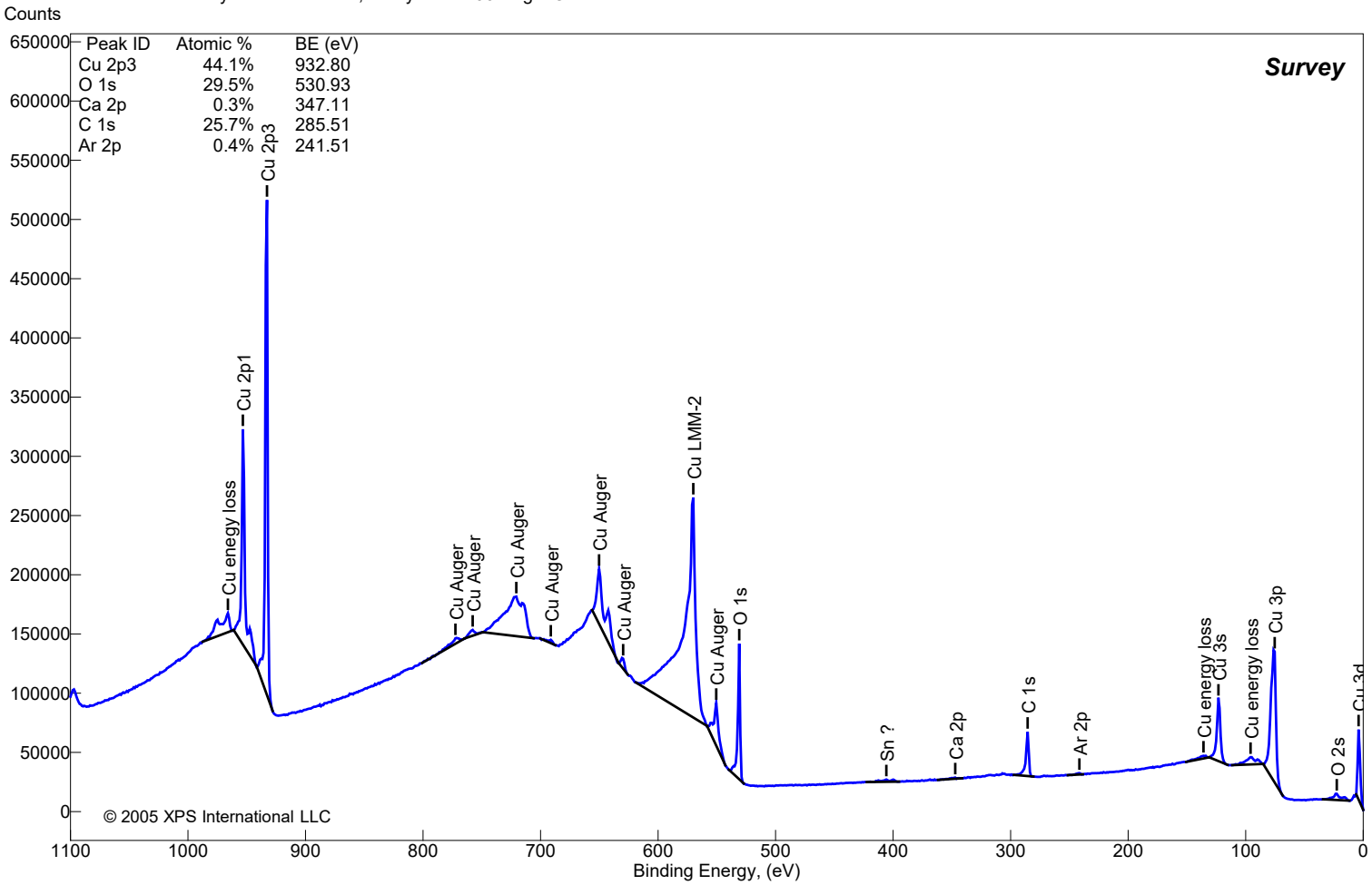
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Cu 3d	3.9	3.9	0.59	1.4	35,911	
O 2s	22.5	22.5	0.14	1.4	10,912	
Cu 3p	75.3	75.3	2.48	1.4	143,395	
Cu loss	95.8	95.8	0.00	1.4	17,363	
Cu 3s	123.2	123.2	0.96	1.4	49,339	
Cu loss	135.9	135.9	0.00	1.4	6,158	
Ar 2p	241.5	241.5	3.04	1.4	1,453	0.4%
C 1s	285.5	285.5	1.00	1.4	27,436	25.7%
Ca 2p	347.1	347.1	5.07	1.4	1,475	0.3%
Sn ?	405.8	405.8	0.00	1.4	5,229	
O 1s	530.9	530.9	2.93	1.4	67,199	29.5%
Cu Auger	550.5	550.5	0.00	1.4	46,090	
Cu LMM-2	570.0	570.0	0.68	1.4	599,386	
Cu Auger	629.7	629.7	0.00	1.4	7,788	
Cu Auger	650.2	650.2	0.00	1.4	91,329	
Cu Auger	691.3	691.3	0.00	1.4	2,642	
Cu Auger	720.6	720.6	0.00	1.4	171,804	
Cu Auger	757.8	757.8	0.00	1.4	7,749	
Cu Auger	772.4	772.4	0.00	1.4	12,011	
Cu 2p3	932.8	932.8	16.73	1.4	267,152	44.1%
Cu 2p1	953.3	953.3	8.66	1.4	161,888	
Cu loss	966.0	966.0	0.00	1.4	43,802	

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Cu_2O
Cuprite

Copper (I) Oxide (FW = 143.08)

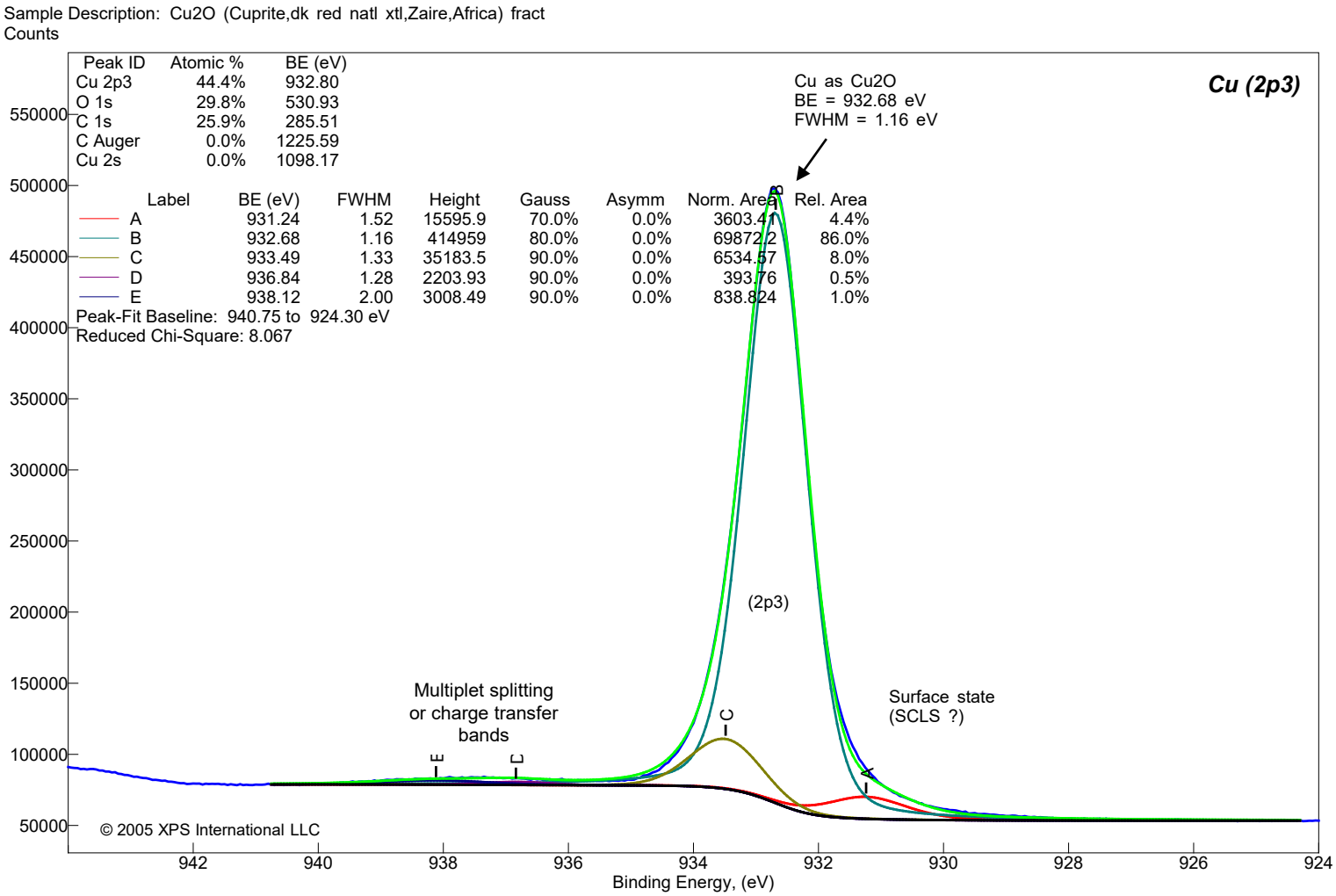
Sample Description: Cu2O (natural crystal called Cuprite) dark red color from Zaire, Africa, conductive freshly fractured in air, analyzed at 90 deg TOA



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Cu_2O
Cuprite

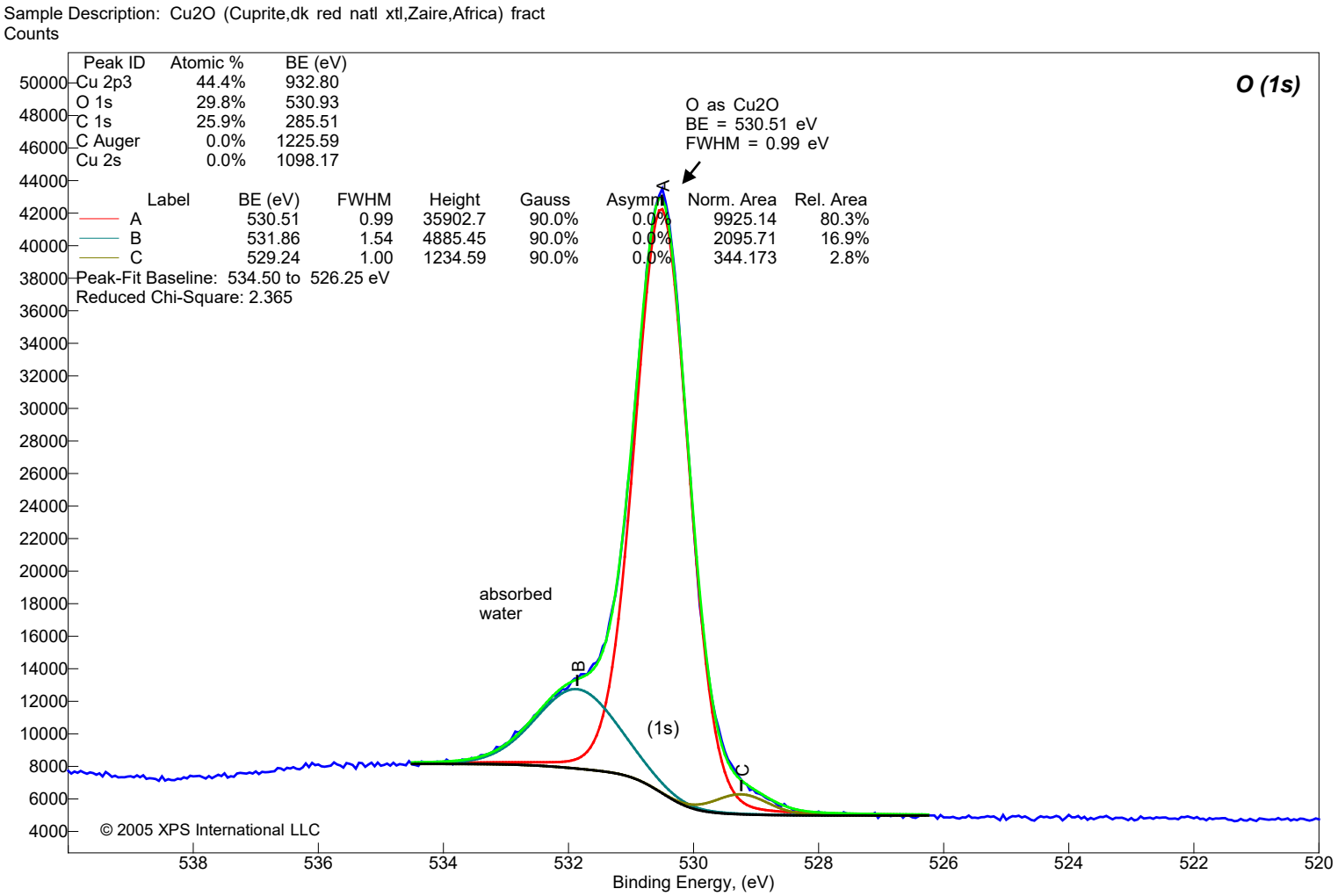
Copper (I) Oxide (FW = 143.08)



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Cu_2O
Cuprite

Copper (I) Oxide (FW = 143.08)

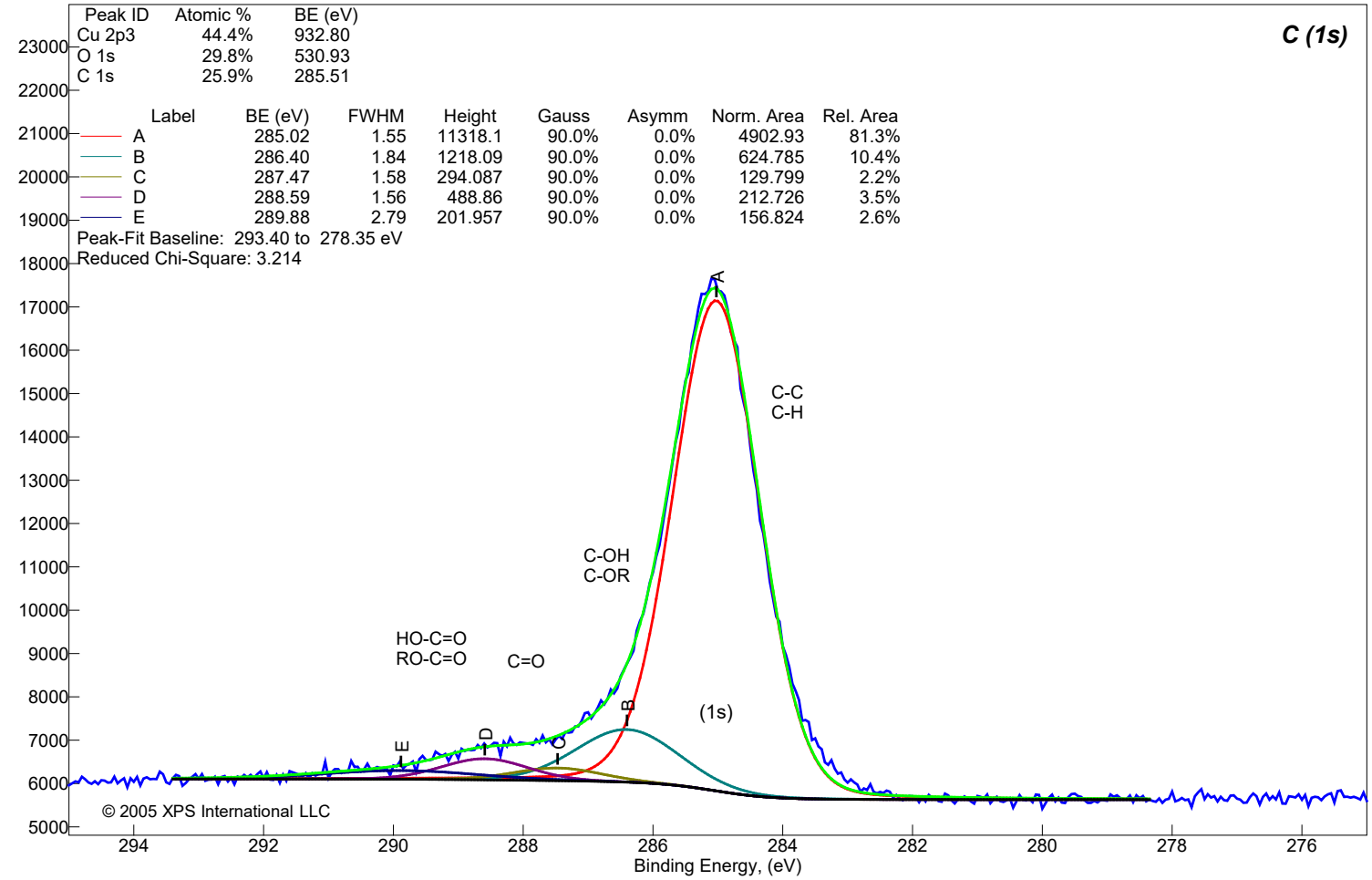


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Cu_2O
Cuprite

Copper (I) Oxide (FW = 143.08)

Sample Description: Cu2O (Cuprite,dk red natl xtl,Zaire,Africa) fract

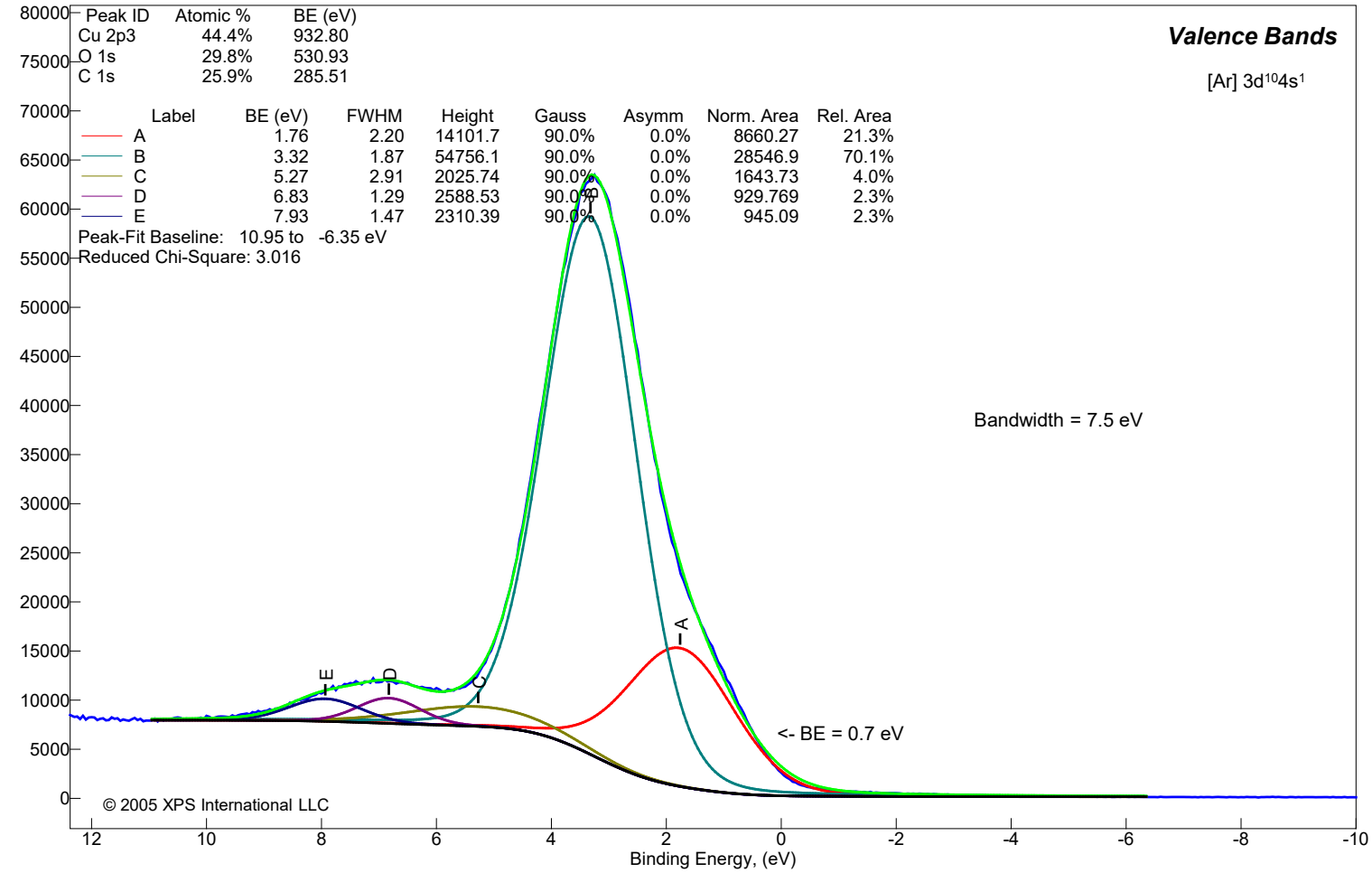


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Cu_2O
Cuprite

Copper (I) Oxide (FW = 143.08)

Sample Description: Cu2O (Cuprite,dk red natl xtl,Zaire,Africa) fract

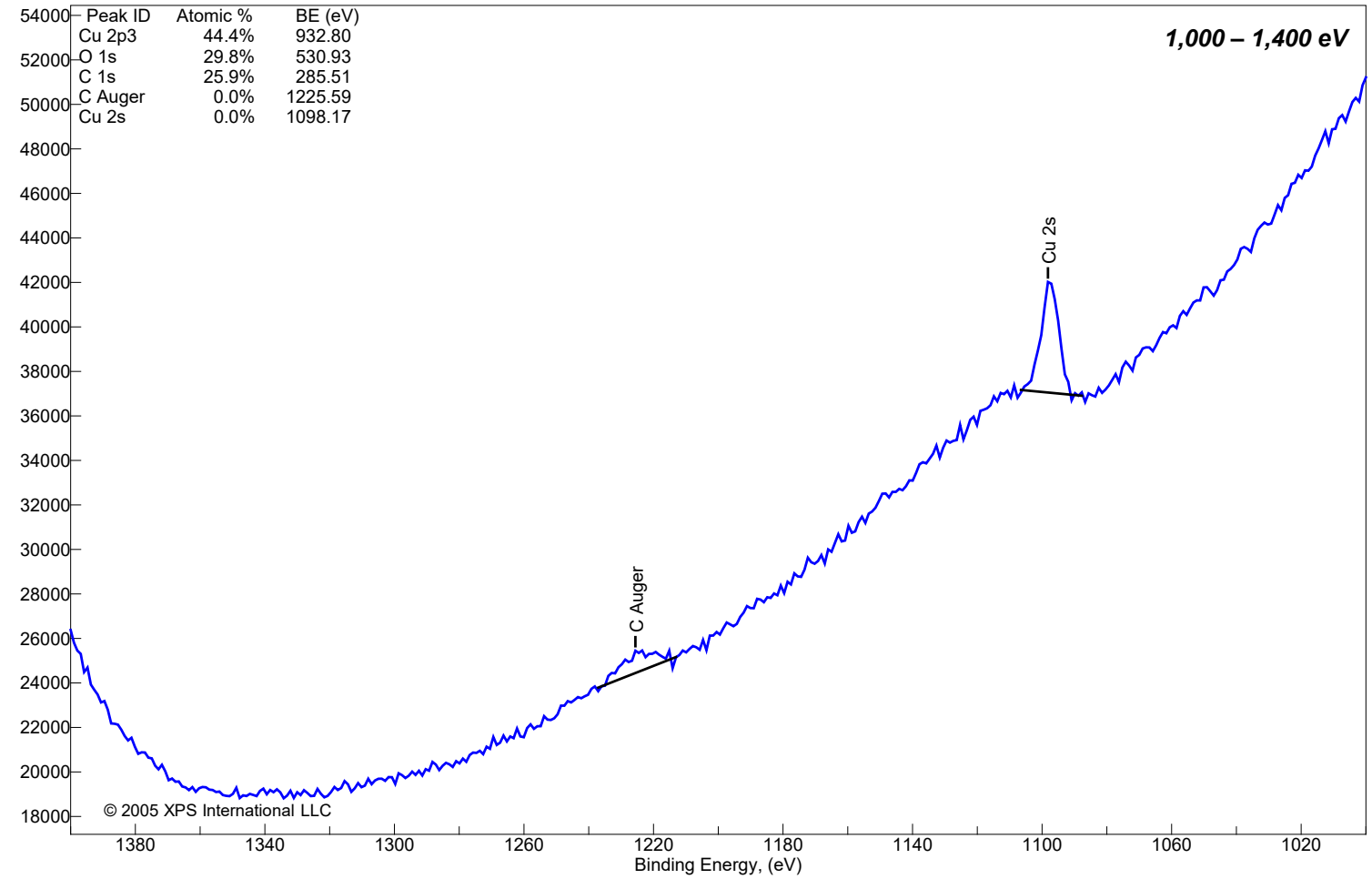


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Cu_2O
Cuprite

Copper (I) Oxide (FW = 143.08)

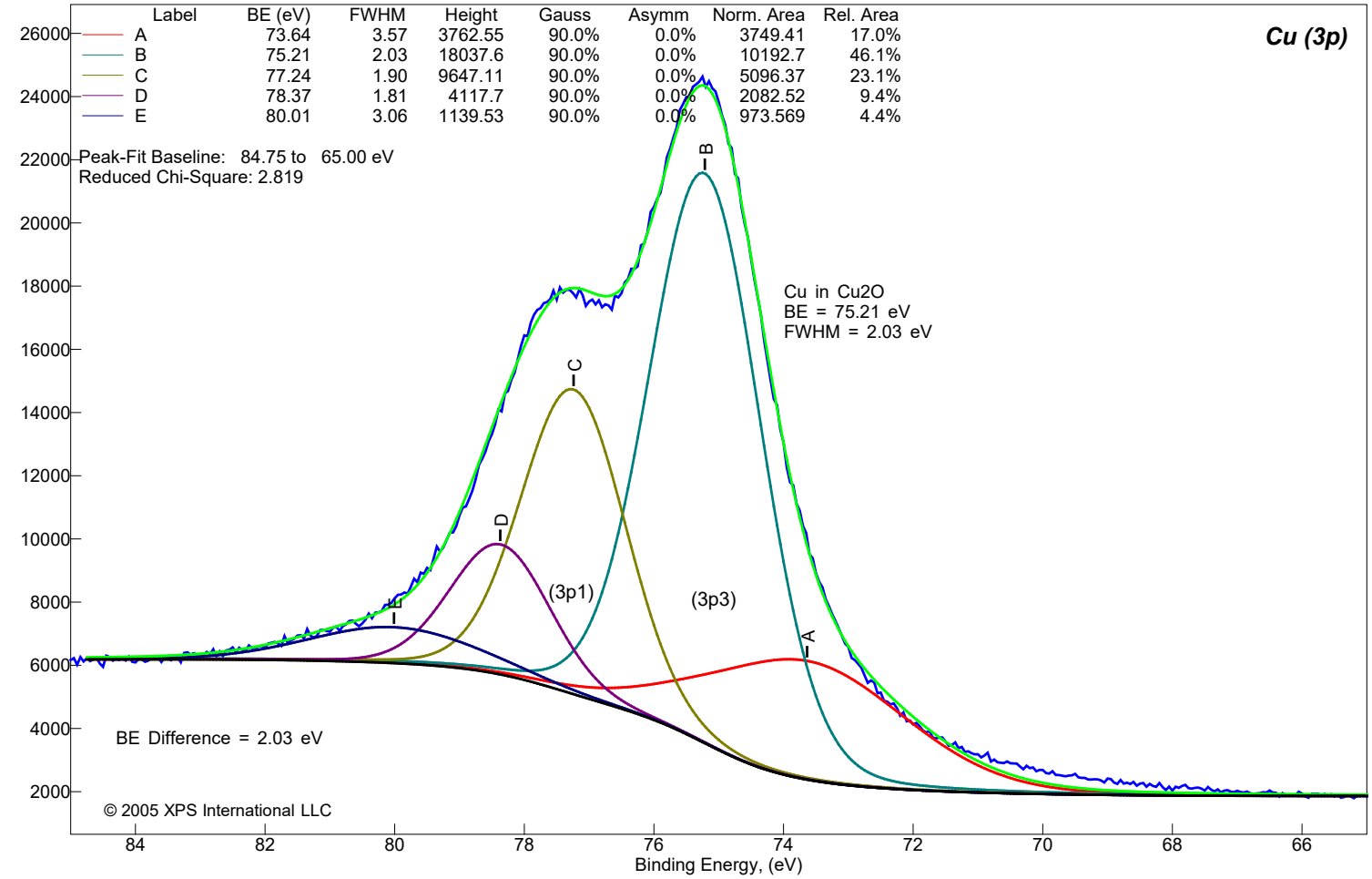
Sample Description: Cu2O (Cuprite,dk red natl xtl,Zaire,Africa) fract



Cu_2O
Cuprite

Copper (I) Oxide (FW = 143.08)

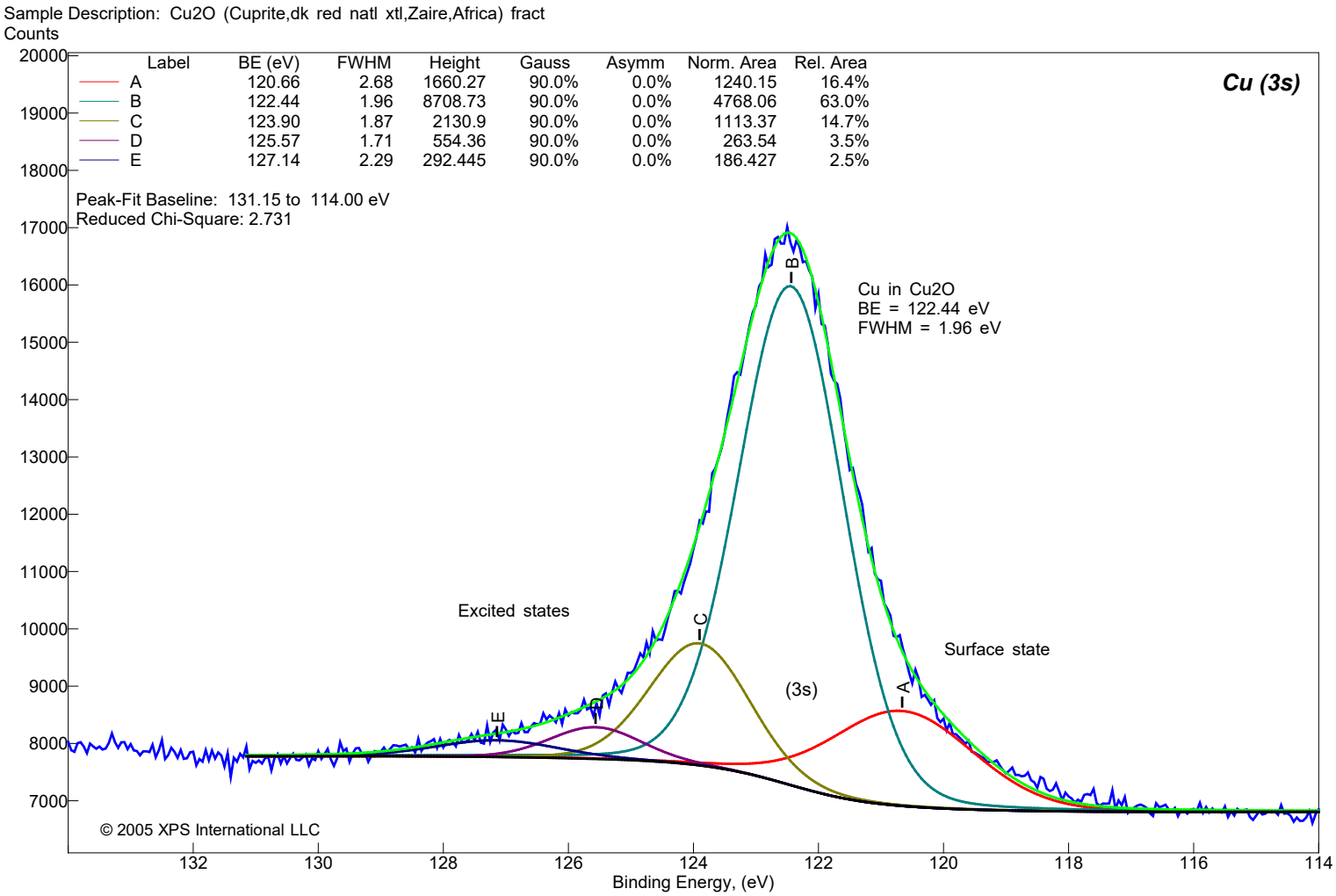
Sample Description: Cu2O (Cuprite,dk red natl xtl,Zaire,Africa) fract



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Cu_2O
Cuprite

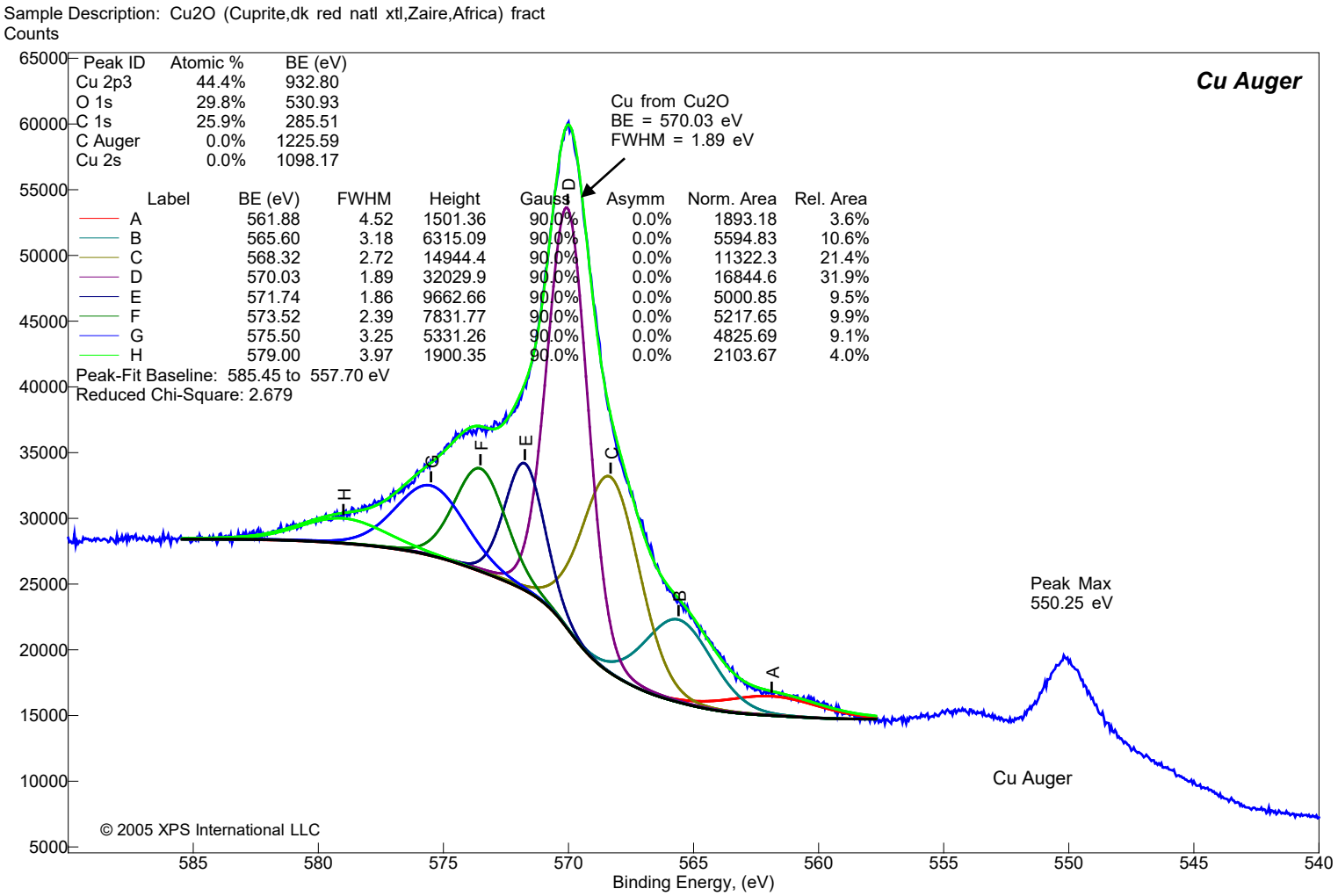
Copper (I) Oxide (FW = 143.08)



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Cu_2O
Cuprite

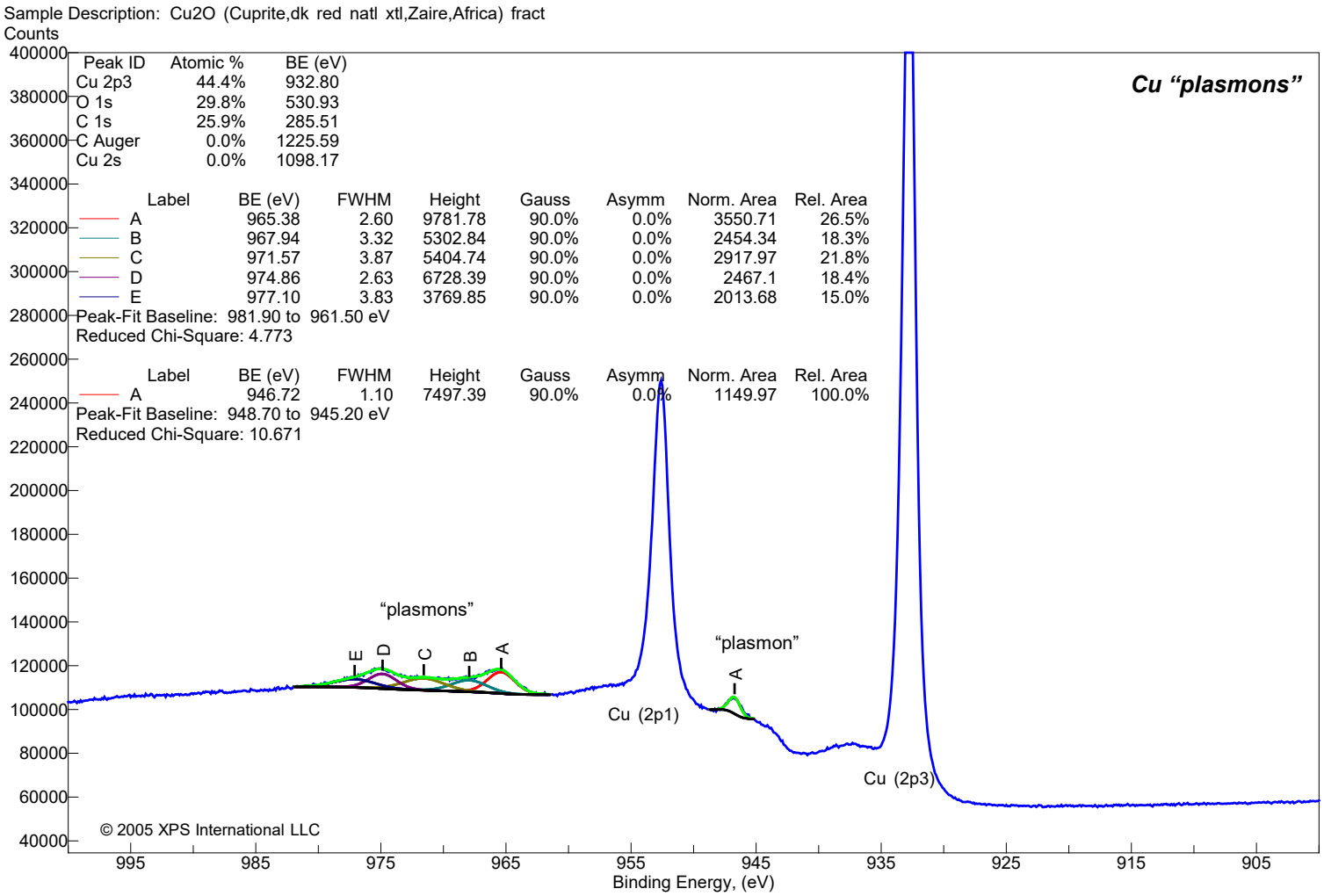
Copper (I) Oxide (FW = 143.08)



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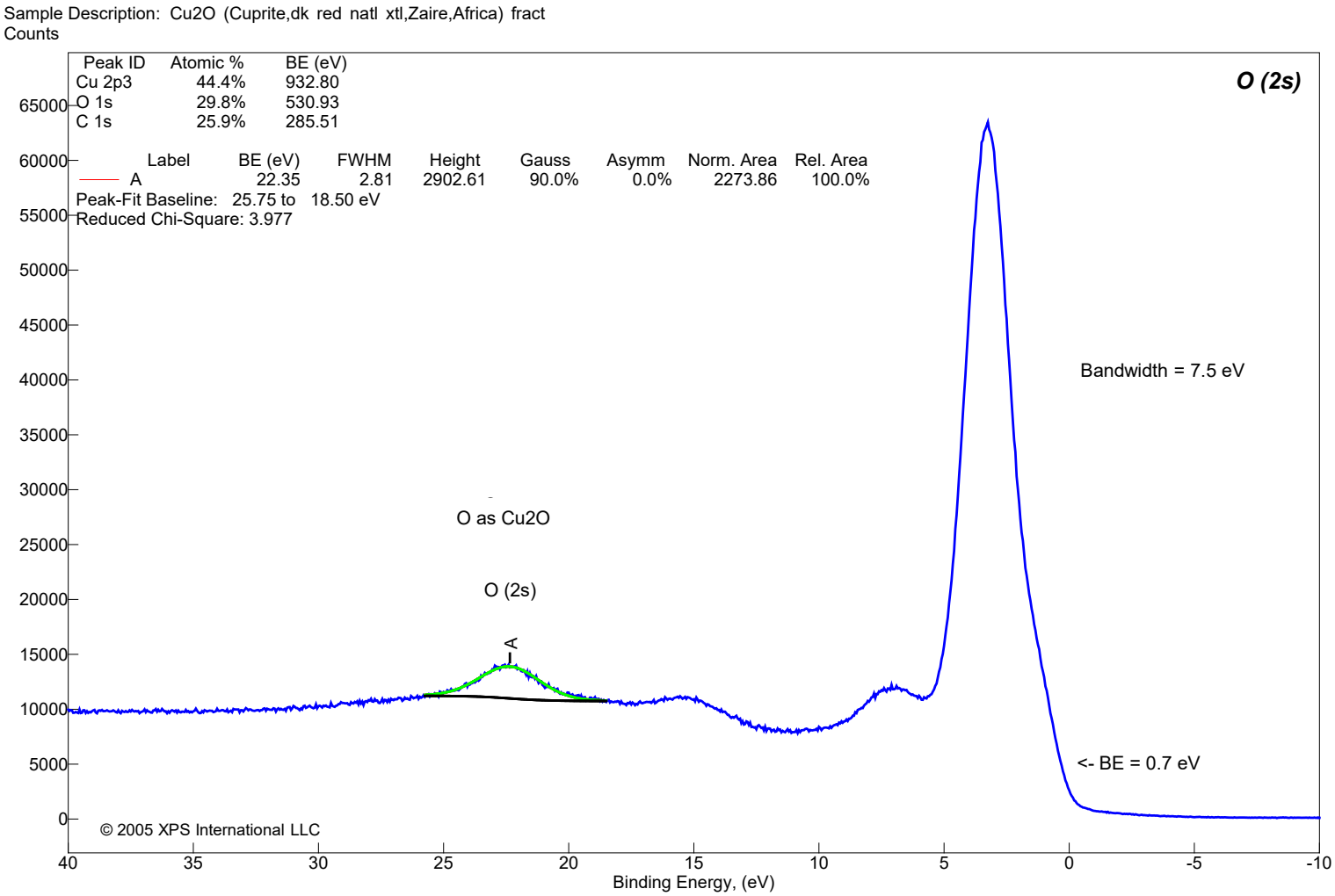
Cu_2O
Cuprite

Copper (I) Oxide (FW = 143.08)



Cu_2O
Cuprite

Copper (I) Oxide (FW = 143.08)



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Copper (II) Hydroxide (FW = 97.57)
Surface Composition Table

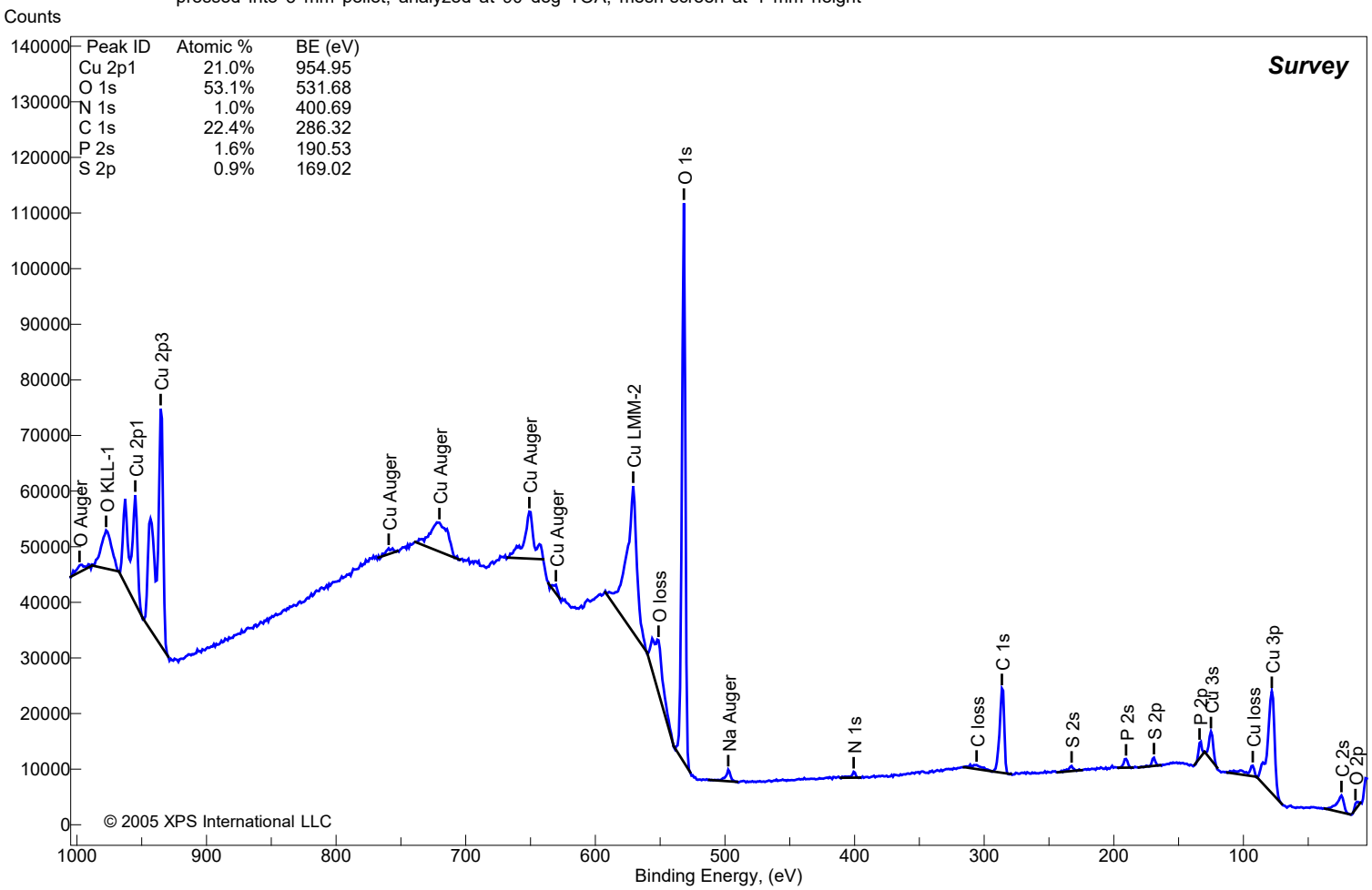
Description: $Cu(OH)_2$ (Tech.) from Aldrich Co. Lot# 11715EW, analyzed at 90 deg TOA, mesh at 1mm, conductive blue powder pressed into 3 mm pellet

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2p	13.6	13.6	0.02	1.5	892	
C 2s	24.4	24.4	0.15	1.5	4,893	
Cu 3p	78.1	78.1	2.48	1.5	29,511	
Cu loss	92.8	92.8	0.00	1.5	4,014	
Cu 3s	125.0	125.0	0.96	1.5	5,135	
P 2p	133.8	133.8	1.19	1.5	1,989	
S 2p	169.0	169.0	1.68	1.5	1,151	0.9%
P 2s	190.5	190.5	1.18	1.5	1,484	1.6%
S 2s	232.6	232.6	1.43	1.5	1,188	
C 1s	286.3	286.3	1.00	1.5	15,683	22.4%
C loss	305.9	305.9	0.00	1.5	2,231	
N 1s	400.7	400.7	1.80	1.5	1,114	1.0%
Na Auger	497.5	497.5	0.00	1.5	2,004	
O 1s	531.7	531.7	2.93	1.5	77,456	53.1%
O loss	551.2	551.2	0.00	1.5	21,656	
Cu LMM-2	570.8	570.8	0.68	1.5	61,366	
Cu Auger	630.4	630.4	0.00	1.5	1,158	
Cu Auger	650.9	650.9	0.00	1.5	19,647	
Cu Auger	720.3	720.3	0.00	1.5	20,983	
Cu Auger	759.4	759.4	0.00	1.5	779	
Cu 2p3	935.4	935.4	16.73	1.5	71,547	
Cu 2p1	954.9	954.9	8.66	1.5	37,821	21.0%
O KLL-1	977.4	977.4	0.70	1.5	15,765	
O Auger	998.0	998.0	0.00	1.5	2,179	

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Copper (II) Hydroxide (FW = 97.57)

Sample Description: Cu(OH)2 (Tech grade) from Aldrich Lot# 11715EW
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height

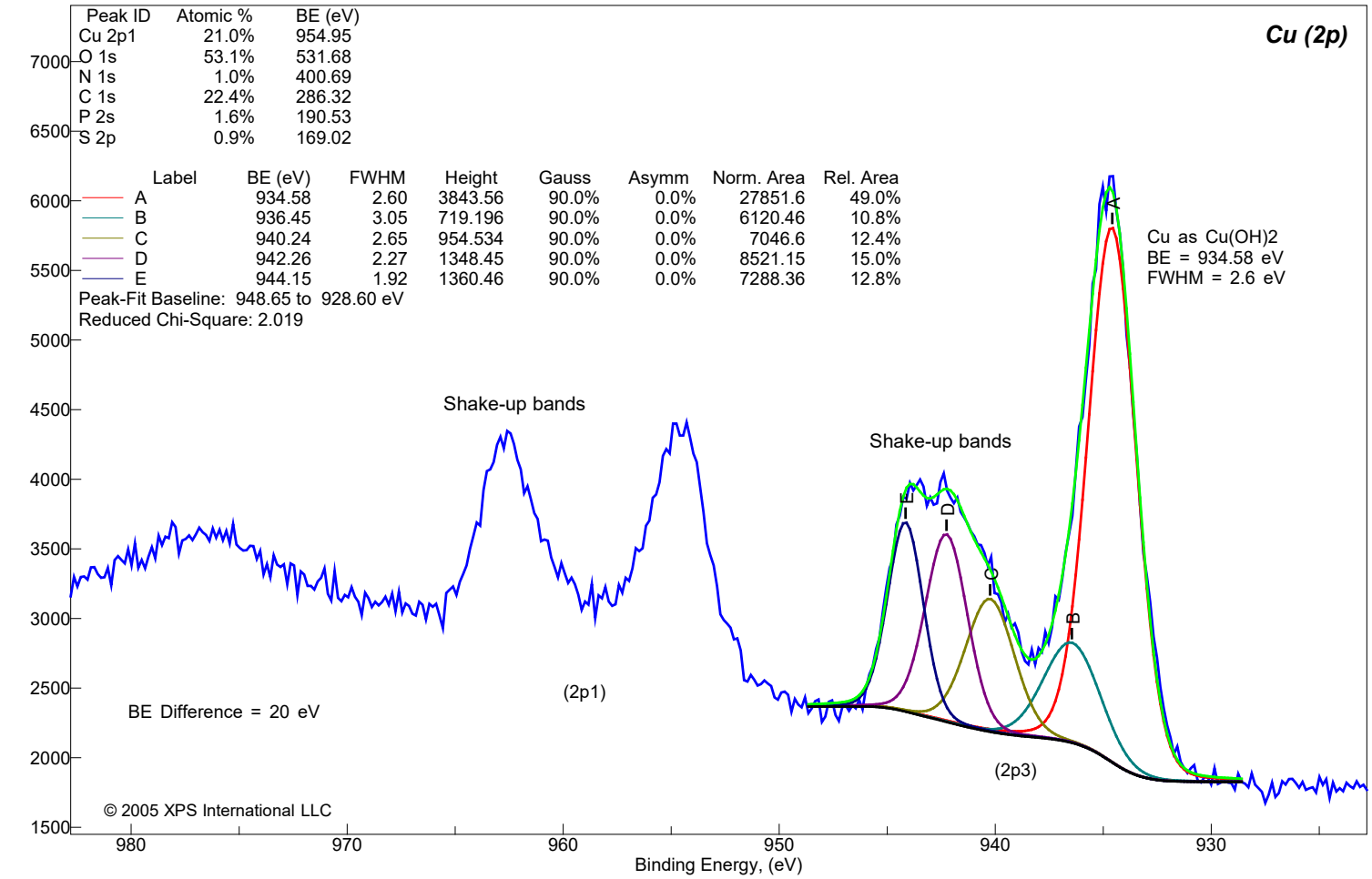


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$Cu(OH)_2$

Copper (II) Hydroxide (FW = 97.57)

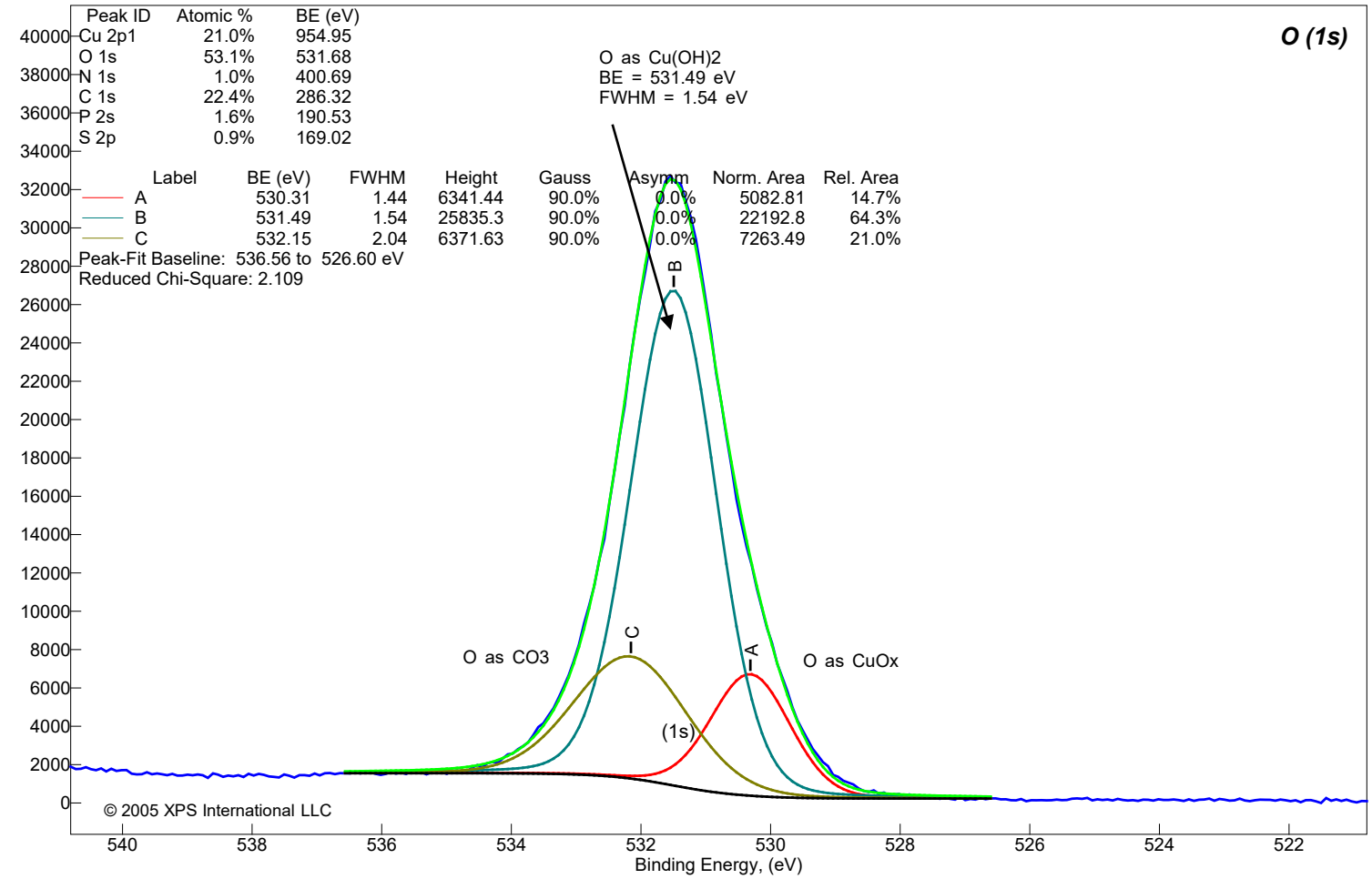
Sample Description: Cu(OH)2 (3 mm pellet, Tech grade) Aldr lot# 11715EW screen 90 TOA



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Copper (II) Hydroxide (FW = 97.57)

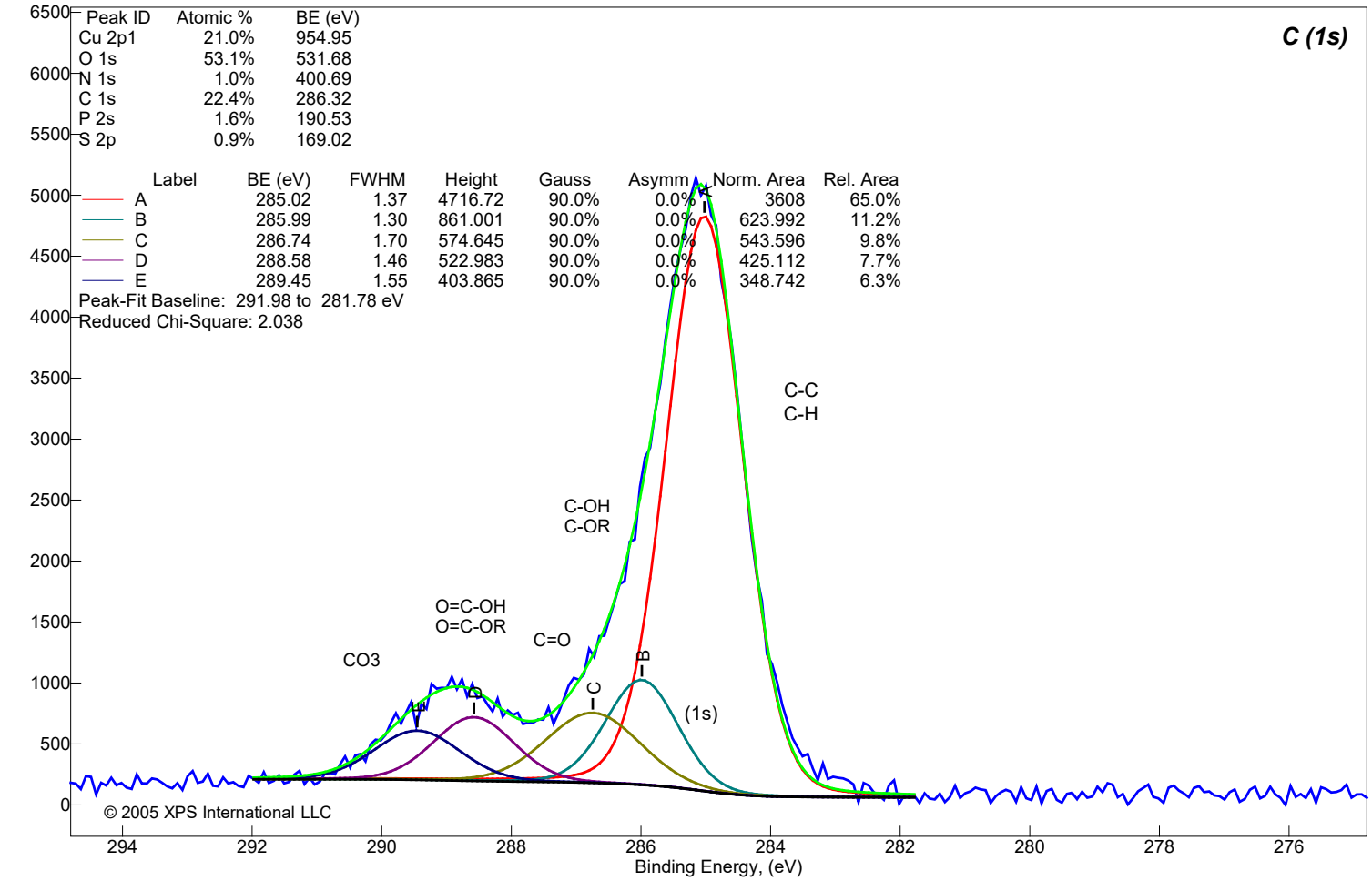
Sample Description: Cu(OH)2 (3 mm pellet, Tech grade) Aldr lot# 11715EW screen 90 TOA



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Copper (II) Hydroxide (FW = 97.57)

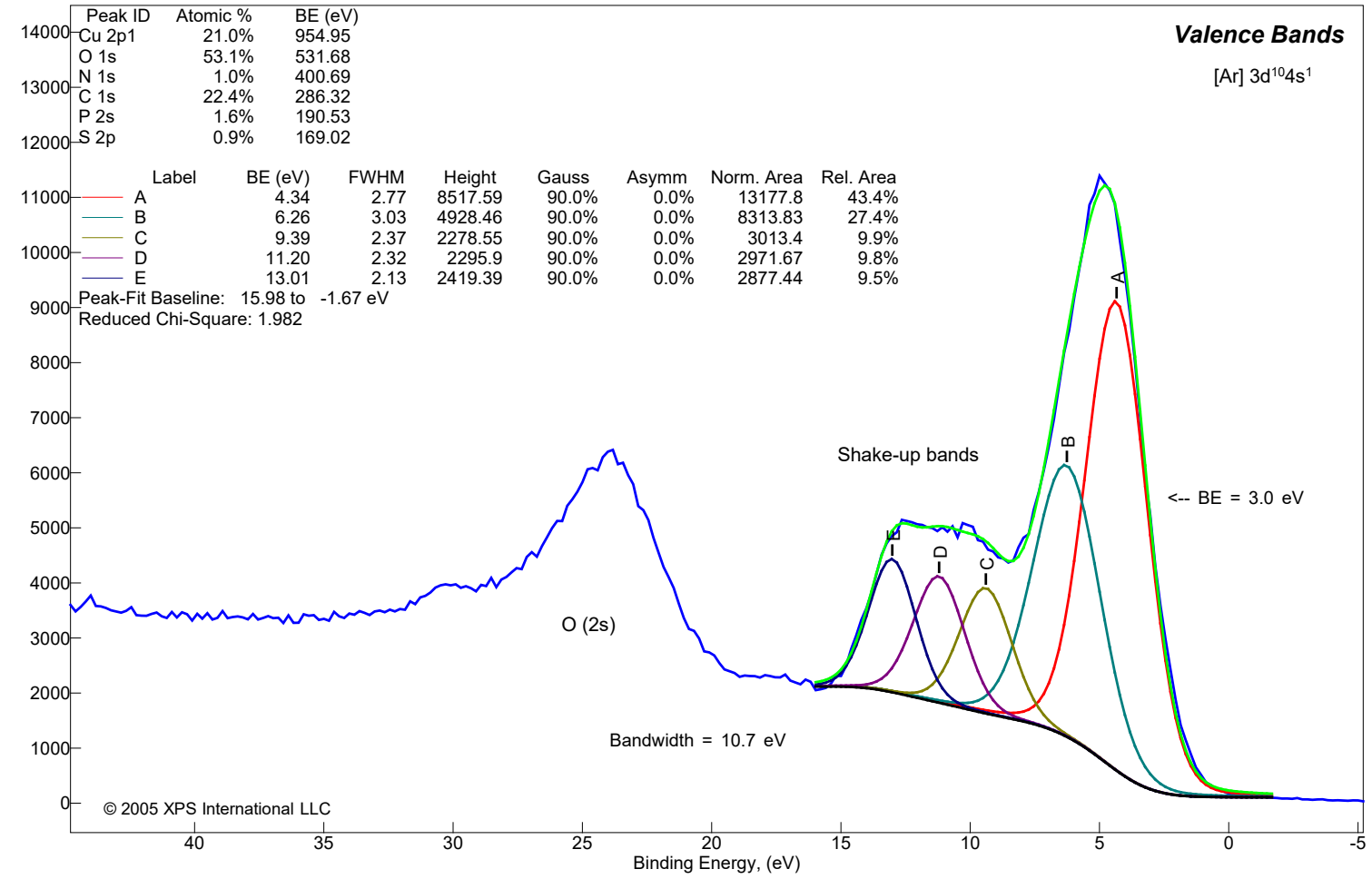
Sample Description: Cu(OH)2 (3 mm pellet, Tech grade) Aldr lot# 11715EW screen 90 TOA



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Copper (II) Hydroxide (FW = 97.57)

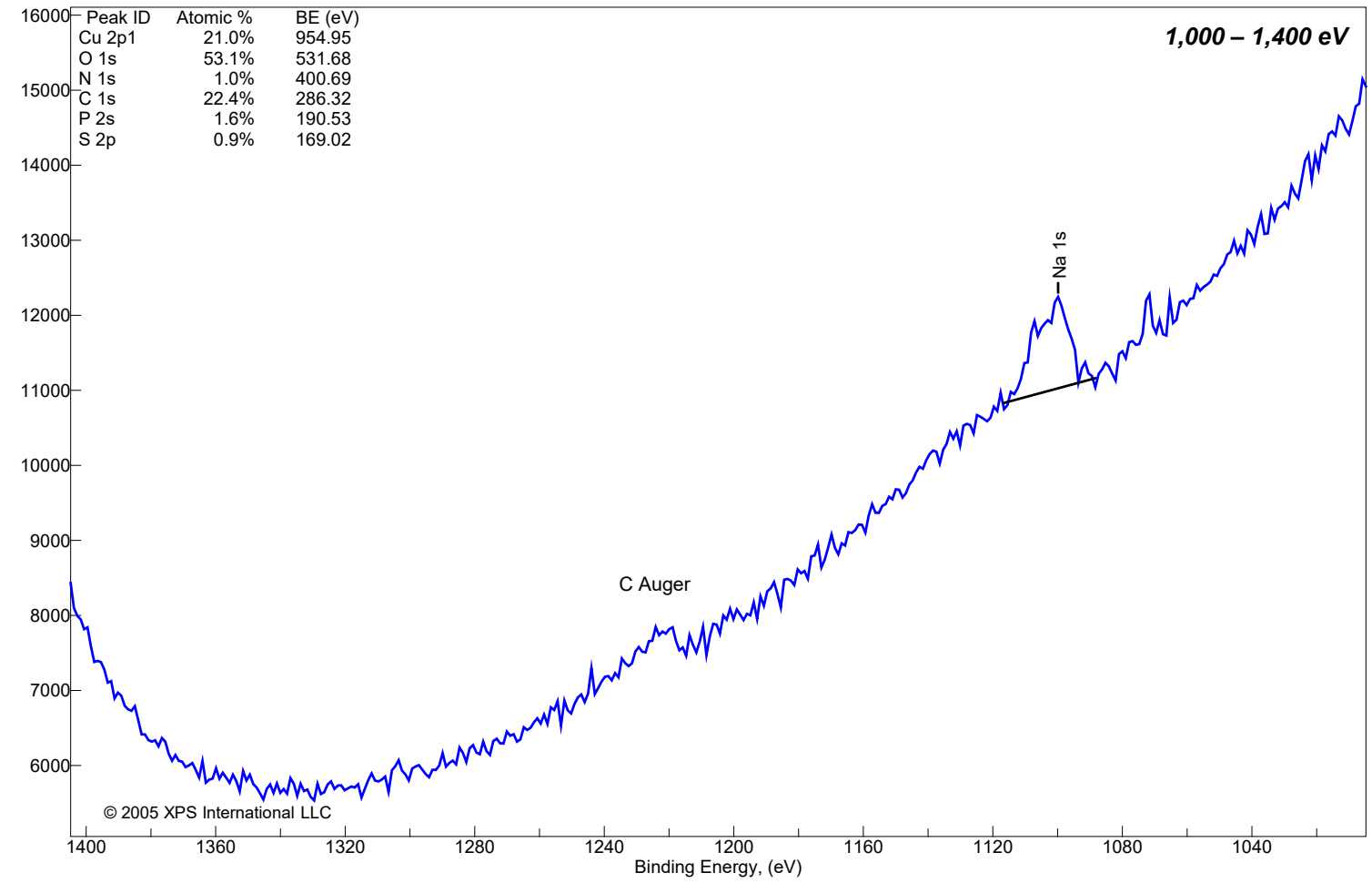
Sample Description: Cu(OH)2 (3 mm pellet, Tech grade) Aldr lot# 11715EW screen 90 TOA



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Copper (II) Hydroxide (FW = 97.57)

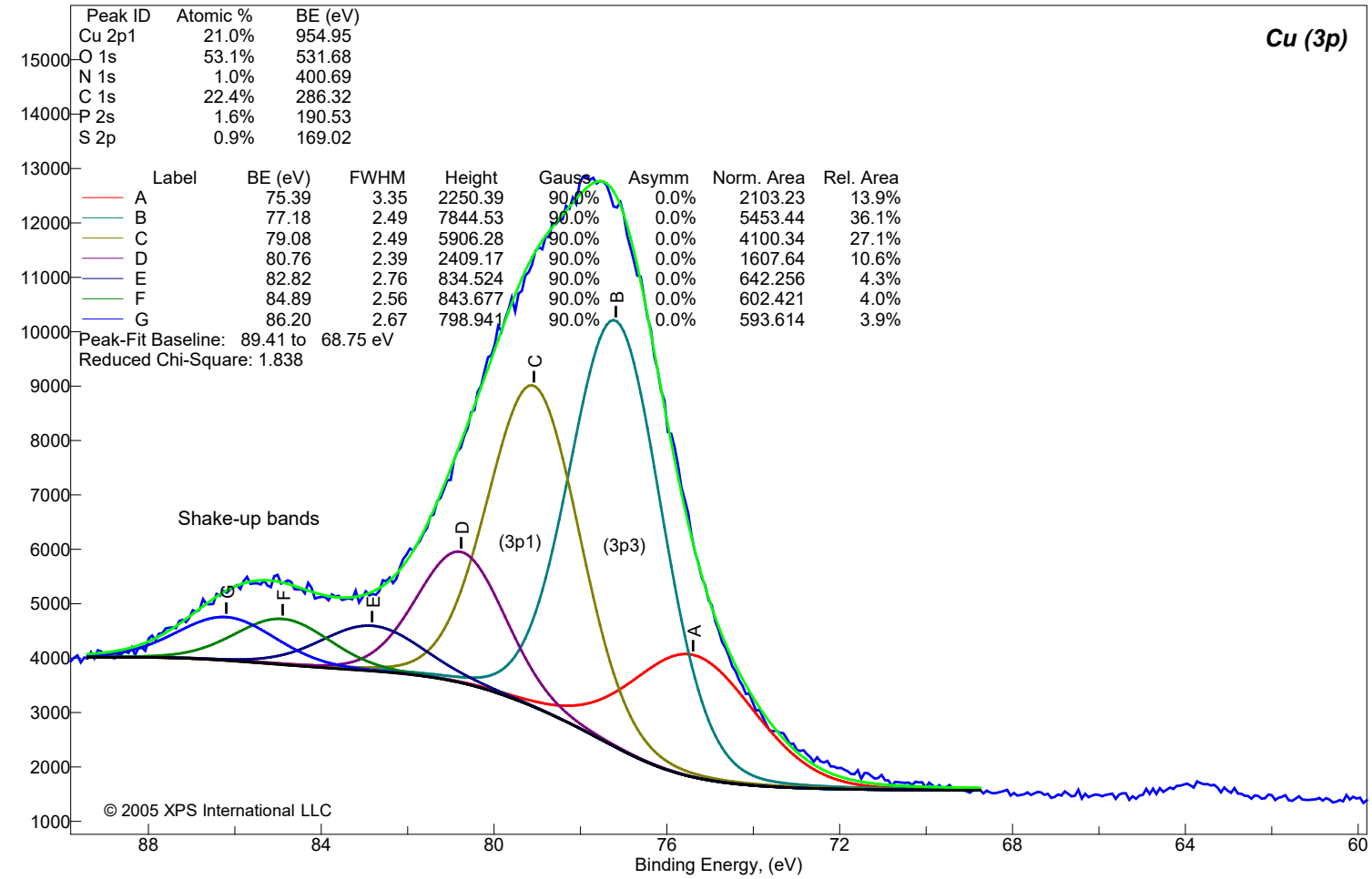
Sample Description: Cu(OH)2 (3 mm pellet, Tech grade) Aldr lot# 11715EW screen 90 TOA



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Copper (II) Hydroxide (FW = 97.57)

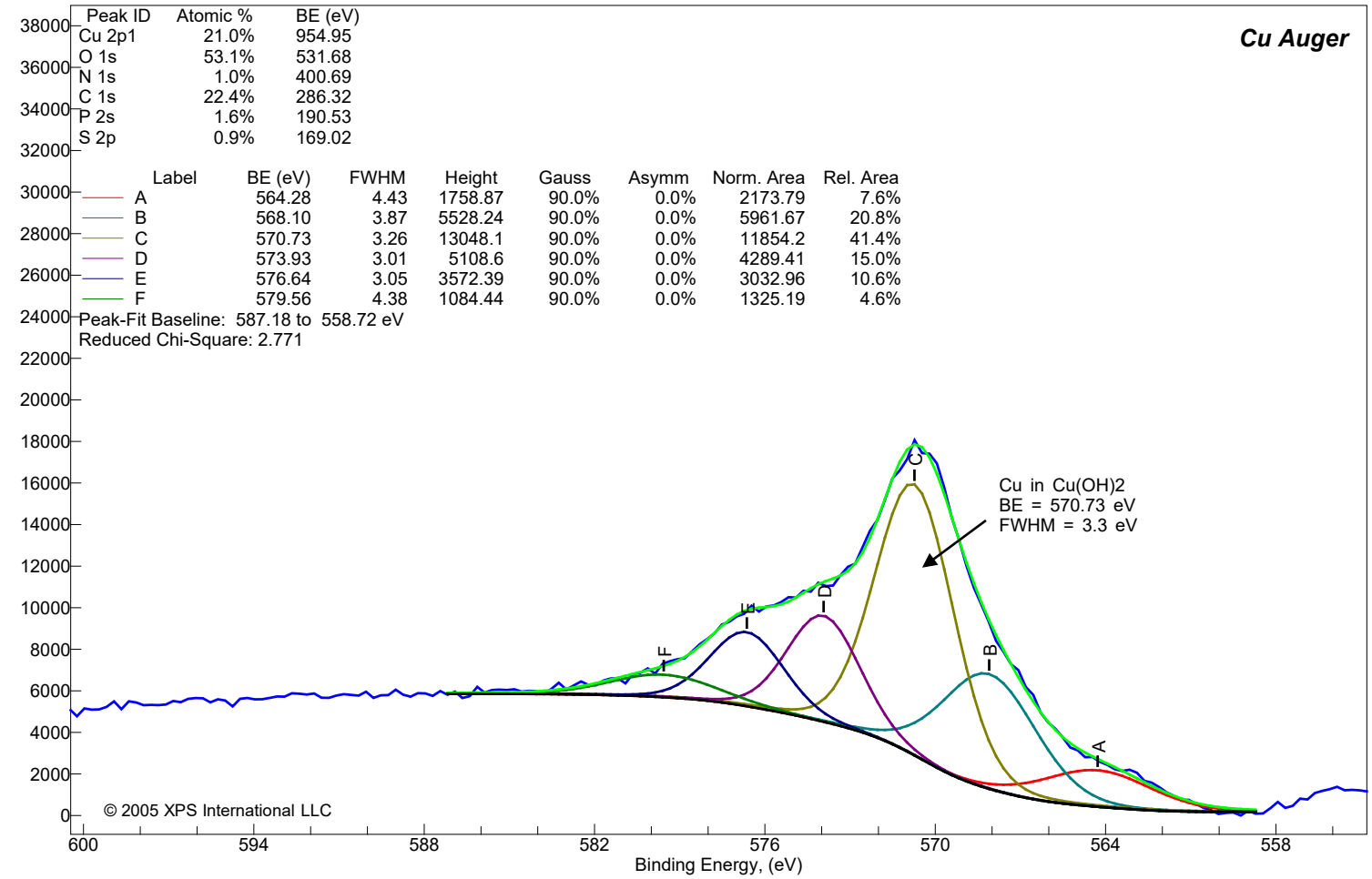
Sample Description: Cu(OH)2 (3 mm pellet, Tech grade) Aldr lot# 11715EW screen 90 TOA



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Copper (II) Hydroxide (FW = 97.57)

Sample Description: Cu(OH)2 (3 mm pellet, Tech grade) Aldr lot# 11715EW screen 90 TOA



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$CuCO_3$
Azurite

Copper (II) Carbonate (FW = 123.56)
Surface Composition Table

Description: $CuCO_3$ (99+%) from Azurite (natural crystal), analyzed at 90 deg TOA, mesh at 1mm, non-conductive blue crystal, cleaved in air just before analysis, Azurite is mixture of $CuCO_3$ and $Cu(OH)_2$

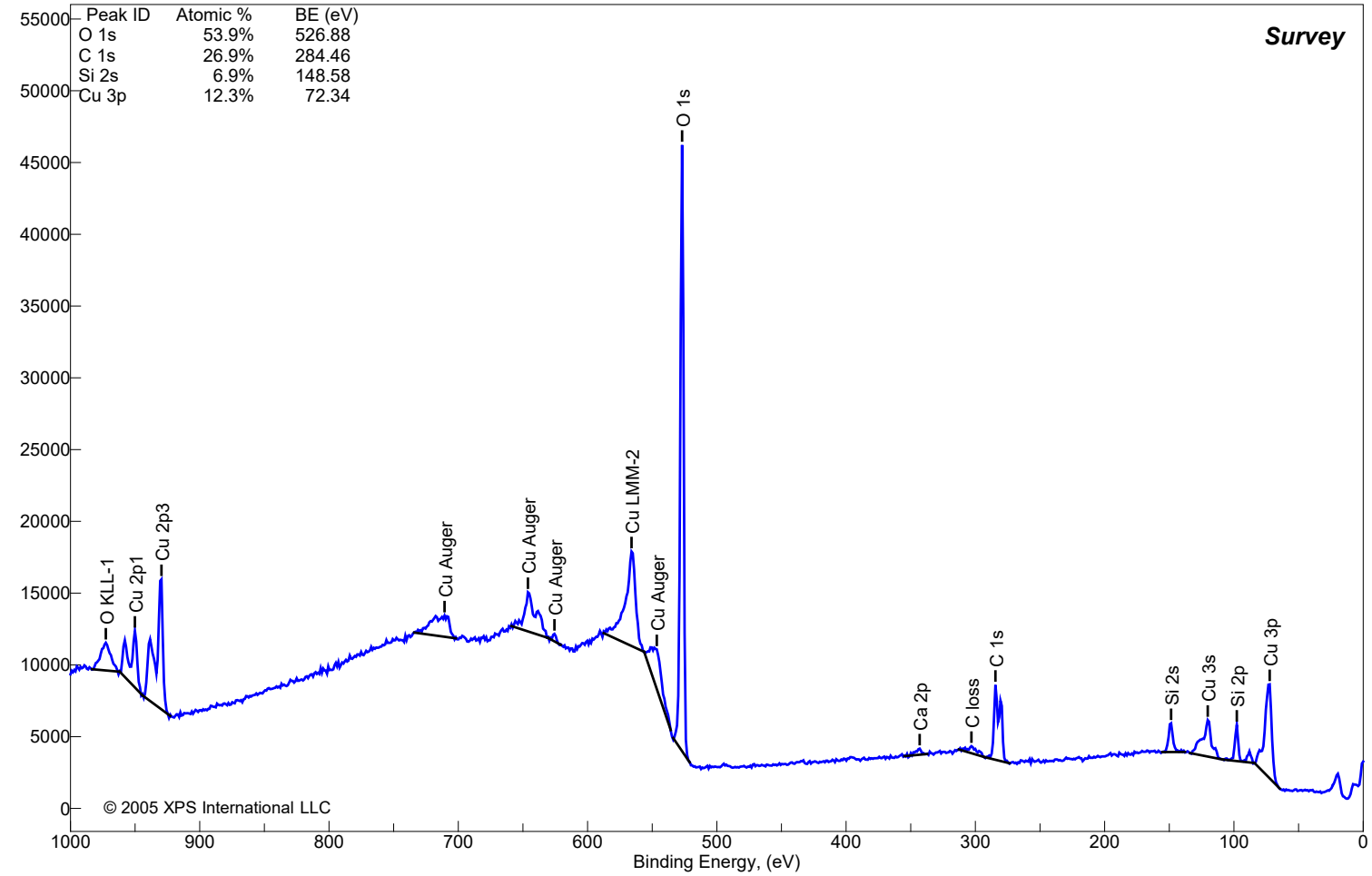
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
C 2s	23.8	21.0	0.15	0.6	3,488	
Cu 3p	77.6	74.8	2.48	0.6	17,274	
Cu loss	93.2	90.4	0.00	0.6	1,946	
Cu 3s	125.5	122.7	0.96	0.6	7,219	
C 1s	285.8	283.0	1.00	0.6	14,194	37.8%
Na Auger	497.9	495.1	5.00	0.6	1,841	1.1%
O 1s	532.1	529.3	2.93	0.6	45,788	47.7%
Cu Auger	550.7	547.9	0.00	0.6	11,279	
Cu LMM-2	570.3	567.5	0.68	0.6	28,938	
Cu Auger	650.4	647.6	0.00	0.6	14,323	
Cu Auger	714.9	712.1	0.00	0.6	9,789	
Cu 2p3	935.9	933.1	16.73	0.6	52,711	13.4%
Cu 2p1	955.4	952.6	8.66	0.6	27,527	
O KLL-1	977.9	975.1	0.70	0.6	10,381	

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$CuCO_3$
Azurite

Copper (II) Carbonate (FW = 123.56)

Sample Description: CuCO3:Cu(OH)2 (Azurite) Arizona, USA bulk 90 TOA, mesh
Counts

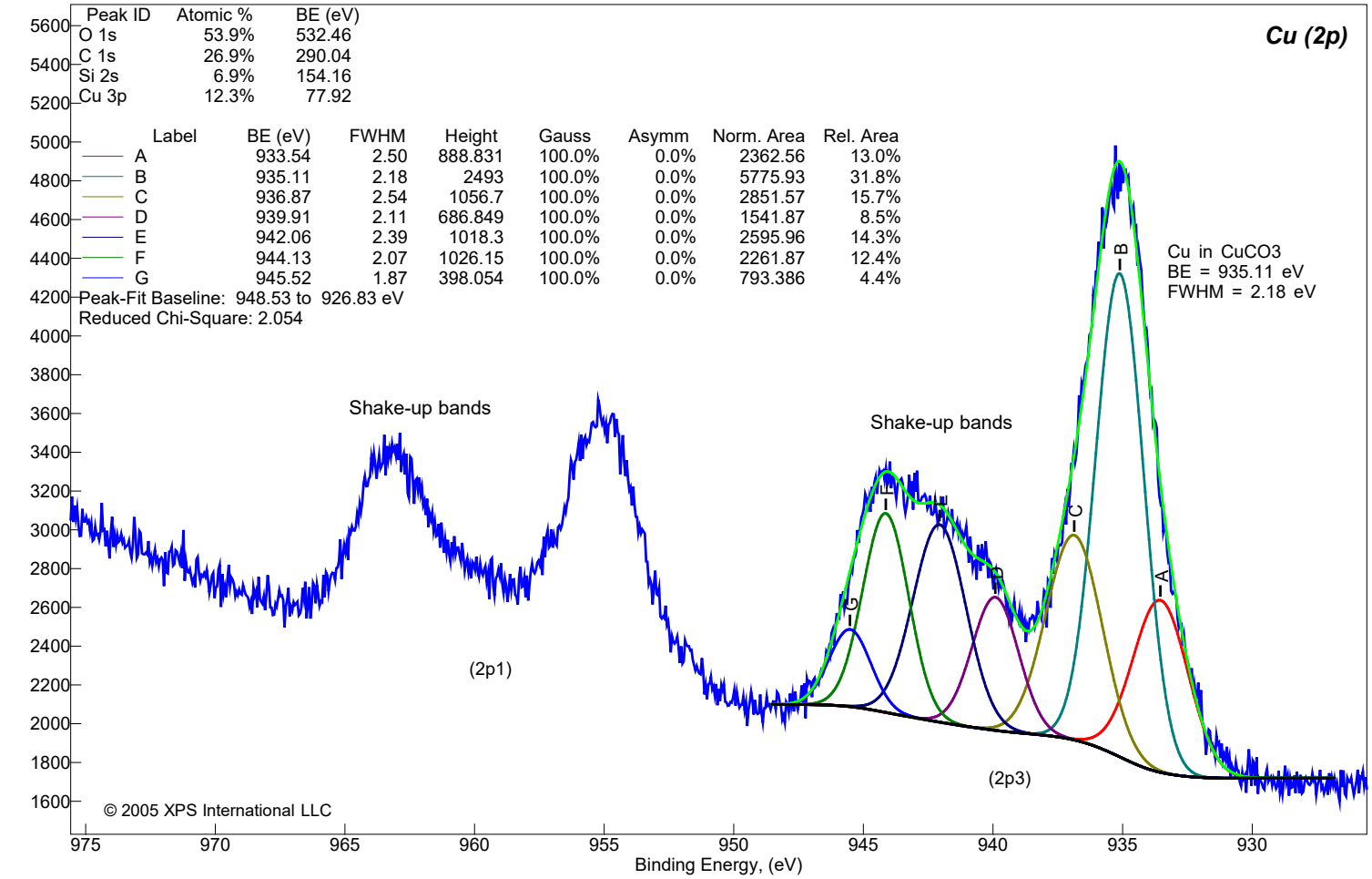


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$CuCO_3$
Azurite

Copper (II) Carbonate (FW = 123.56)

Sample Description: CuCO3:Cu(OH)2 (Azurite) Arizona, USA bulk 90 TOA, mesh
Counts

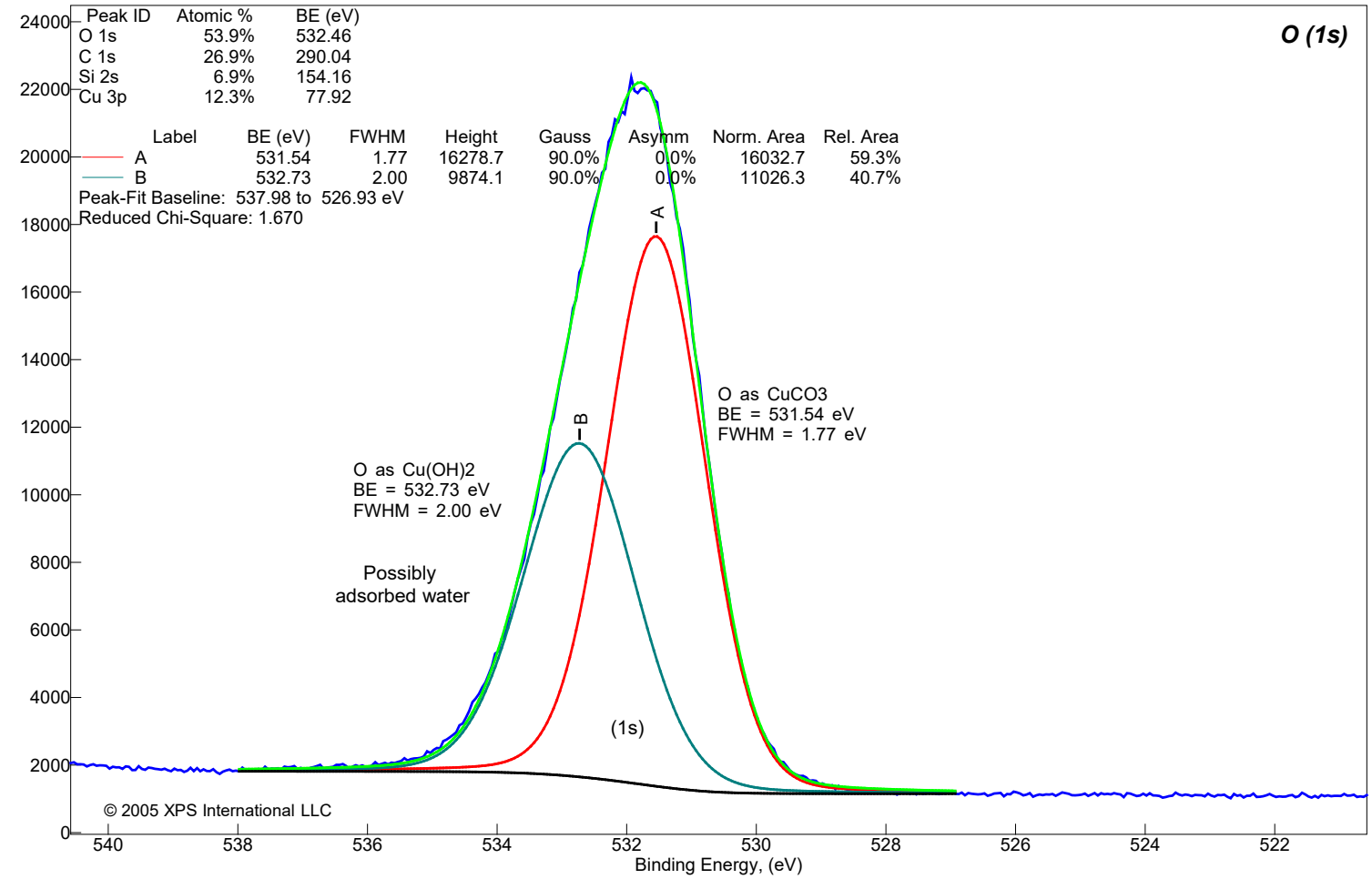


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$CuCO_3$
Azurite

Copper (II) Carbonate (FW = 123.56)

Sample Description: CuCO3:Cu(OH)2 (Azurite) Arizona, USA bulk 90 TOA, mesh

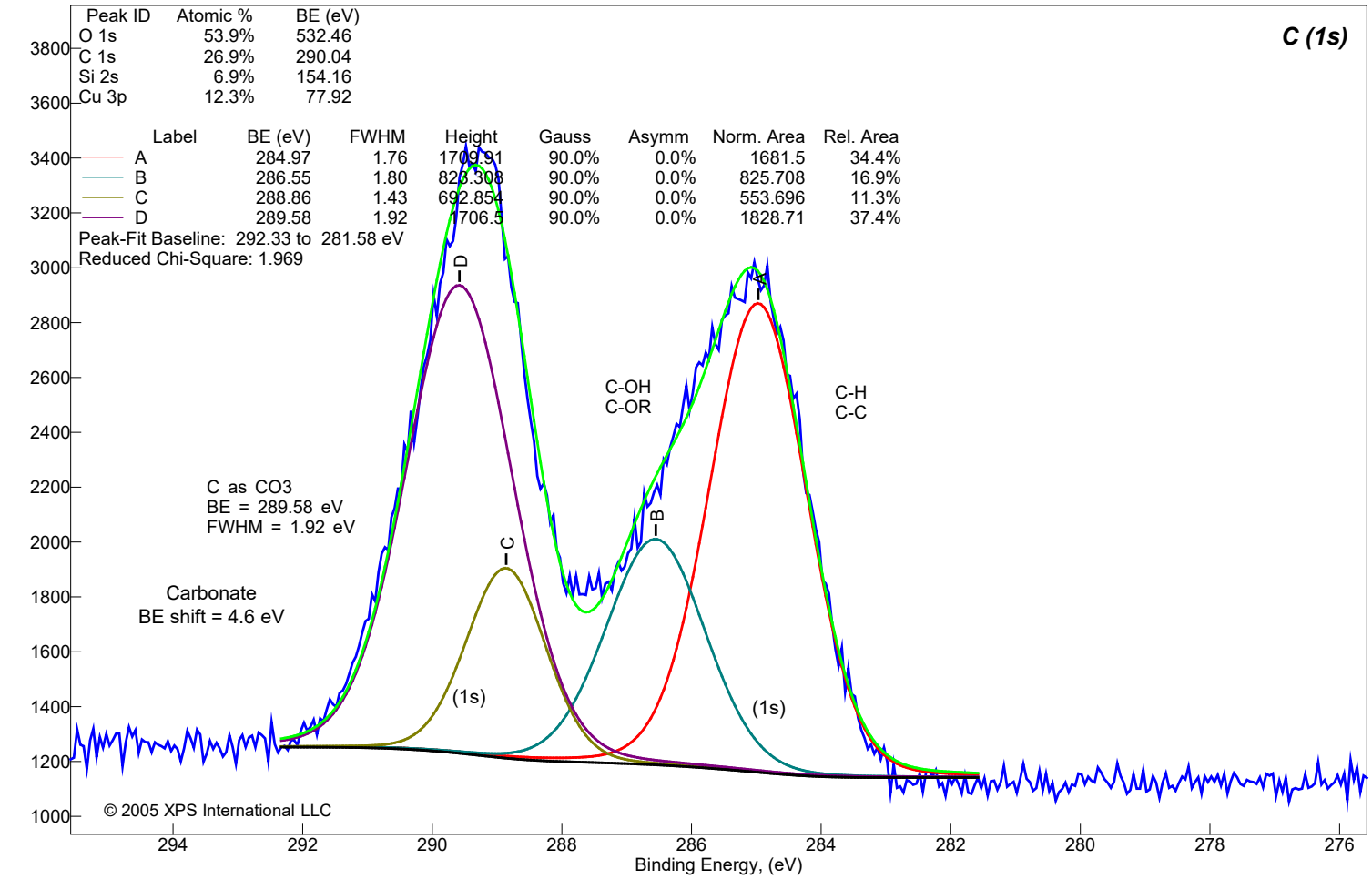


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$CuCO_3$
Azurite

Copper (II) Carbonate (FW = 123.56)

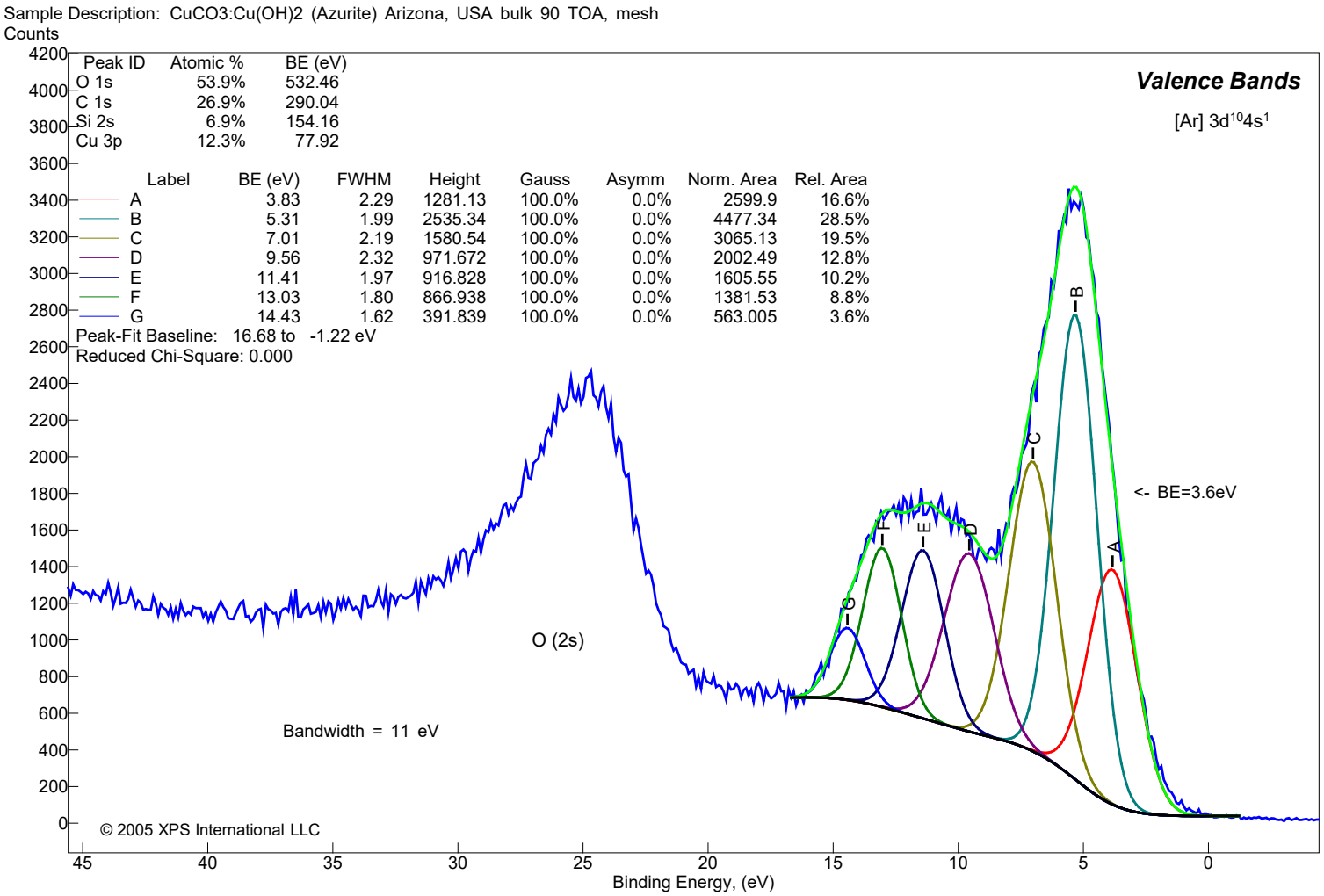
Sample Description: CuCO3:Cu(OH)2 (Azurite) Arizona, USA bulk 90 TOA, mesh



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$CuCO_3$
Azurite

Copper (II) Carbonate (FW = 123.56)

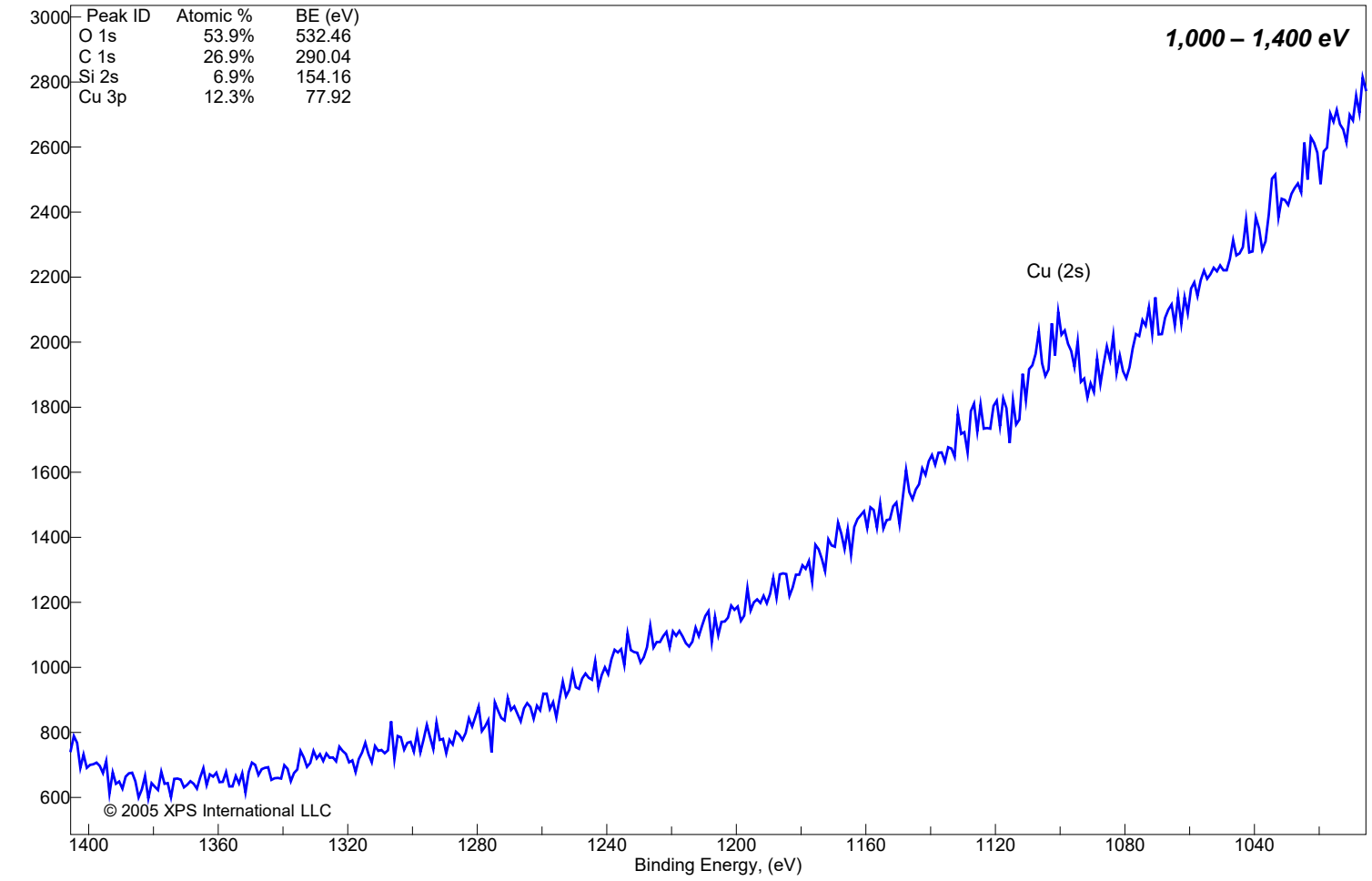


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$CuCO_3$
Azurite

Copper (II) Carbonate (FW = 123.56)

Sample Description: CuCO3:Cu(OH)2 (Azurite) Arizona, USA bulk 90 TOA, mesh



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Dy_2O_3

Dysprosium (III) Oxide (FW = 373.00)
Surface Composition Table

Description: Dy_2O_3 (99.99%) from Aldrich Co. Lot# 02803KV, analyzed at 35 deg TOA, mesh at 1mm, non-conductive white powder pressed into 5 mm pellet, mp 2340 C, d 7.81, sol in acids and alcohol, very hygroscopic

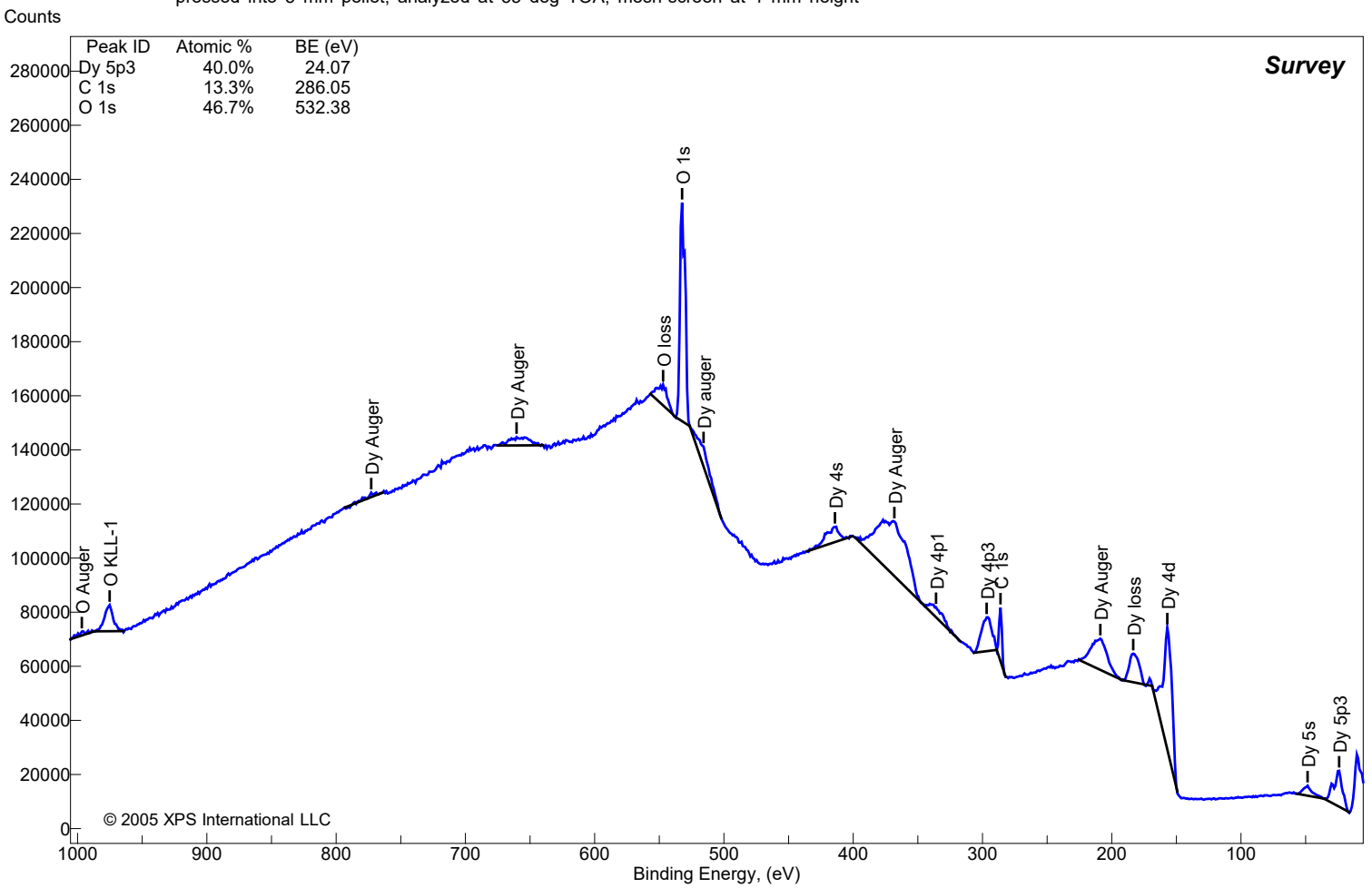
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Dy 4f	9.7	4.9	2.49	1.4	46,208	
Dy 5p3	24.1	19.3	0.54	1.4	26,803	40.0%
Dy 5s	48.5	43.7	0.29	1.4	7,541	
Dy 4d	157.0	152.2	11.43	1.4	90,724	
Dy loss	183.4	178.6	0.00	1.4	25,309	
Dy Auger	208.8	204.0	0.00	1.4	40,753	
C 1s	286.0	281.2	1.00	1.4	12,529	13.3%
Dy 4p3	296.8	292.0	4.12	1.4	29,698	
Dy 4p1	335.9	331.1	1.88	1.4	12,208	
Dy Auger	368.2	363.4	0.00	1.4	133,990	
Dy 4s	414.1	409.3	1.58	1.4	16,714	
Dy Auger	515.8	511.0	0.00	1.4	20,447	
O 1s	532.4	527.6	2.93	1.4	93,505	46.7%
O loss	547.0	542.2	0.00	1.4	17,170	
Dy Auger	660.4	655.6	0.00	1.4	13,838	
Dy Auger	772.9	768.1	0.00	1.4	2,232	
O KLL-1	975.2	970.4	0.70	1.4	20,244	
O Auger	996.7	991.9	0.00	1.4	3,214	
Dy 3d5	1295.9	1291.1	0.00	1.2	7,103	

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Dy_2O_3

Dysprosium (III) Oxide (FW = 373.00)

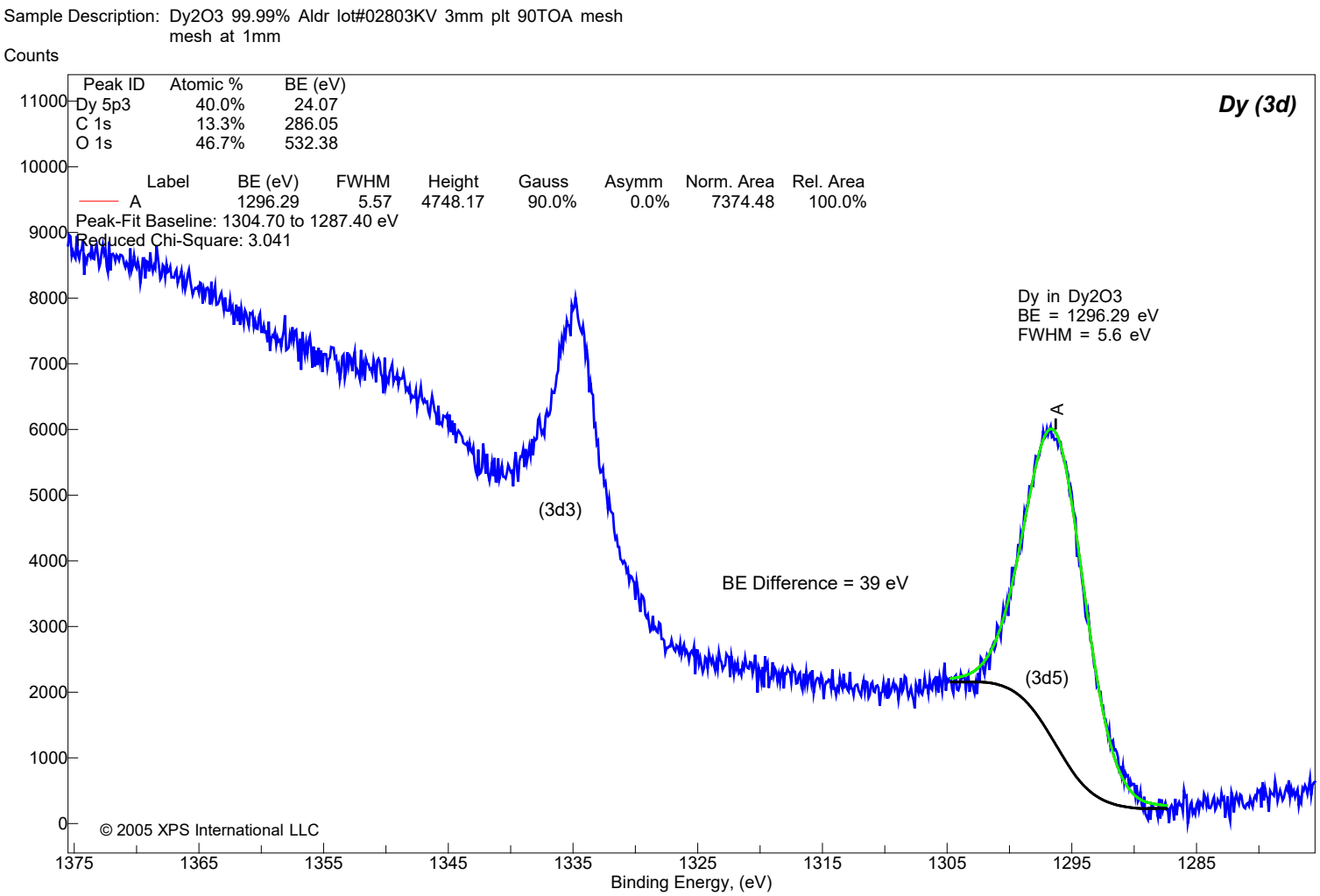
Sample Description: Dy2O3 (99.99%) from Aldrich Lot# 02803KV
pressed into 5 mm pellet, analyzed at 35 deg TOA, mesh-screen at 1 mm height



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Dy_2O_3

Dysprosium (III) Oxide (FW = 373.00)

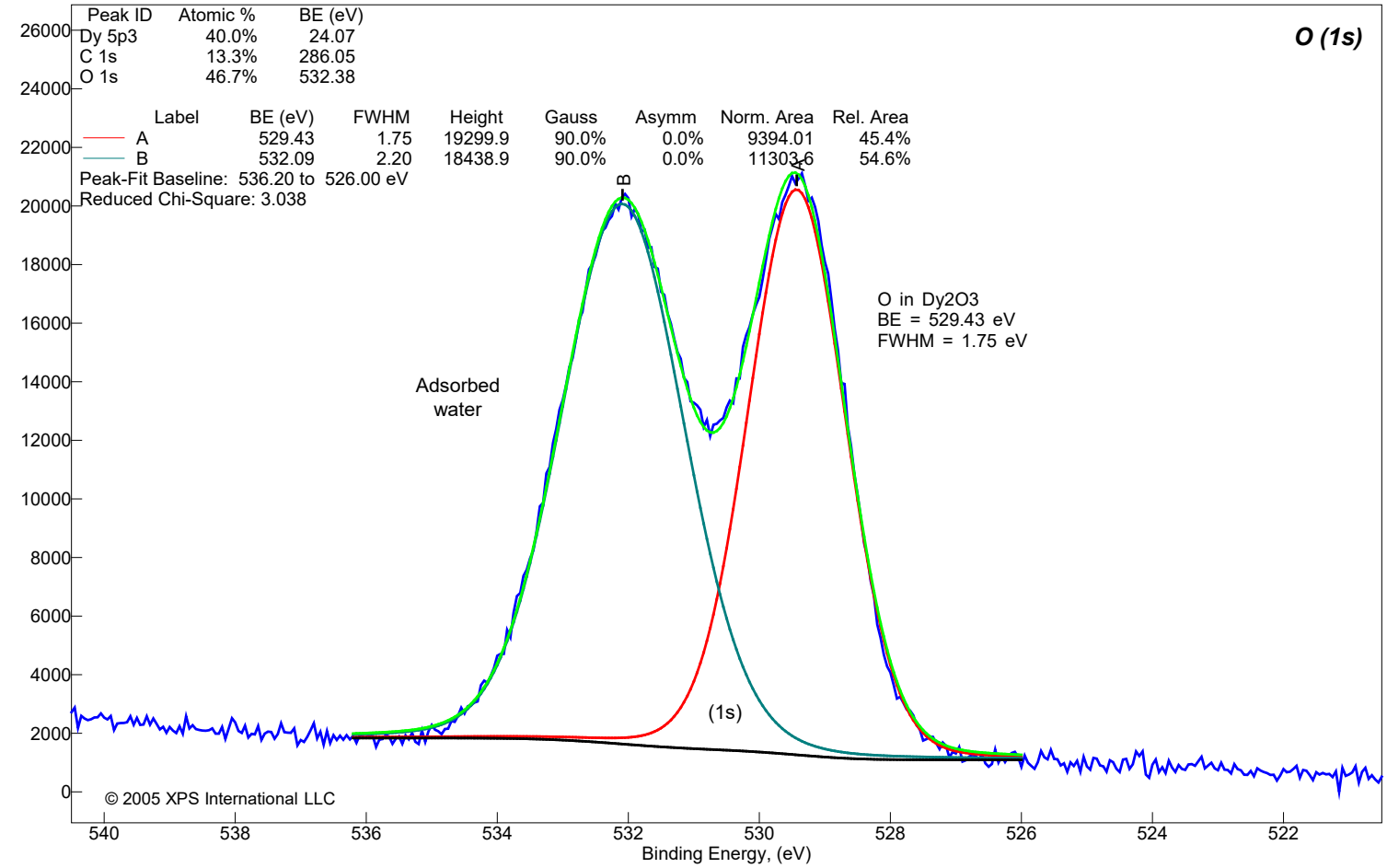


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Dy_2O_3

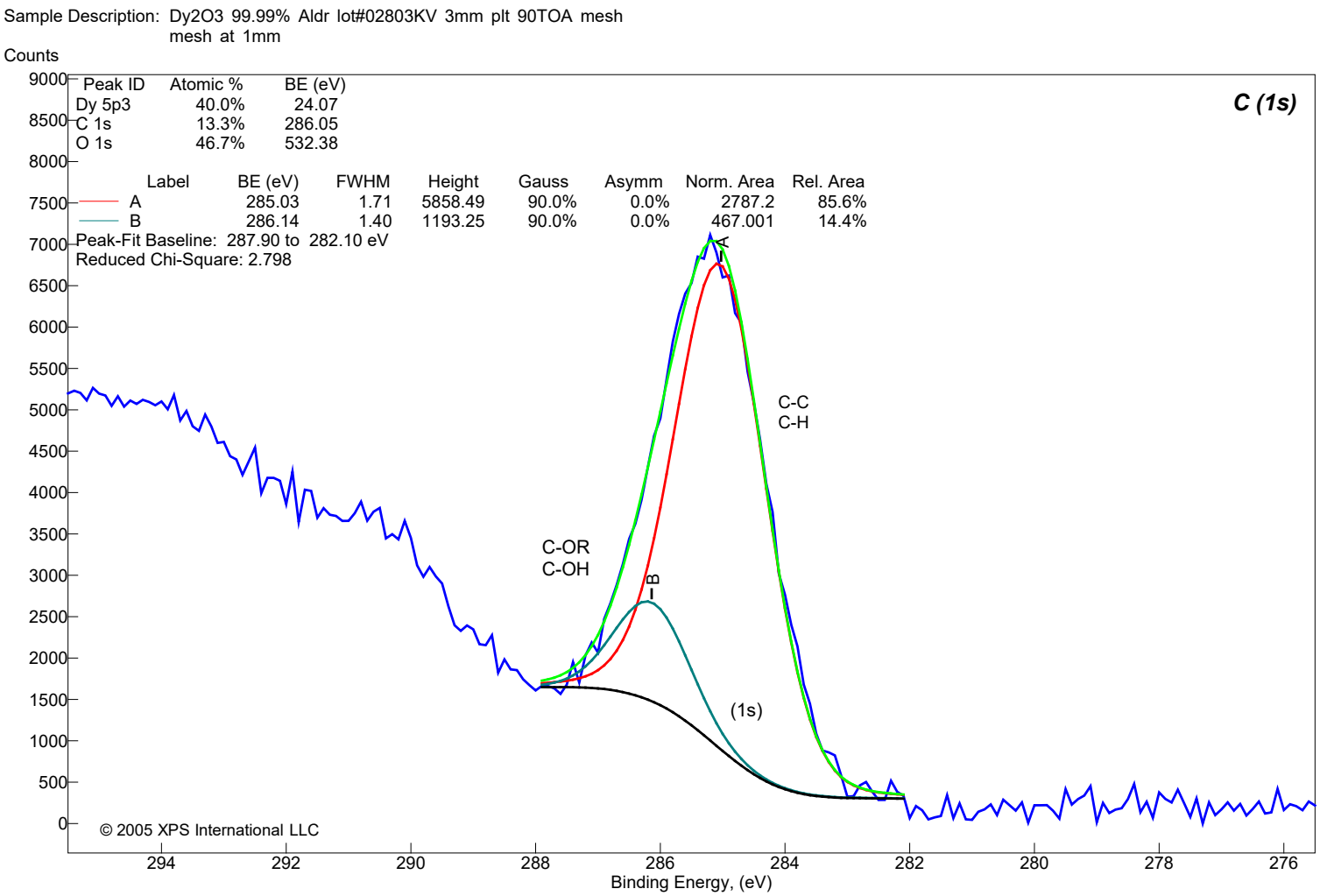
Dysprosium (III) Oxide (FW = 373.00)

Sample Description: Dy2O3 99.99% Aldr lot#02803KV 3mm plt 90TOA mesh
mesh at 1mm



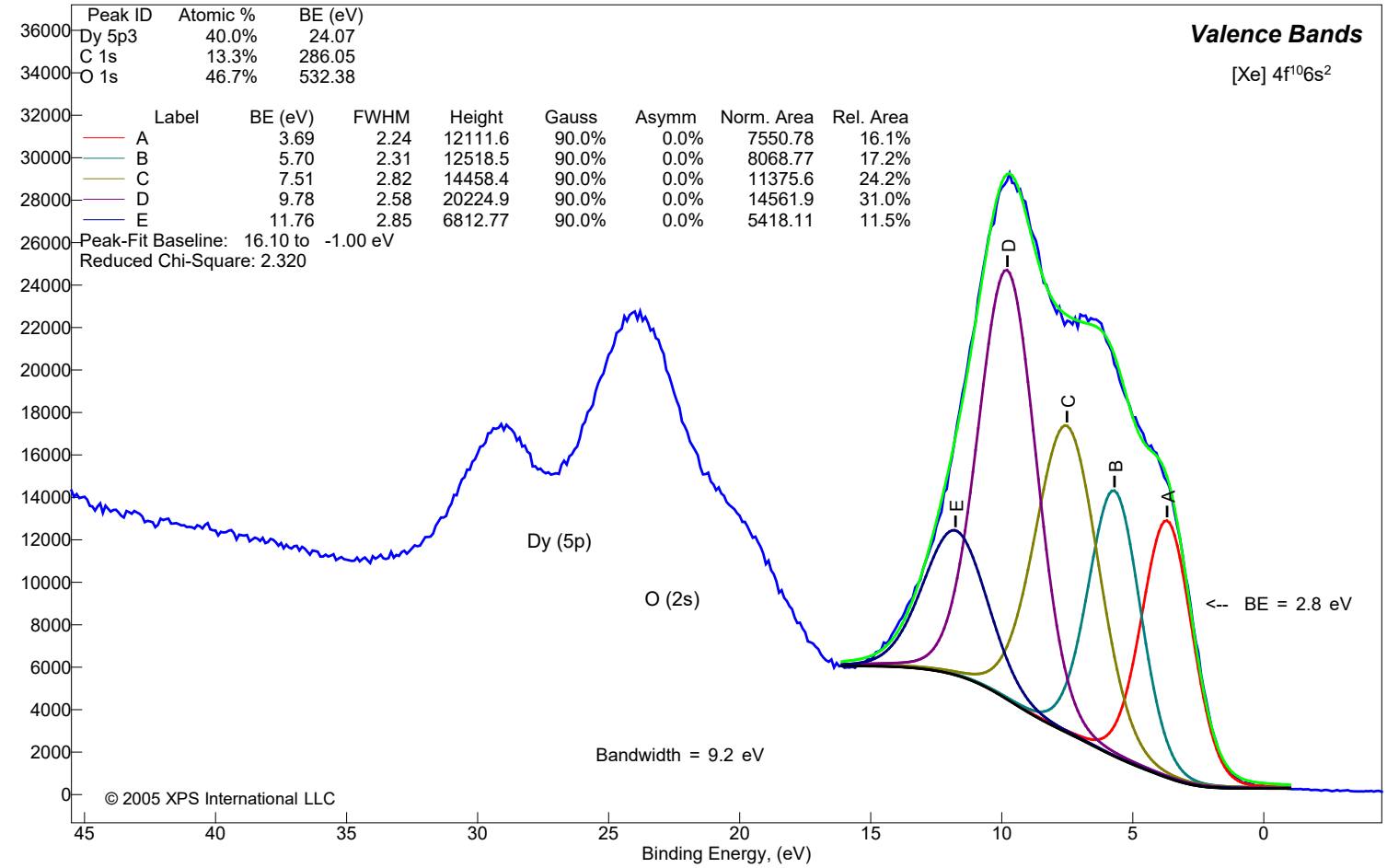
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Dysprosium (III) Oxide (FW = 373.00)



Dysprosium (III) Oxide (FW = 373.00)

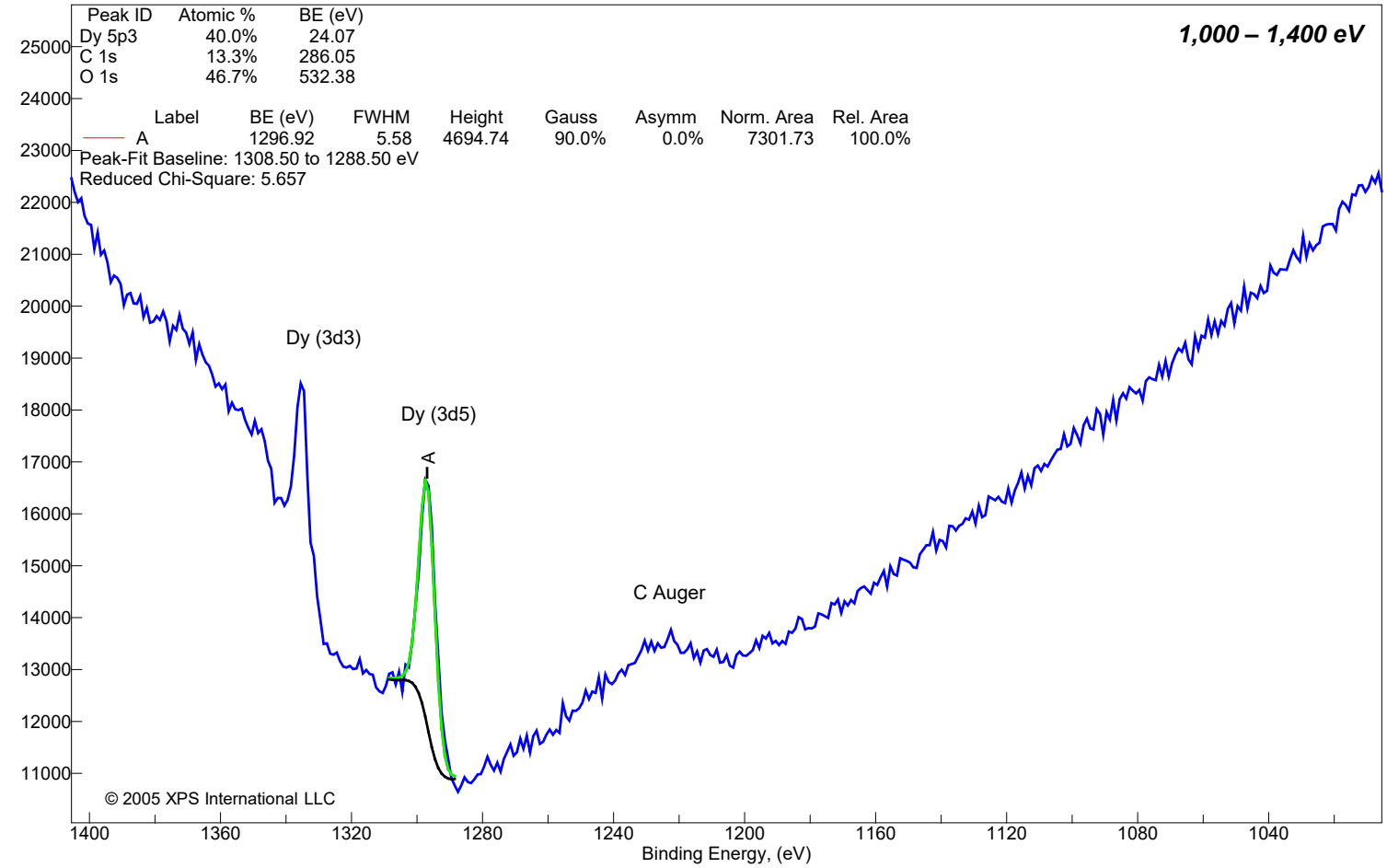
Sample Description: Dy2O3 99.99% Aldr lot#02803KV 3mm plt 90TOA mesh
mesh at 1mm



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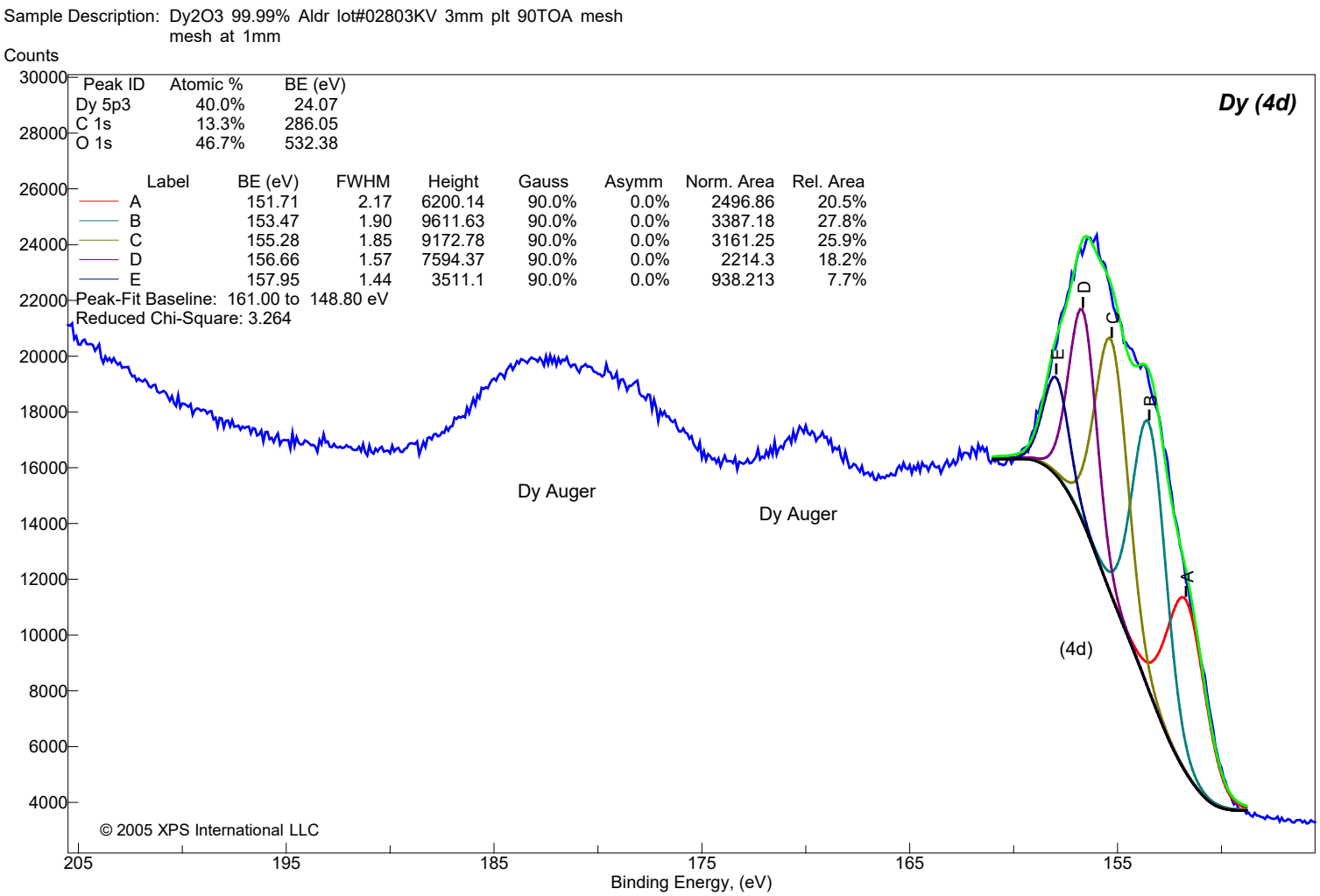
Dysprosium (III) Oxide (FW = 373.00)

Sample Description: Dy2O3 99.99% Aldr lot#02803KV 3mm plt 90TOA mesh mesh at 1mm



Dy_2O_3

Dysprosium (III) Oxide (FW = 373.00)



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Er_2O_3

Erbium (III) Oxide (FW = 382.52)
Surface Composition Table

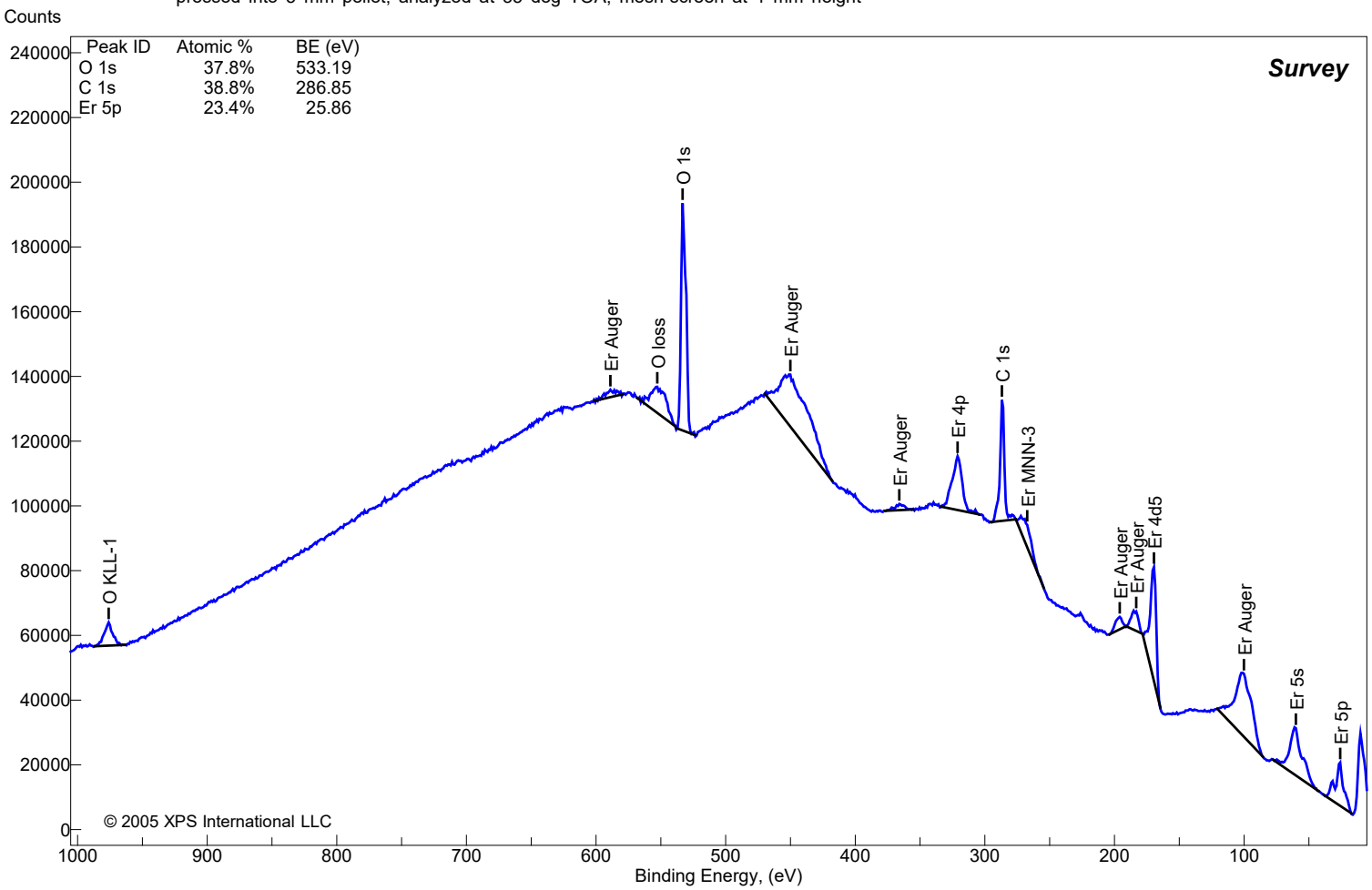
Description: Er_2O_3 (99.99%) from Aldrich Co. Lot# 02413KV, analyzed at 35 deg TOA, mesh at 1mm, non-conductive white powder pressed into 5 mm pellet, mp 2400 C, d 8.64, sol in acids, very hygroscopic

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2p	9.5	9.5	0.02	1.4	43,725	
Er 5p	25.9	25.9	0.85	1.4	25,584	23.4%
Er 5s	60.1	60.1	0.30	1.4	40,212	
Er Auger	100.1	100.1	0.00	1.4	74,396	
Er 4d5	169.6	169.6	7.41	1.4	48,054	
Er Auger	183.2	183.2	0.00	1.4	9,989	
Er Auger	195.9	195.9	0.00	1.4	6,565	
Er MNN-3	267.3	267.3	0.80	1.4	16,998	
C 1s	286.9	286.9	1.00	1.4	37,974	38.8%
Er 4p	321.1	321.1	0.00	1.4	38,129	
Er Auger	366.0	366.0	0.00	1.4	3,674	
Er Auger	450.1	450.1	0.00	1.4	106,251	
O 1s	533.2	533.2	2.93	1.4	78,639	37.8%
O loss	552.7	552.7	0.00	1.4	27,847	
Er Auger	588.9	588.9	0.00	1.4	3,629	
O KLL-1	976.0	976.0	0.70	1.4	13,358	

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Erbium (III) Oxide (FW = 382.52)

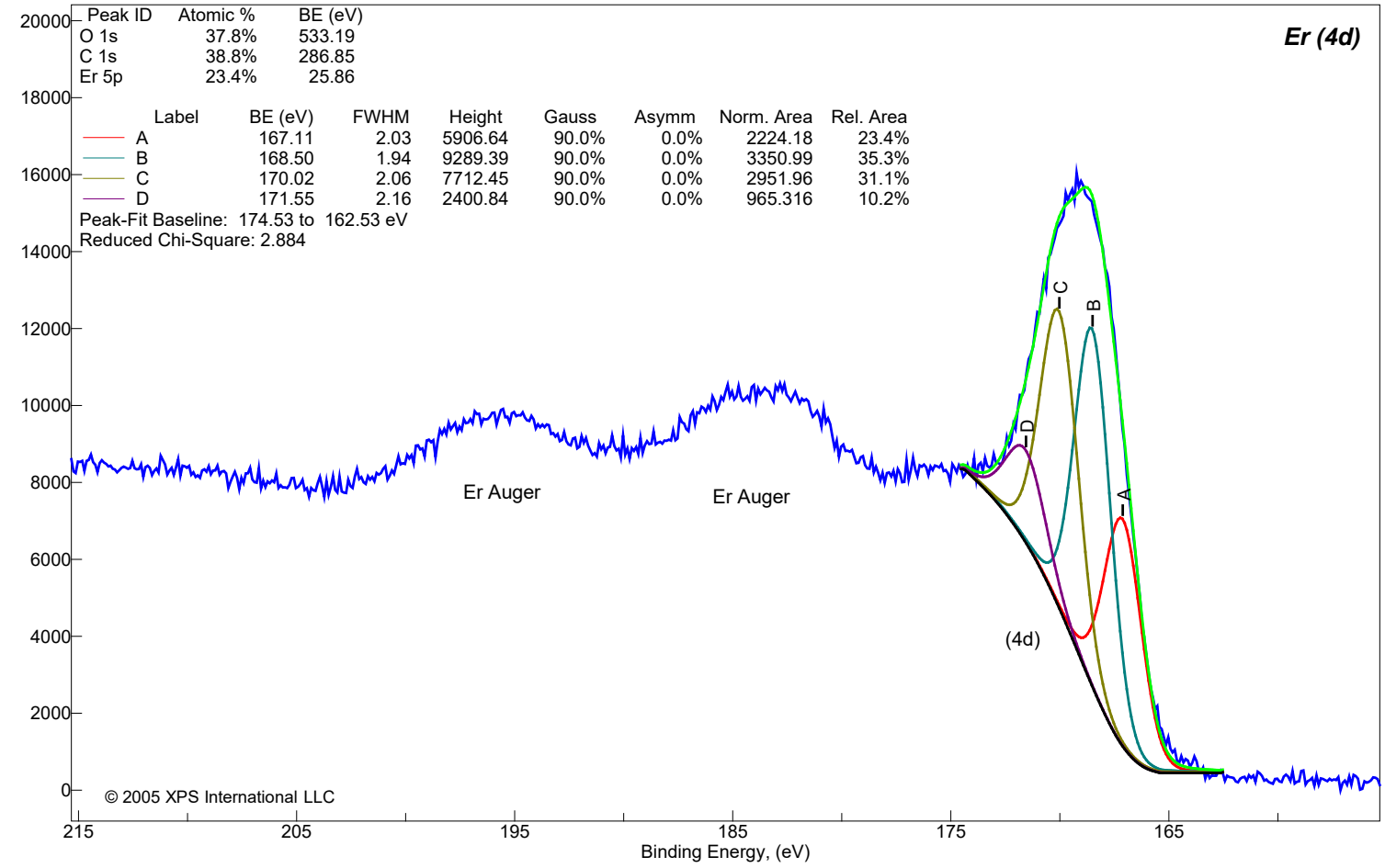
Sample Description: Er2O3 (99.99%) from Aldrich lot# 02413KV
pressed into 5 mm pellet, analyzed at 35 deg TOA, mesh-screen at 1 mm height



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Erbium (III) Oxide (FW = 382.52)

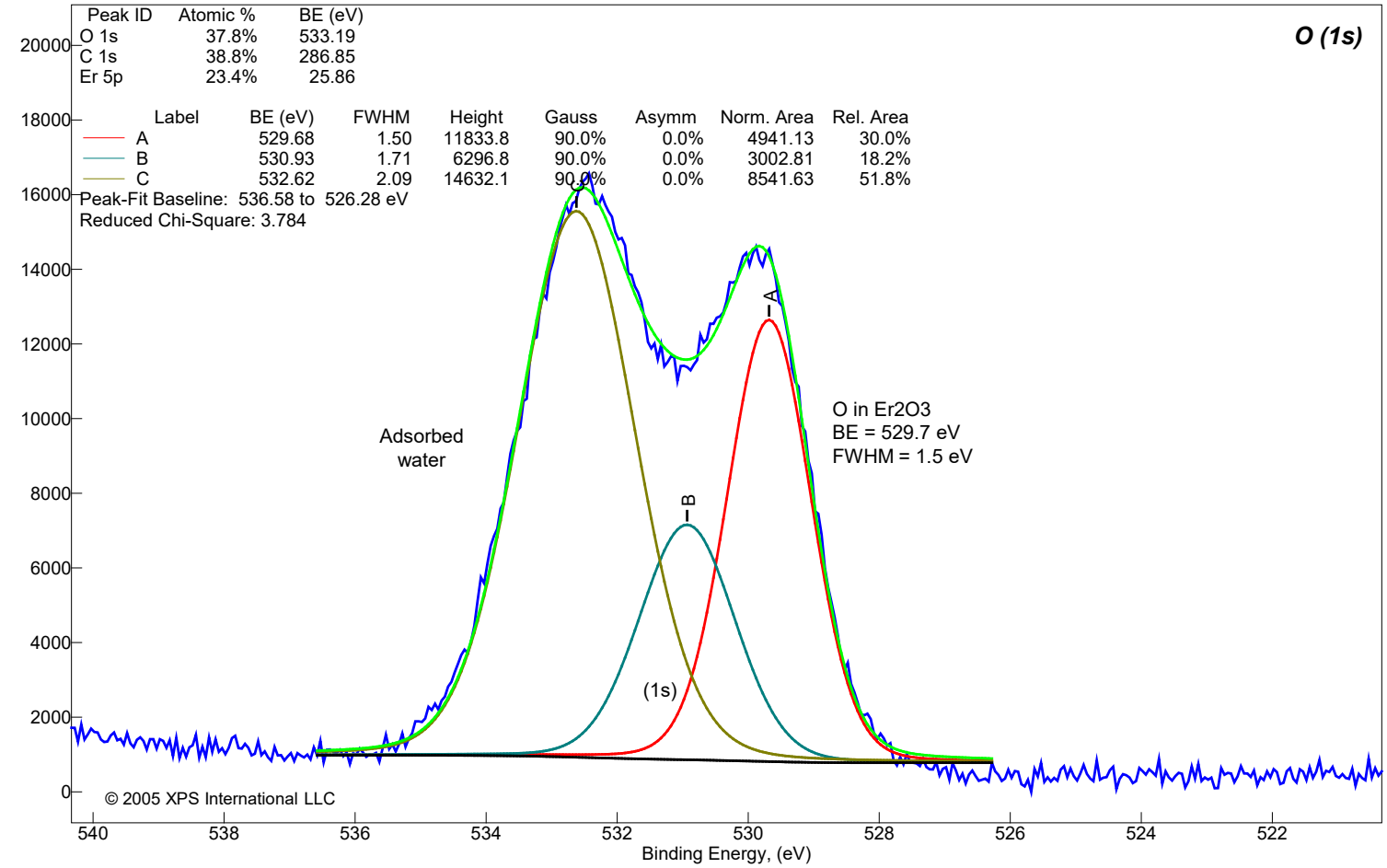
Sample Description: Er2O3 99.99% Aldr lot#02413KV 3mm plt 90TOA mesh mesh at 1mm



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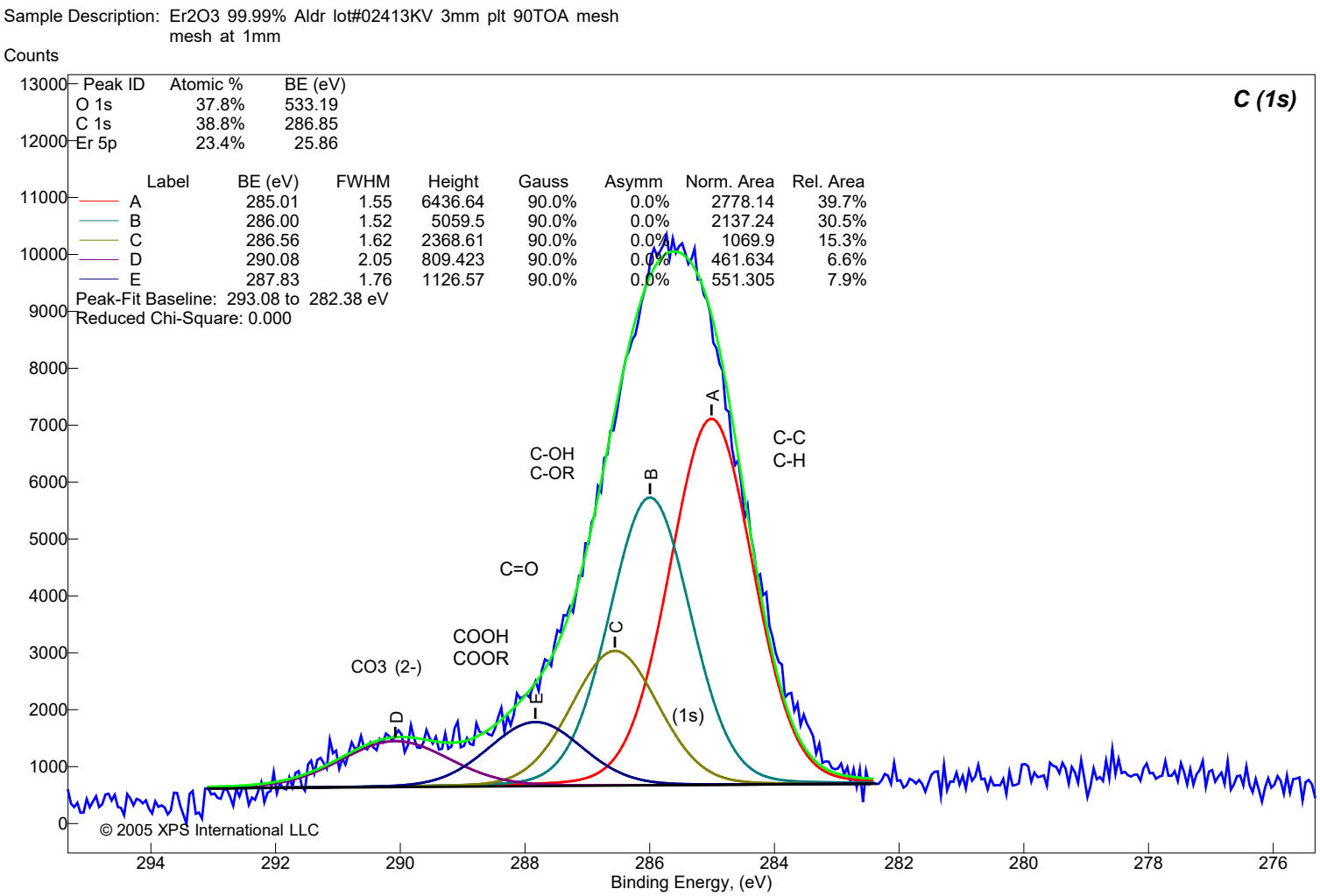
Erbium (III) Oxide (FW = 382.52)

Sample Description: Er2O3 99.99% Aldr lot#02413KV 3mm plt 90TOA mesh
mesh at 1mm



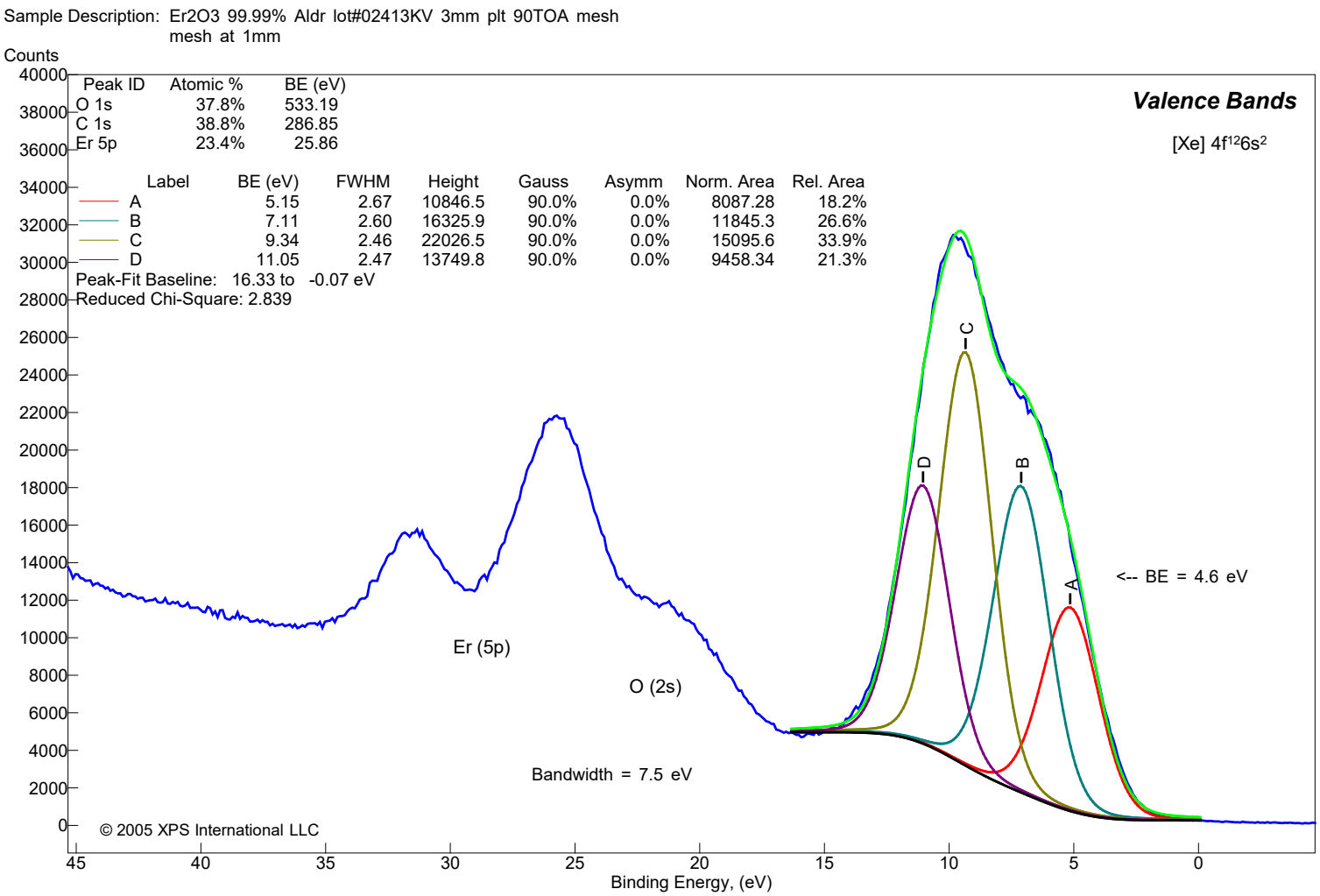
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Erbium (III) Oxide (FW = 382.52)



Er_2O_3

Erbium (III) Oxide (FW = 382.52)

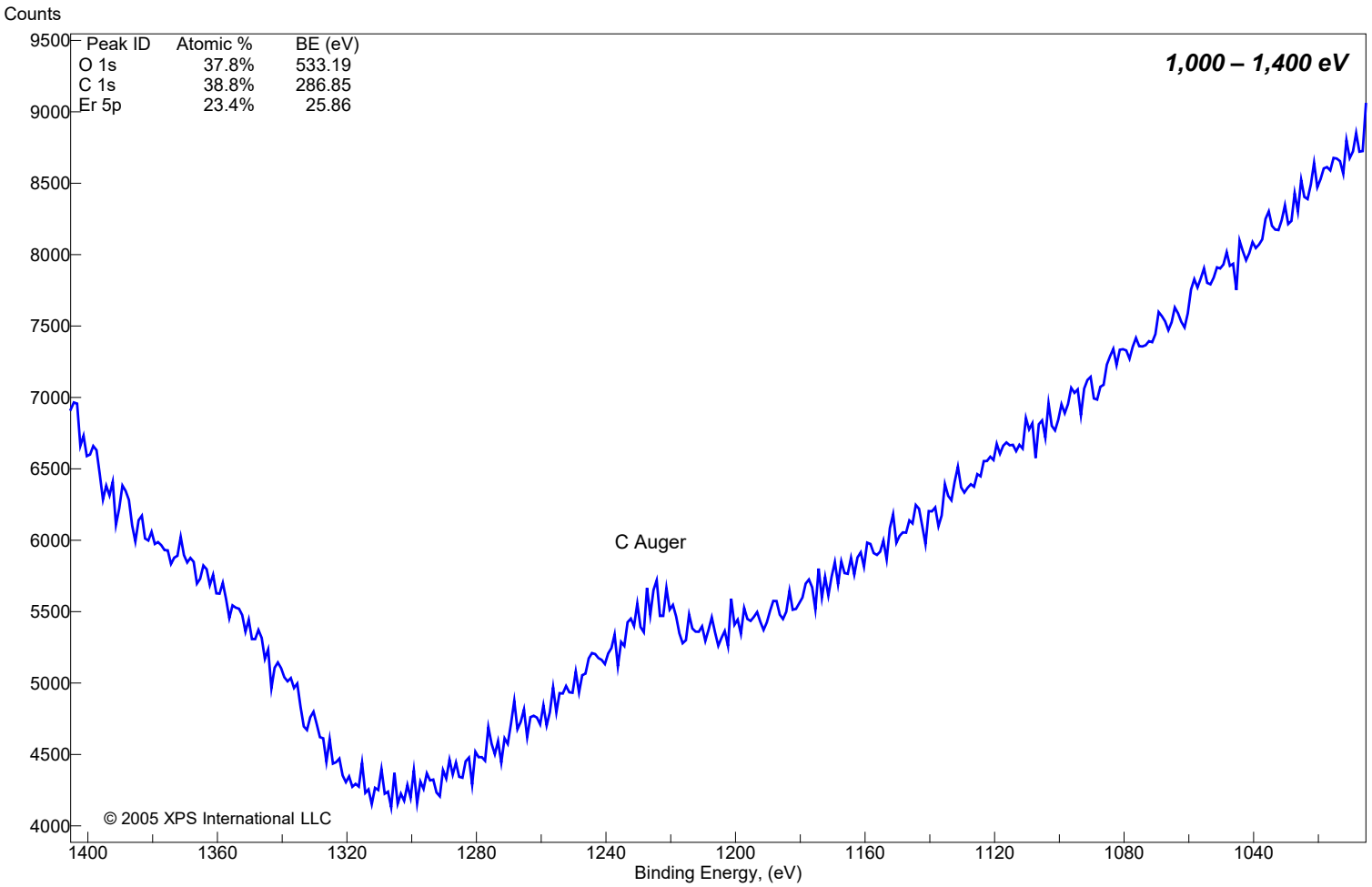


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Er_2O_3

Erbium (III) Oxide (FW = 382.52)

Sample Description: Er2O3 99.99% Aldr lot#02413KV 3mm plt 90TOA mesh mesh at 1mm



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Eu_2O_3

Europium (III) Oxide (FW = 351.92)
Surface Composition Table

Description: Eu_2O_3 (99%) analyzed at 35 deg TOA, no mesh, non-conductive sintered film, mp 2291 C, d 7.42, hygroscopic

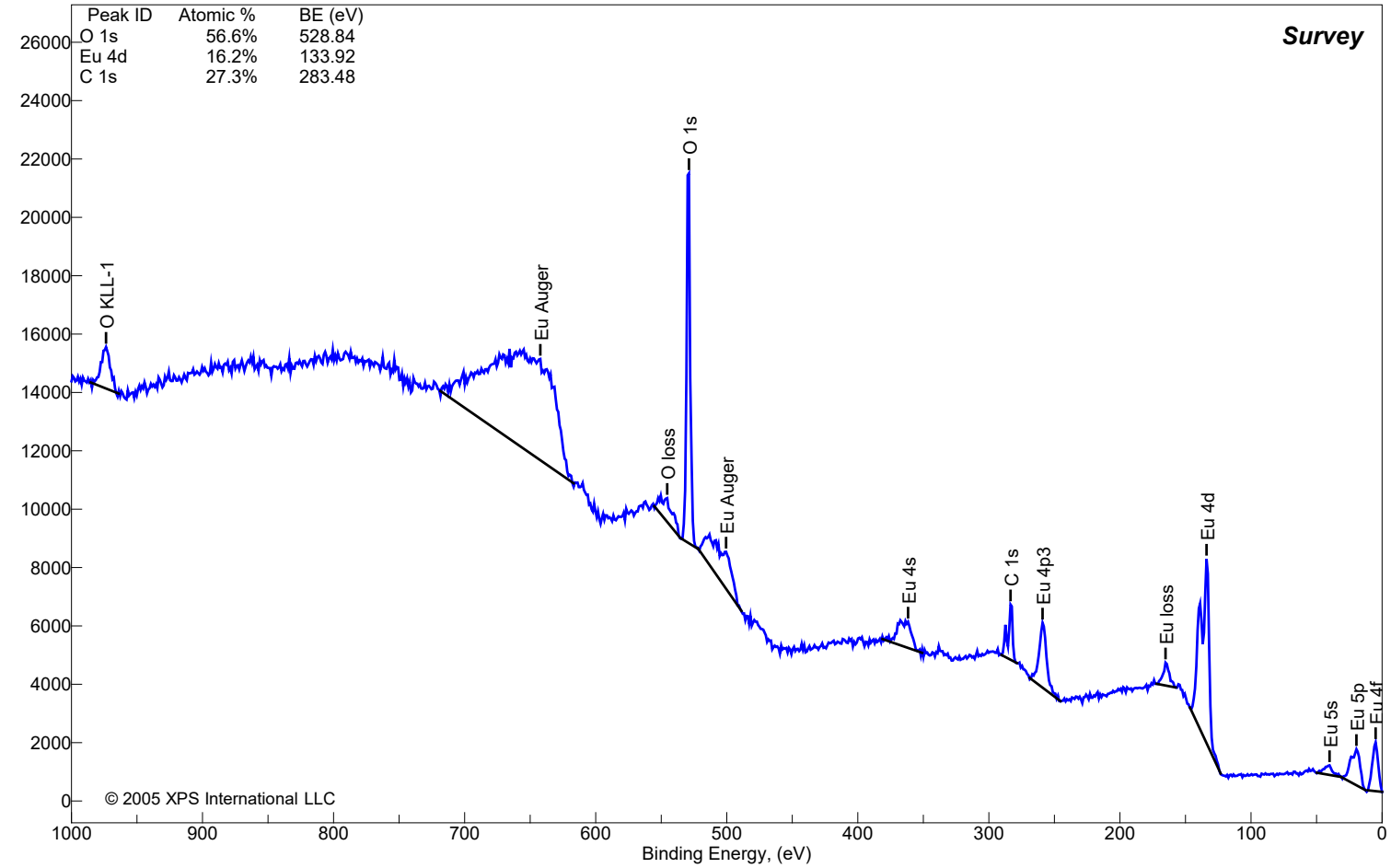
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Eu 4f	6.4	4.9	1.16	0.6	10,825	
Eu 5p	21.1	19.6	0.77	0.6	12,509	
Eu 5s	41.6	40.1	0.27	0.6	3,248	
Eu 4d	135.4	133.9	9.73	0.6	61,392	16.2%
Eu loss	166.7	165.2	0.00	0.6	5,486	
Eu 4p3	260.5	259.0	3.72	0.6	19,753	
C 1s	285.0	283.5	1.00	0.6	9,932	27.3%
Eu 4s	363.2	361.7	1.46	0.6	9,888	
Eu Auger	502.0	500.5	0.00	0.6	30,617	
O 1s	530.3	528.8	2.93	0.6	52,603	56.6%
O loss	547.0	545.5	0.00	0.6	11,692	
Eu Auger	643.7	642.2	0.00	0.6	264,792	
O KLL-1	975.1	973.6	0.70	0.6	11,990	

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Eu_2O_3

Europium (III) Oxide (FW = 351.92)

Sample Description: Eu2O3 (Standard) Scraped clean with knife edge
no mesh

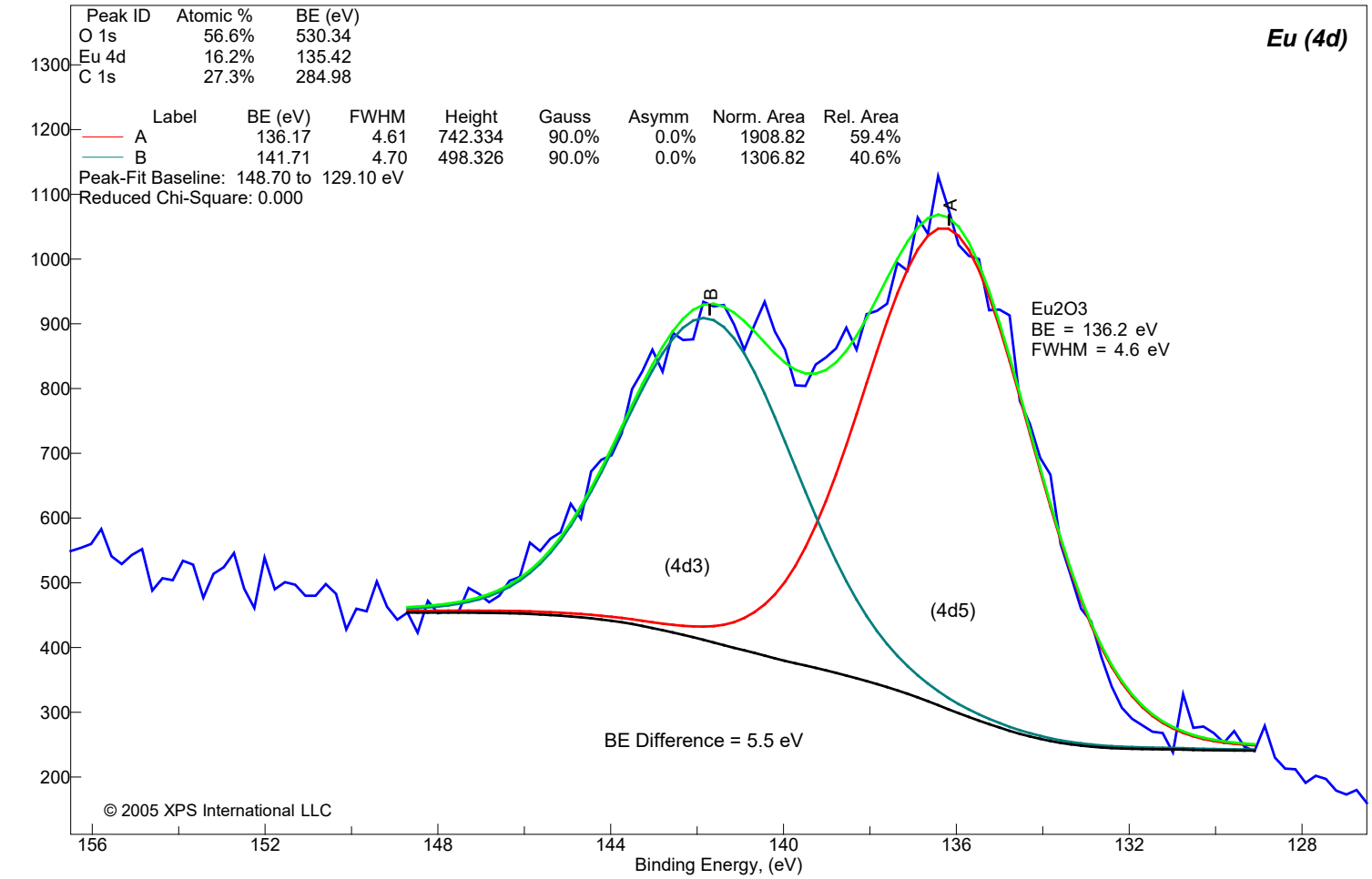


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Eu_2O_3

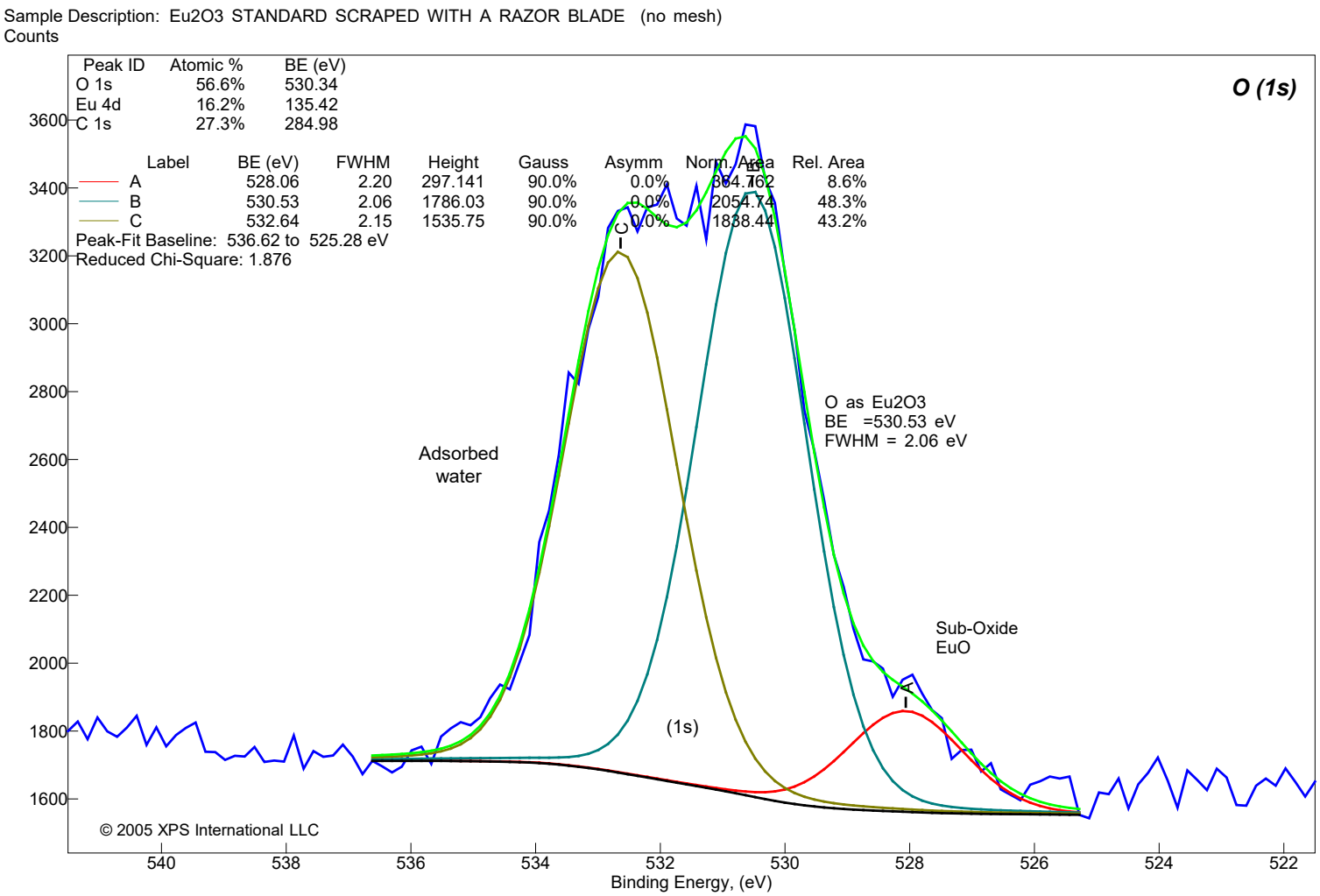
Europium (III) Oxide (FW = 351.92)

Sample Description: Eu2O3 STANDARD SCRAPED WITH A RAZOR BLADE (no mesh)



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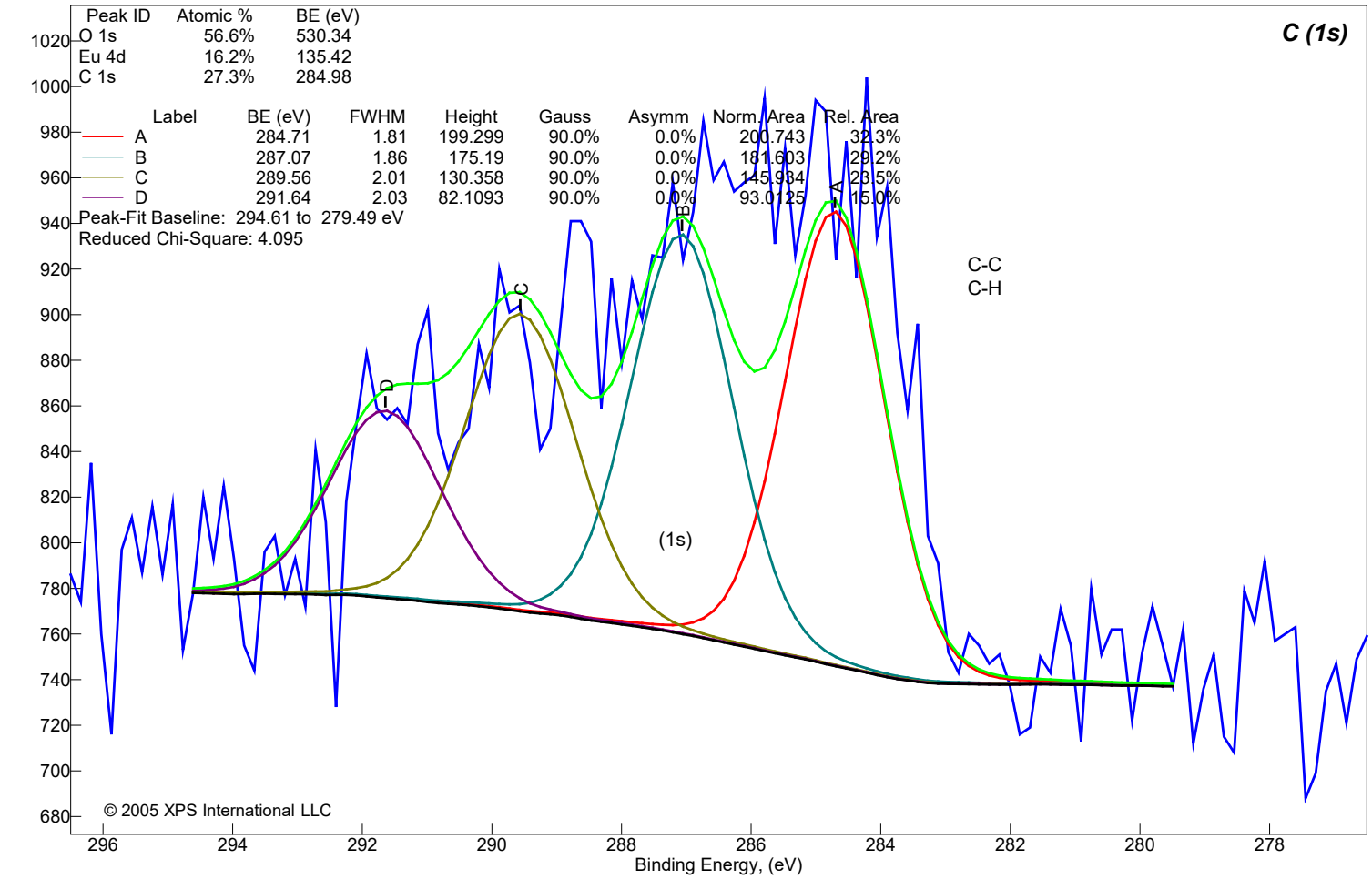
Europium (III) Oxide (FW = 351.92)



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Europium (III) Oxide (FW = 351.92)

Sample Description: Eu2O3 STANDARD SCRAPED WITH A RAZOR BLADE (no mesh)



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FeO

Iron (II) Oxide (FW = 71.85)
Surface Composition Table

Description: FeO (99.9%) from Cerac Co. Lot# 60539a1-4, analyzed at 90 deg TOA, no mesh, conductive black piece, dipped in dil HF 2 min, then ion etched 10 min, mp 1369 C, d 7.81, sol in HCl and H2SO4

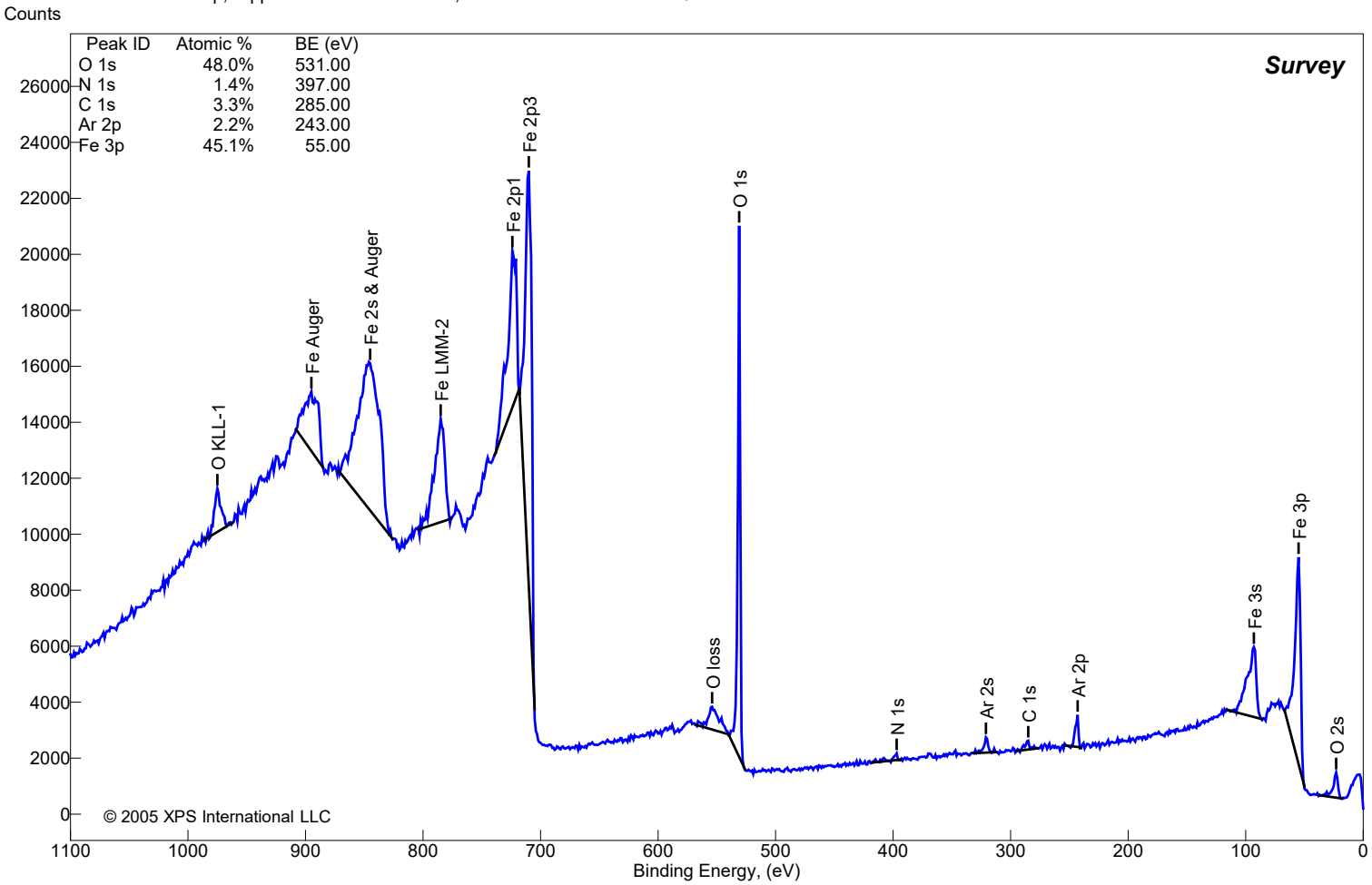
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	22.0	23.0	0.14	1.4	4,264	
Fe 3p	54.0	55.0	1.67	1.4	44,489	45.1%
Fe 3s	92.0	93.0	0.75	1.4	22,964	
Ar 2p	242.0	243.0	3.04	1.4	3,266	2.2%
C 1s	284.0	285.0	1.00	1.4	1,549	3.3%
Ar 2s	320.0	321.0	1.97	1.4	2,485	
N 1s	396.0	397.0	1.80	1.4	1,012	1.4%
O 1s	530.0	531.0	2.93	1.4	47,182	48.0%
O loss	553.0	554.0	0.00	1.4	9,690	
Fe 2p3	709.0	710.0	10.82	1.4	99,564	
Fe 2p1	723.0	724.0	5.60	1.4	51,340	
Fe LMM-2	784.0	785.0	0.28	1.4	36,039	
Fe 2s & Auger	844.0	845.0	4.57	1.4	112,848	
Fe Auger	894.0	895.0	0.00	1.4	29,665	
O KLL-1	974.0	975.0	0.70	1.4	9,482	

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FeO

Iron (II) Oxide (FW = 71.85)

Sample Description: FeO (99.9%) from Cerac lot# 60539a1-4
lump, dipped in dil HF for 2 min, ion etched at 4 keV for 10 min

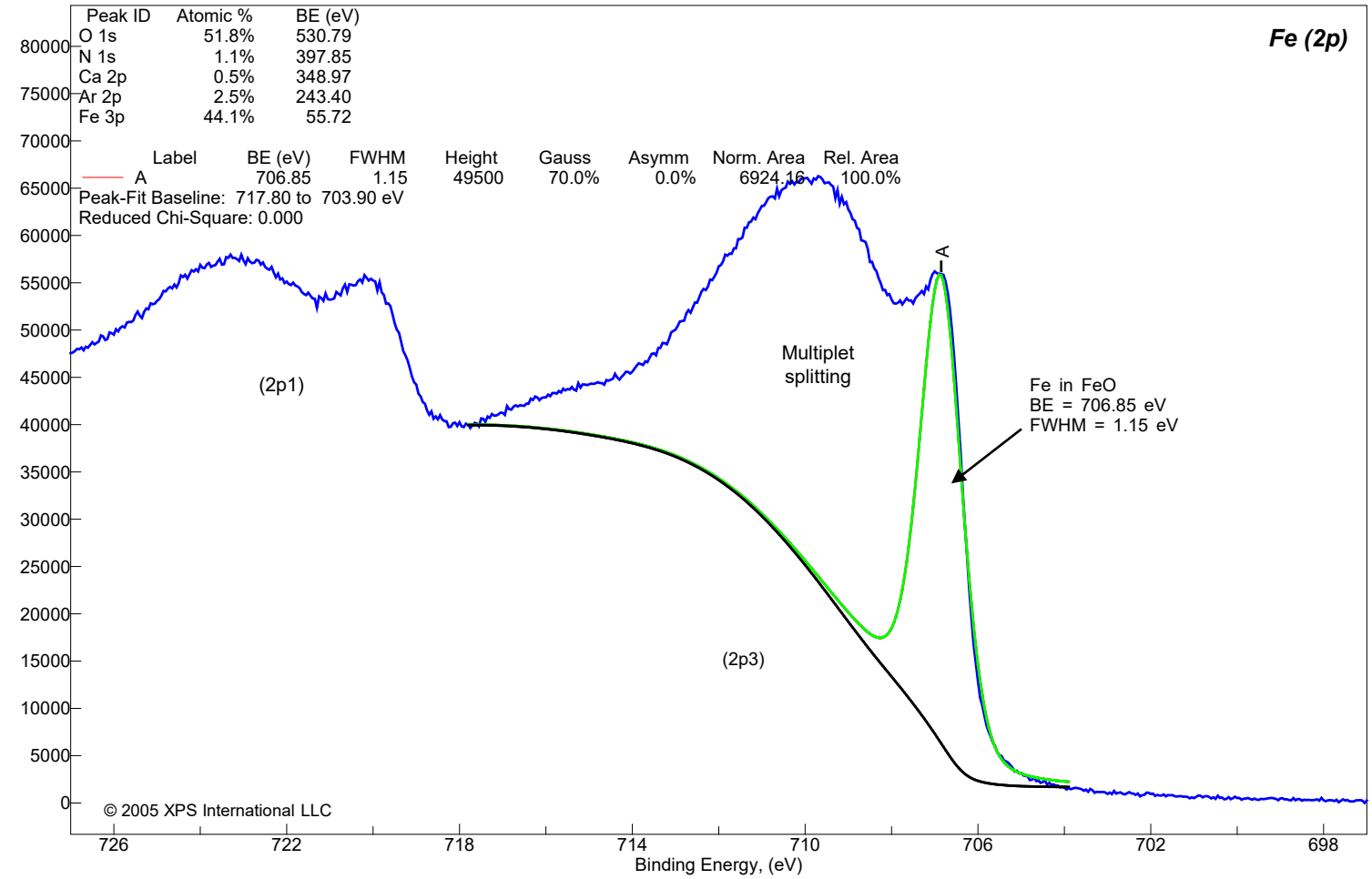


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FeO

Iron (II) Oxide (FW = 71.85)

Sample Description: FeO (99.9%) Cerac, 2min dil HF, 5min ion etch 90TO

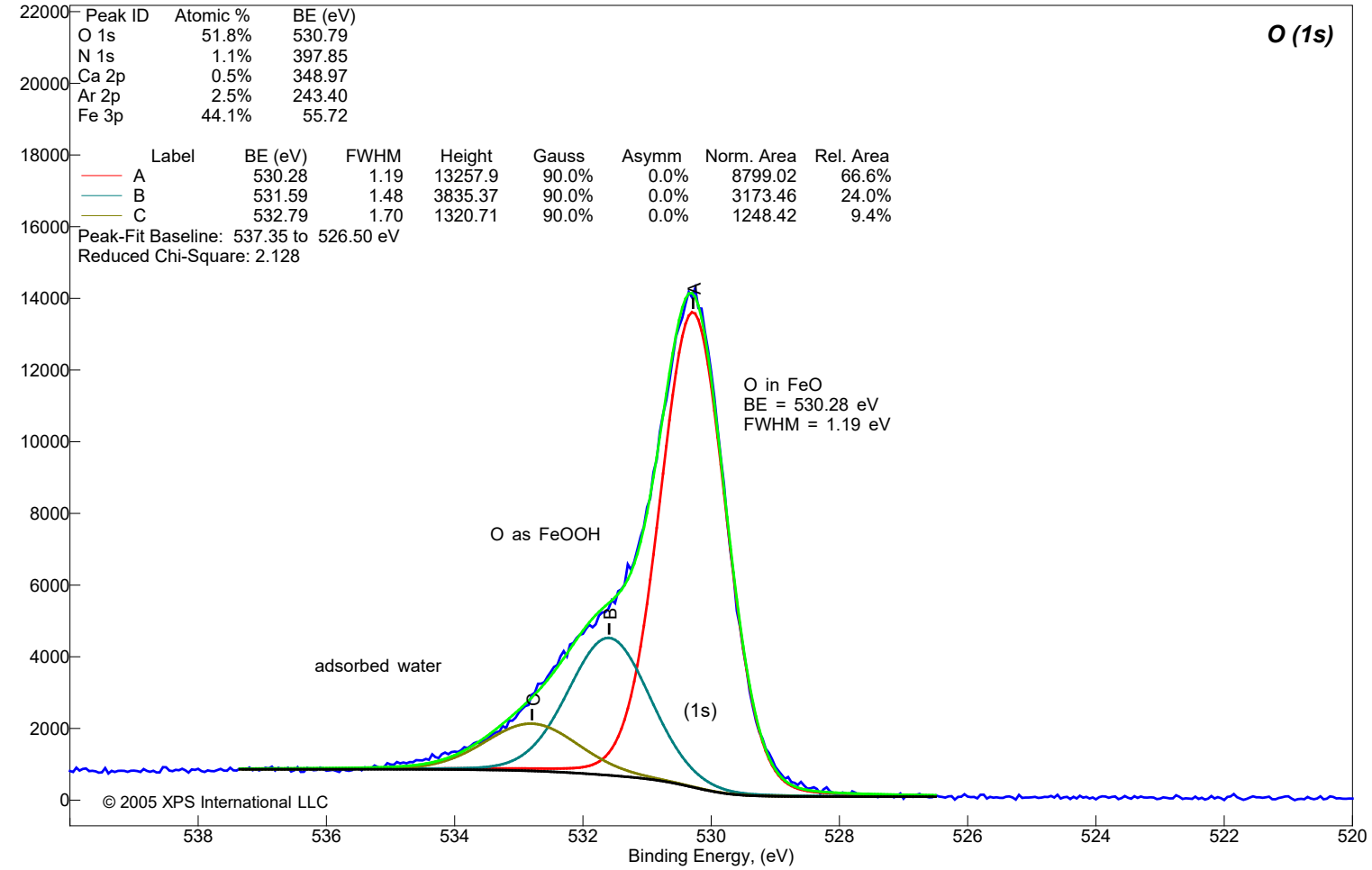


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FeO

Iron (II) Oxide (FW = 71.85)

Sample Description: FeO (99.9%) Cerac, 2min dil HF, 5min ion etch 90TO

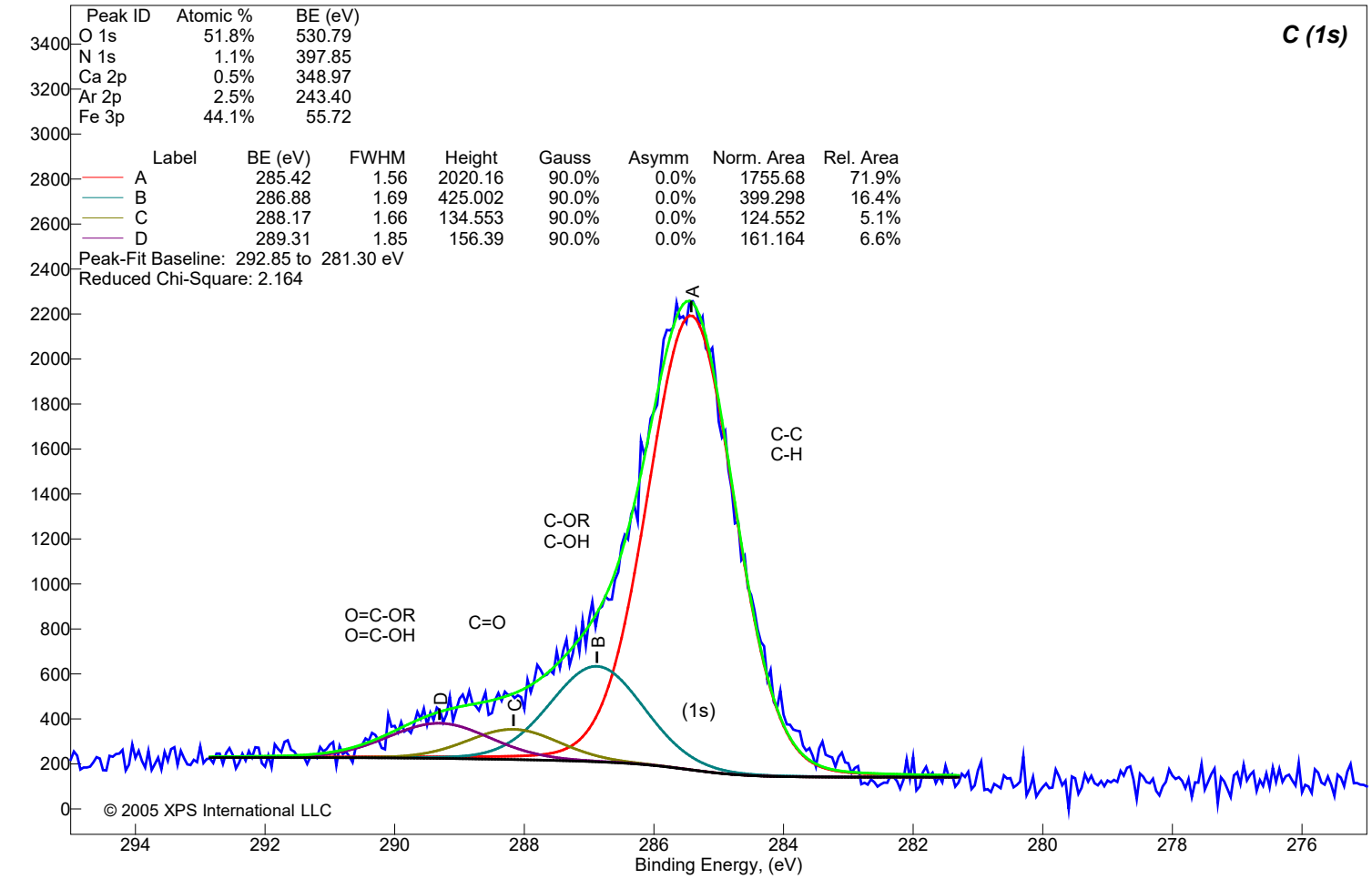


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FeO

Iron (II) Oxide (FW = 71.85)

Sample Description: FeO (99.9%) Cerac, 2min dil HF, 5min ion etch 90TO

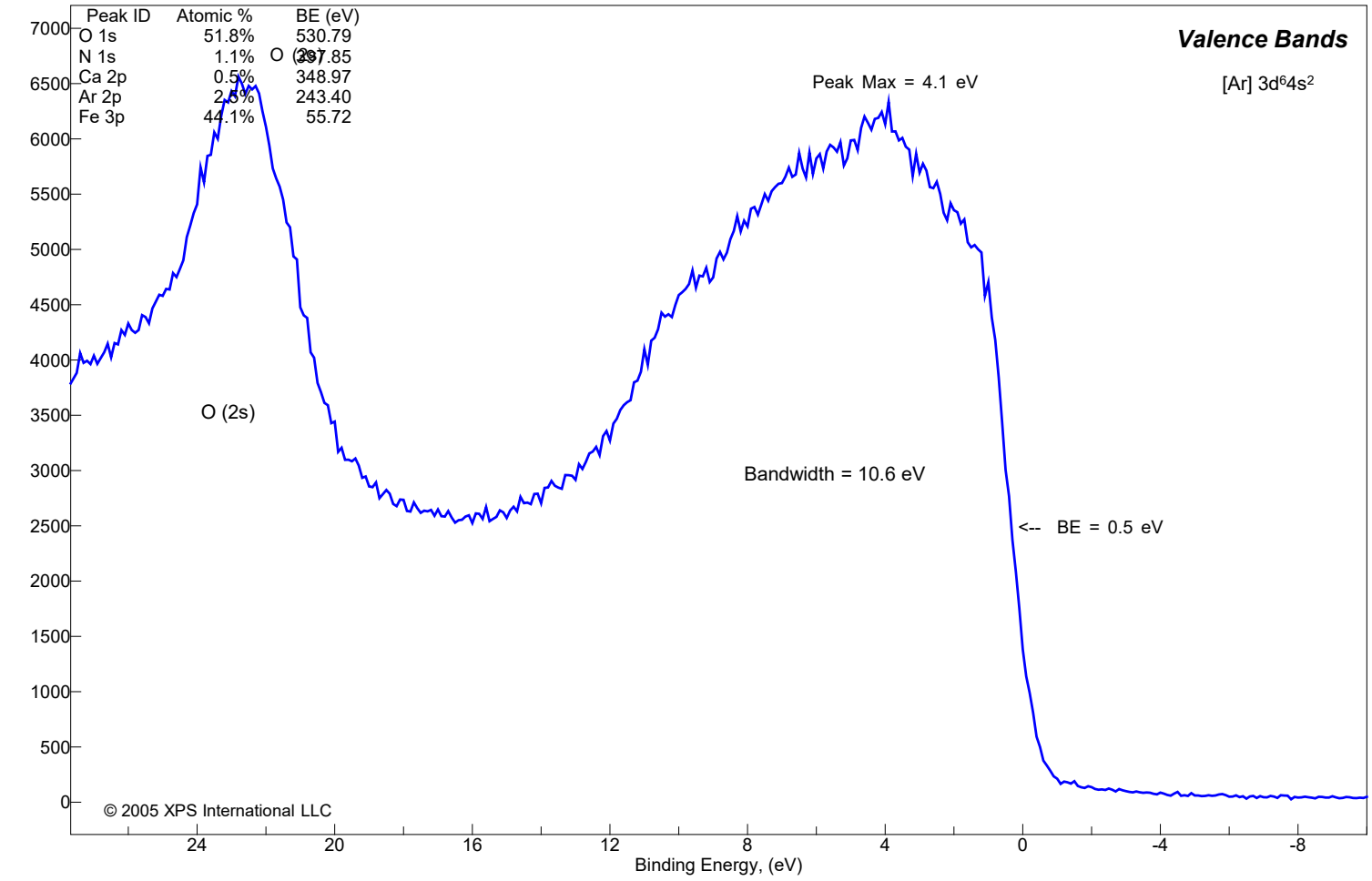


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FeO

Iron (II) Oxide (FW = 71.85)

Sample Description: FeO (99.9%) Cerac, 2min dil HF, 5min ion etch 90TO

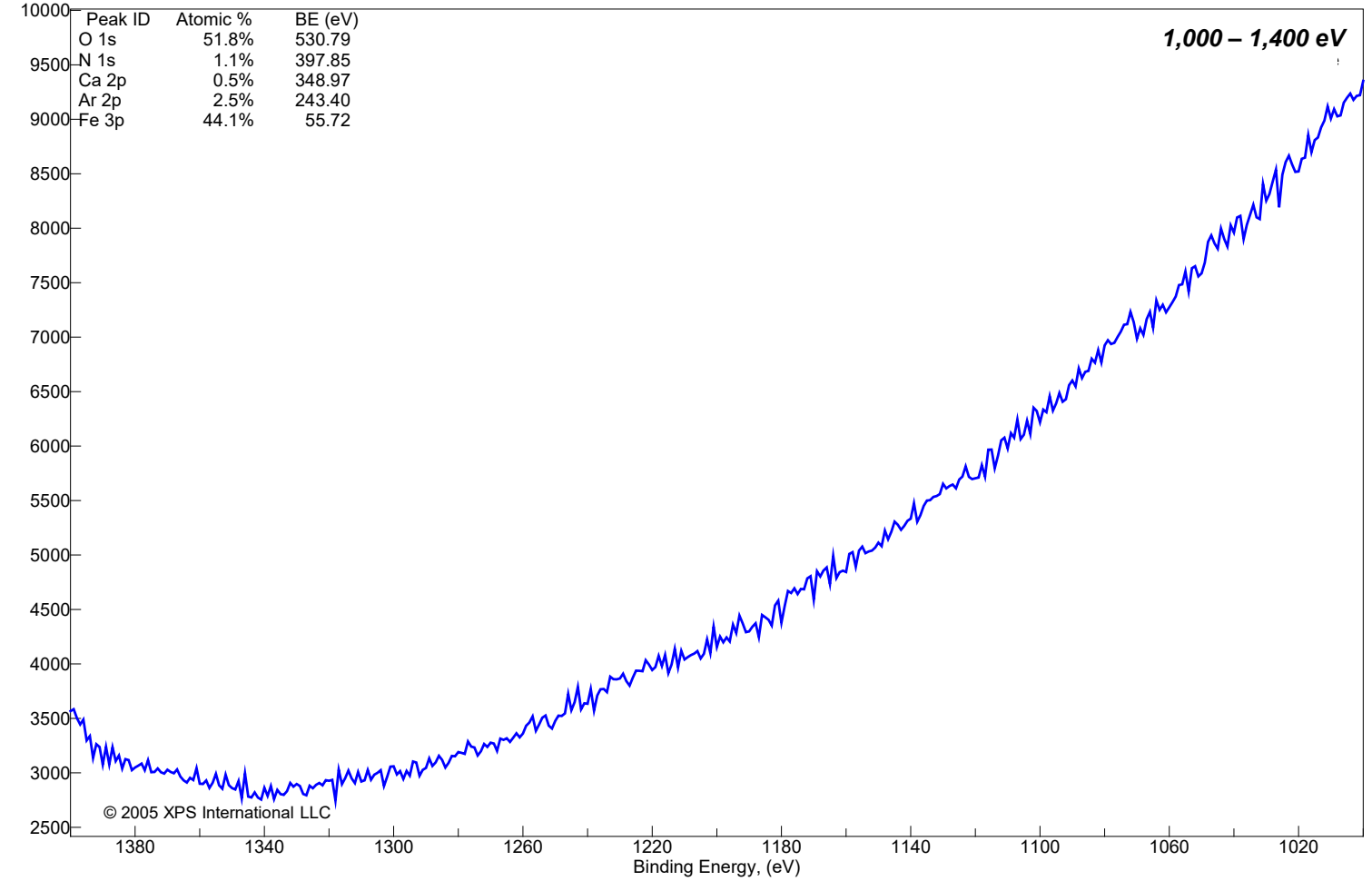


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FeO

Iron (II) Oxide (FW = 71.85)

Sample Description: FeO (99.9%) Cerac, 2min dil HF, 5min ion etch 90TO

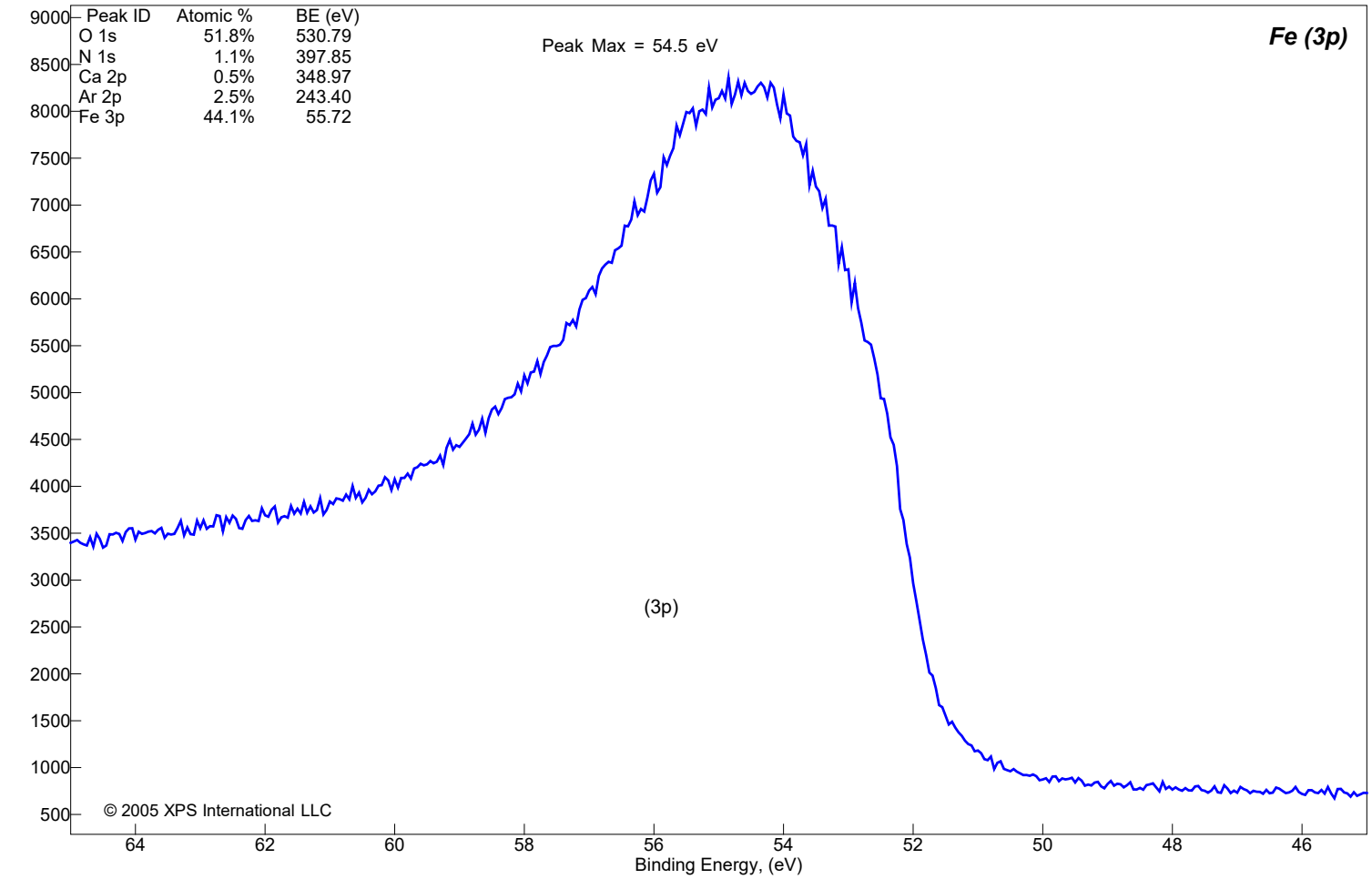


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FeO

Iron (II) Oxide (FW = 71.85)

Sample Description: FeO (99.9%) Cerac, 2min dil HF, 5min ion etch 90TO

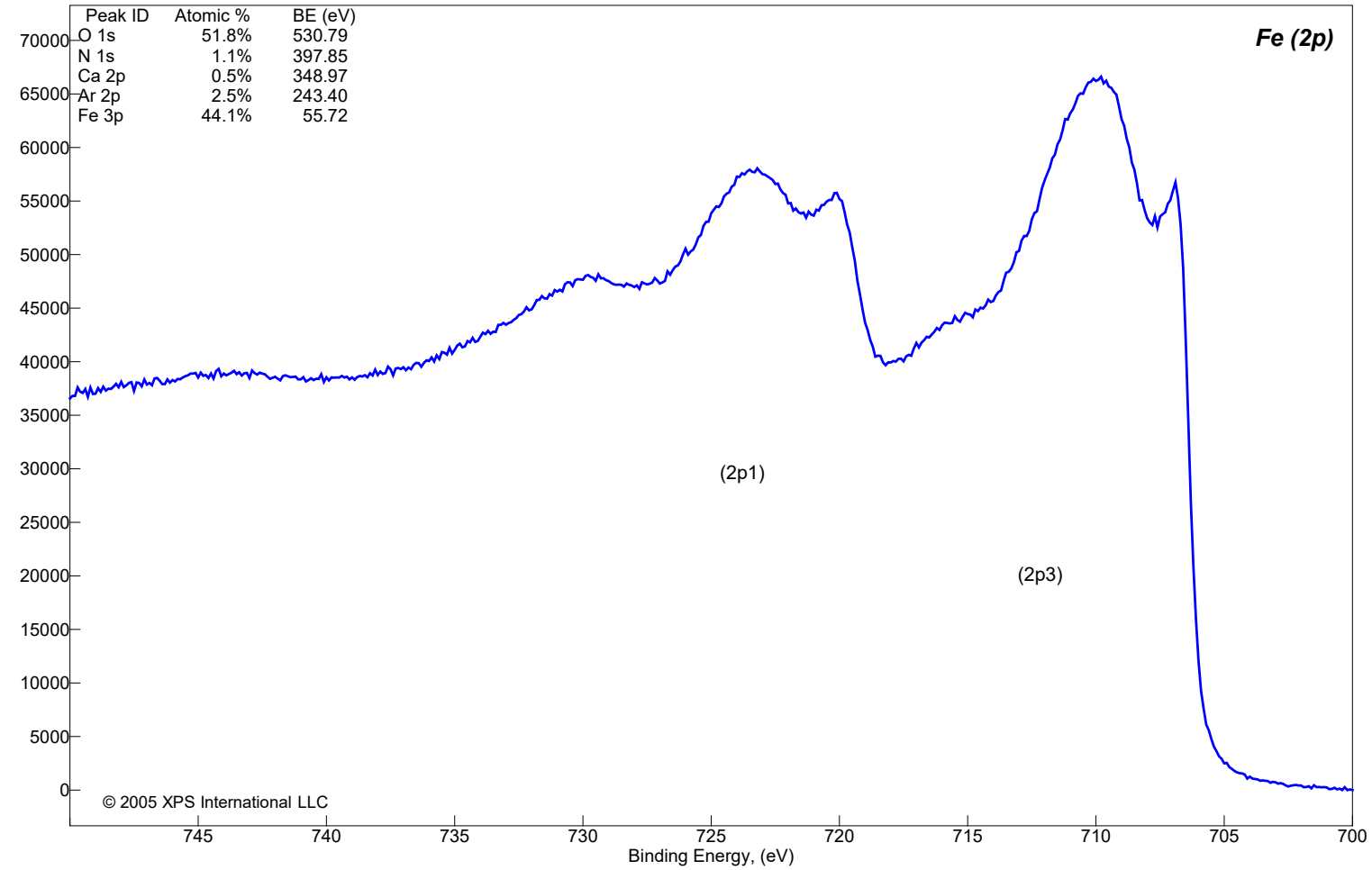


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FeO

Iron (II) Oxide (FW = 71.85)

Sample Description: FeO (99.9%) Cerac, 2min dil HF, 5min ion etch 90TO



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α-Fe_2O_3

Iron (III) Oxide, alpha-type (FW = 159.69)
Surface Composition Table

Description: α-Fe_2O_3 (99.99+%) from Rare Metallics Co. Lot# 70924-60H , analyzed at 90 deg TOA, mesh at 1 mm, semi-conductive red-brown powder pressed into 3 mm pellet, mp 1565 C, d 5.24, sol in acid

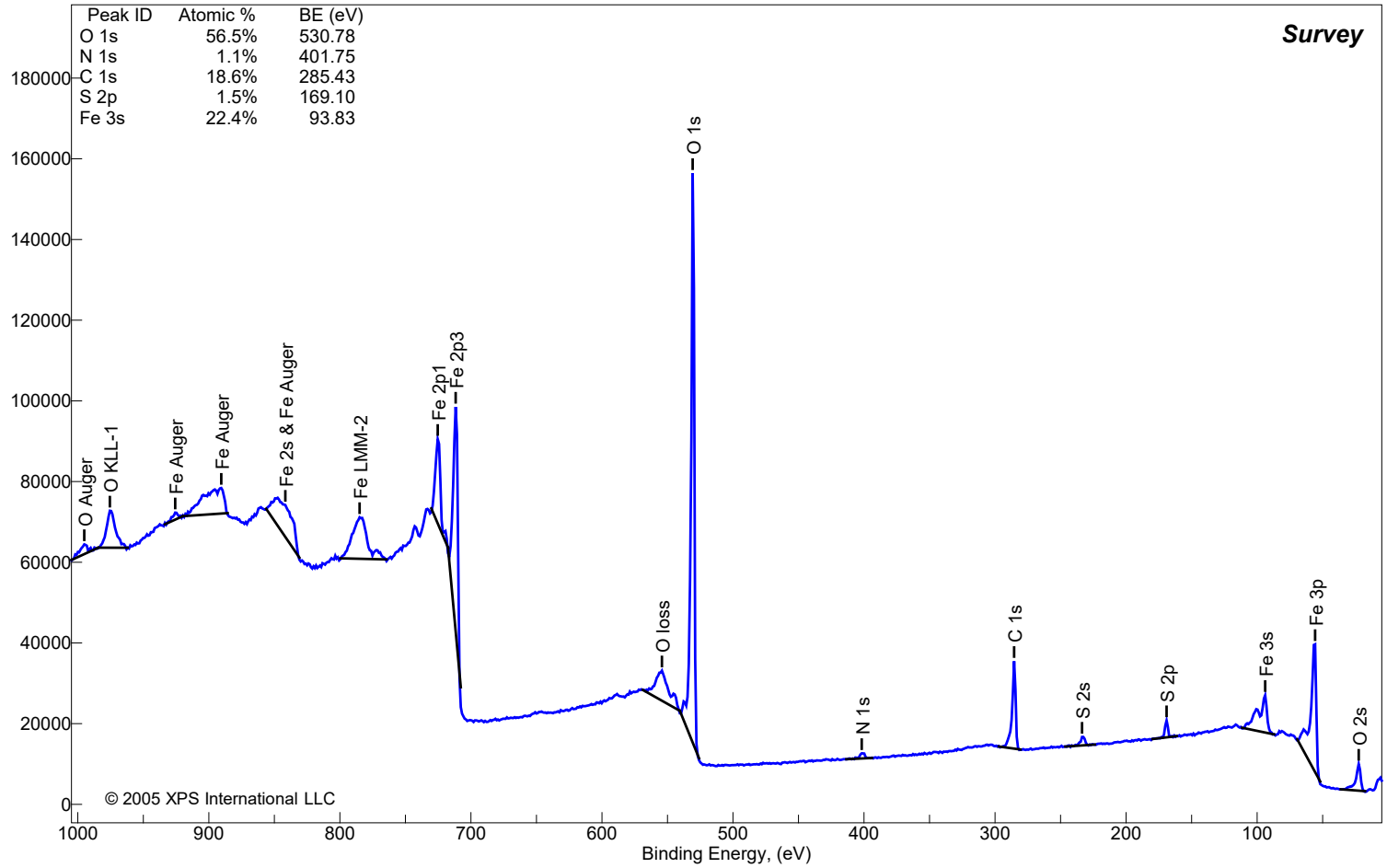
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	22.5	22.5	0.14	1.5	5,187	
Fe 3p	55.7	55.7	1.67	1.5	28,324	
Fe 3s	93.8	93.8	0.75	1.5	12,757	22.4%
S 2p	169.1	169.1	1.68	1.5	1,741	1.5%
S 2s	233.6	233.6	1.43	1.5	1,638	
C 1s	285.4	285.4	1.00	1.5	11,437	18.6%
N 1s	401.8	401.8	1.80	1.5	1,005	1.1%
O 1s	530.8	530.8	2.93	1.5	72,077	56.5%
O loss	554.2	554.2	0.00	1.5	15,972	
Fe 2p3	711.6	711.6	10.82	1.5	41,919	
Fe 2p1	725.3	725.3	5.60	1.5	18,189	
Fe LMM-2	784.9	784.9	0.28	1.5	25,130	
Fe 2s & Fe Auger	841.6	841.6	4.57	1.5	23,528	
Fe Auger	890.5	890.5	0.00	1.5	20,724	
Fe Auger	925.7	925.7	0.00	1.5	827	
O KLL-1	975.6	975.6	0.70	1.5	12,481	
O Auger	995.1	995.1	0.00	1.5	3,200	
C Auger	1225.3	1225.3	0.00	1.1	820	

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α-Fe_2O_3

Iron (III) Oxide, alpha-type (FW = 159.69)

Sample Description: alpha-Fe2O3 (99.99+%) from Rare Metallics Corp. lot# 70924-60H, semi-conductive pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height

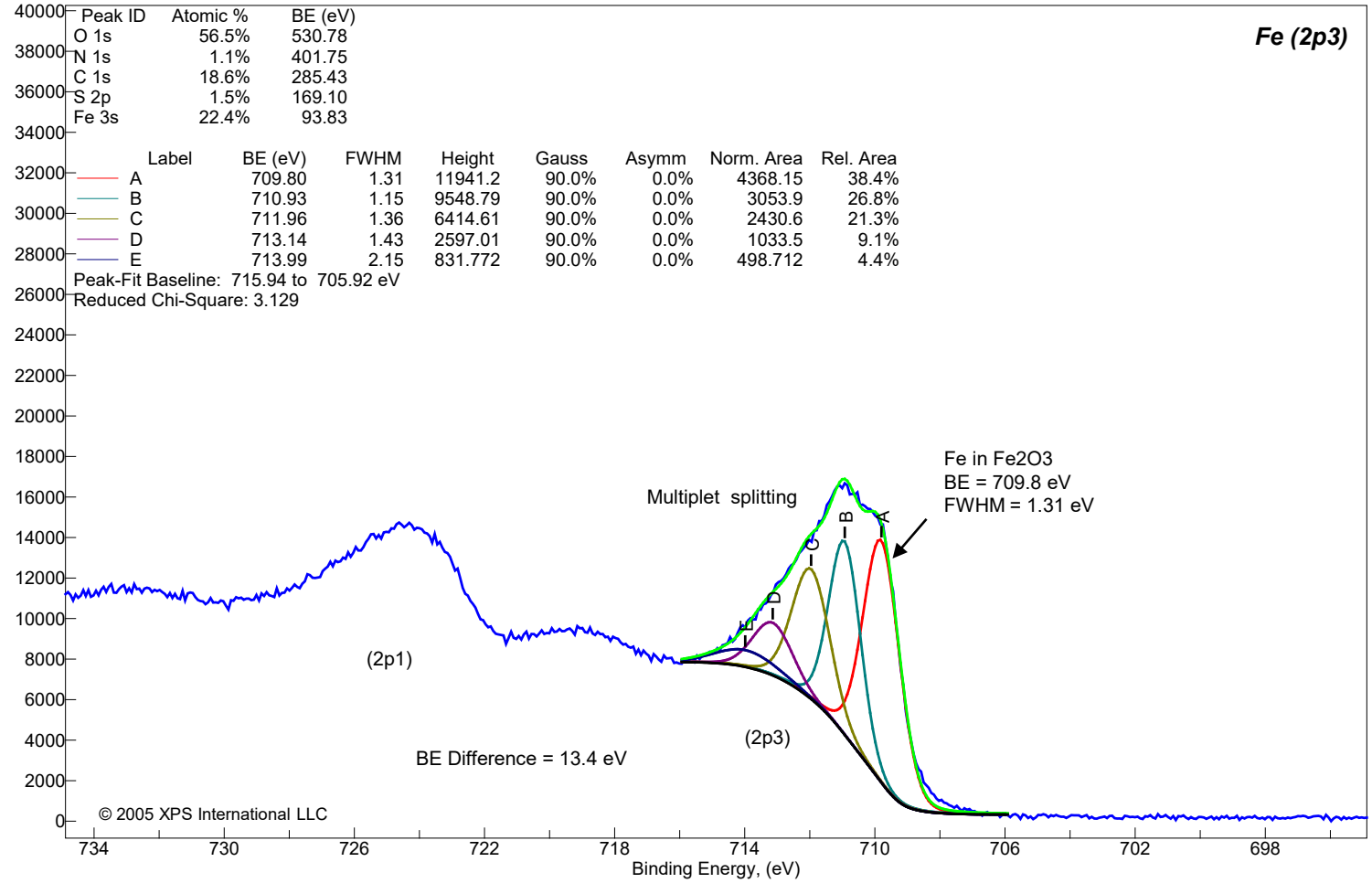


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α-Fe_2O_3

Iron (III) Oxide, alpha-type (FW = 159.69)

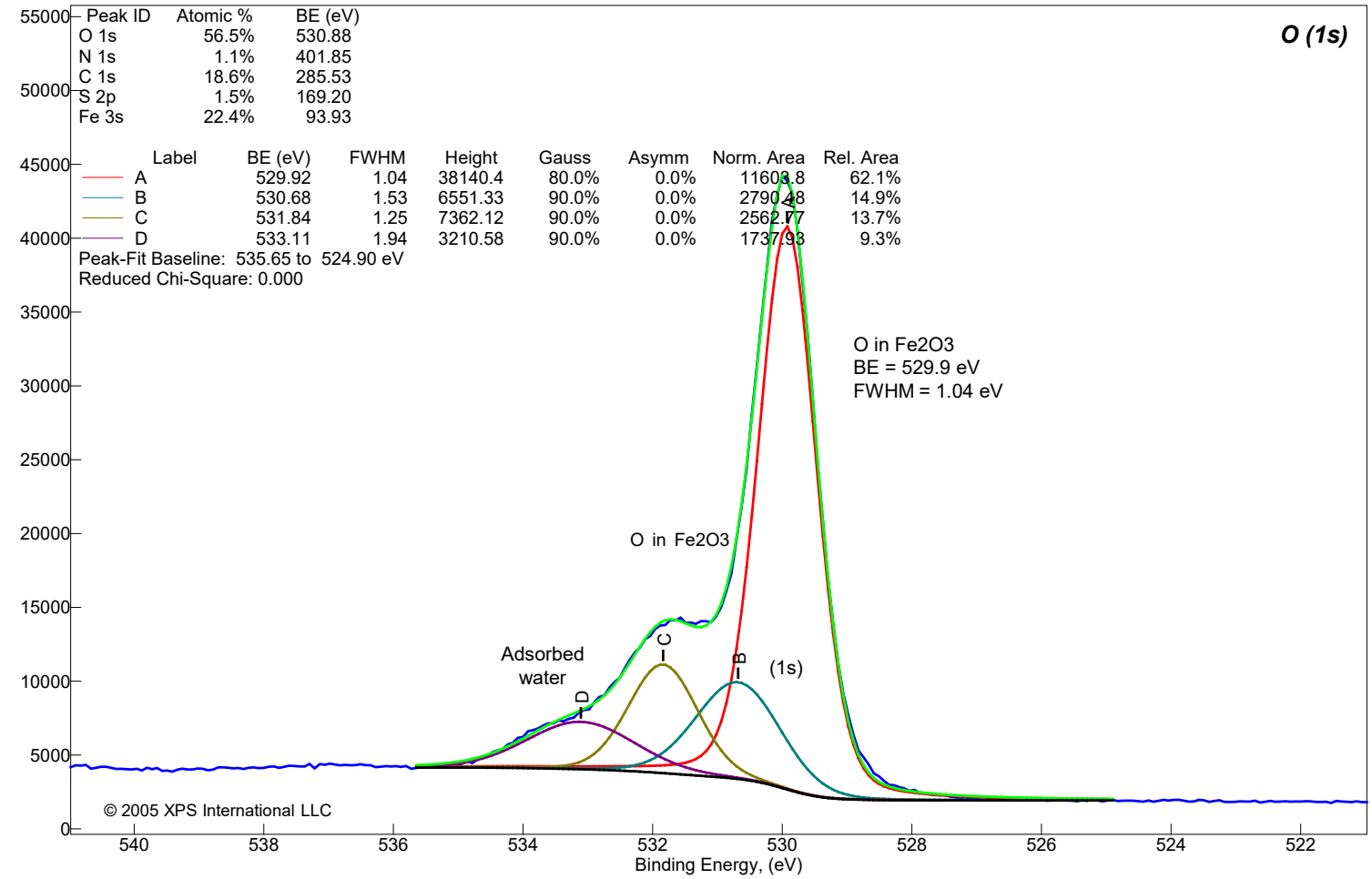
Sample Description: alpha-Fe2O3 (99.99+%) Rare Metallics #70924-60H Semi-Conduct., screen, 90 TOA



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Iron (III) Oxide, alpha-type (FW = 159.69)

Sample Description: alpha-Fe2O3 (99.99+%) Rare Metallics #70924-60H Semi-Conduct., screen, 90 TOA

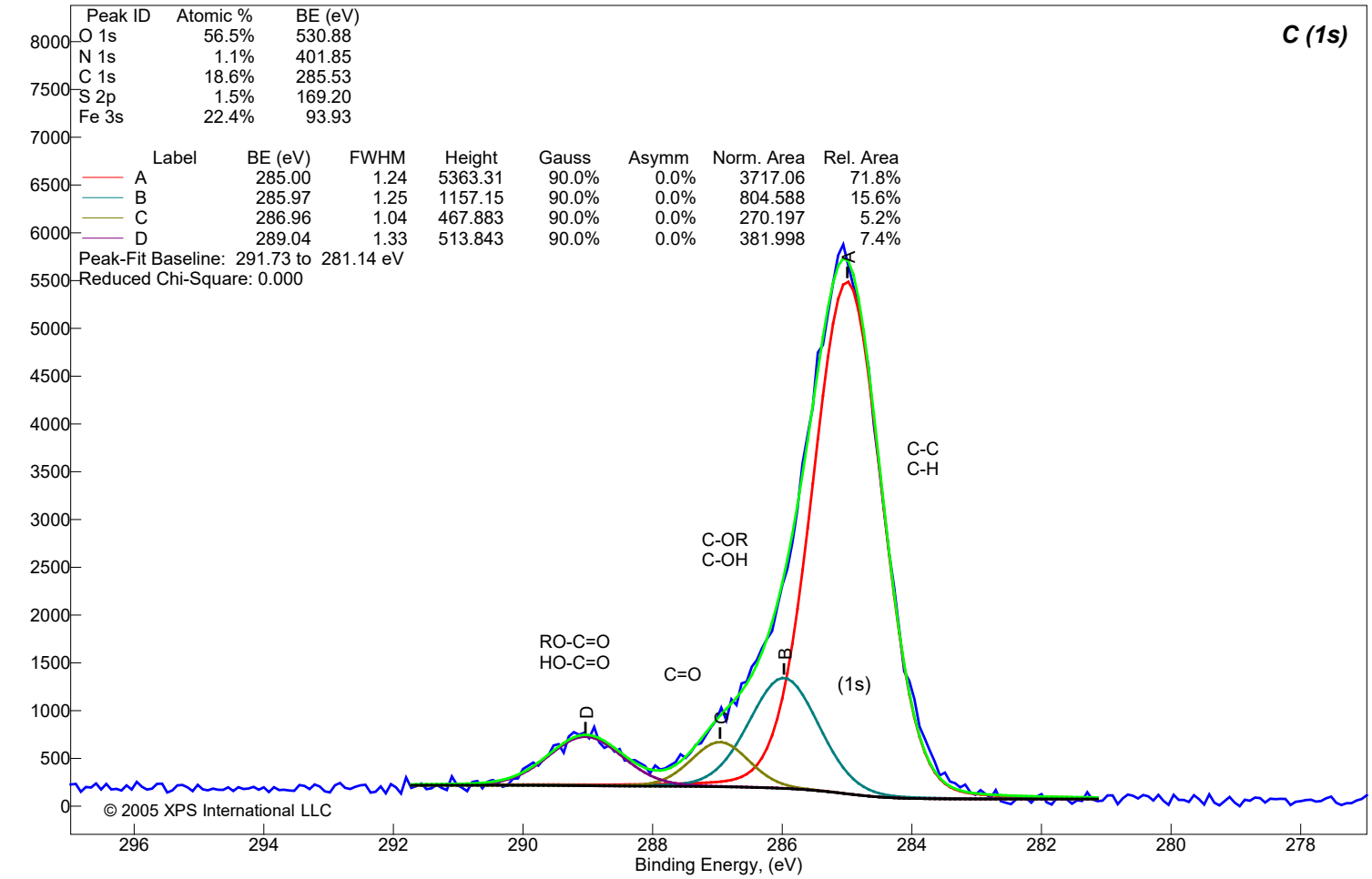


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α-Fe_2O_3

Iron (III) Oxide, alpha-type (FW = 159.69)

Sample Description: alpha-Fe2O3 (99.99+%) Rare Metallics #70924-60H Semi-Conduct., screen, 90 TOA

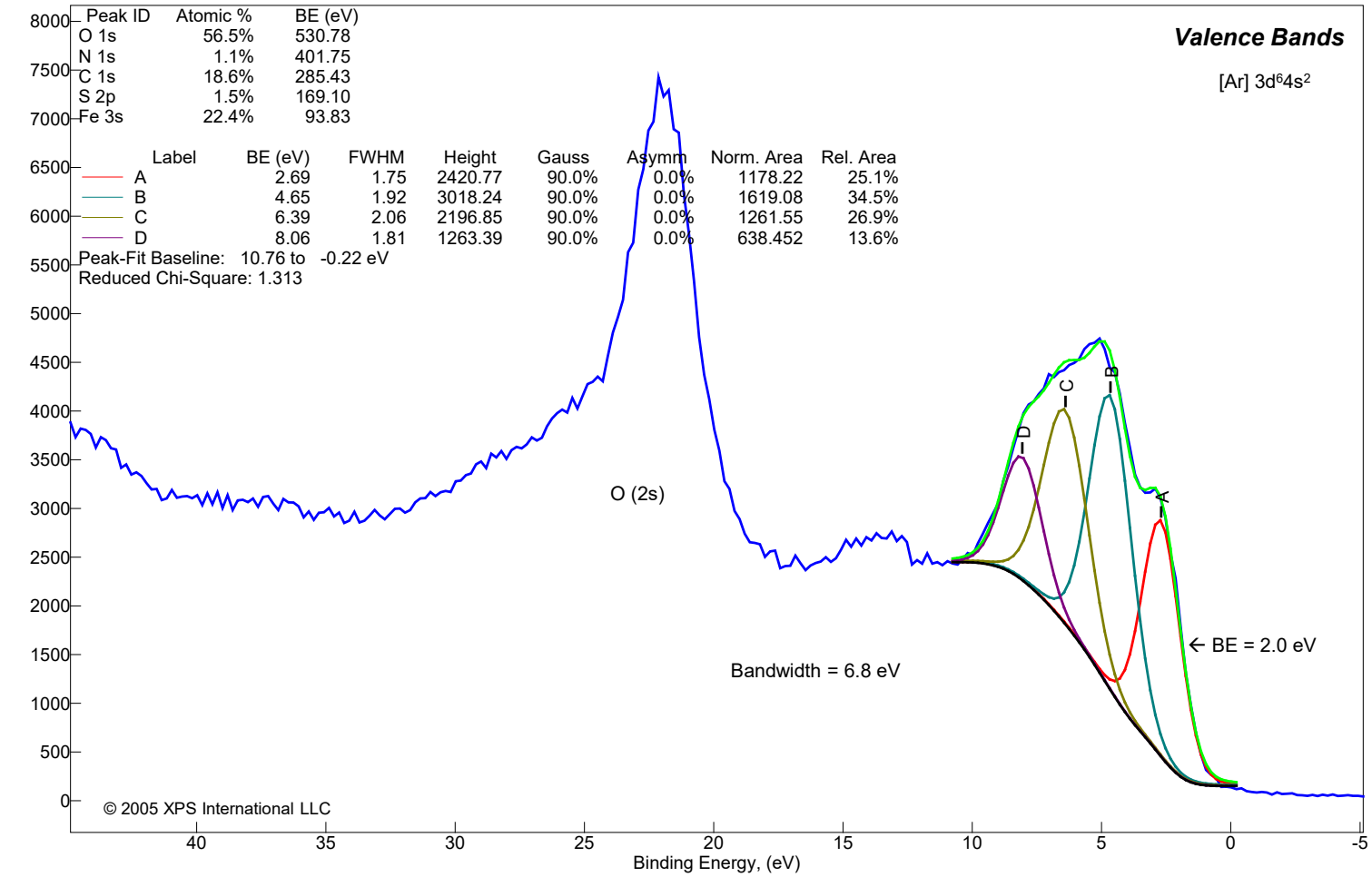


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α-Fe_2O_3

Iron (III) Oxide, alpha-type (FW = 159.69)

Sample Description: alpha-Fe2O3 (99.99+%) Rare Metallics #70924-60H Semi-Conduct., screen, 90 TOA

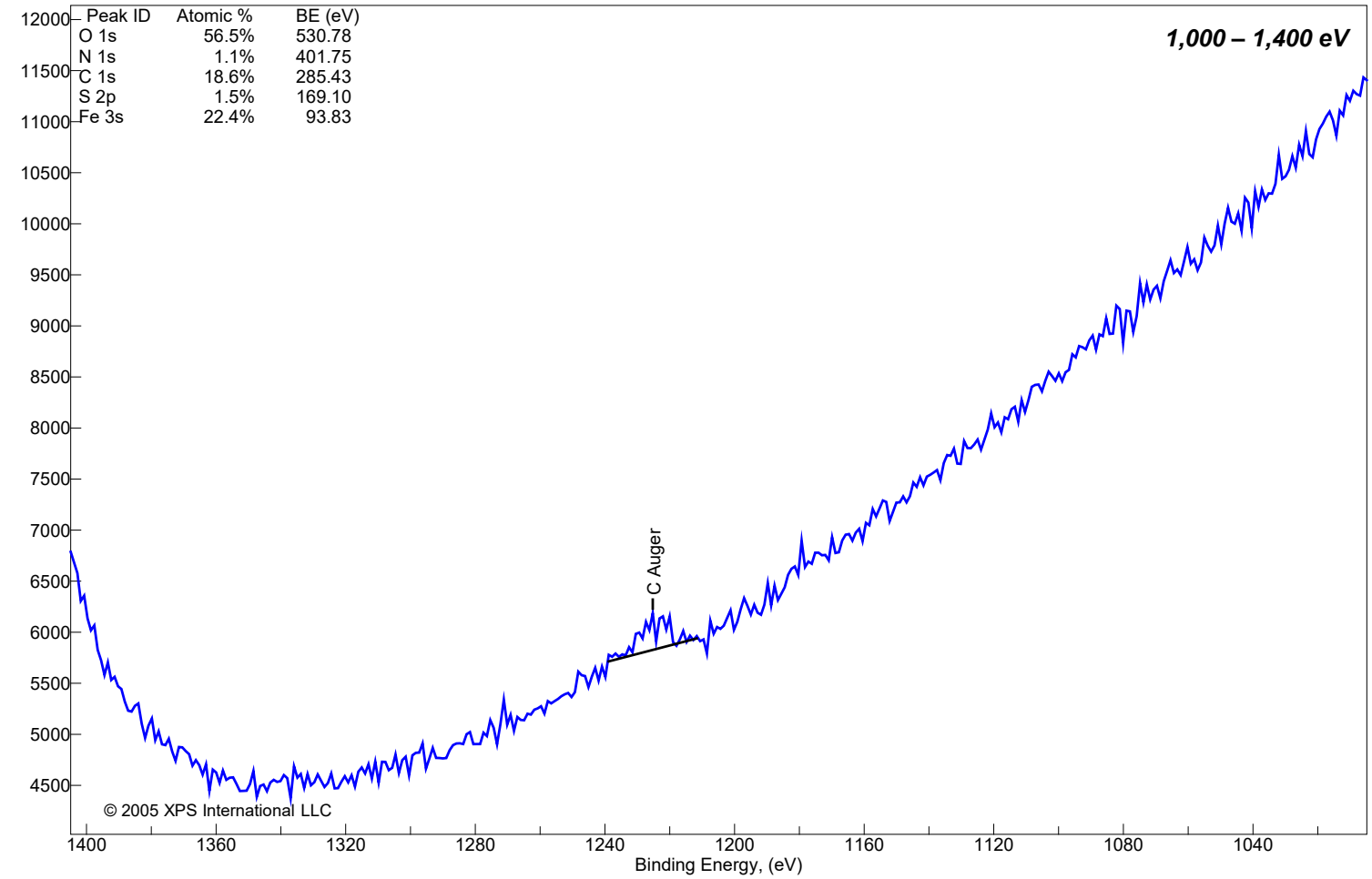


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α-Fe_2O_3

Iron (III) Oxide, alpha-type (FW = 159.69)

Sample Description: alpha-Fe2O3 (99.99+%) Rare Metallics #70924-60H Semi-Conduct., screen, 90 TOA

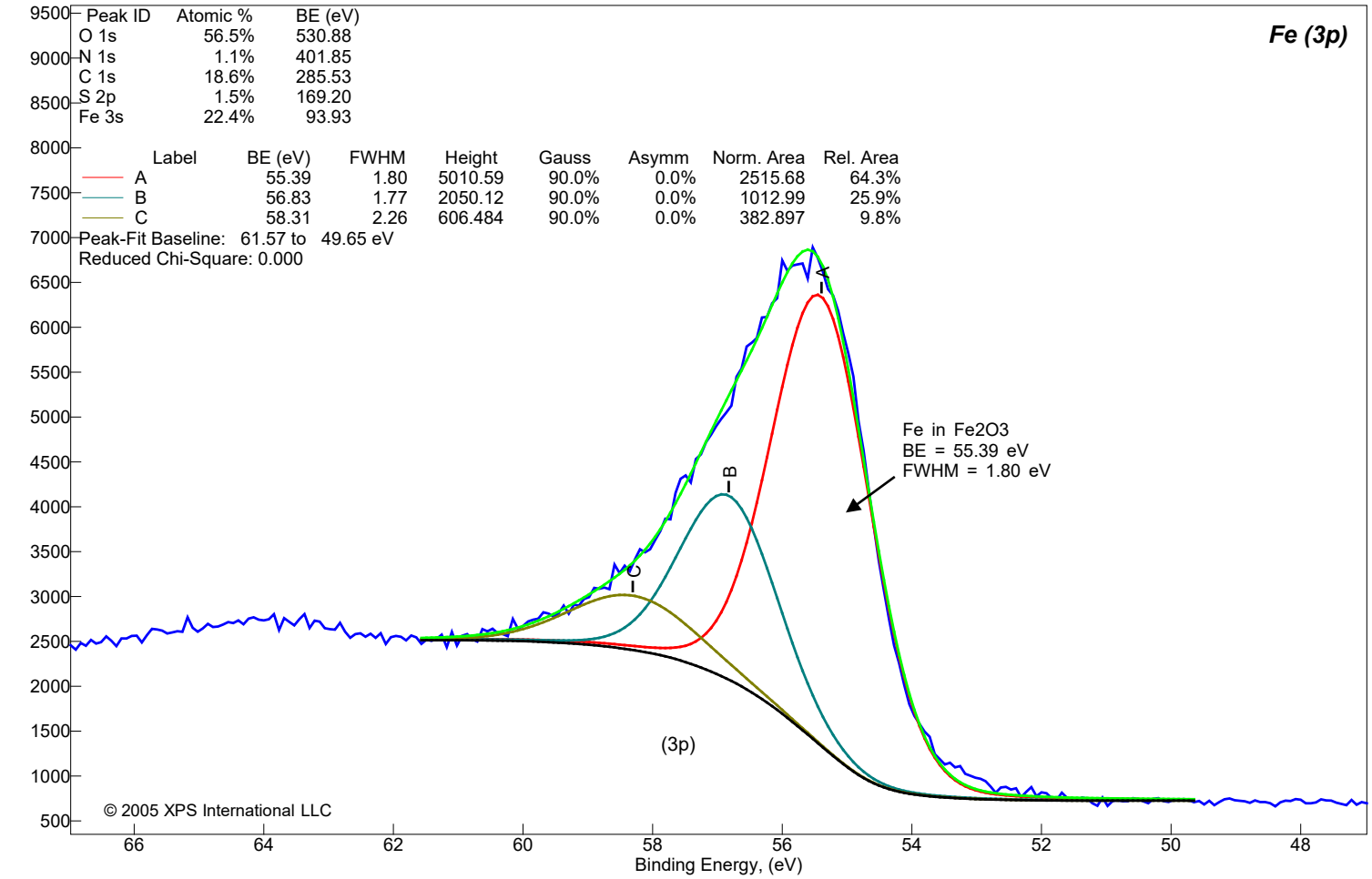


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α-Fe_2O_3

Iron (III) Oxide, alpha-type (FW = 159.69)

Sample Description: alpha-Fe2O3 (99.99+%) Rare Metallics #70924-60H Semi-Conduct., screen, 90 TOA

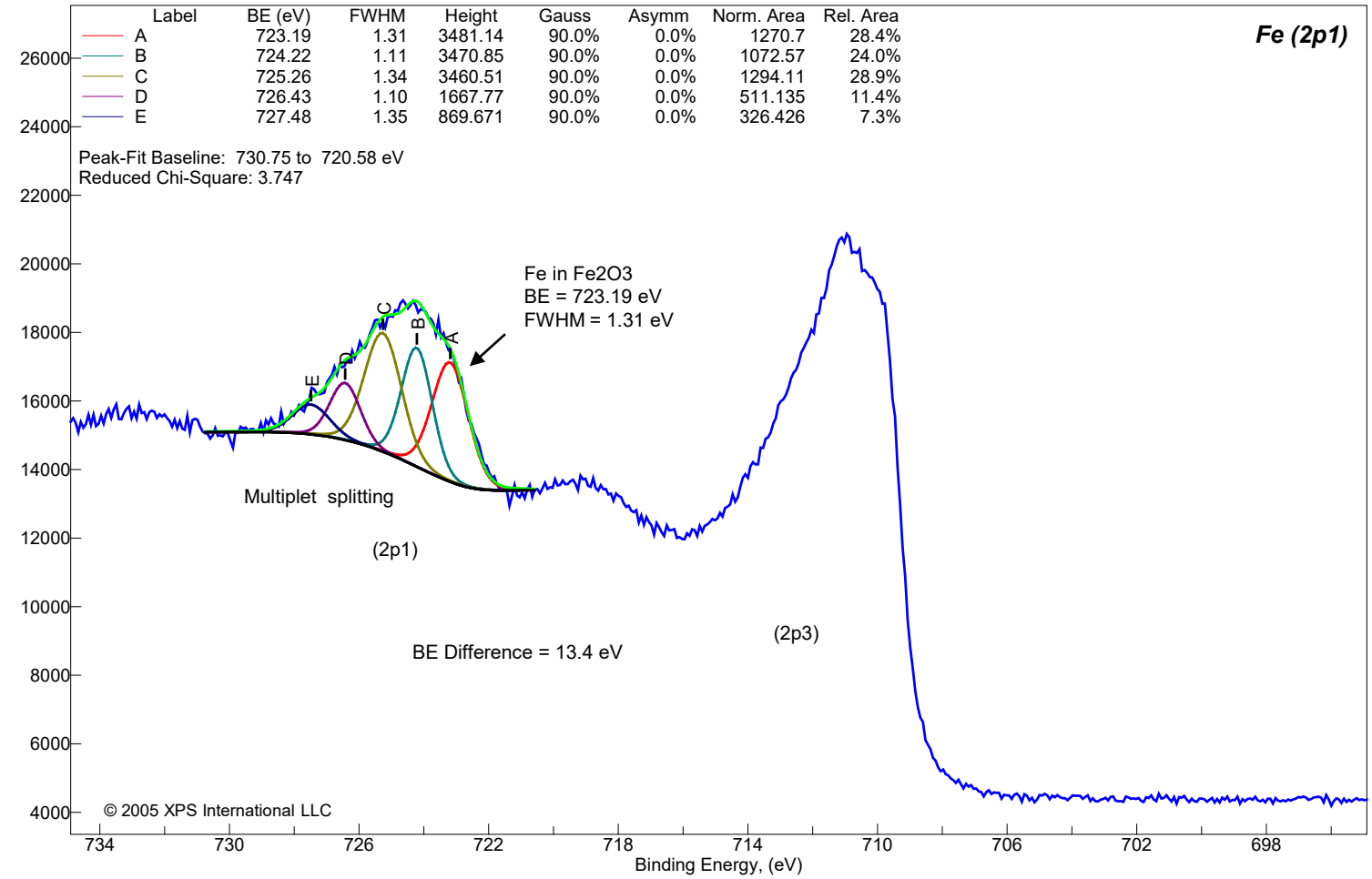


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α-Fe_2O_3

Iron (III) Oxide, alpha-type (FW = 159.69)

Sample Description: alpha-Fe2O3 (99.99+%) Rare Metallics #70924-60H Semi-Conduct., screen, 90 TOA



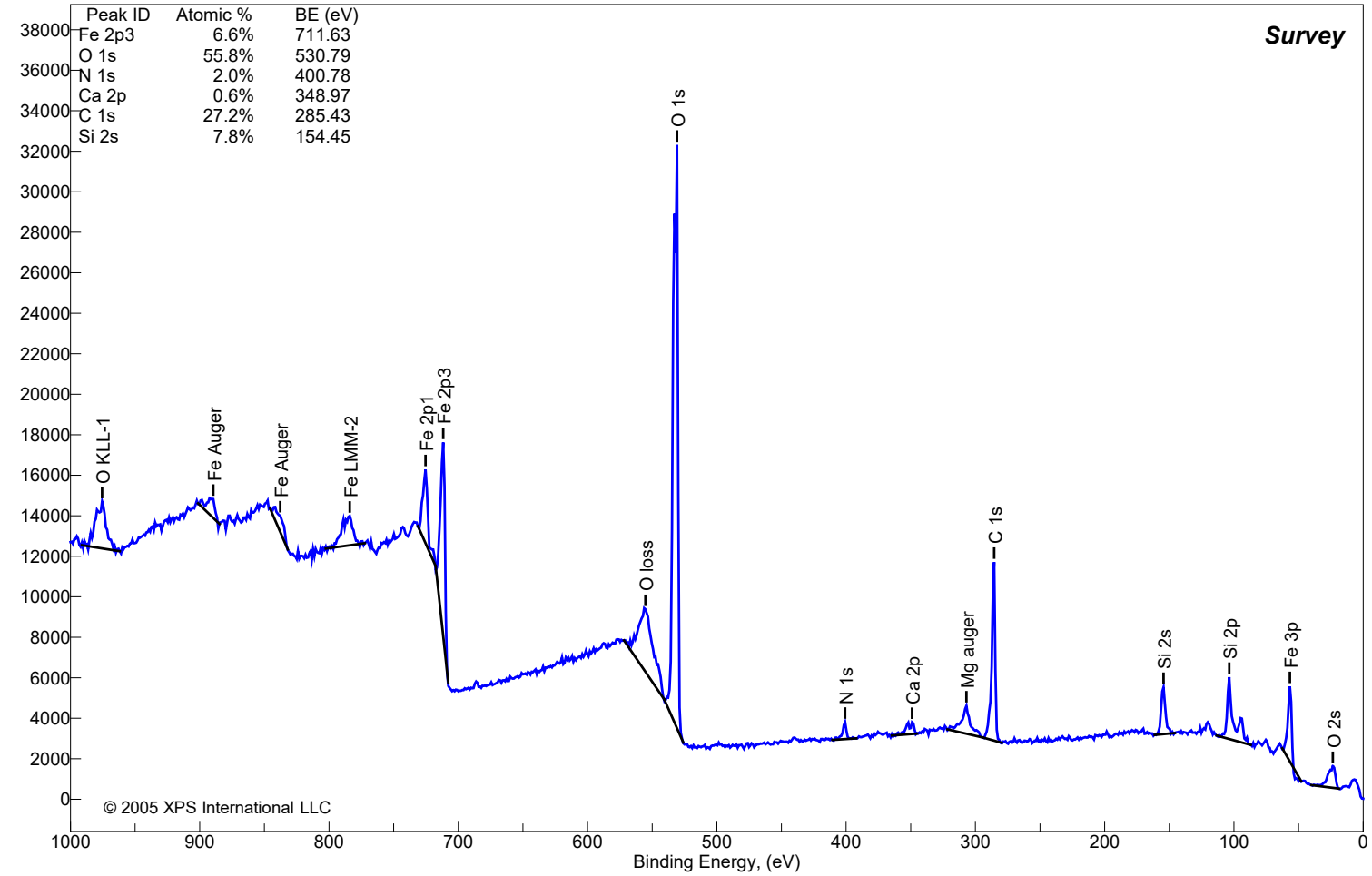
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α-Fe_2O_3
Hematite

Iron (III) Oxide, alpha-type (FW = 159.69)

Sample Description: alpha-Fe2O3 (Hematite) Arizona,USA bulk 90 TOA
Counts

Peak ID	Atomic %	BE (eV)
Fe 2p3	6.6%	711.63
O 1s	55.8%	530.79
N 1s	2.0%	400.78
Ca 2p	0.6%	348.97
C 1s	27.2%	285.43
Si 2s	7.8%	154.45

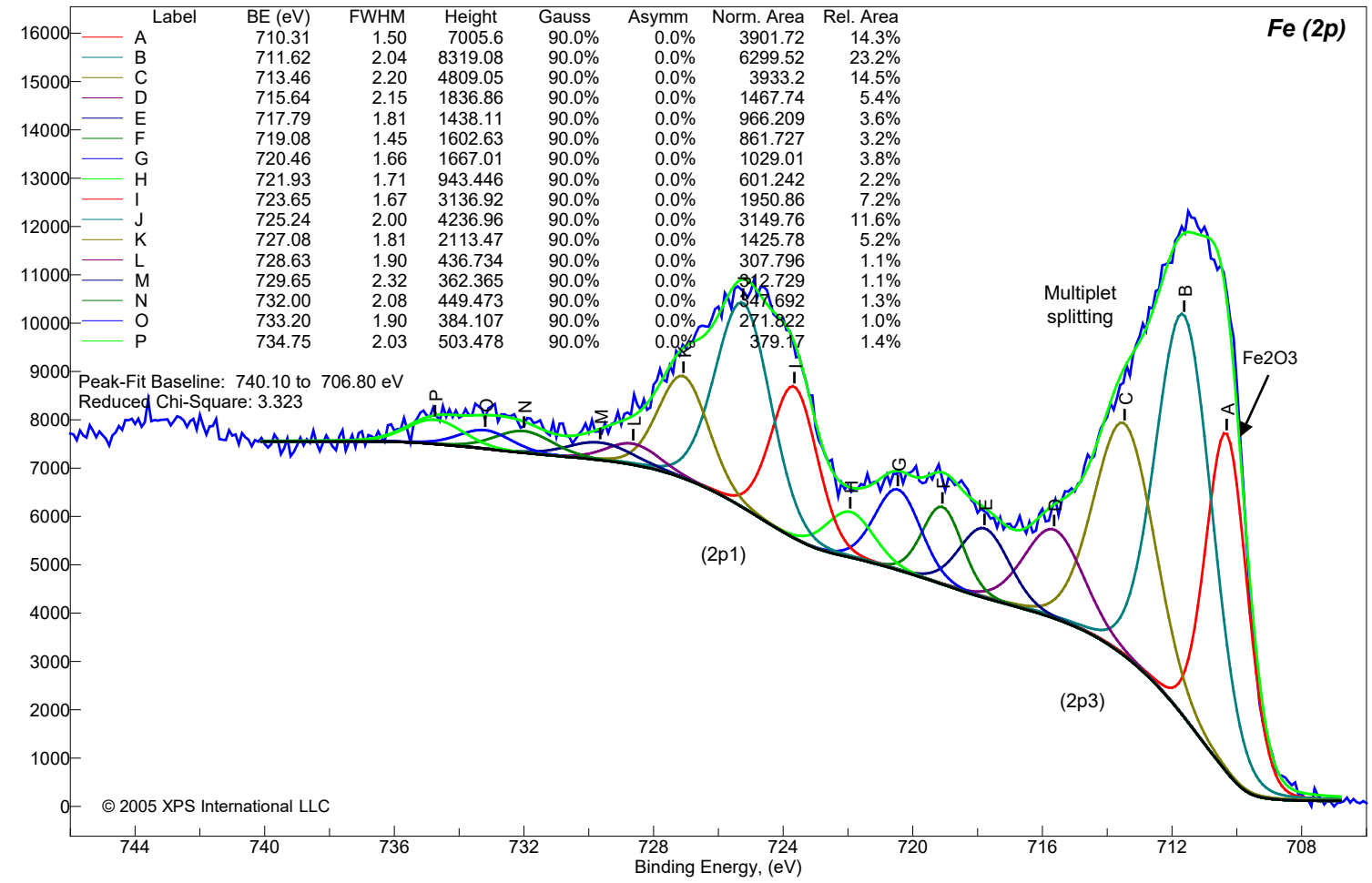


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α-Fe_2O_3
Hematite

Iron (III) Oxide, alpha-type (FW = 159.69)

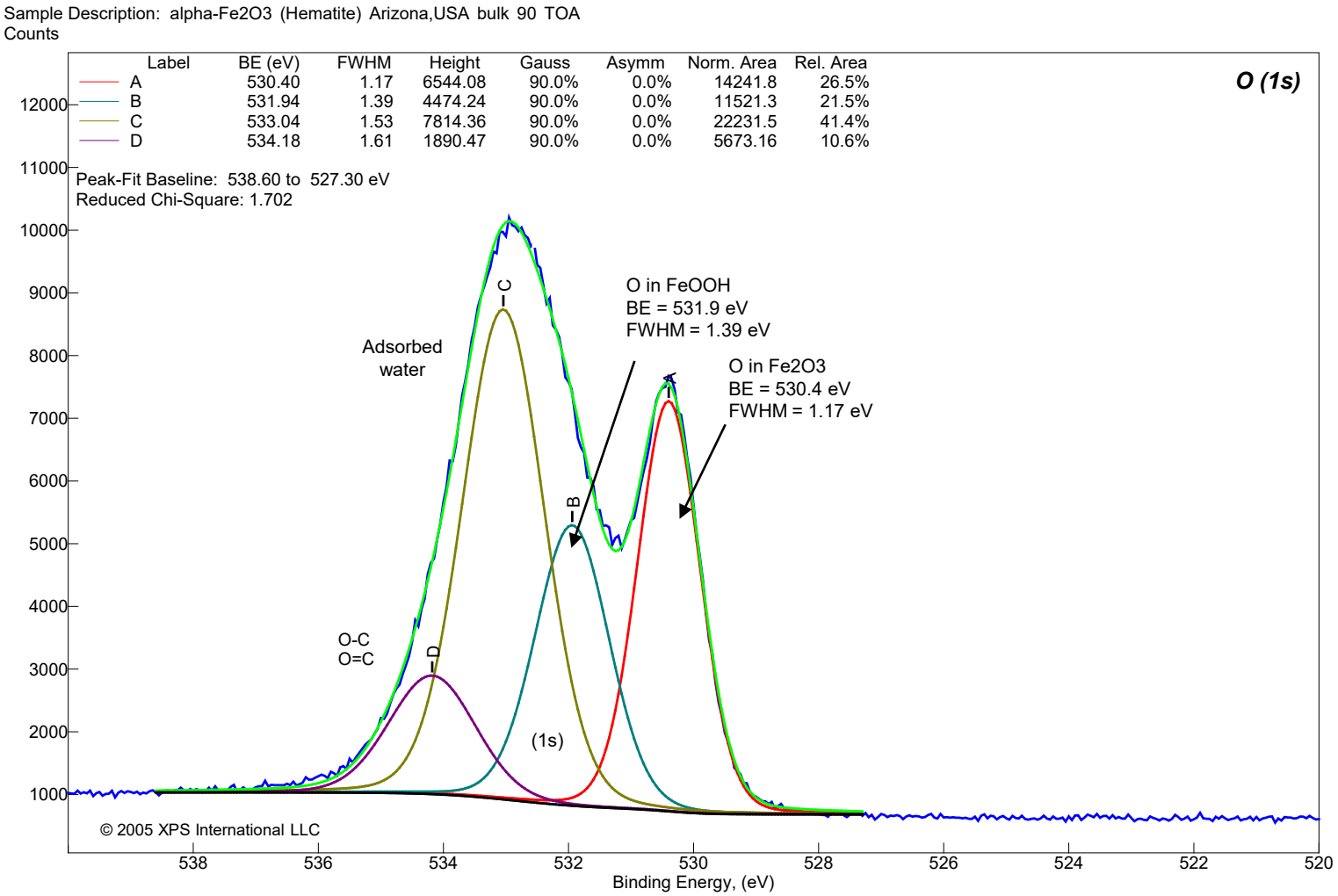
Sample Description: alpha-Fe2O3 (Hematite) Arizona,USA bulk 90 TOA



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α-Fe_2O_3
Hematite

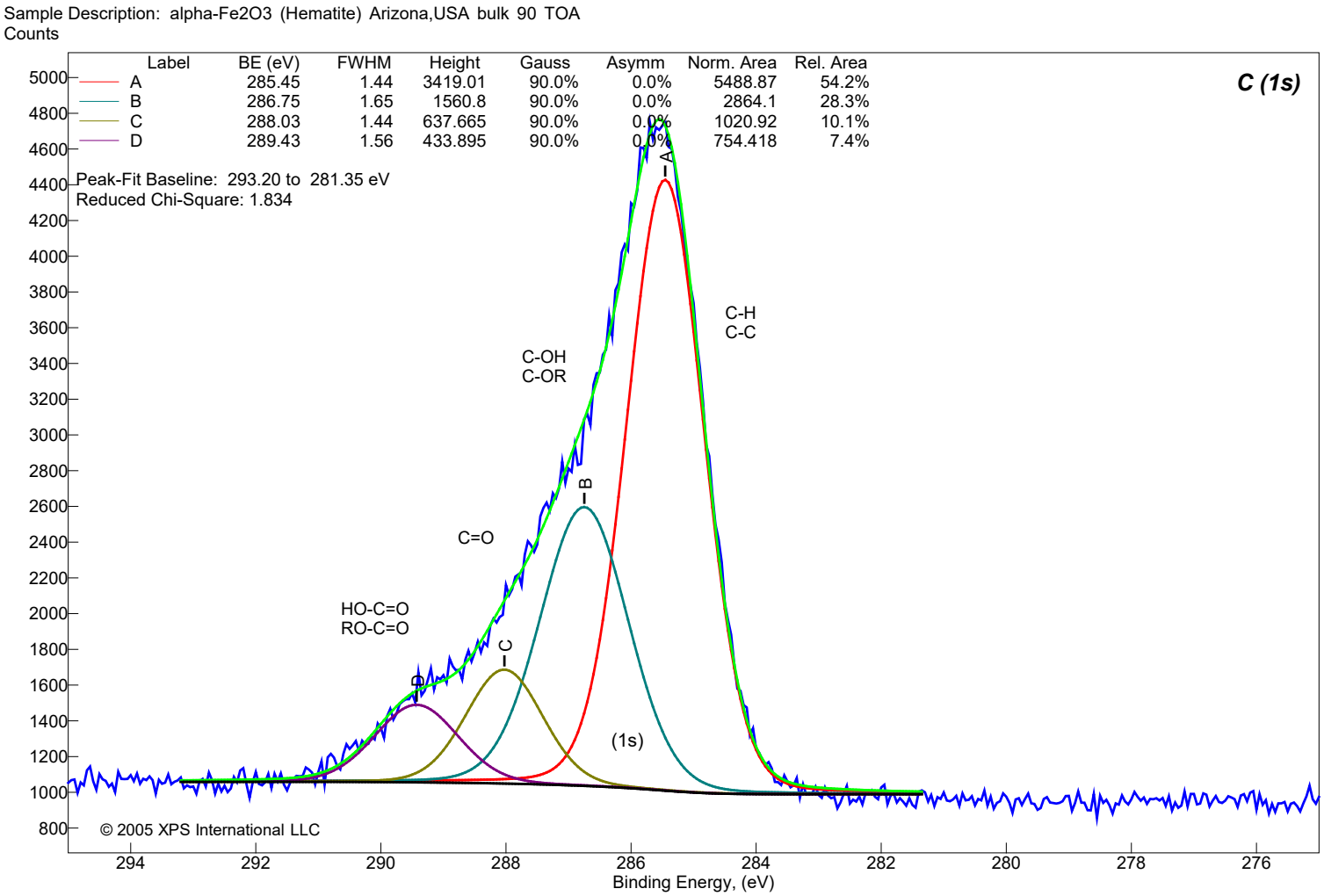
Iron (III) Oxide, alpha-type (FW = 159.69)



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α-Fe_2O_3
Hematite

Iron (III) Oxide, alpha-type (FW = 159.69)



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γ-Fe_2O_3

Iron (III) Oxide, gamma-type (FW = 159.69)
Surface Composition Table

Description: γ-Fe_2O_3 (95%) from Rare Metallics Co. Lot# 70924-10 , analyzed at 90 deg TOA, mesh at 1 mm, conductive black powder pressed into 3 mm pellet, mp 1565 C, d 5.24, sol in acid

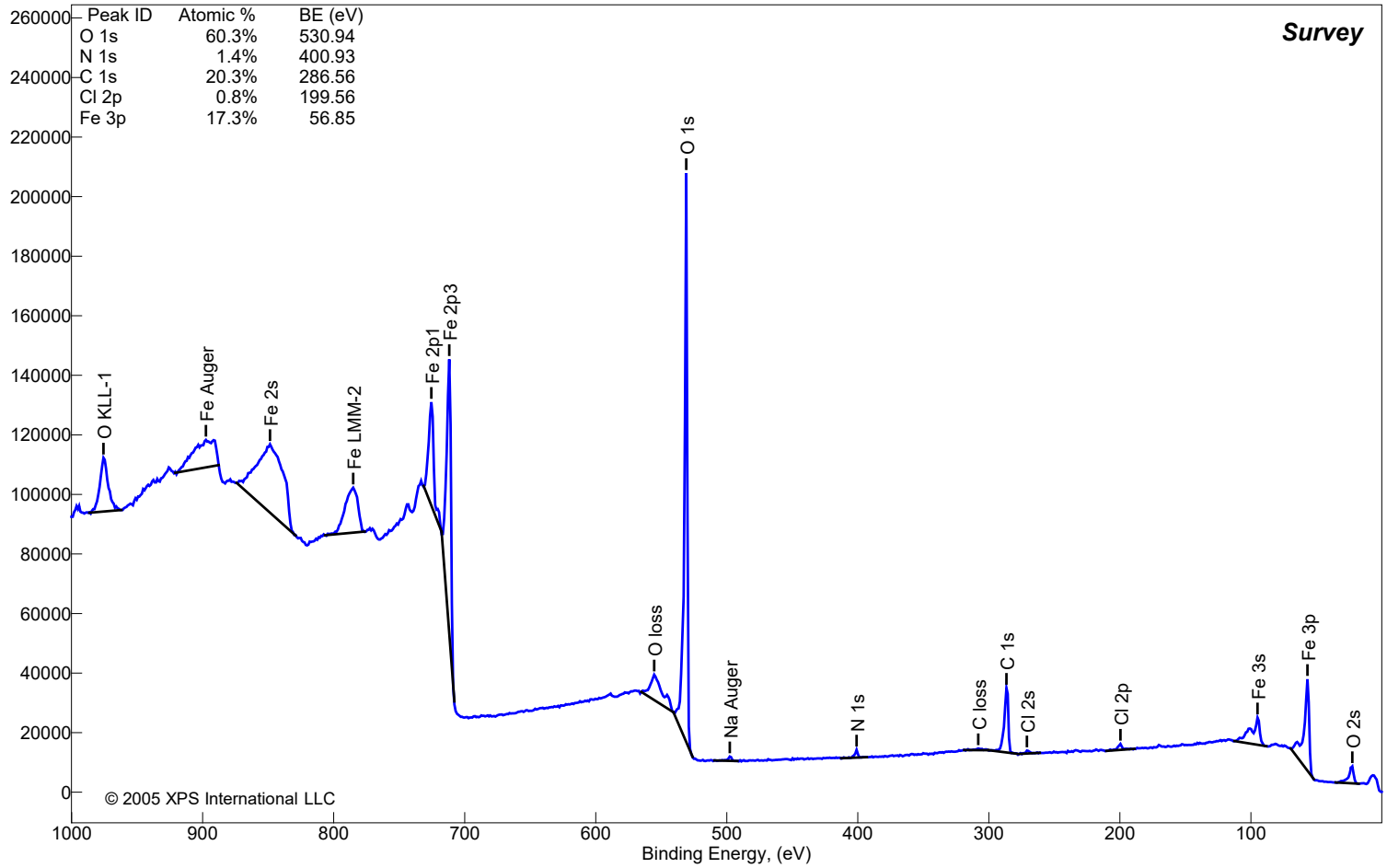
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	23.6	22.6	0.14	1.5	4,295	
Fe 3p	57.8	56.8	1.67	1.5	24,448	17.3%
Fe 3s	96.0	95.0	0.75	1.5	12,155	
Cl 2p	200.6	199.6	2.28	1.5	1,275	0.8%
Cl 2s	271.9	270.9	1.69	1.5	472	
C 1s	287.6	286.6	1.00	1.5	13,264	20.3%
C loss	309.1	308.1	0.00	1.5	515	
N 1s	401.9	400.9	1.80	1.5	1,404	1.4%
Na Auger	498.7	497.7	0.00	1.5	706	
O 1s	531.9	530.9	2.93	1.5	81,956	60.3%
O loss	556.4	555.4	0.00	1.5	15,644	
Fe 2p3	712.8	711.8	10.82	1.5	60,886	
Fe 2p1	726.5	725.5	5.60	1.5	28,072	
Fe LMM-2	786.1	785.1	0.28	1.5	29,183	
Fe 2s	849.6	848.6	4.57	1.5	88,618	
Fe Auger	898.5	897.5	0.00	1.5	29,346	
O KLL-1	976.7	975.7	0.70	1.5	22,155	

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γ-Fe_2O_3

Iron (III) Oxide, gamma-type (FW = 159.69)

Sample Description: gamma-Fe2O3 (95%) from Rare Metallics Corp., lot #70924-10, conductive pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height

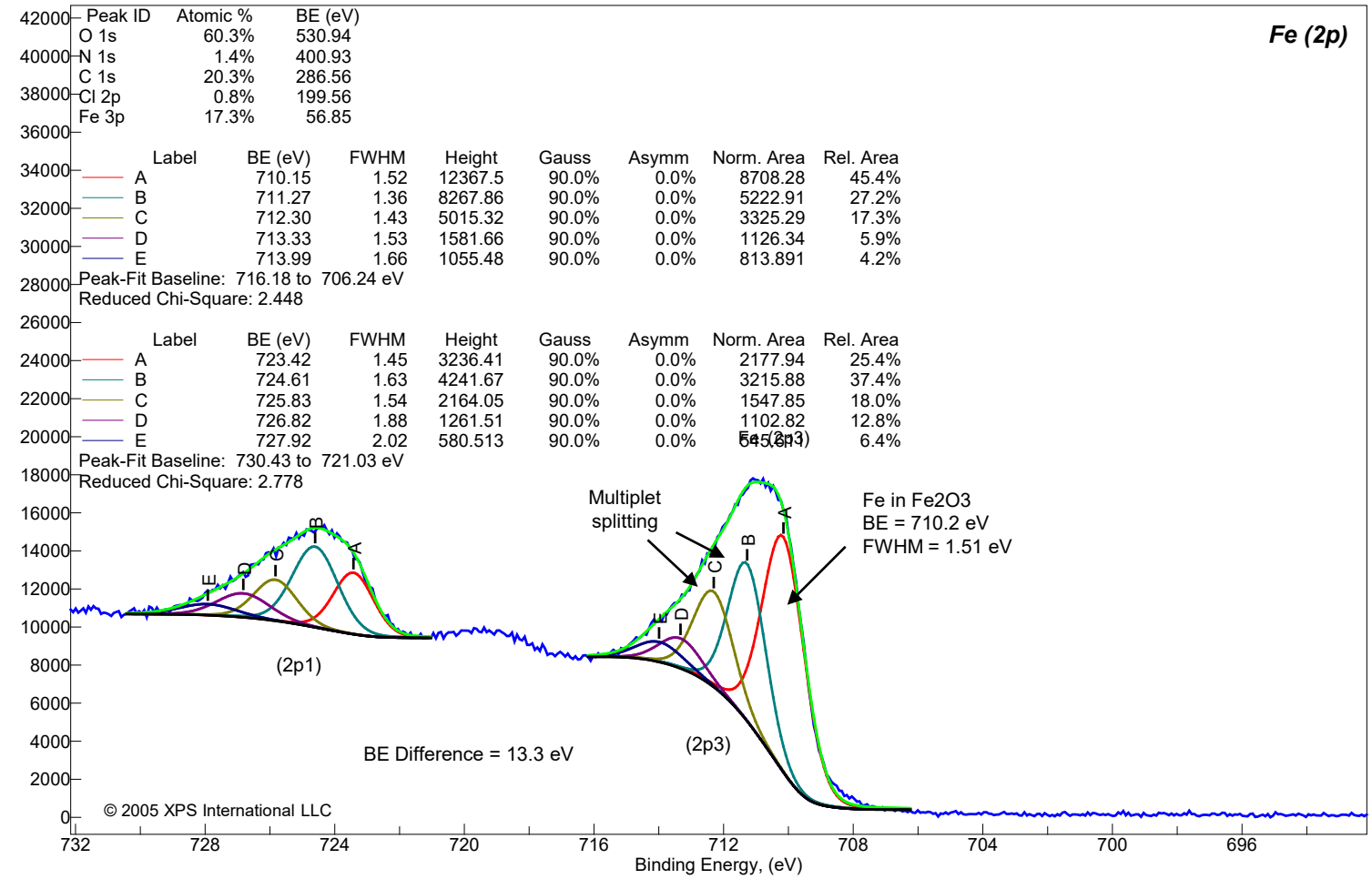


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γ-Fe_2O_3

Iron (III) Oxide, gamma-type (FW = 159.69)

Sample Description: gamma-Fe2O3 (95%, Mg) RMC #70924-10, 3mm pellet, CONDUCTIVE, 90 TOA

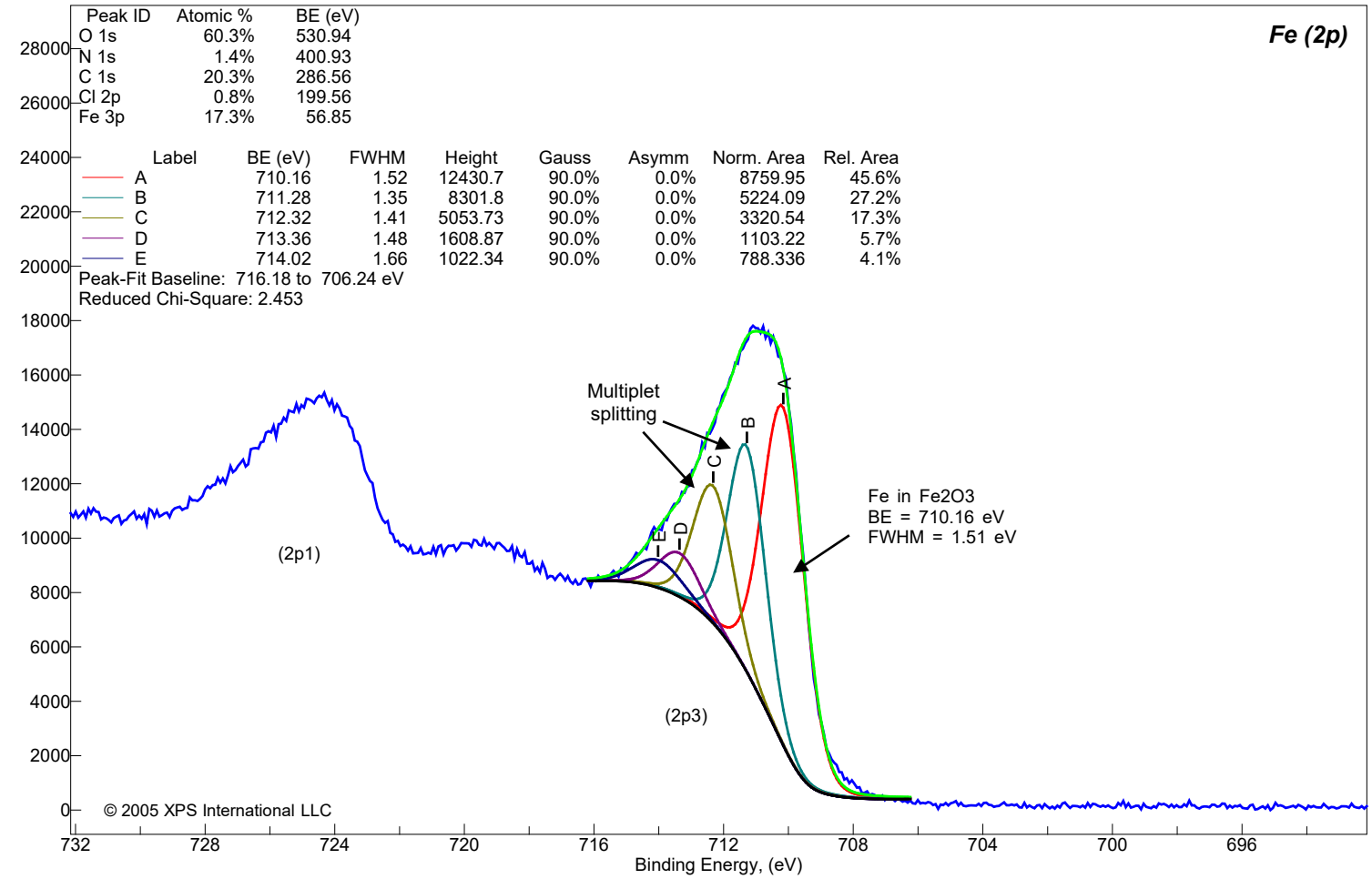


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γ-Fe_2O_3

Iron (III) Oxide, gamma-type (FW = 159.69)

Sample Description: gamma-Fe2O3 (95%, Mg) RMC #70924-10, 3mm pellet, CONDUCTIVE, 90 TOA

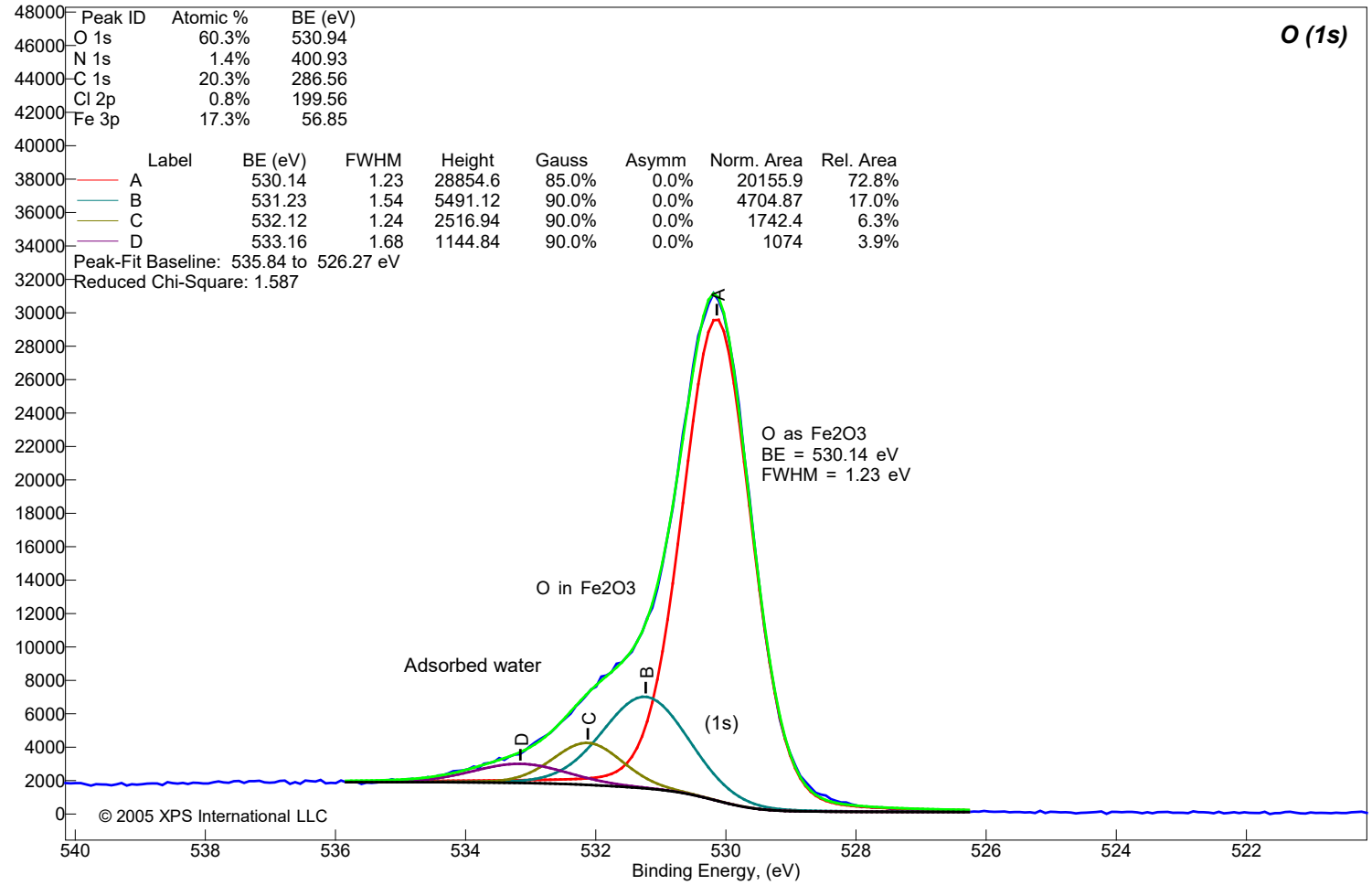


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γ-Fe_2O_3

Iron (III) Oxide, gamma-type (FW = 159.69)

Sample Description: gamma-Fe2O3 (95%, Mg) RMC #70924-10, 3mm pellet, CONDUCTIVE, 90 TOA

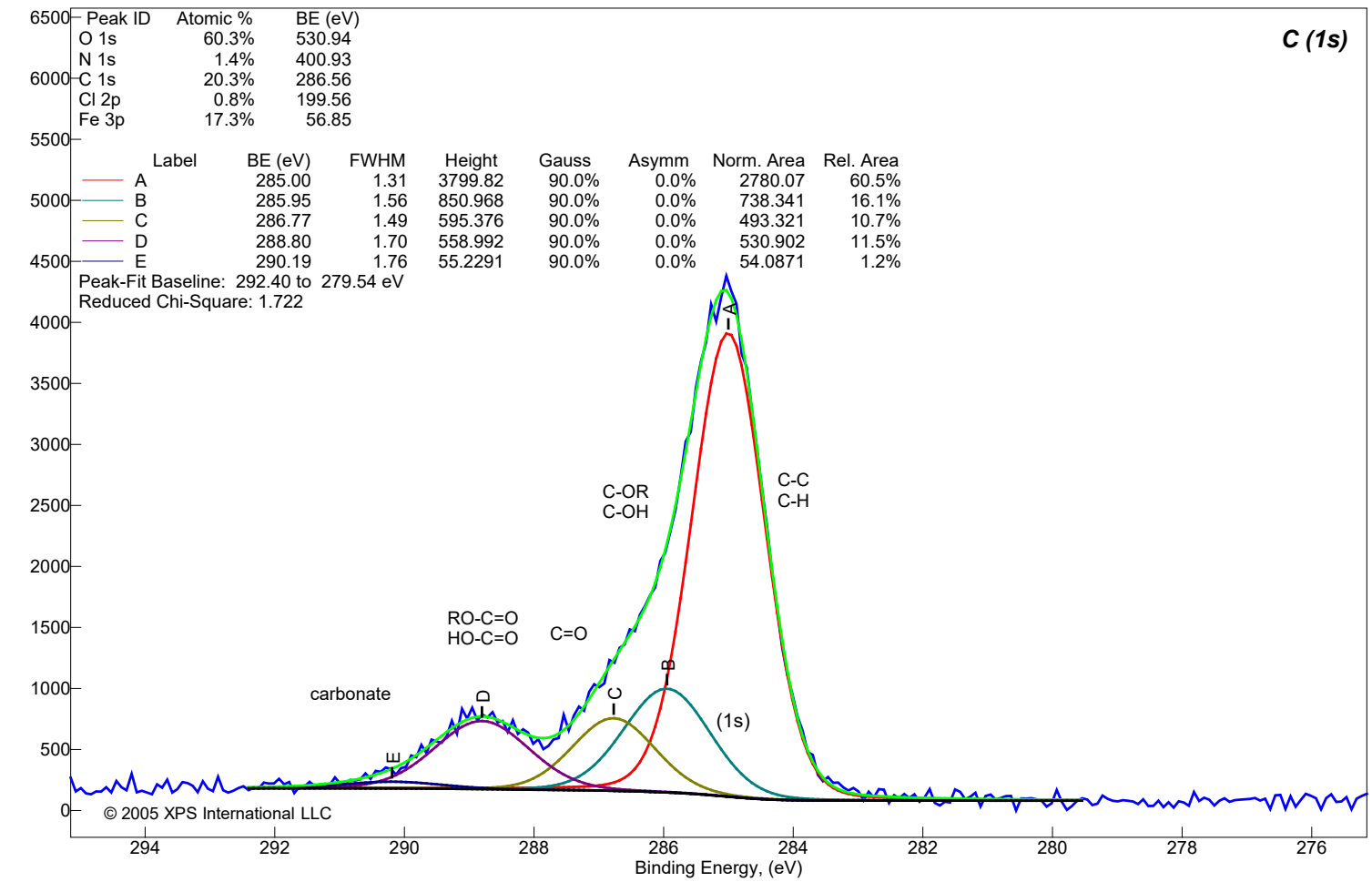


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γ-Fe_2O_3

Iron (III) Oxide, gamma-type (FW = 159.69)

Sample Description: gamma-Fe2O3 (95%, Mg) RMC #70924-10, 3mm pellet, CONDUCTIVE, 90 TOA

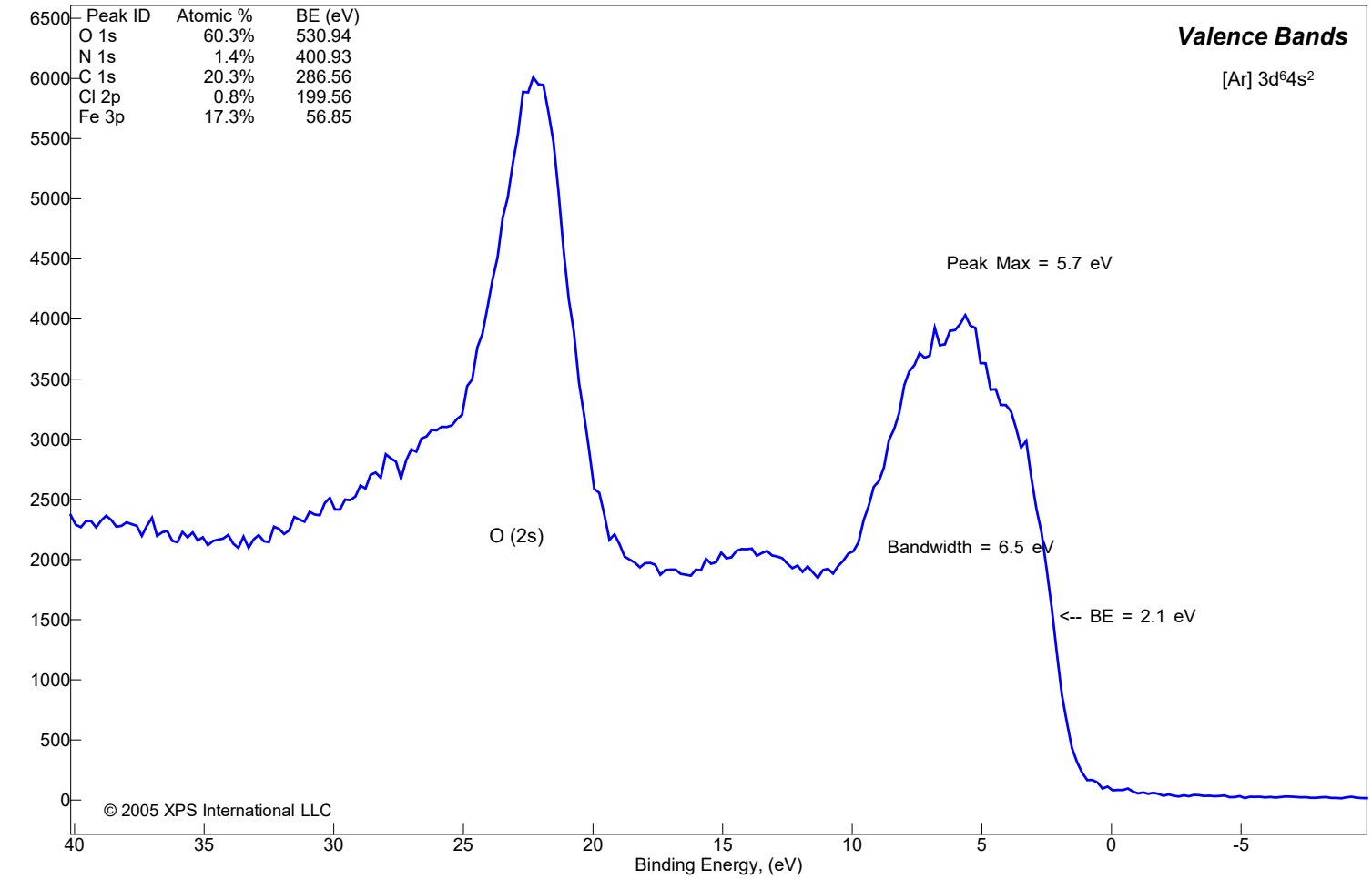


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γ-Fe_2O_3

Iron (III) Oxide, gamma-type (FW = 159.69)

Sample Description: gamma-Fe2O3 (95%, Mg) RMC #70924-10, 3mm pellet, CONDUCTIVE, 90 TOA

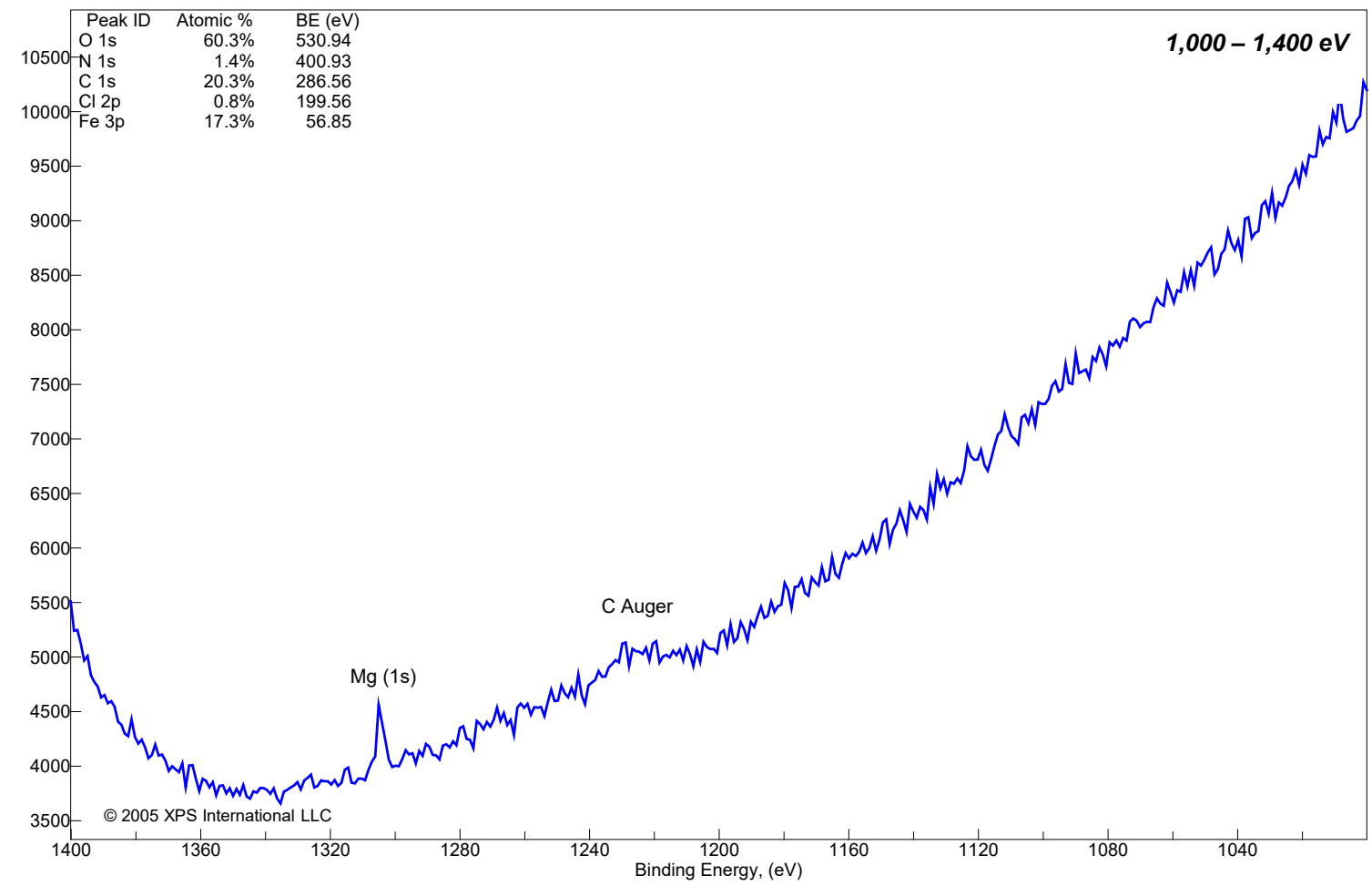


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γ-Fe_2O_3

Iron (III) Oxide, gamma-type (FW = 159.69)

Sample Description: gamma-Fe2O3 (95%, Mg) RMC #70924-10, 3mm pellet, CONDUCTIVE, 90 TOA

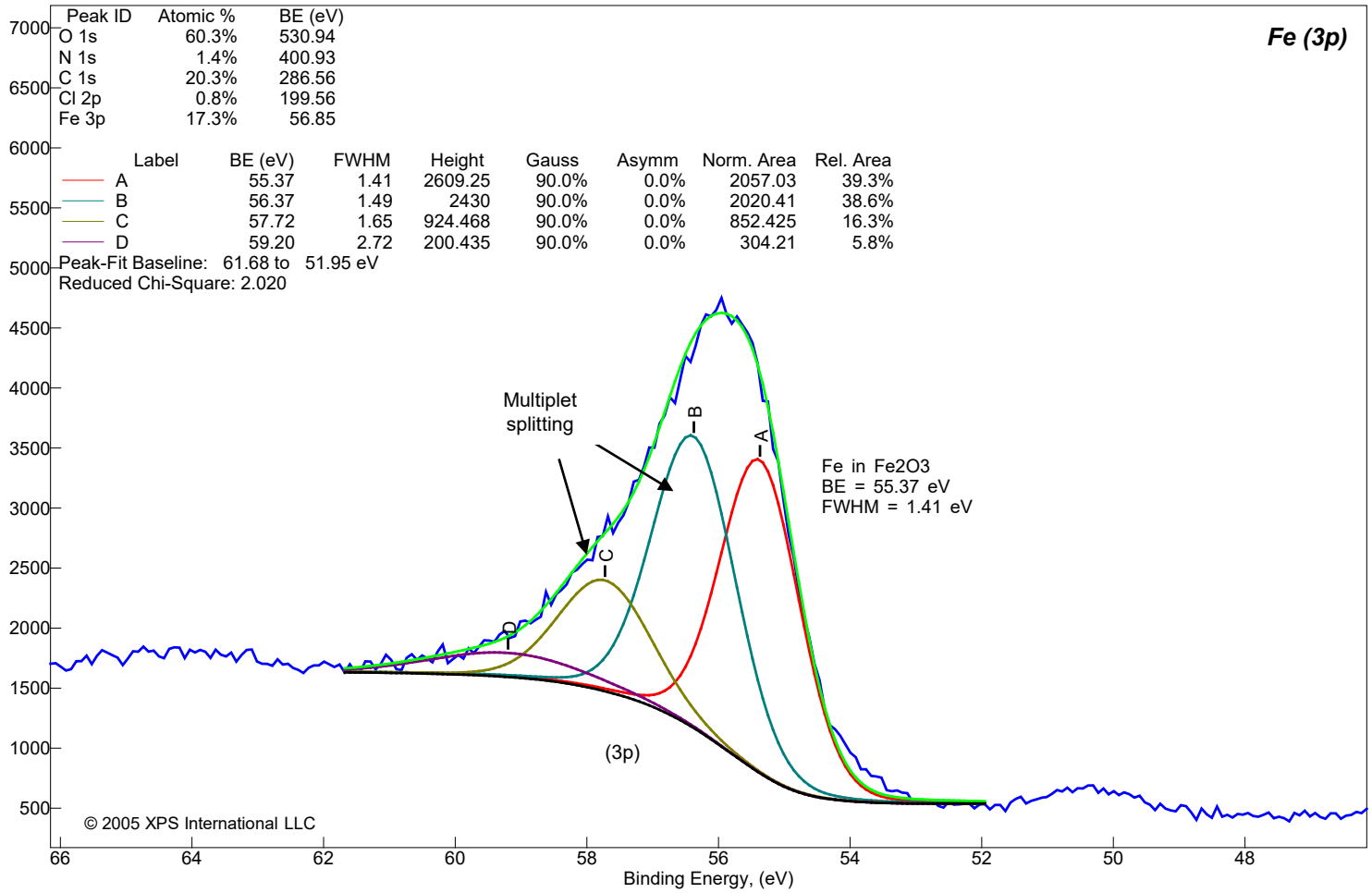


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γ-Fe_2O_3

Iron (III) Oxide, gamma-type (FW = 159.69)

Sample Description: gamma-Fe2O3 (95%, Mg) RMC #70924-10, 3mm pellet, CONDUCTIVE, 90 TOA



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Fe_3O_4

Iron (II, III) Oxide (FW = 234.54)
Surface Composition Table

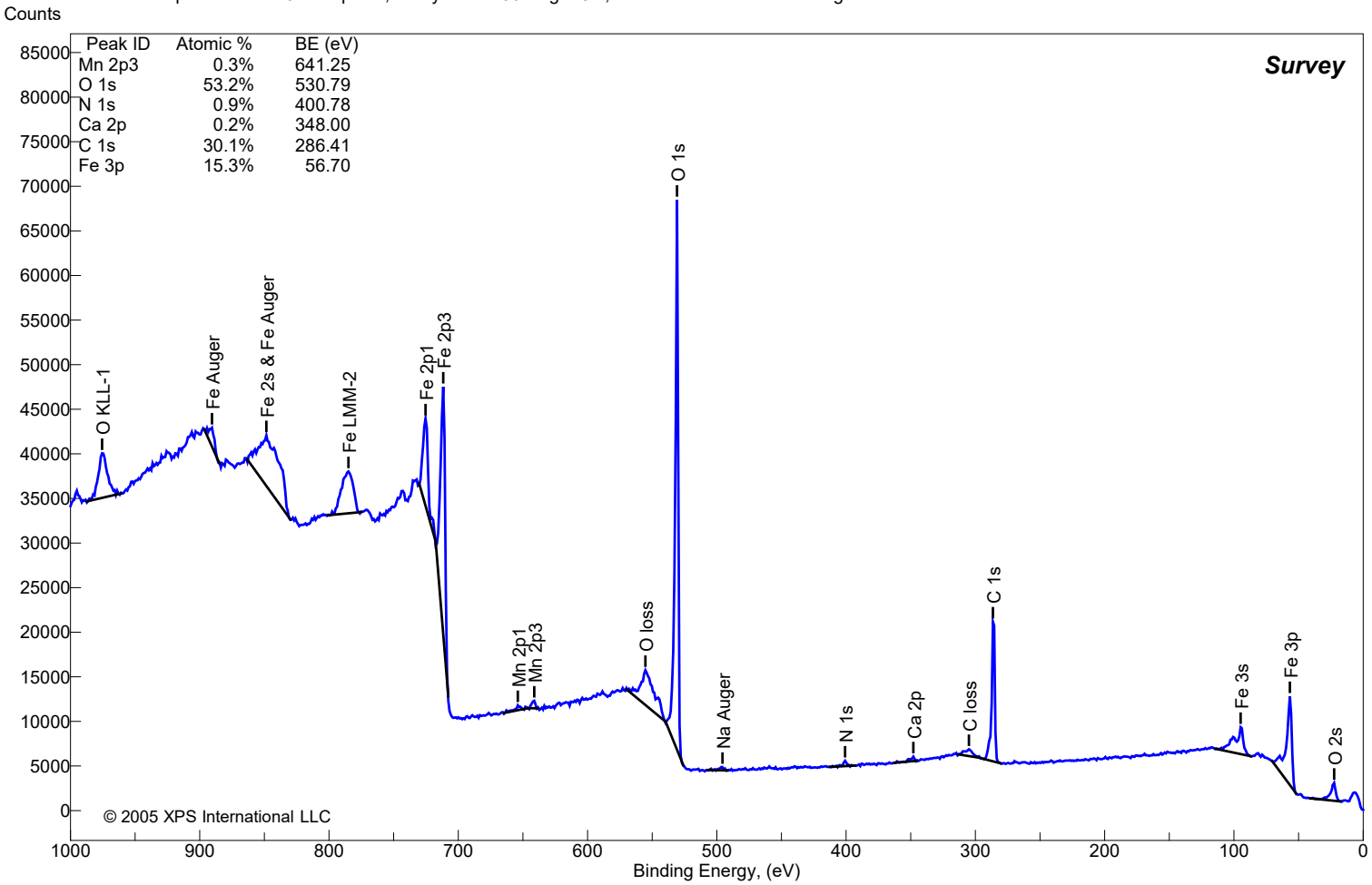
Description: Fe_3O_4 (99.9%) from Rare Metallics Co. Lot# 70924-10, analyzed at 90 deg TOA, mesh at 1 mm, conductive black powder pressed into 3 mm pellet, mp 1538 C, d 5.2

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	22.5	22.5	0.14	1.5	2,950	
Fe 3p	56.7	56.7	1.67	1.5	16,123	15.3%
Fe 3s	94.8	94.8	0.75	1.5	8,024	
C 1s	286.4	286.4	1.00	1.5	14,562	30.1%
C loss	305.0	305.0	0.00	1.5	1,831	
Ca 2p	348.0	348.0	5.07	1.5	492	0.2%
N 1s	400.8	400.8	1.80	1.5	649	0.9%
Na Auger	495.6	495.6	0.00	1.5	518	
O 1s	530.8	530.8	2.93	1.5	53,706	53.2%
O loss	555.2	555.2	0.00	1.5	15,361	
Mn 2p3	641.3	641.3	9.17	1.5	705	0.3%
Mn 2p1	654.0	654.0	4.74	1.5	1,098	
Fe 2p3	711.6	711.6	10.82	1.5	36,509	
Fe 2p1	725.3	725.3	5.60	1.5	15,522	
Fe LMM-2	784.9	784.9	0.28	1.5	15,274	
Fe 2s & Fe Auger	848.5	848.5	4.57	1.5	36,425	
Fe Auger	890.5	890.5	0.00	1.5	2,772	
O KLL-1	975.6	975.6	0.70	1.5	13,319	

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Iron (II, III) Oxide (FW = 234.54)

Sample Description: Fe3O4 (99.9%) from Rare Metallics Corp., lot# 70924-10, conductive pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height

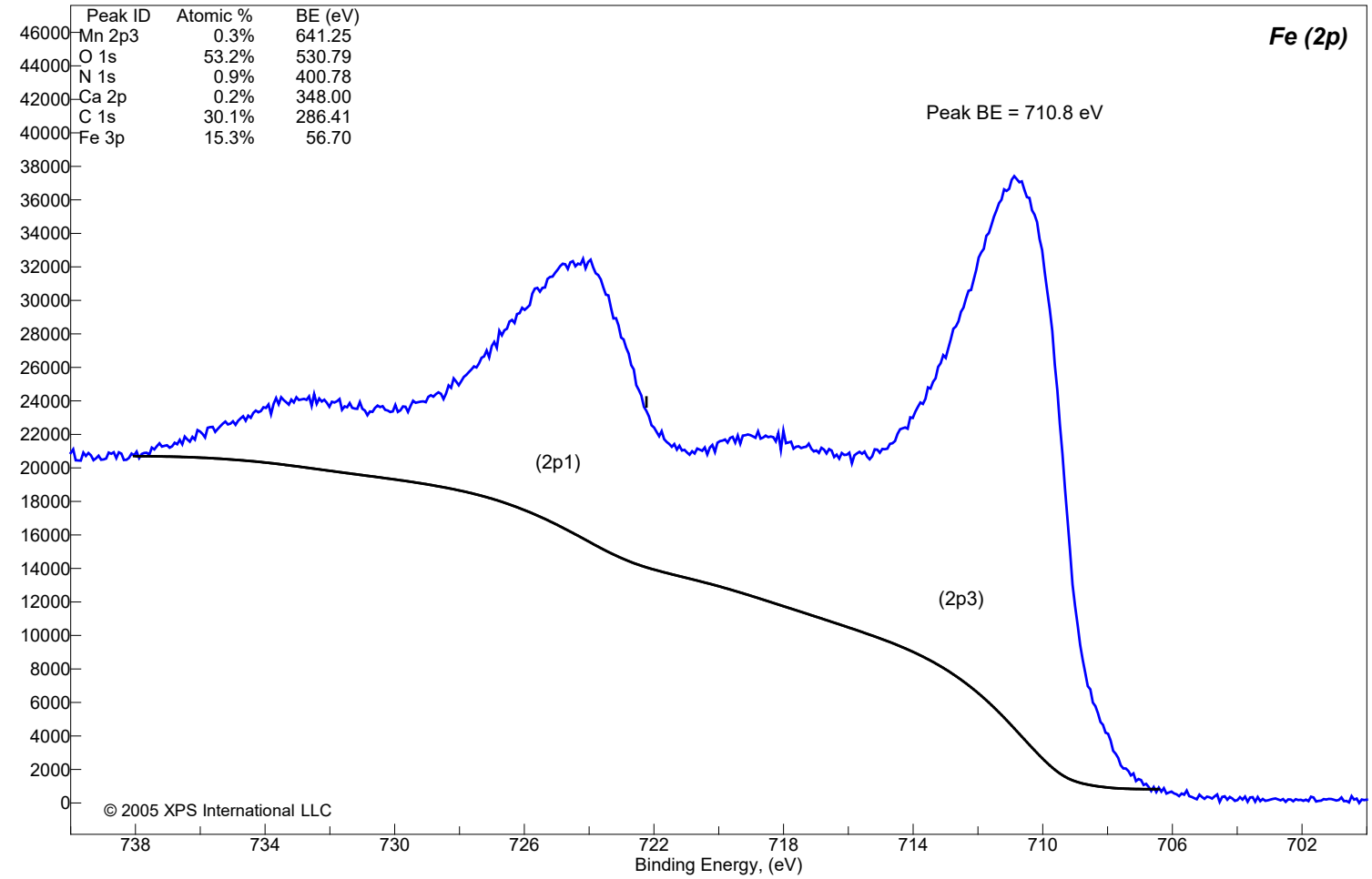


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Fe_3O_4

Iron (II, III) Oxide (FW = 234.54)

Sample Description: Fe3O4 (99.9%) RMC #70924-10 CONDUCTIVE 90 TOA

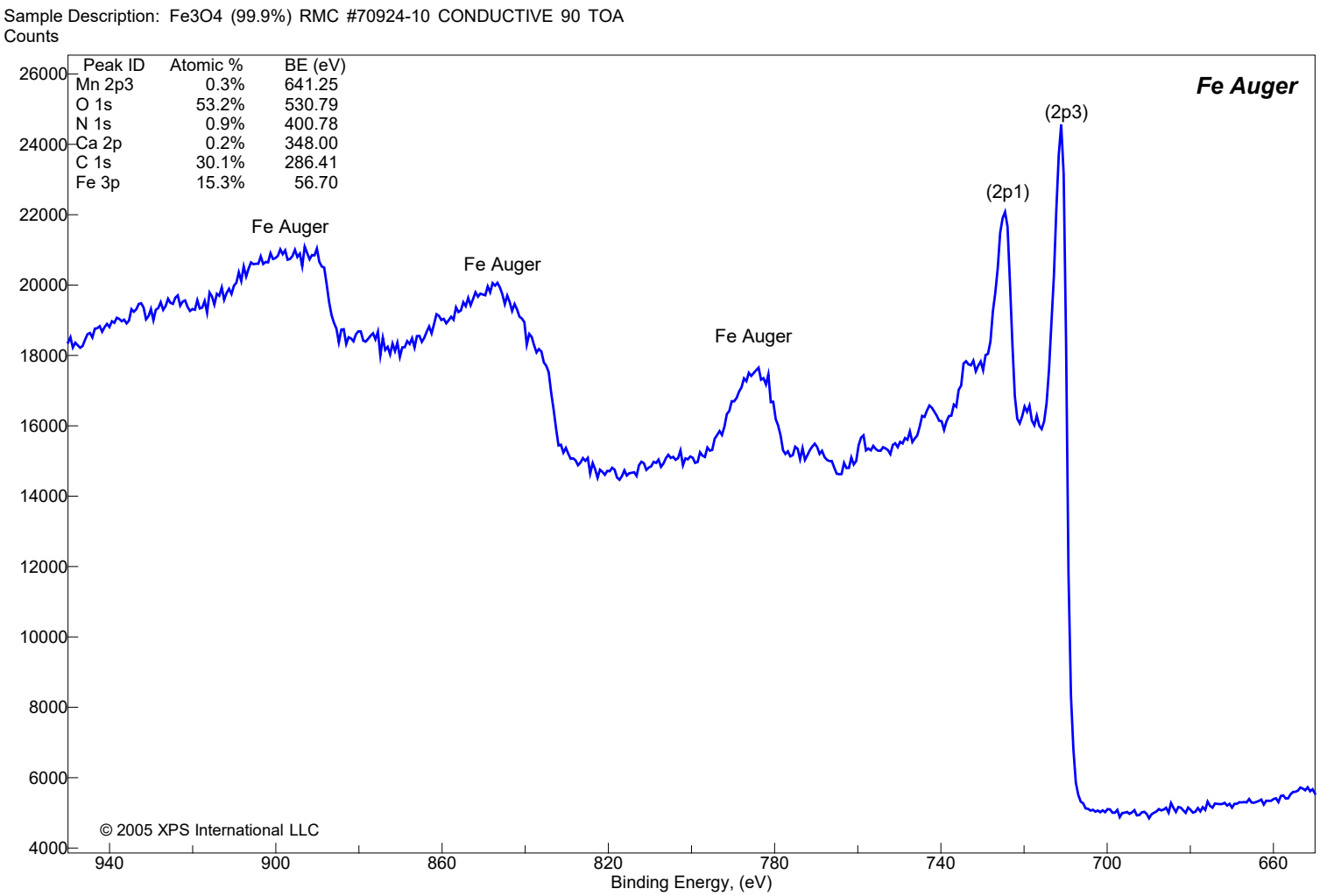


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Fe_3O_4

Iron (II, III) Oxide (FW = 234.54)

Sample Description: Fe3O4 (99.9%) RMC #70924-10 CONDUCTIVE 90 TOA

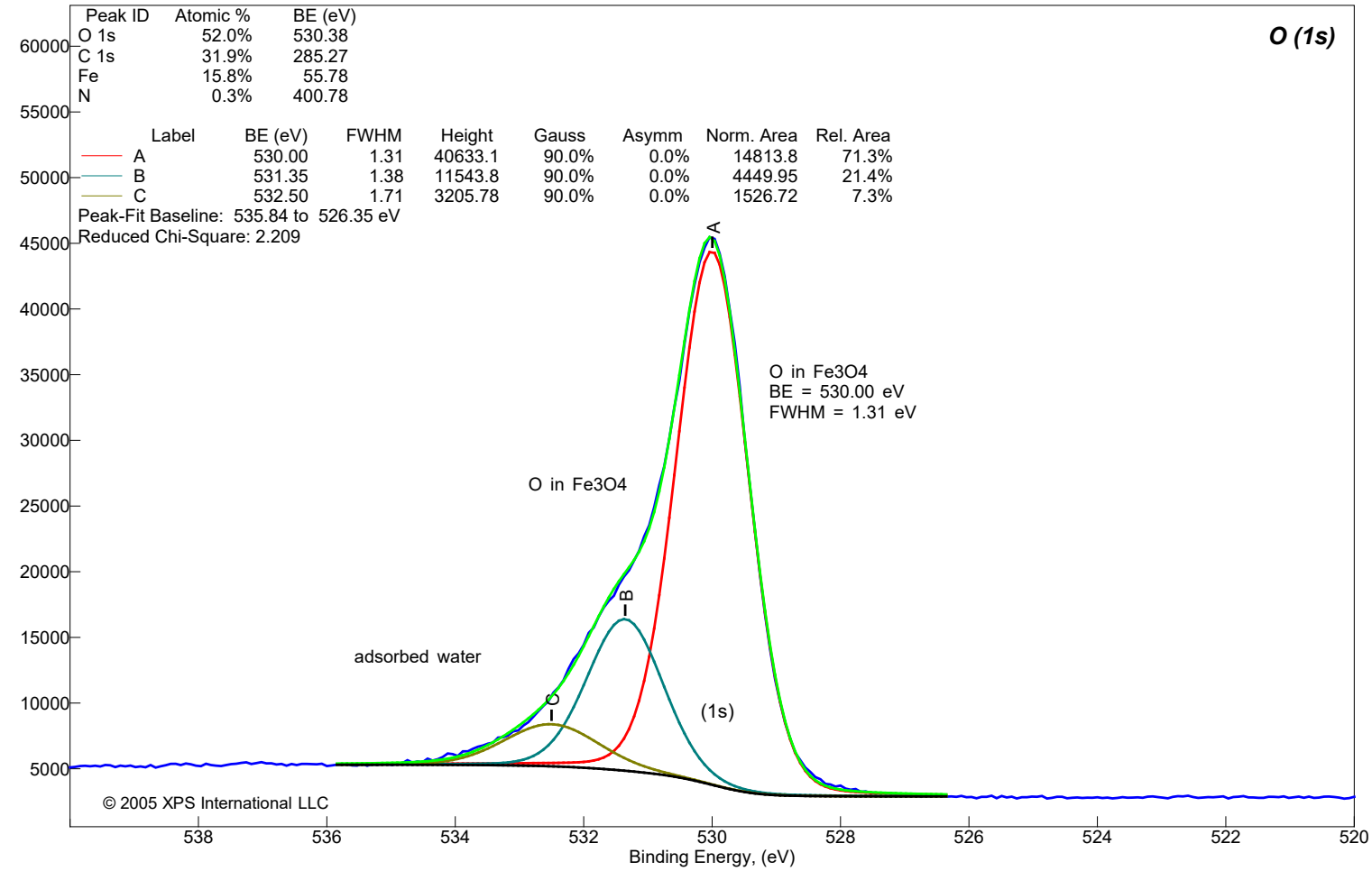


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Fe_3O_4

Iron (II, III) Oxide (FW = 234.54)

Sample Description: Fe3O4 (99.9%) RMC #70924-10 CONDUCTIVE 90 TOA

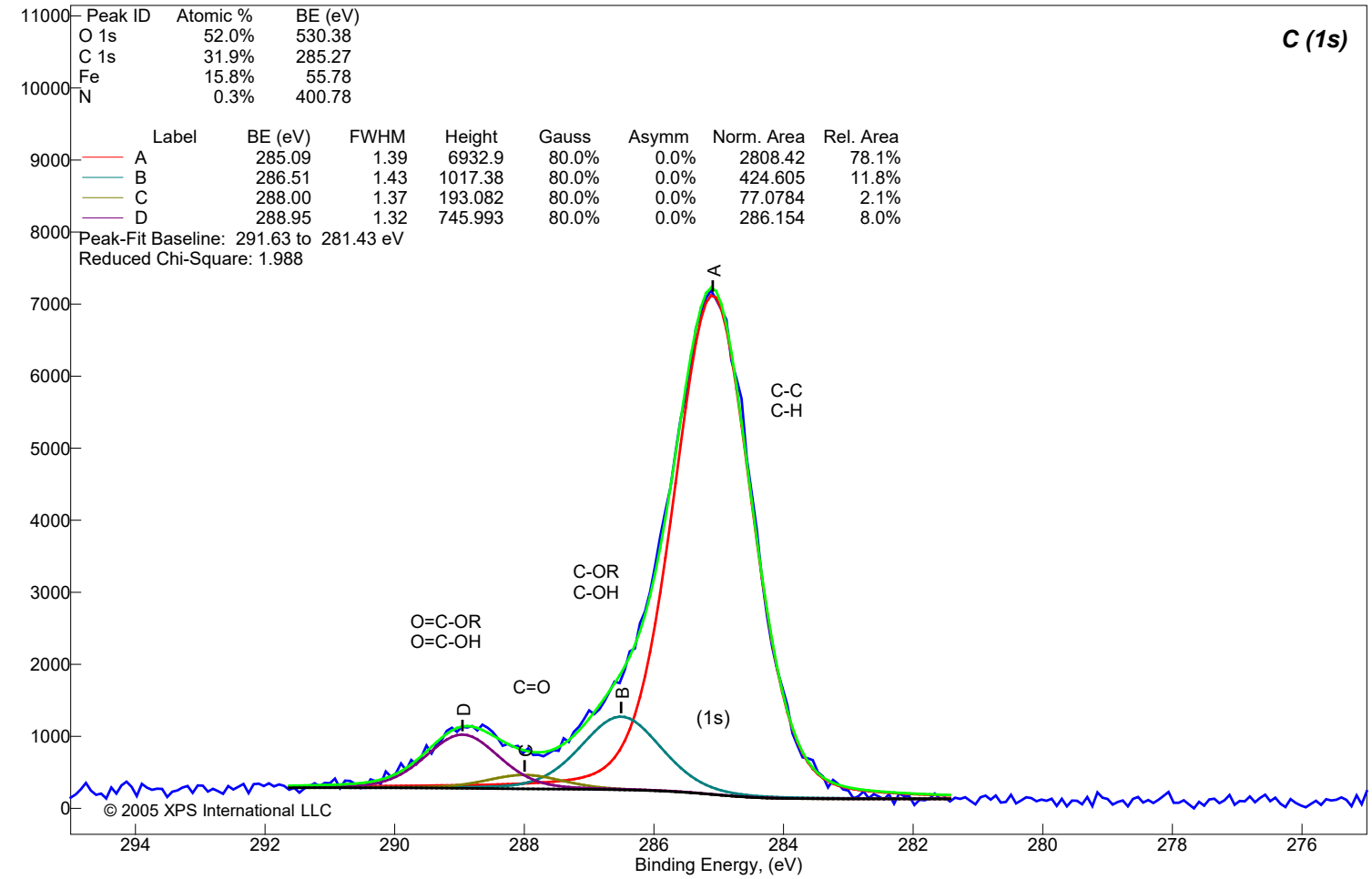


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Fe_3O_4

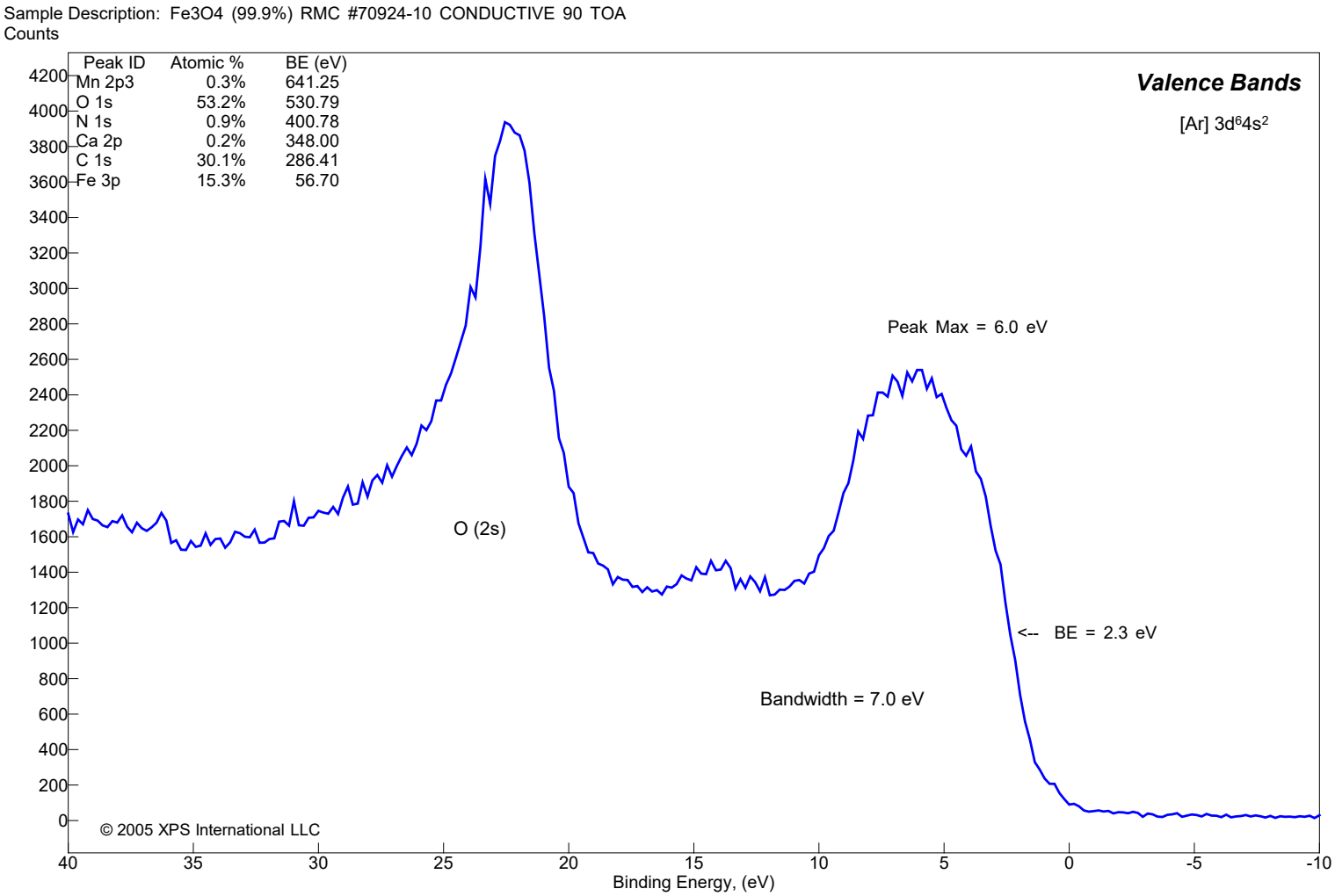
Iron (II, III) Oxide (FW = 234.54)

Sample Description: Fe3O4 (99.9%) RMC #70924-10 CONDUCTIVE 90 TOA



Fe_3O_4

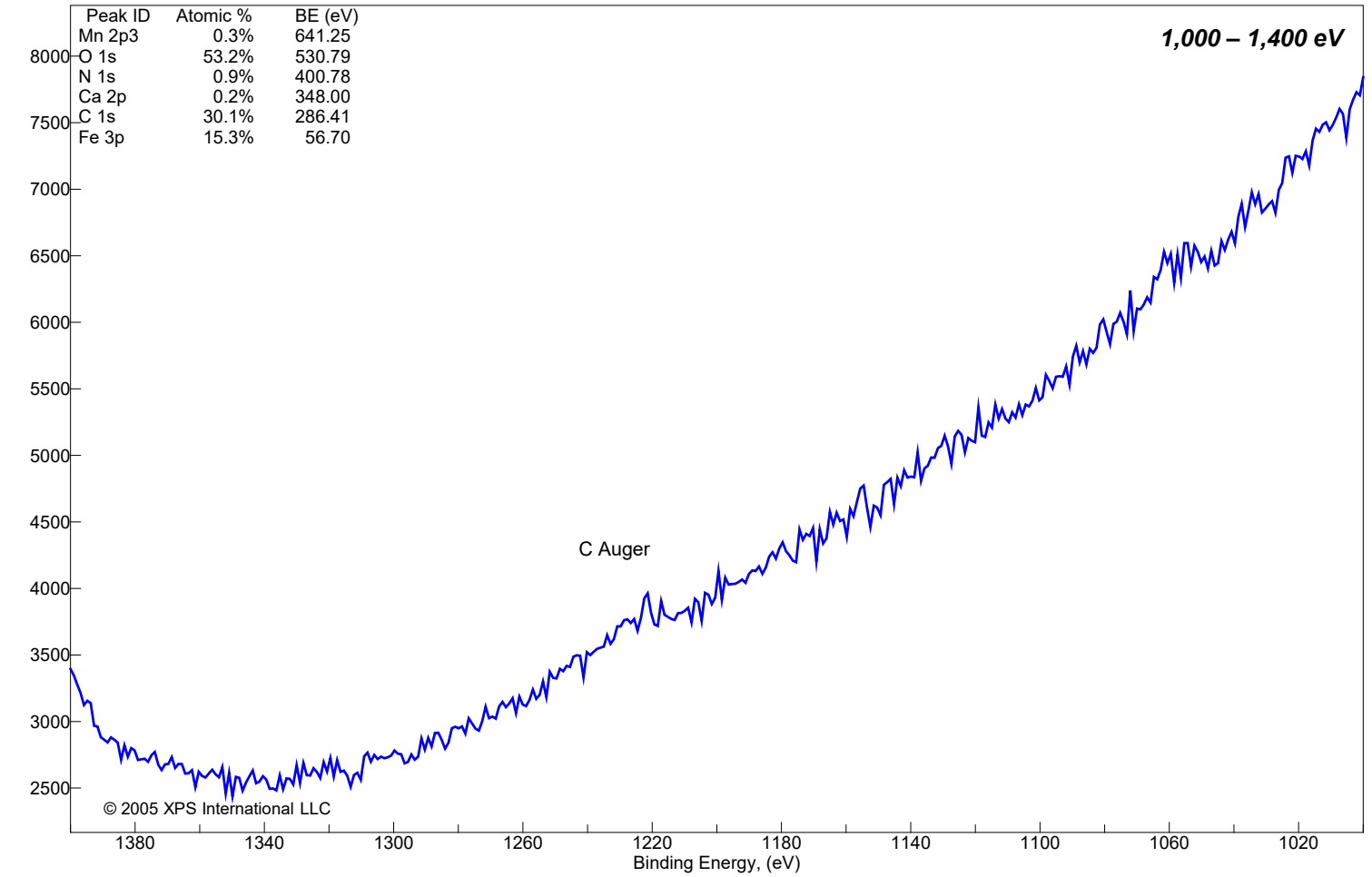
Iron (II, III) Oxide (FW = 234.54)



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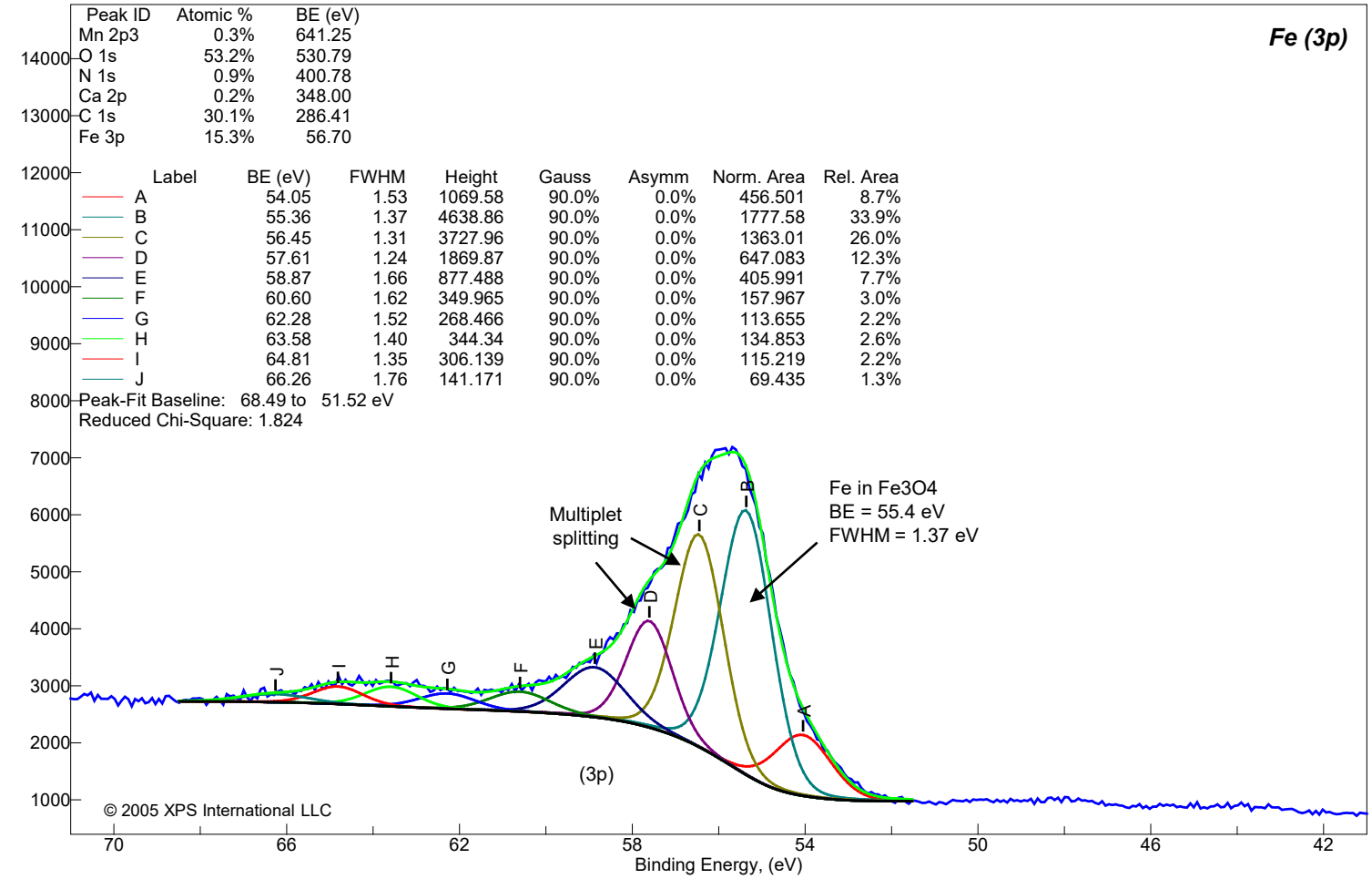
Iron (II, III) Oxide (FW = 234.54)

Sample Description: Fe3O4 (99.9%) RMC #70924-10 CONDUCTIVE 90 TOA



Iron (II, III) Oxide (FW = 234.54)

Sample Description: Fe3O4 (99.9%) RMC #70924-10 CONDUCTIVE 90 TOA



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α-FeOOH
Goethite

Iron (III) Hydroxide, alpha-type (FW = 88.85)
Surface Composition Table

Description: α-FeOOH (99.999%) from Rare Metallics Co. Lot# 70924-01, analyzed at 90 deg TOA, mesh at 1 mm, conductive pale green powder pressed into 3 mm pellet, mp dec, d 3.4, sol in acid

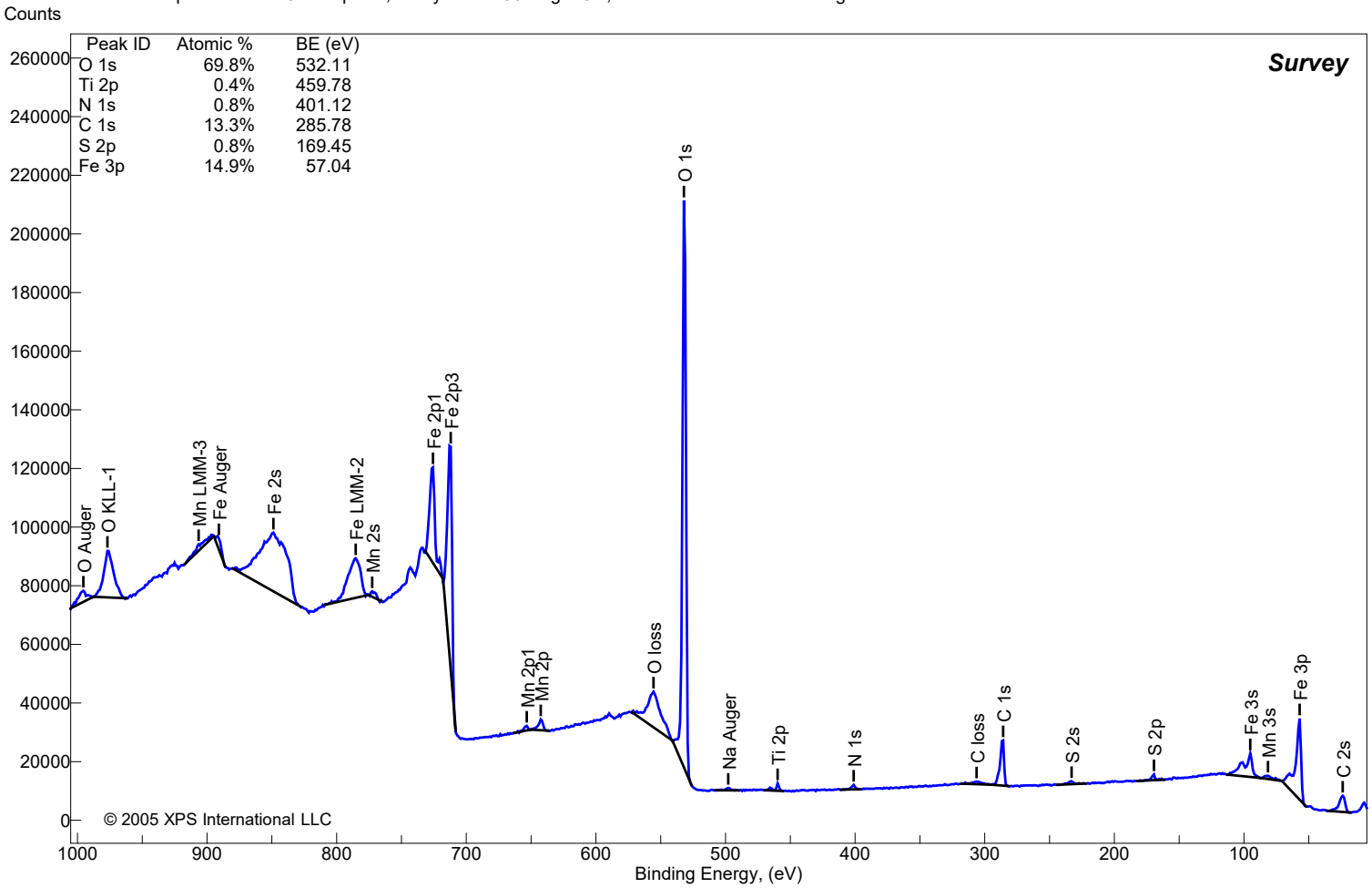
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
C 2s	23.8	23.8	0.15	1.5	5,156	
Fe 3p	57.0	57.0	1.67	1.5	23,312	14.9%
Mn 3s	81.5	81.5	0.67	1.5	1,514	
Fe 3s	95.2	95.2	0.75	1.5	11,342	
S 2p	169.5	169.5	1.68	1.5	1,122	0.8%
S 2s	233.0	233.0	1.43	1.5	889	
C 1s	285.8	285.8	1.00	1.5	9,554	13.3%
C loss	306.3	306.3	0.00	1.5	1,327	
N 1s	401.1	401.1	1.80	1.5	925	0.8%
Ti 2p	459.8	459.8	7.91	1.5	1,619	0.4%
Na Auger	497.9	497.9	0.00	1.5	727	
O 1s	532.1	532.1	2.93	1.5	104,608	69.8%
O loss	555.6	555.6	0.00	1.5	26,528	
Mn 2p3	642.6	642.6	13.91	1.5	2,591	
Mn 2p1	653.3	653.3	4.74	1.5	910	
Fe 2p3	712.0	712.0	10.82	1.5	51,778	
Fe 2p1	725.7	725.7	5.60	1.5	28,110	
Mn 2s	772.6	772.6	4.23	1.5	1,070	
Fe LMM-2	785.3	785.3	0.28	1.5	24,895	
Fe 2s	848.8	848.8	4.57	1.5	81,979	
Fe Auger	890.9	890.9	0.00	1.5	2,764	
Mn LMM-3	906.5	906.5	0.48	1.5	3,540	
O KLL-1	976.9	976.9	0.70	1.5	23,308	
O Auger	995.5	995.5	0.00	1.5	5,275	

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α-FeOOH
Goethite

Iron (III) Hydroxide, alpha-type (FW = 88.85)

Sample Description: alpha-FeOOH (99.999%) from Rare Metallics Corp., lot# 70924-01
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height

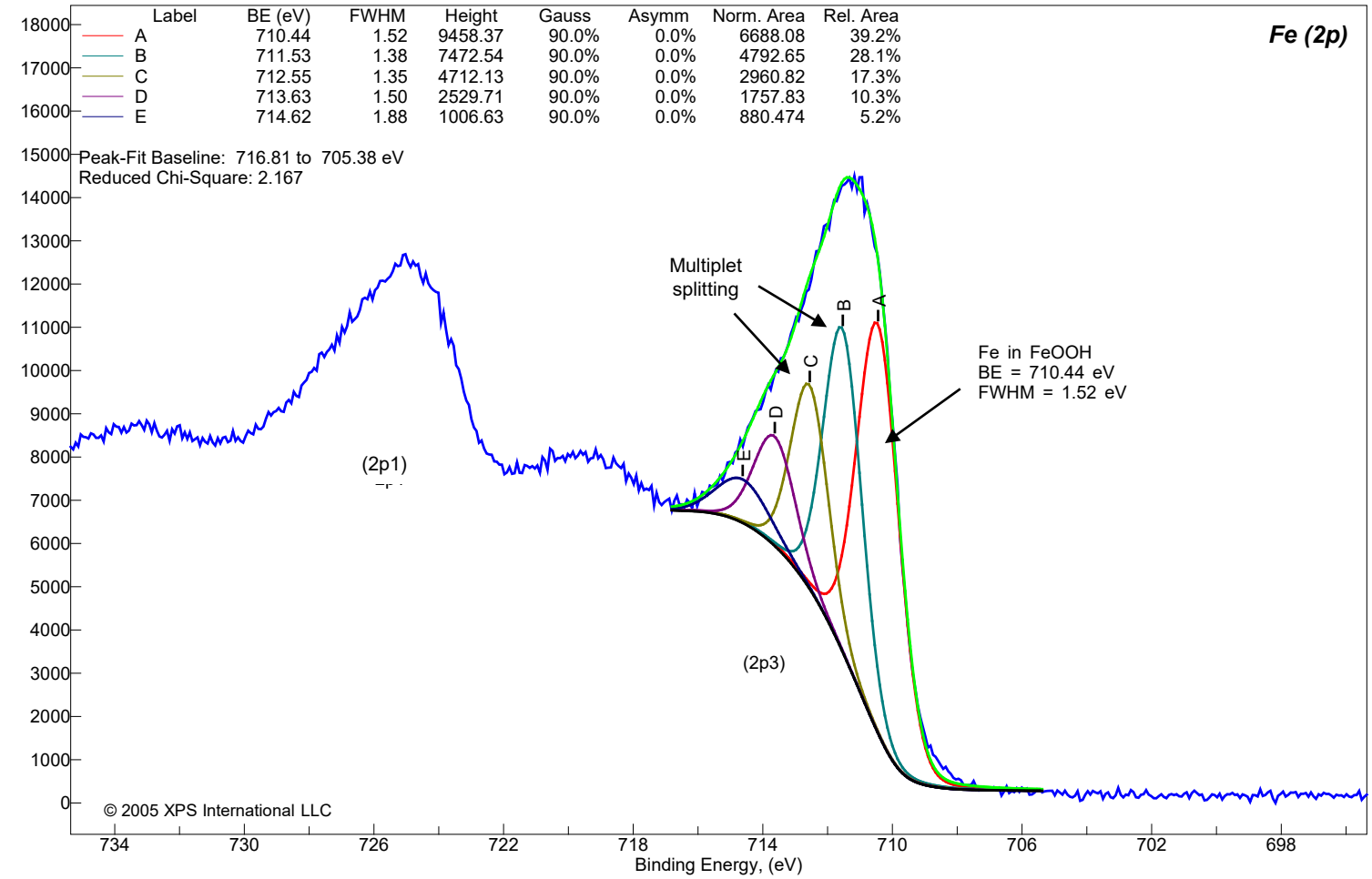


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α-FeOOH
Goethite

Iron (III) Hydroxide, alpha-type (FW = 88.85)

Sample Description: alpha-FeOOH (3mm pellet) 99.999% RMC #70924-01 screen 90 TOA

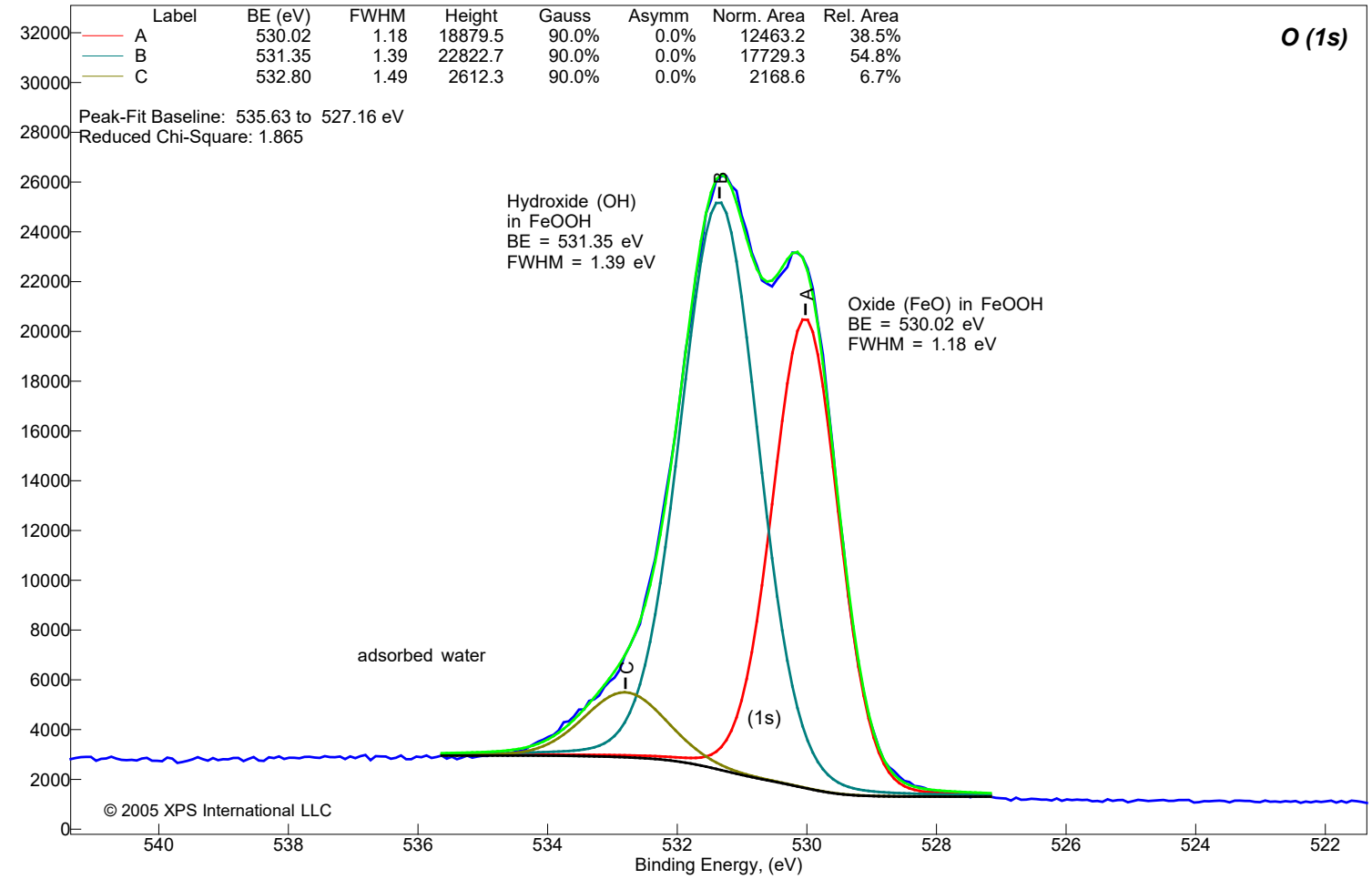


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α-FeOOH
Goethite

Iron (III) Hydroxide, alpha-type (FW = 88.85)

Sample Description: alpha-FeOOH (3mm pellet) 99.999% RMC #70924-01 screen 90 TOA

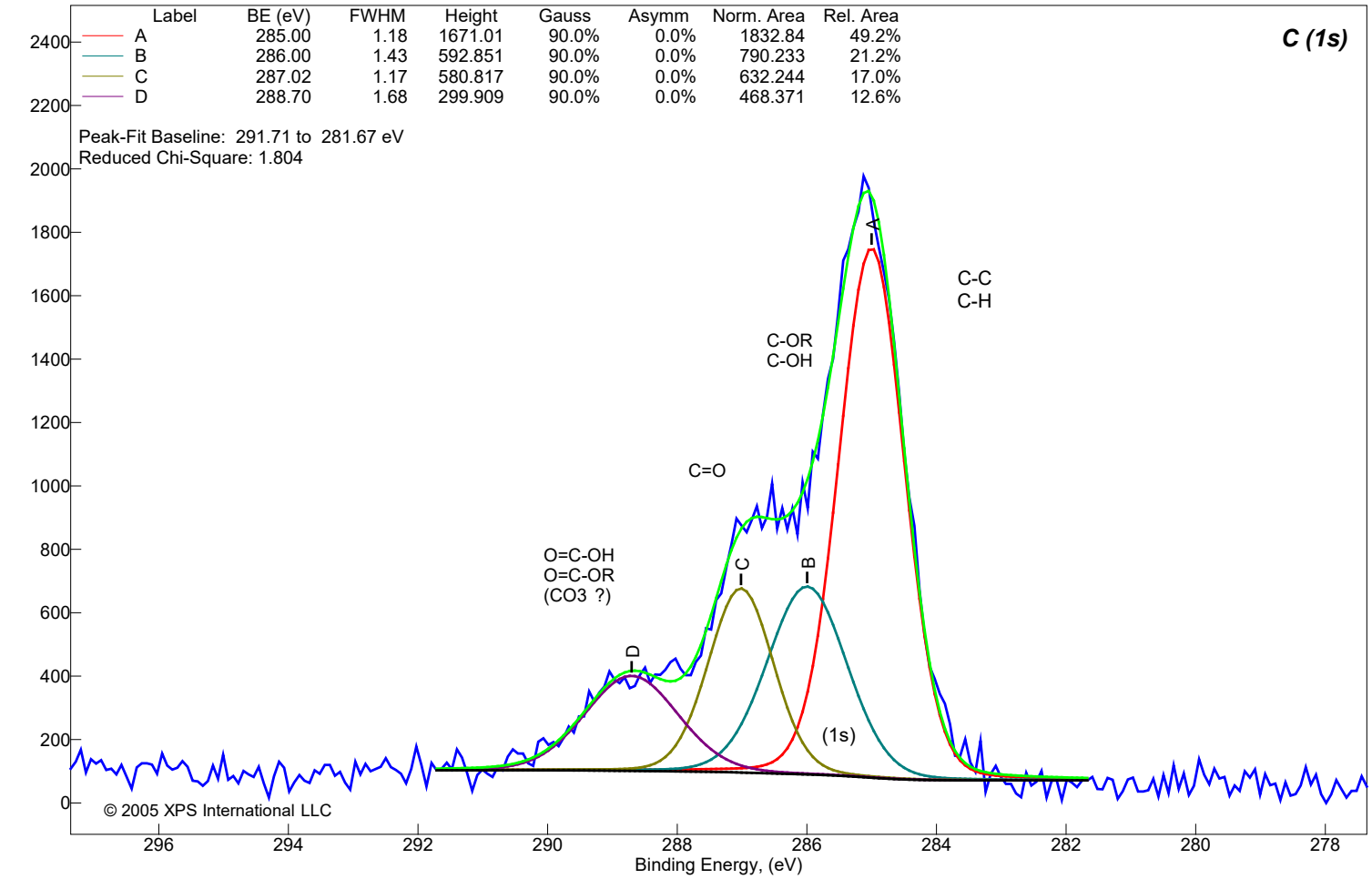


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α-FeOOH
Goethite

Iron (III) Hydroxide, alpha-type (FW = 88.85)

Sample Description: alpha-FeOOH (3mm pellet) 99.999% RMC #70924-01 screen 90 TOA

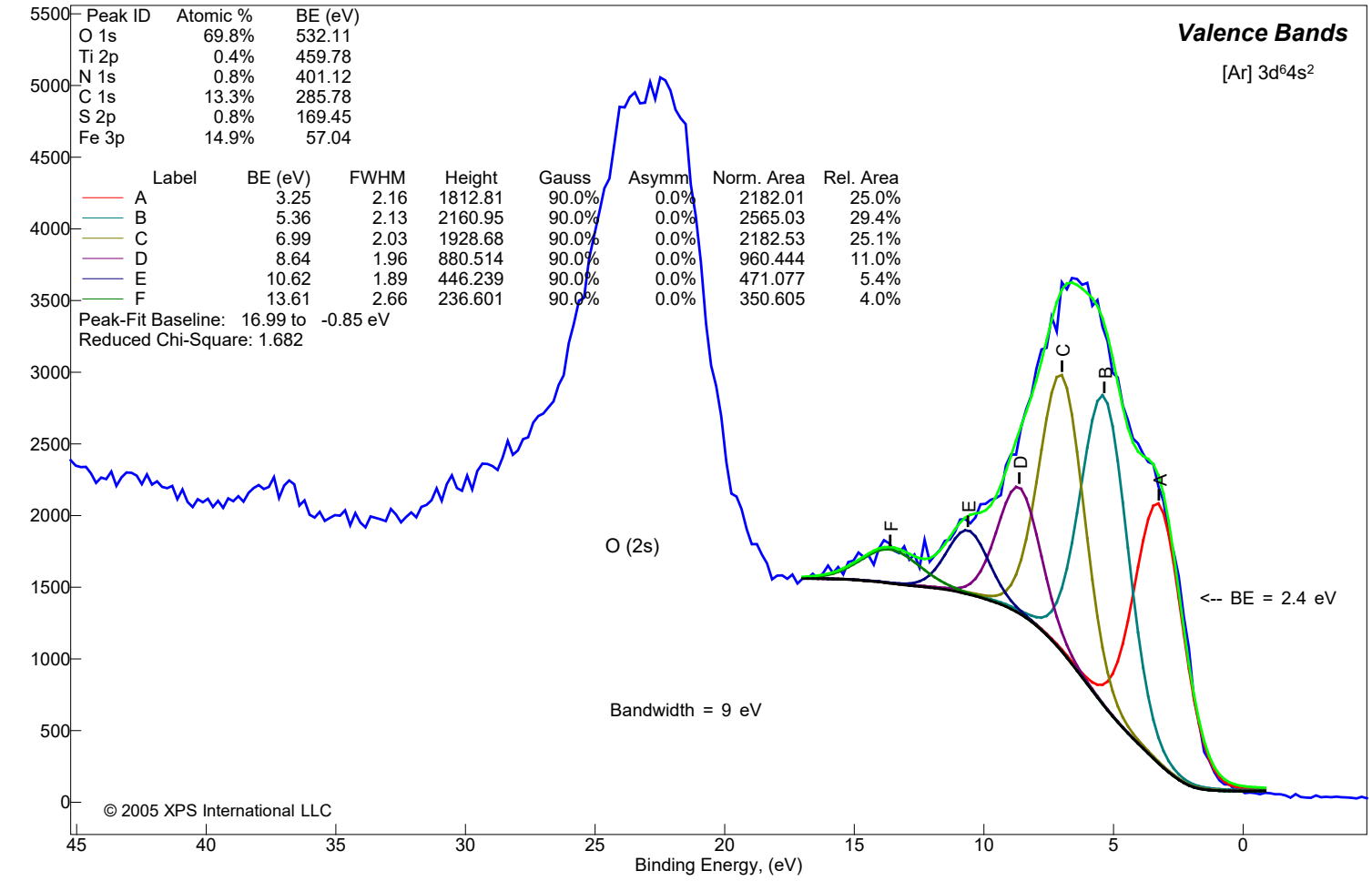


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α-FeOOH
Goethite

Iron (III) Hydroxide, alpha-type (FW = 88.85)

Sample Description: alpha-FeOOH (3mm pellet) 99.999% RMC #70924-01 screen 90 TOA

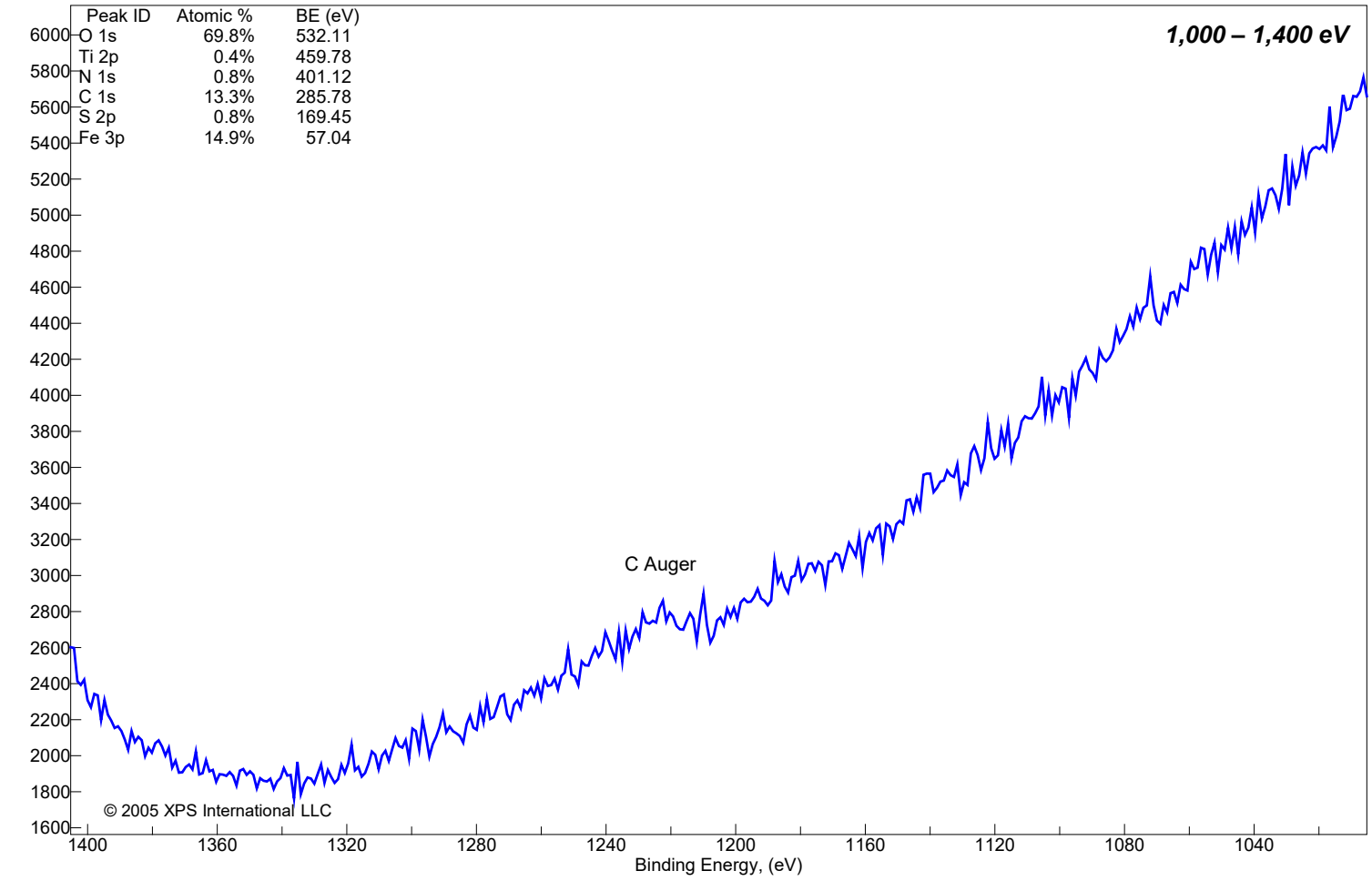


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α-FeOOH
Goethite

Iron (III) Hydroxide, alpha-type (FW = 88.85)

Sample Description: alpha-FeOOH (3mm pellet) 99.999% RMC #70924-01 screen 90 TOA

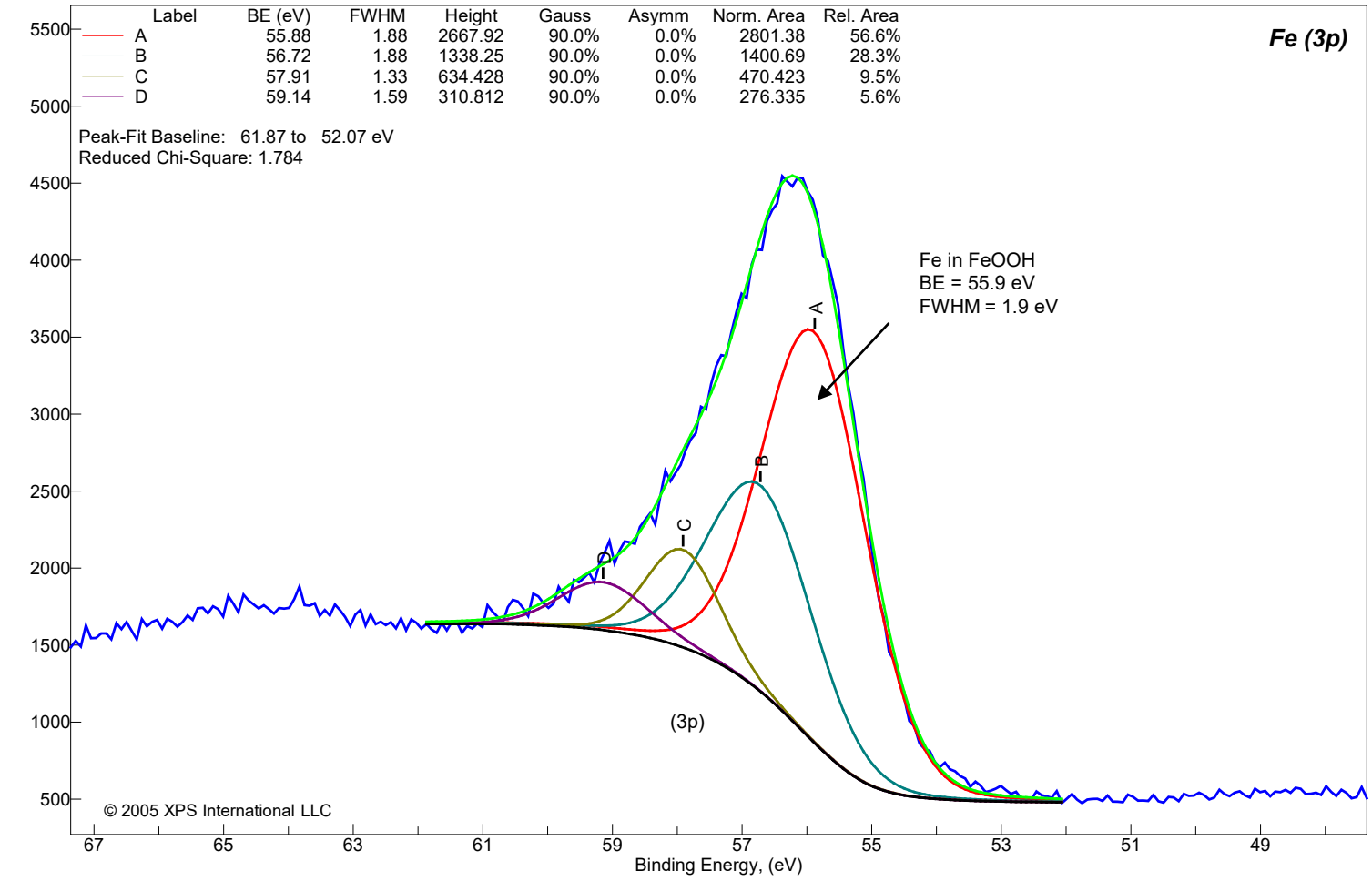


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α-FeOOH
Goethite

Iron (III) Hydroxide, alpha-type (FW = 88.85)

Sample Description: alpha-FeOOH (3mm pellet) 99.999% RMC #70924-01 screen 90 TOA



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Gallium (III) Oxide (FW = 187.44)
Surface Composition Table

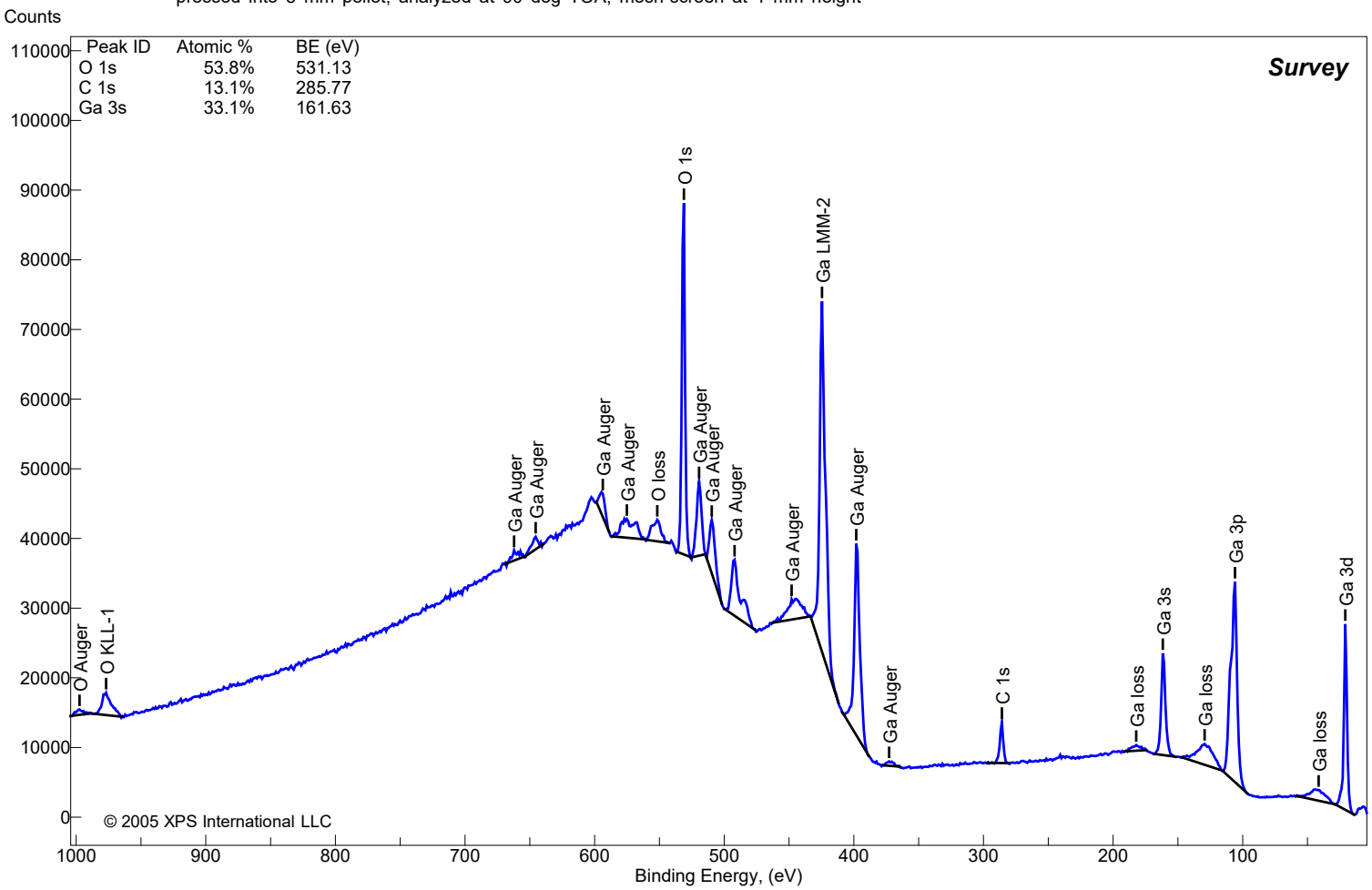
Description: Ga_2O_3 (99.999+%) from Aldrich Co. Lot# 09325MV, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white powder pressed into 3 mm pellet, mp 1900 C, d 6.44, sol in alkalies

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Ga 3d	20.9	17.2	1.09	1.5	50,020	
Ga loss	41.4	37.7	0.00	1.5	13,131	
Ga 3p	105.9	102.2	3.21	1.5	103,886	
Ga loss	129.4	125.7	0.00	1.5	28,499	
Ga 3s	161.6	157.9	1.13	1.5	36,275	33.1%
Ga loss	182.2	178.5	0.00	1.5	4,263	
C 1s	285.8	282.1	1.00	1.5	10,939	13.1%
Ga Auger	372.8	369.1	0.00	1.5	1,929	
Ga Auger	398.2	394.5	0.00	1.5	89,863	
Ga LMM-2	424.6	420.9	0.00	1.5	165,689	
Ga Auger	448.0	444.3	0.00	1.5	23,941	
Ga Auger	492.0	488.3	0.00	1.5	40,448	
Ga Auger	509.6	505.9	0.00	1.5	26,248	
Ga Auger	519.4	515.7	0.00	1.5	31,366	
O 1s	531.1	527.4	2.93	1.5	93,753	53.8%
O loss	551.7	548.0	0.00	1.5	16,369	
Ga Auger	575.1	571.4	0.00	1.5	22,814	
Ga Auger	593.7	590.0	0.00	1.5	10,849	
Ga Auger	645.5	641.8	0.00	1.5	6,828	
Ga Auger	662.1	658.4	0.00	1.5	4,862	
O KLL-1	976.9	973.2	0.70	1.5	16,398	
O Auger	997.4	993.7	0.00	1.5	3,151	

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Gallium (III) Oxide (FW = 187.44)

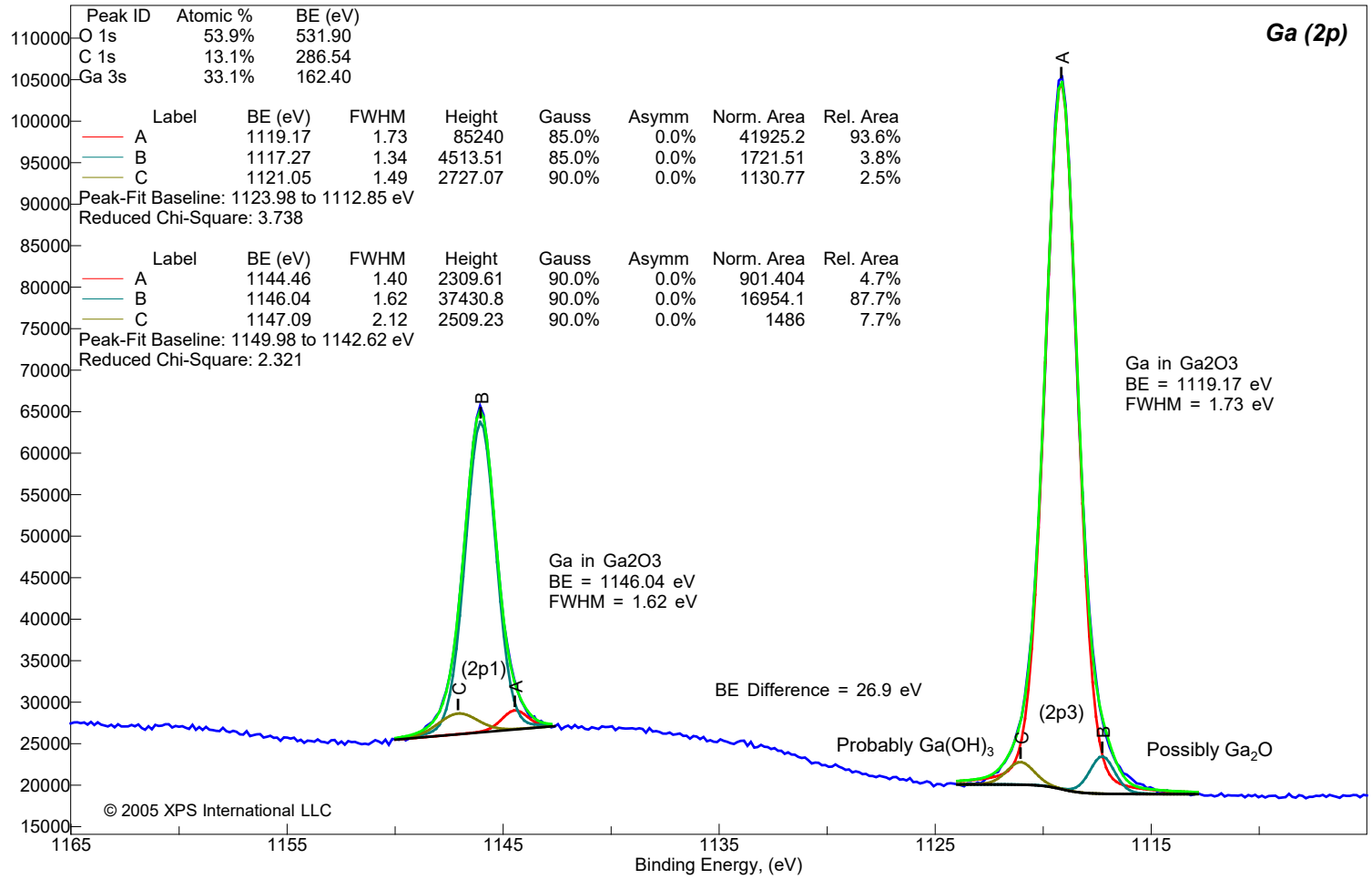
Sample Description: Ga2O3 (99.999+%) from Aldrich lot# 09325MV
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Gallium (III) Oxide (FW = 187.44)

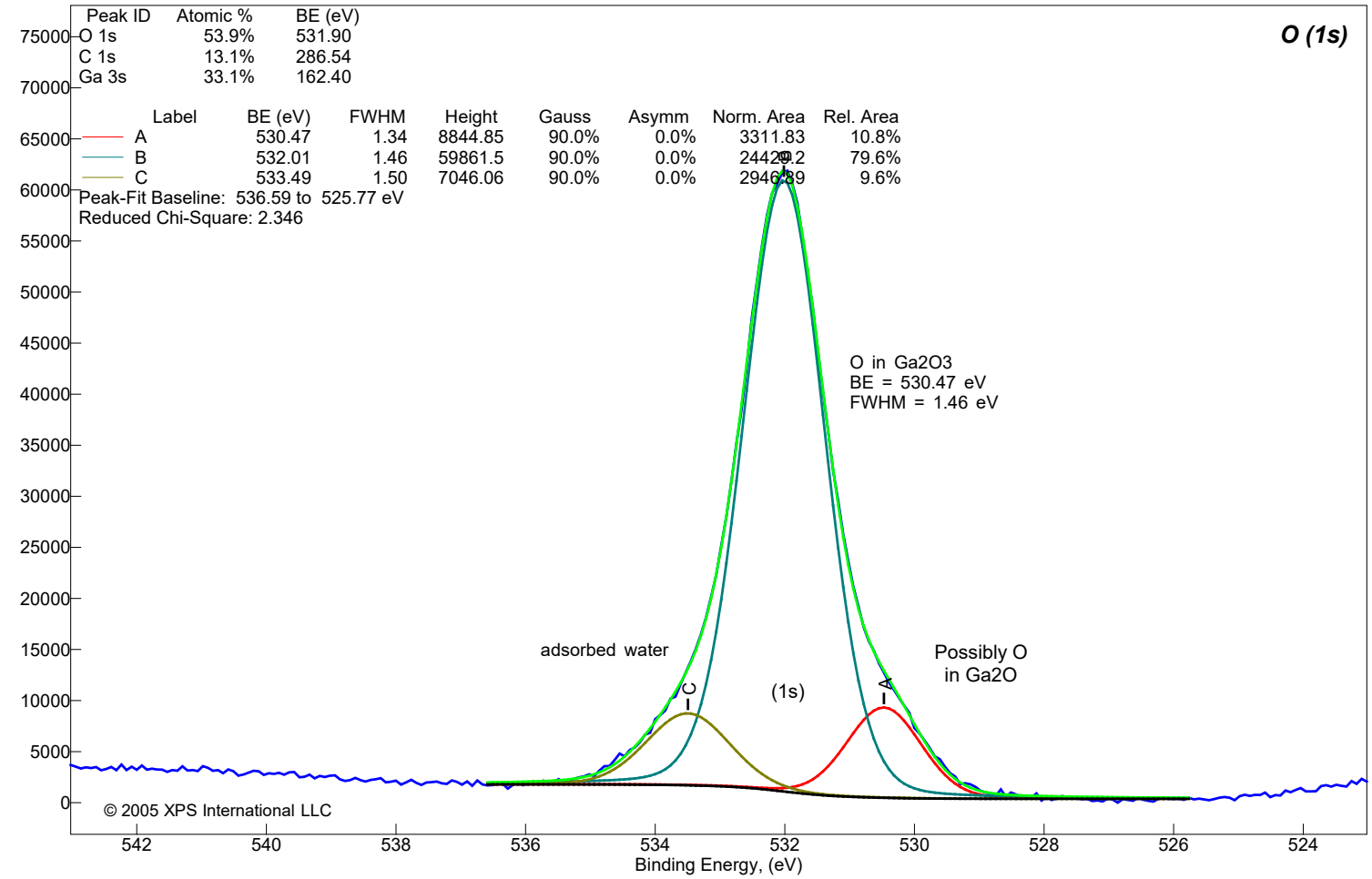
Sample Description: Ga2O3 (99.999+%) Aldrich lot# 09325MV, 3mm pellet, screen, 90 TOA



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Gallium (III) Oxide (FW = 187.44)

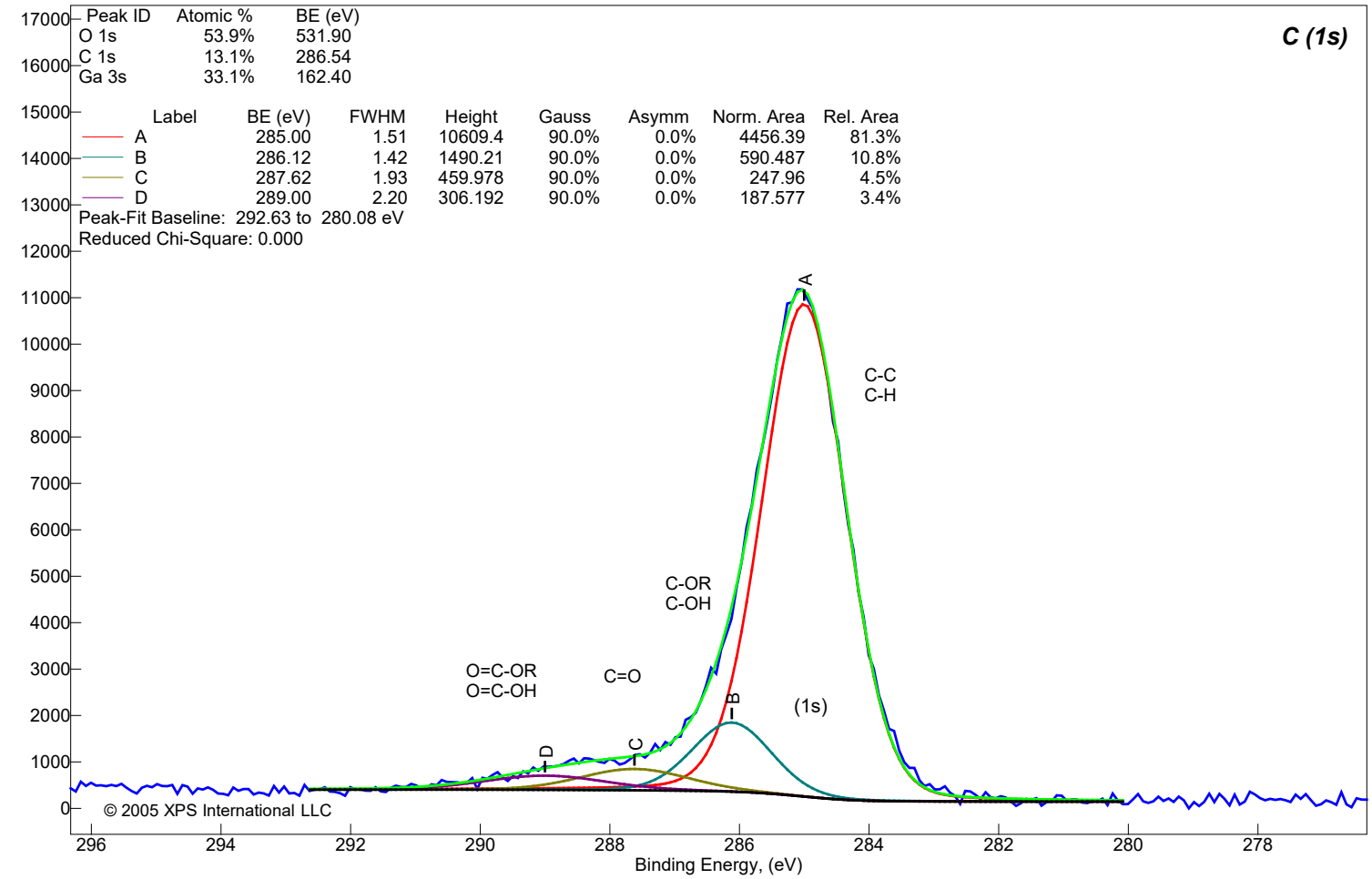
Sample Description: Ga2O3 (99.999+%) Aldrich lot# 09325MV, 3mm pellet, screen, 90 TOA



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Gallium (III) Oxide (FW = 187.44)

Sample Description: Ga2O3 (99.999+%) Aldrich lot# 09325MV, 3mm pellet, screen, 90 TOA

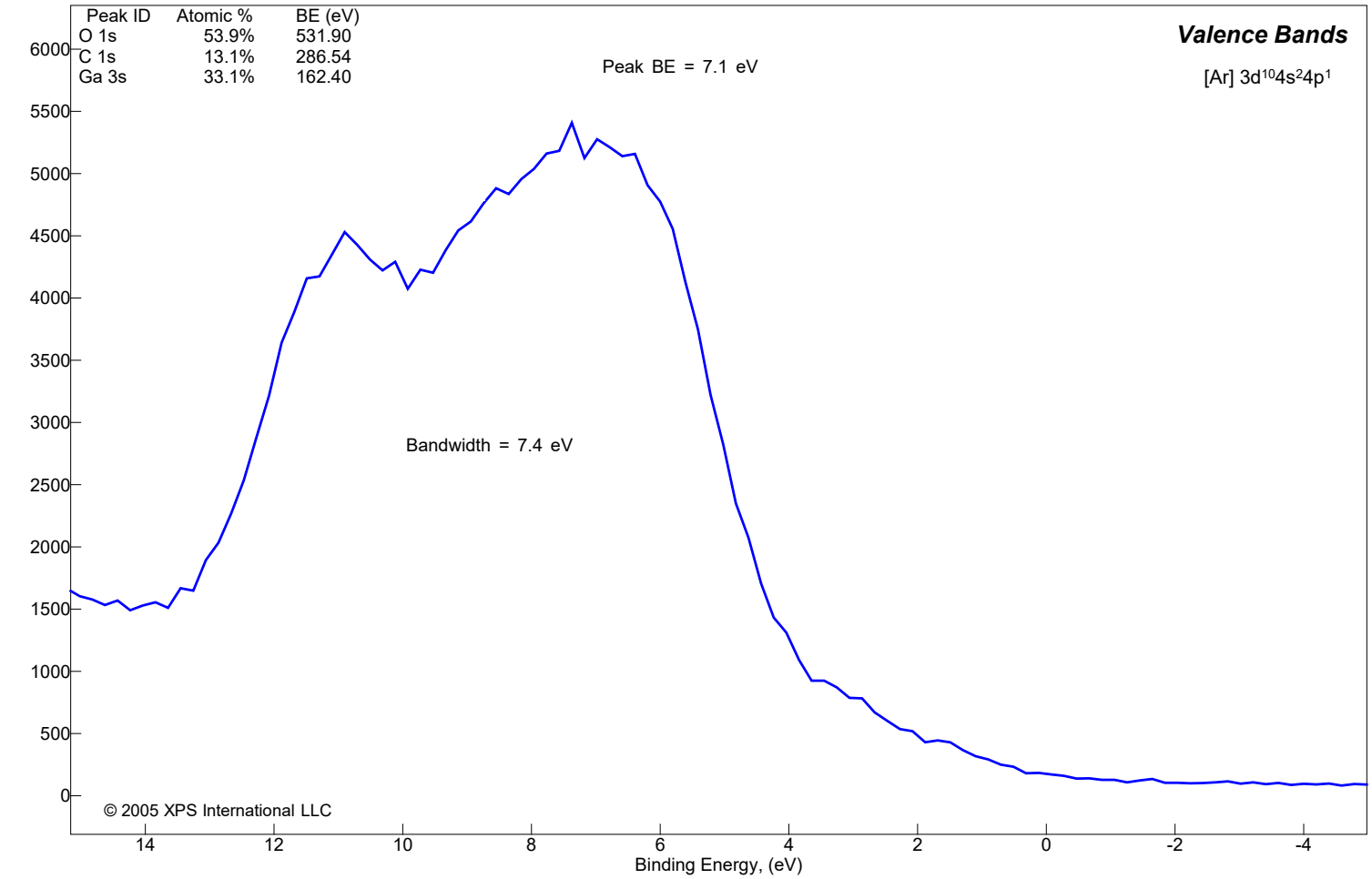


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Ga_2O_3

Gallium (III) Oxide (FW = 187.44)

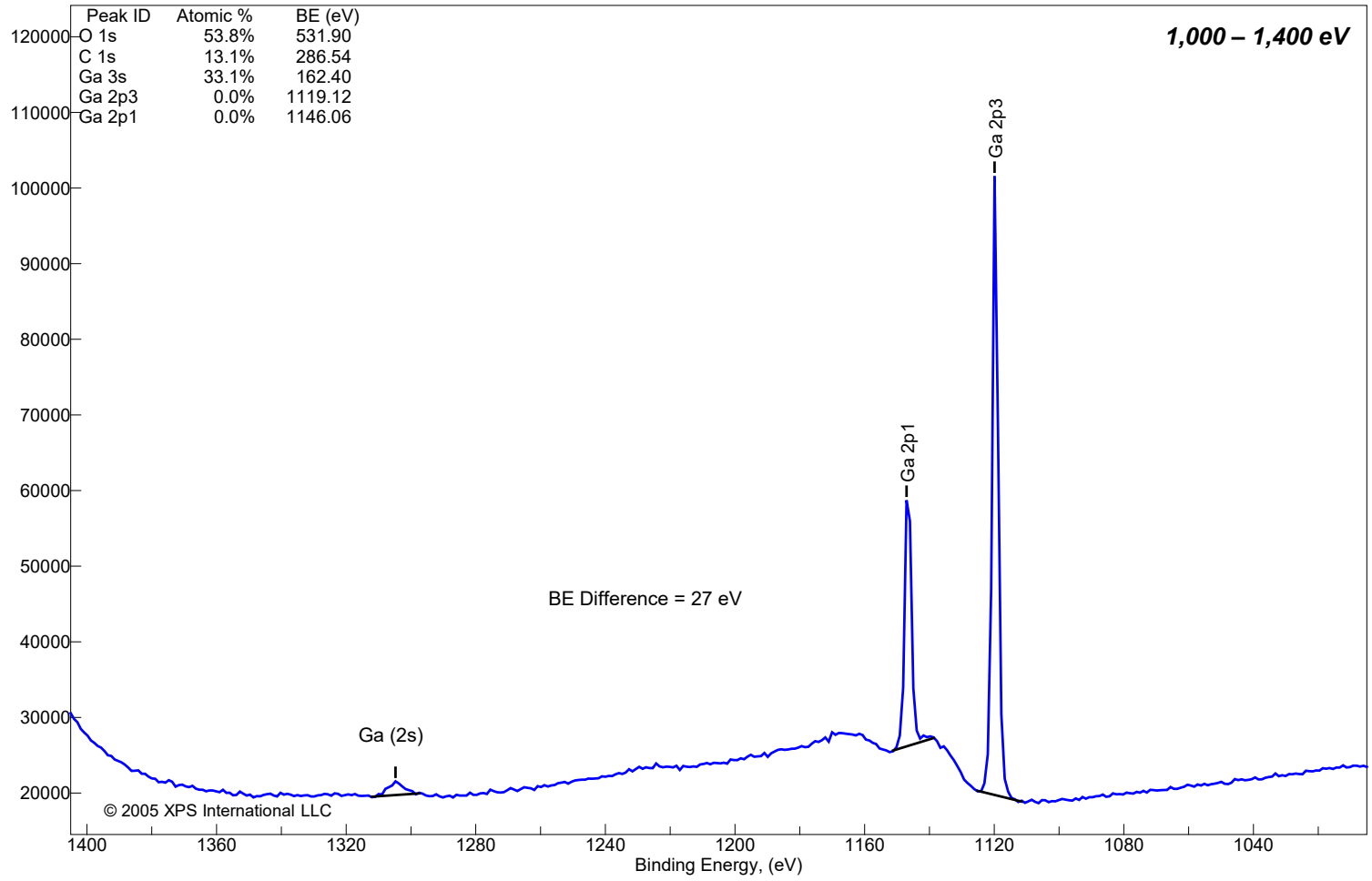
Sample Description: Ga2O3 (99.999+%) Aldrich lot# 09325MV, 3mm pellet, screen, 90 TOA



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Gallium (III) Oxide (FW = 187.44)

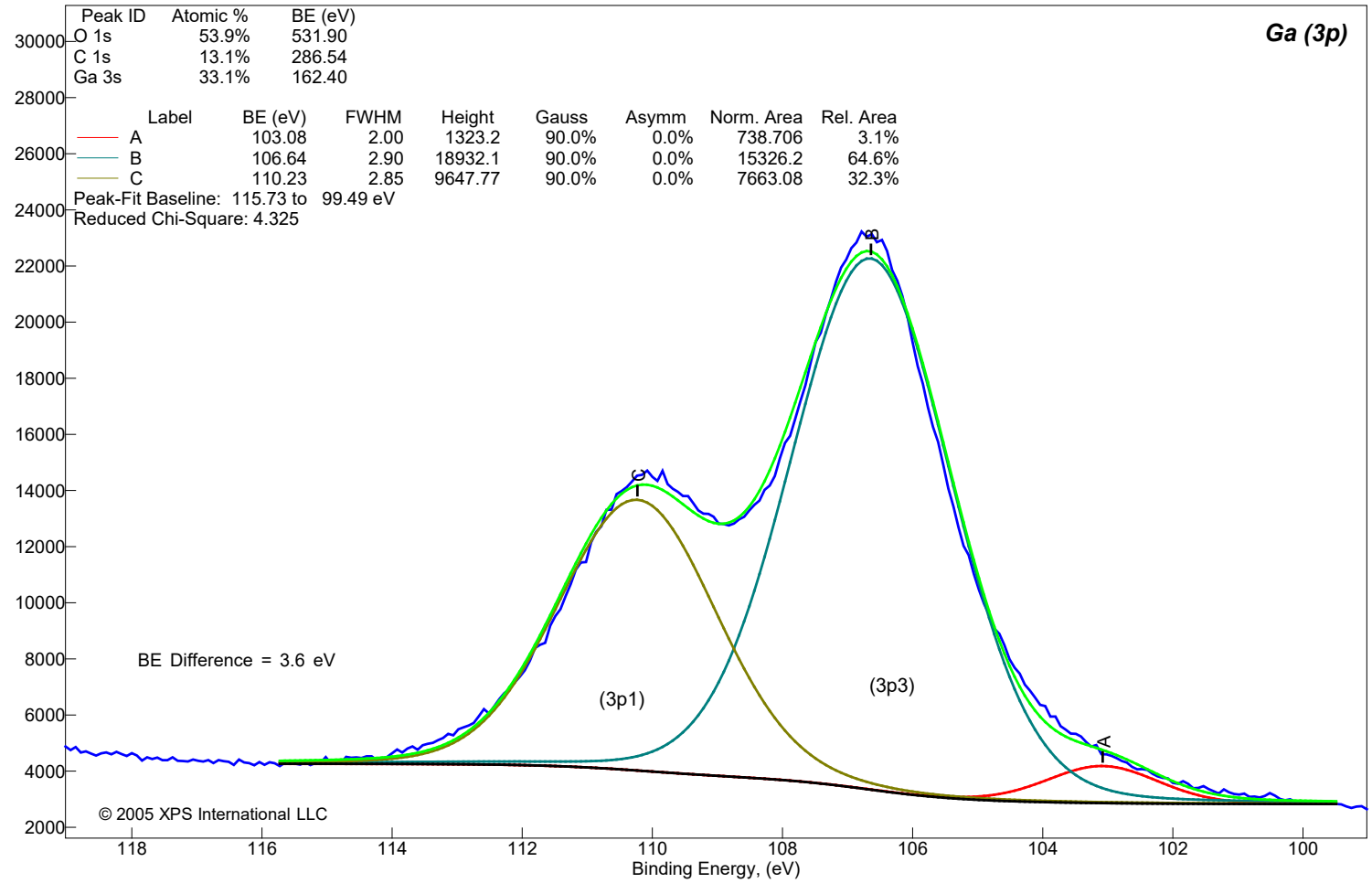
Sample Description: Ga2O3 (99.999+%) Aldrich lot# 09325MV, 3mm pellet, screen, 90 TOA



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Gallium (III) Oxide (FW = 187.44)

Sample Description: Ga2O3 (99.999+%) Aldrich lot# 09325MV, 3mm pellet, screen, 90 TOA



Gadolinium (III) Oxide (FW = 362.50)
Surface Composition Table

Description: Gd_2O_3 (99%) from Aldrich Co., analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white powder pressed into 3 mm pellet, mp 2330 C, d 7.41, sol in acids, very hygroscopic

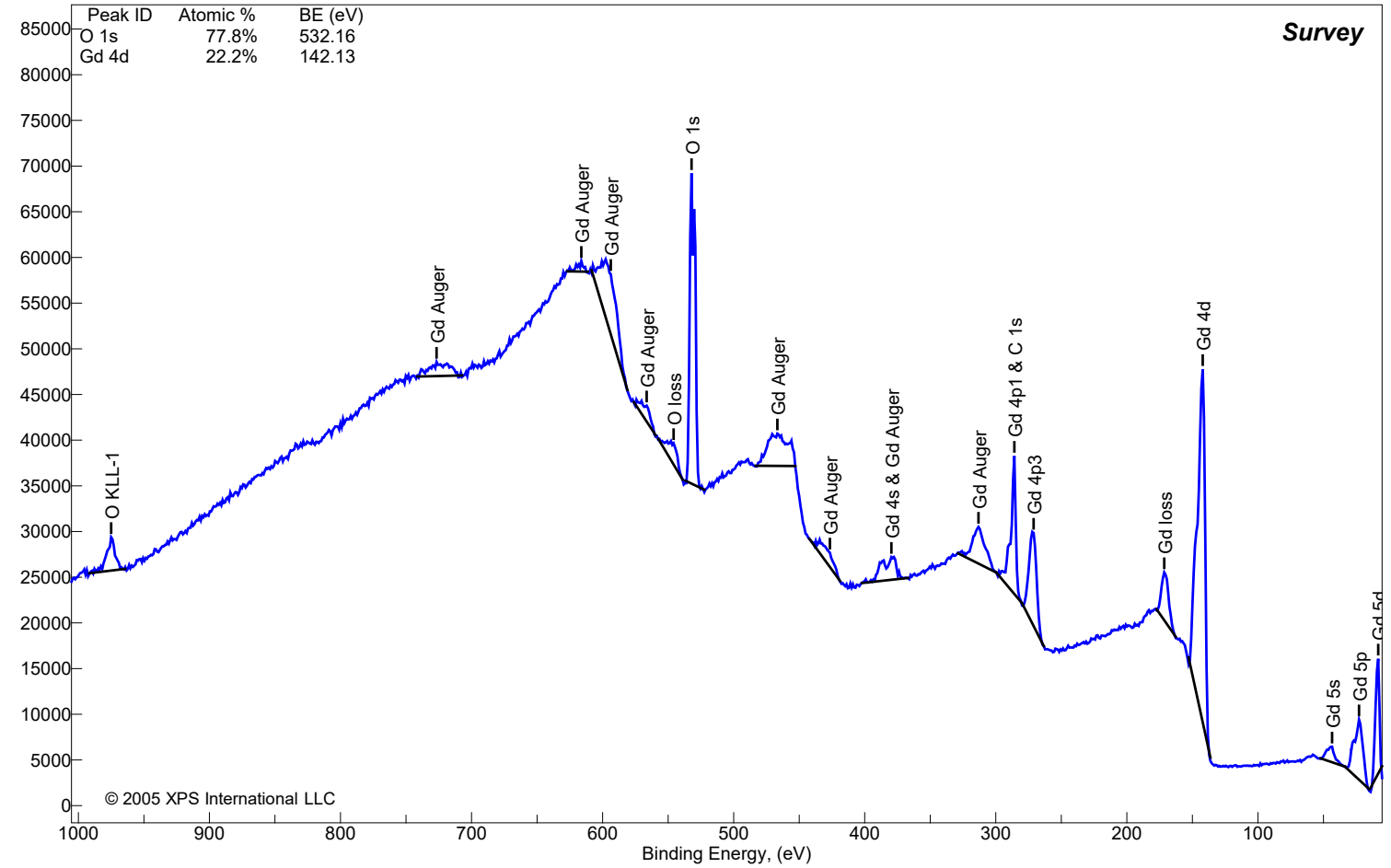
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Gd 5d	8.2	8.2	0.00	1.4	25,521	
Gd 5p	22.9	22.9	0.85	1.4	26,109	
Gd 5s	43.4	43.4	0.29	1.4	6,091	
Gd 4d	142.1	142.1	10.40	1.4	135,450	22.2%
Gd loss	171.5	171.5	0.00	1.4	17,993	
Gd 4p3	271.2	271.2	3.88	1.4	35,270	
Gd 4p1 & C 1s	285.8	285.8	1.80	1.4	34,700	
Gd Auger	313.2	313.2	0.00	1.4	21,981	
Gd 4s & Gd Auger	379.7	379.7	1.51	1.4	16,086	
Gd Auger	426.6	426.6	0.00	1.4	10,390	
Gd Auger	466.7	466.7	0.00	1.4	33,941	
O 1s	532.2	532.2	2.93	1.4	82,634	77.8%
O loss	545.8	545.8	0.00	1.4	10,422	
Gd Auger	566.4	566.4	0.00	1.4	8,316	
Gd Auger	593.7	593.7	0.00	1.4	50,556	
Gd Auger	616.2	616.2	0.00	1.4	3,134	
Gd Auger	726.7	726.7	0.00	1.4	13,988	
O KLL-1	975.0	975.0	0.70	1.4	13,267	

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Gd_2O_3

Gadolinium (III) Oxide (FW = 362.50)

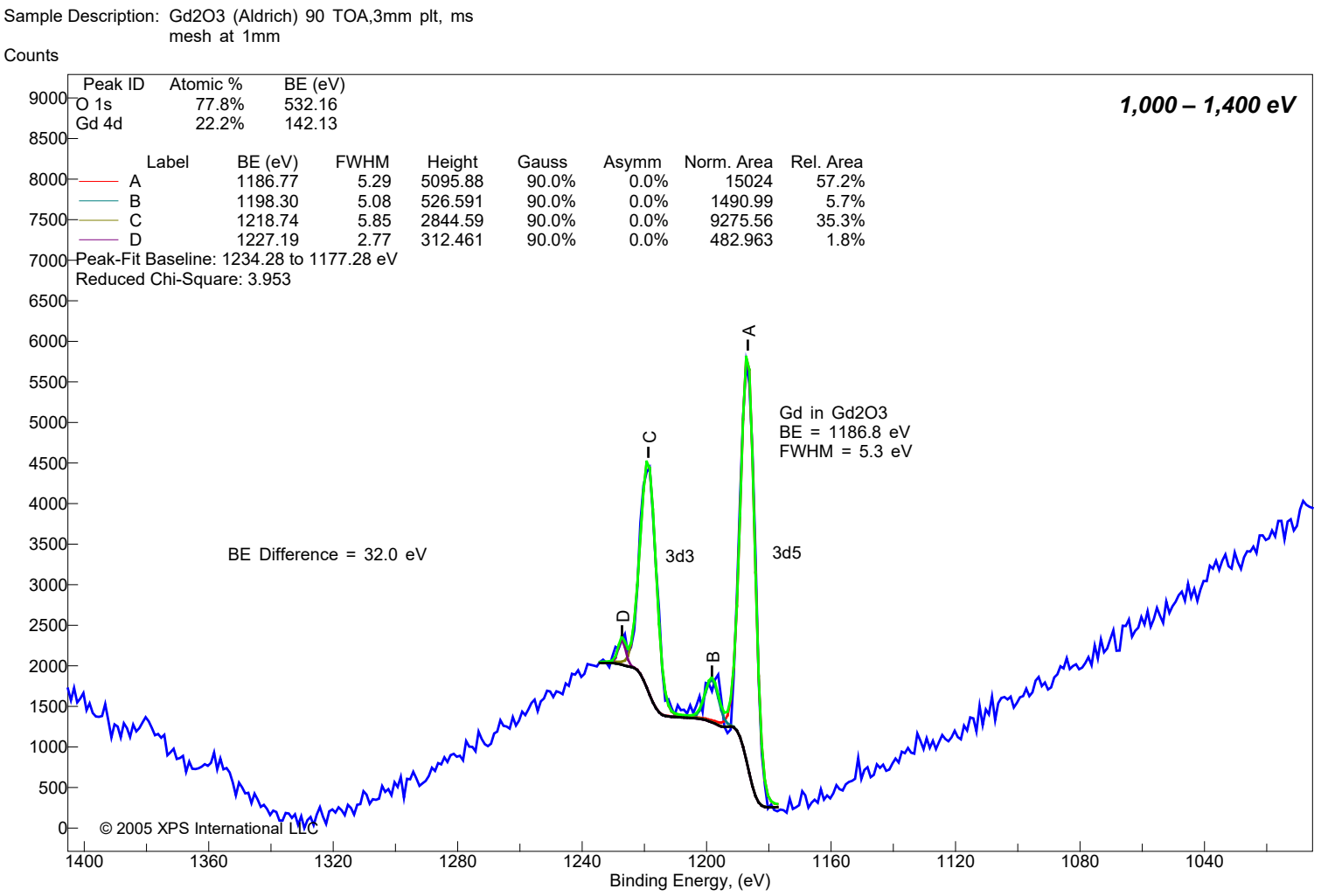
Sample Description: Gd2O3 (99%) from Aldrich
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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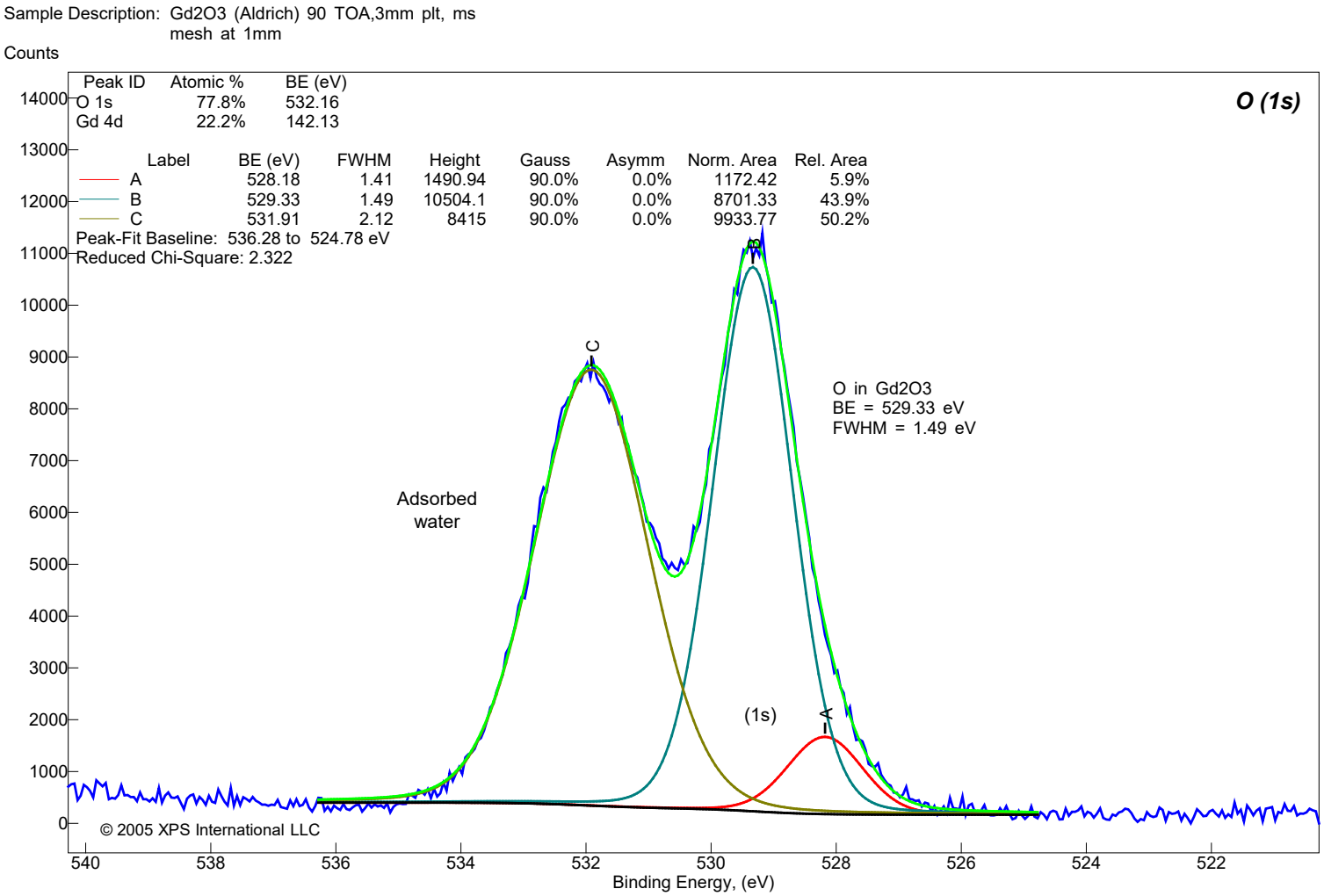
Gd_2O_3

Gadolinium (III) Oxide (FW = 362.50)



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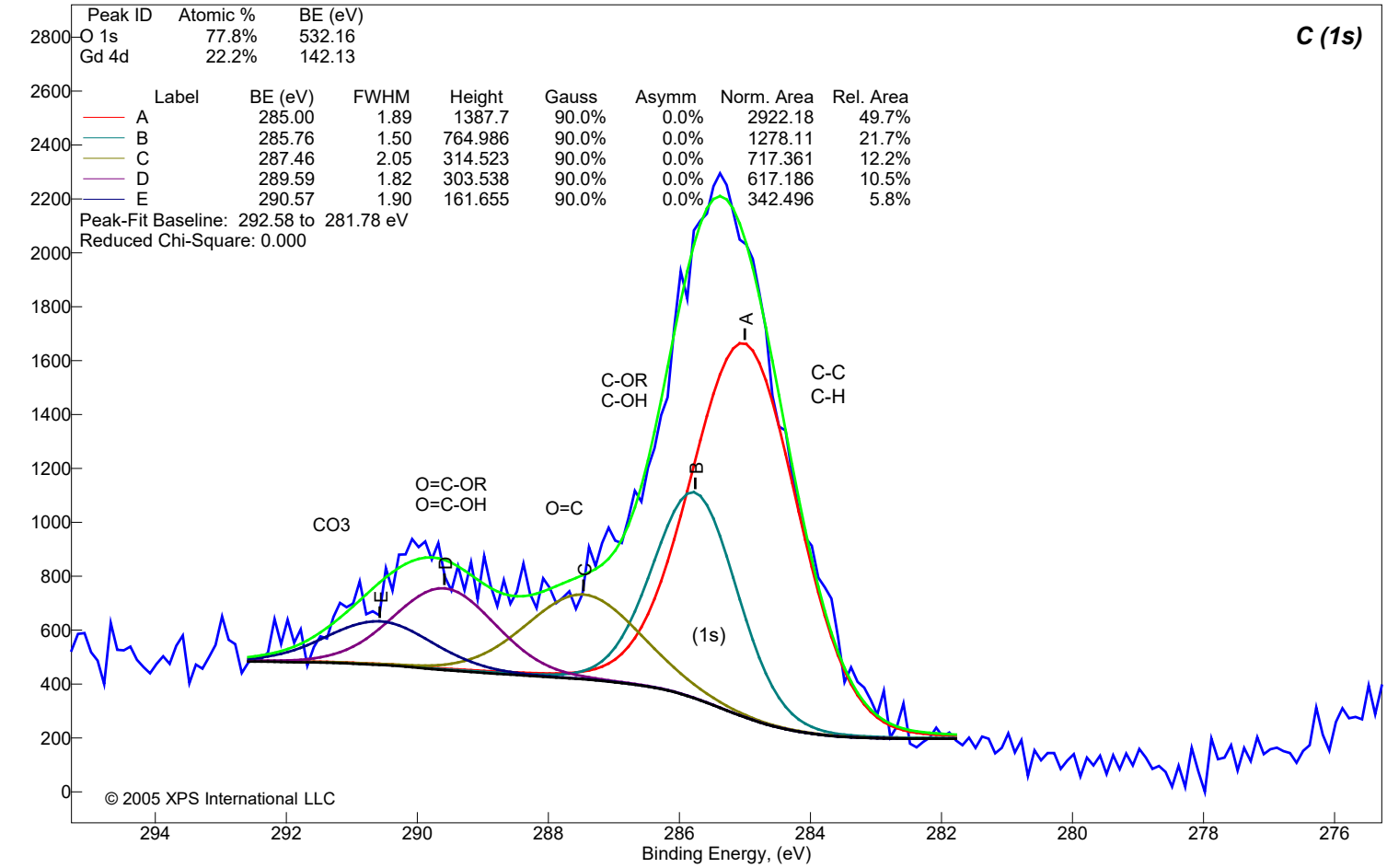
Gadolinium (III) Oxide (FW = 362.50)



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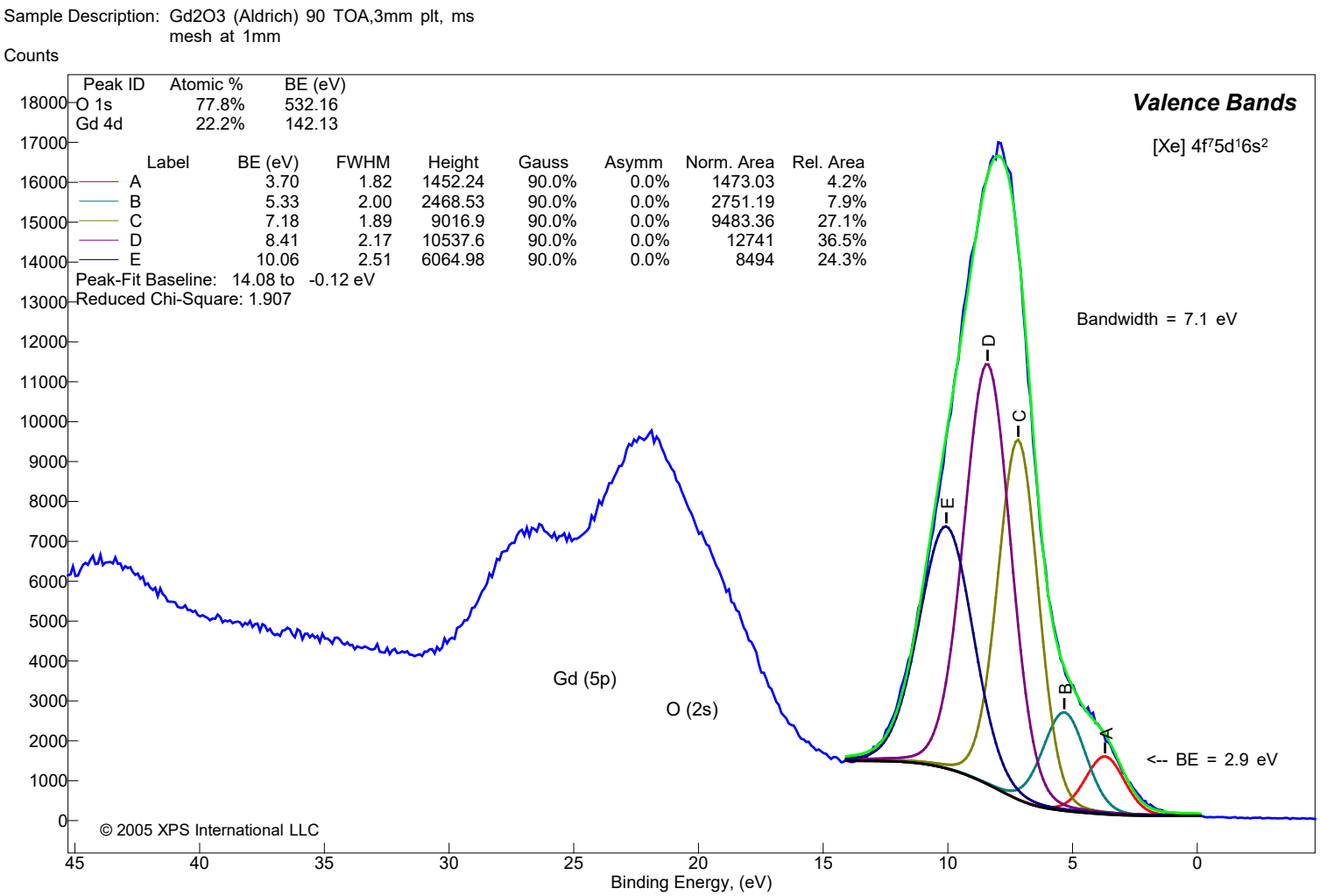
Gadolinium (III) Oxide (FW = 362.50)

Sample Description: Gd2O3 (Aldrich) 90 TOA,3mm plt, ms mesh at 1mm



Gd_2O_3

Gadolinium (III) Oxide (FW = 362.50)



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GeO_2

Germanium (IV) Oxide (FW = 104.59)
Surface Composition Table

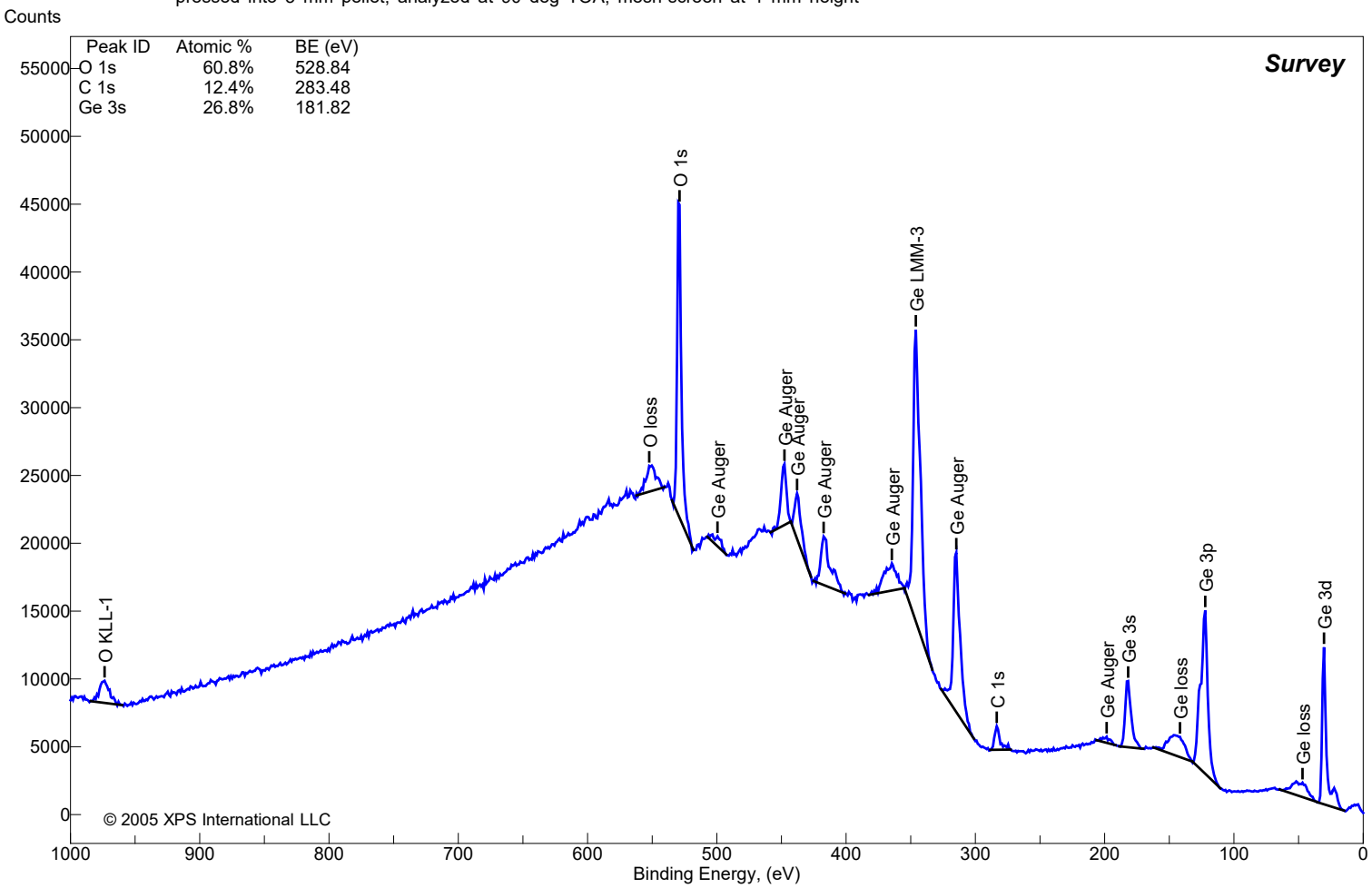
Description: GeO_2 (99.999%) from Aldrich Co. Lot# 02904BW, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white powder pressed into 3 mm pellet, mp 1086 C, d 6.24, slightly sol in water

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Ge 3d	31.8	30.3	1.42	1.5	38,523	
Ge loss	48.4	46.9	0.00	1.5	11,623	
Ge 3p	123.7	122.2	2.39	1.5	66,723	
Ge loss	143.2	141.7	0.00	1.5	19,358	
Ge 3s	183.3	181.8	1.23	1.5	22,171	26.8%
Ge Auger	199.9	198.4	0.00	1.5	2,365	
C 1s	285.0	283.5	1.00	1.5	7,405	12.4%
Ge Auger	316.3	314.8	0.00	1.5	62,360	
Ge LMM-3	347.5	346.0	0.52	1.5	119,560	
Ge Auger	366.1	364.6	0.00	1.5	21,806	
Ge Auger	418.9	417.4	0.00	1.5	24,549	
Ge Auger	439.4	437.9	0.00	1.5	16,843	
Ge Auger	449.2	447.7	0.00	1.5	18,696	
Ge Auger	501.0	499.5	0.00	1.5	5,222	
O 1s	530.3	528.8	2.93	1.5	75,284	60.8%
O loss	553.8	552.3	0.00	1.5	12,469	
O KLL-1	975.1	973.6	0.70	1.5	12,095	

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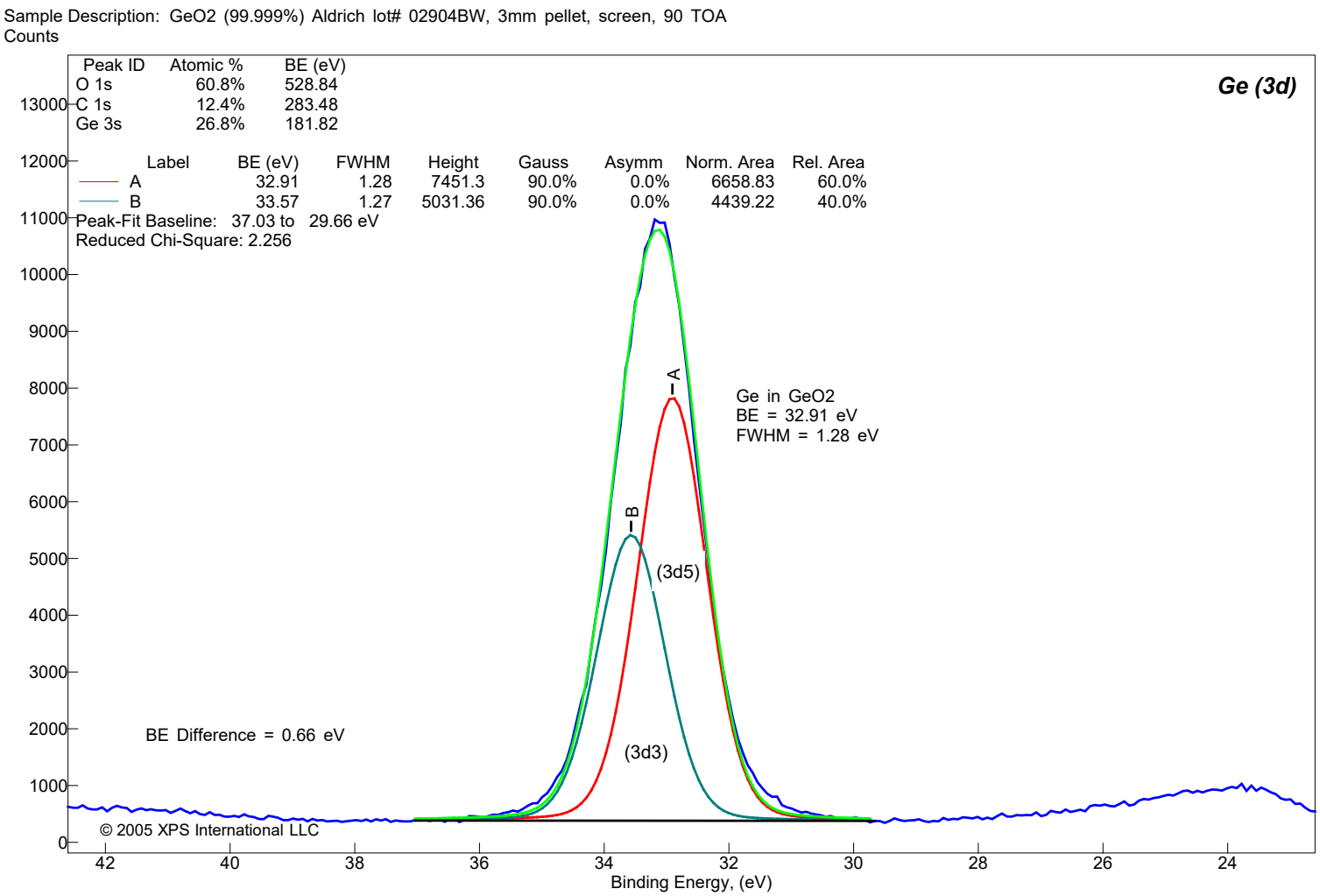
Germanium (IV) Oxide (FW = 104.59)

Sample Description: GeO2 (99.999%) from Aldrich lot# 02904BW
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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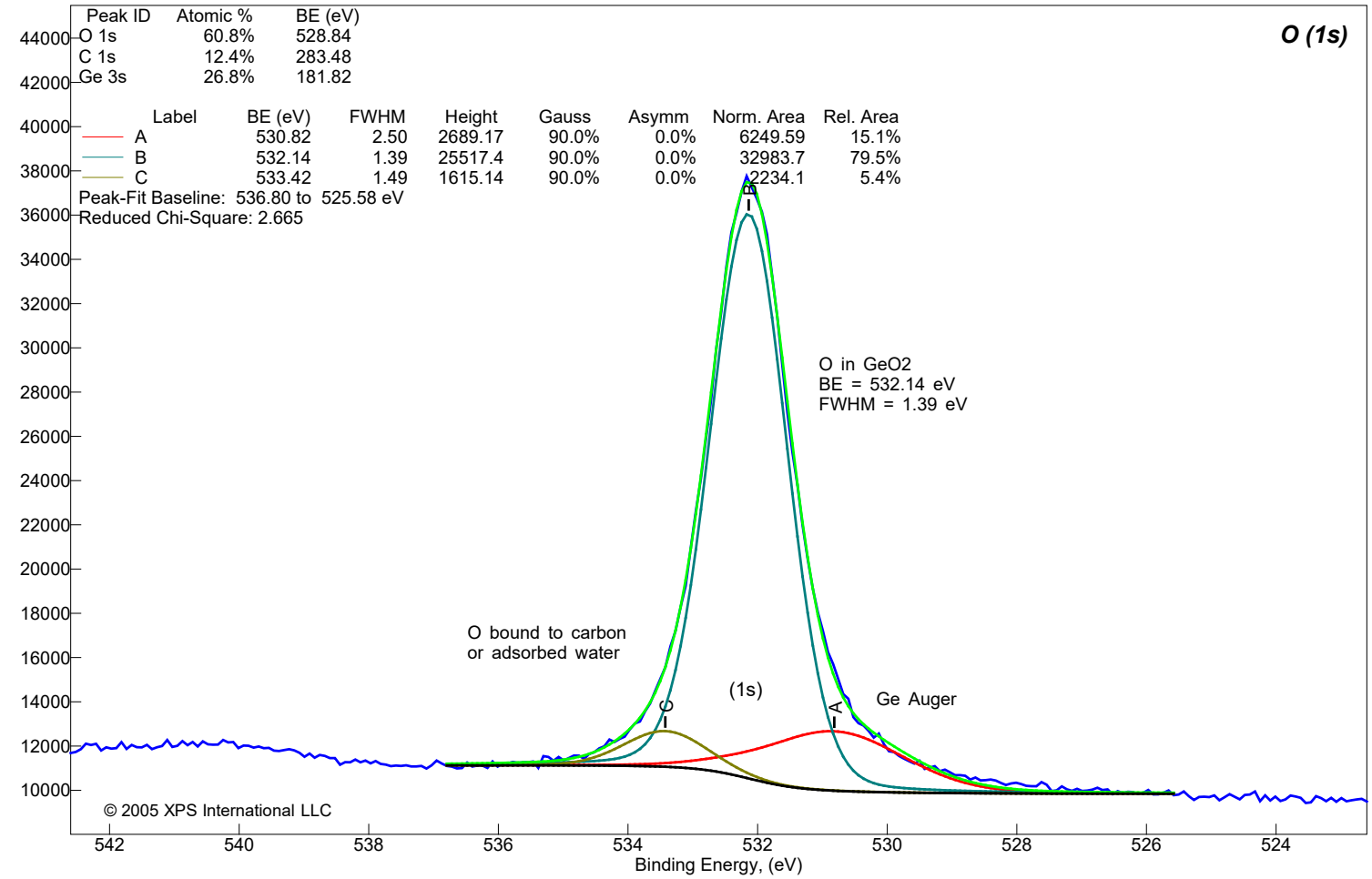
Germanium (IV) Oxide (FW = 104.59)



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Germanium (IV) Oxide (FW = 104.59)

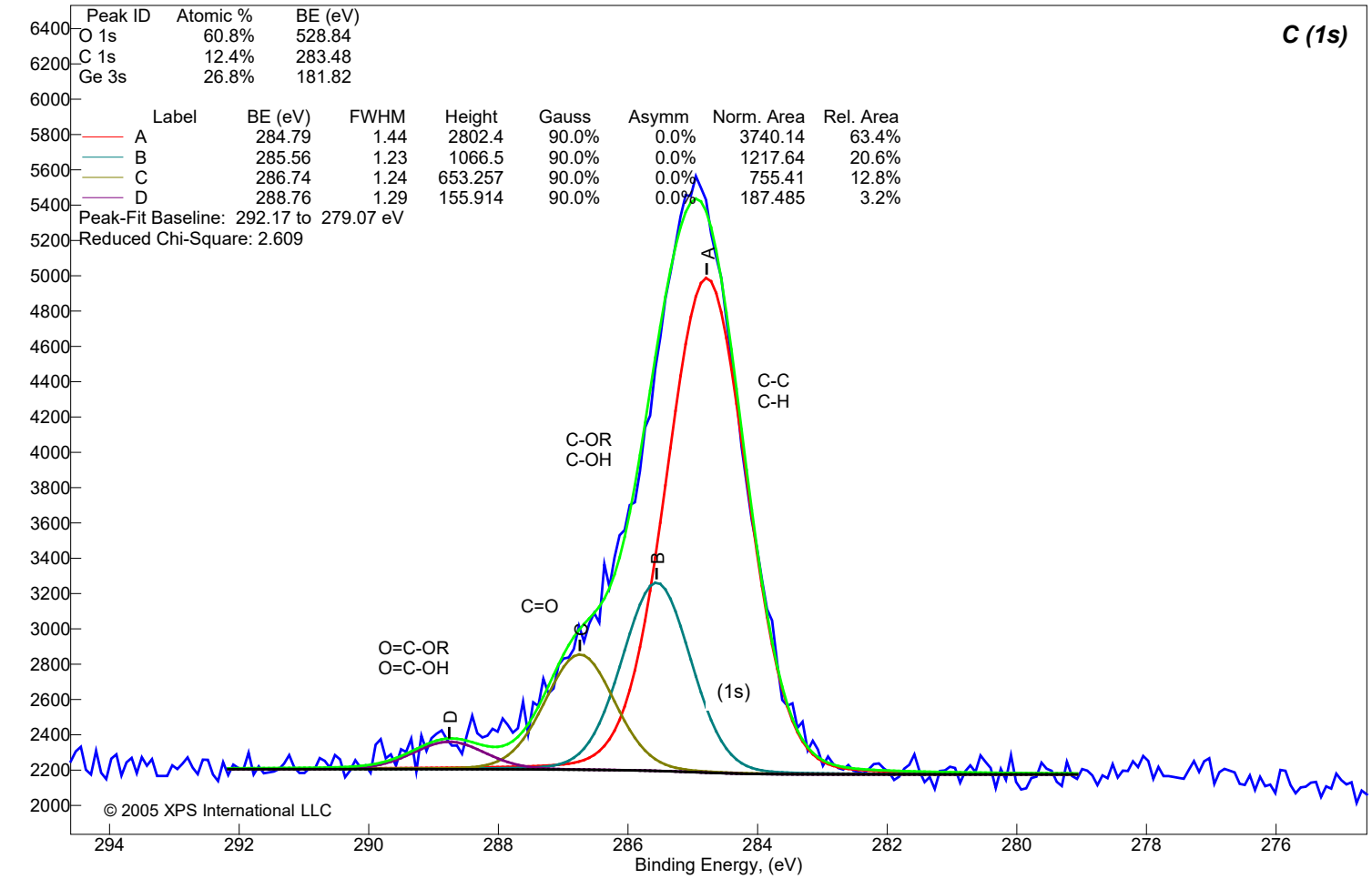
Sample Description: GeO2 (99.999%) Aldrich lot# 02904BW, 3mm pellet, screen, 90 TOA



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Germanium (IV) Oxide (FW = 104.59)

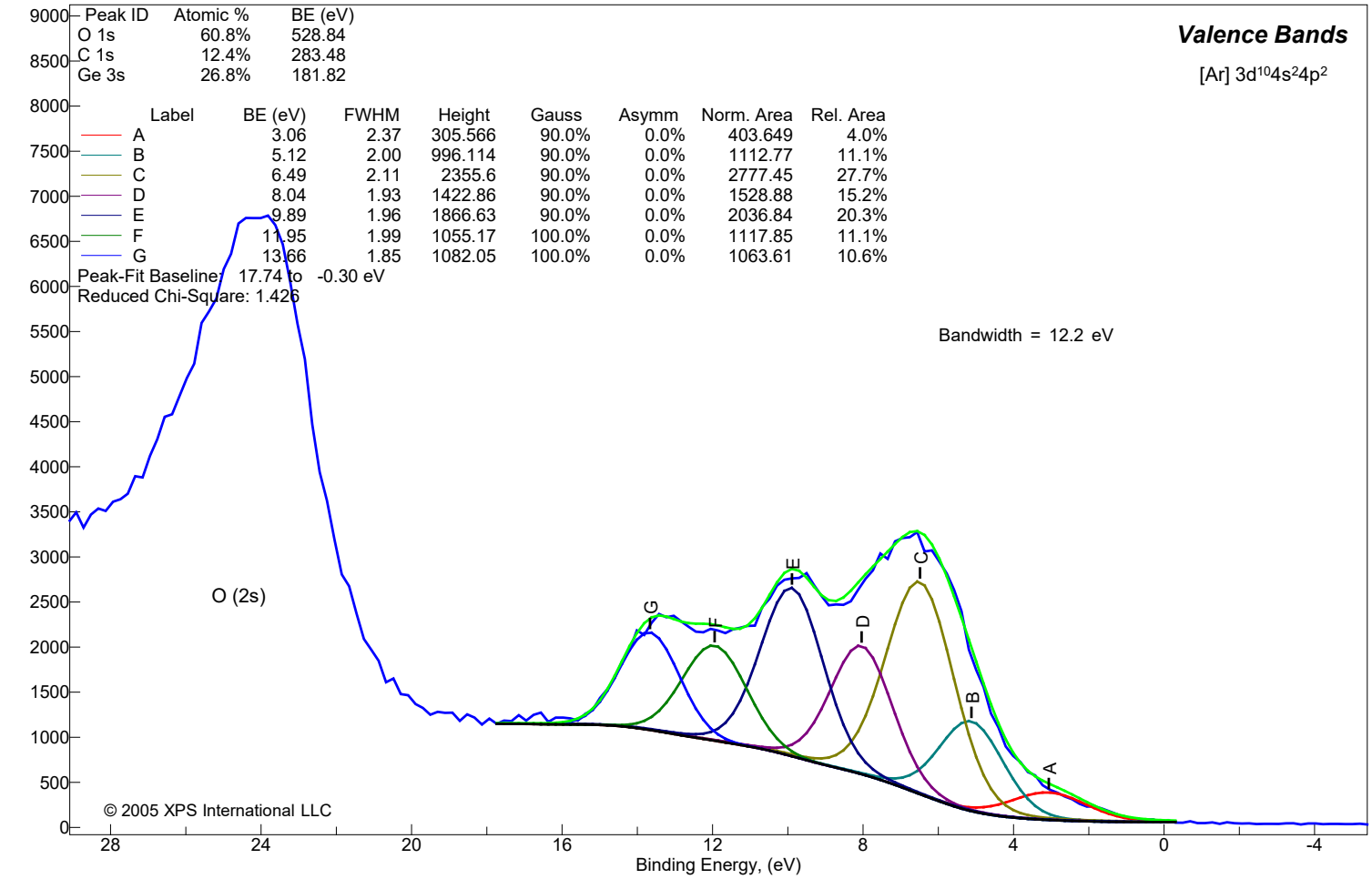
Sample Description: GeO2 (99.999%) Aldrich lot# 02904BW, 3mm pellet, screen, 90 TOA



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Germanium (IV) Oxide (FW = 104.59)

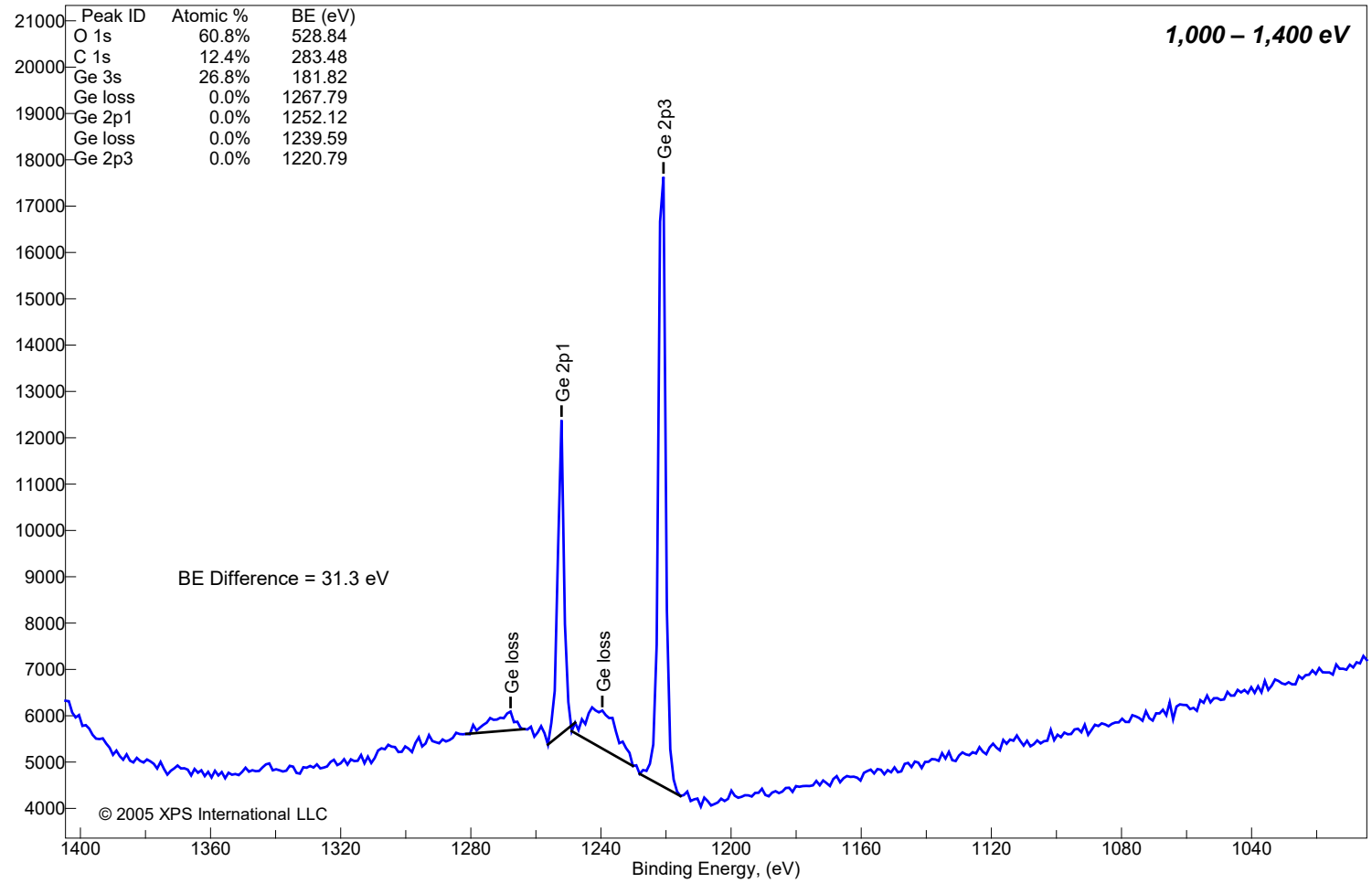
Sample Description: GeO2 (99.999%) Aldrich lot# 02904BW, 3mm pellet, screen, 90 TOA



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Germanium (IV) Oxide (FW = 104.59)

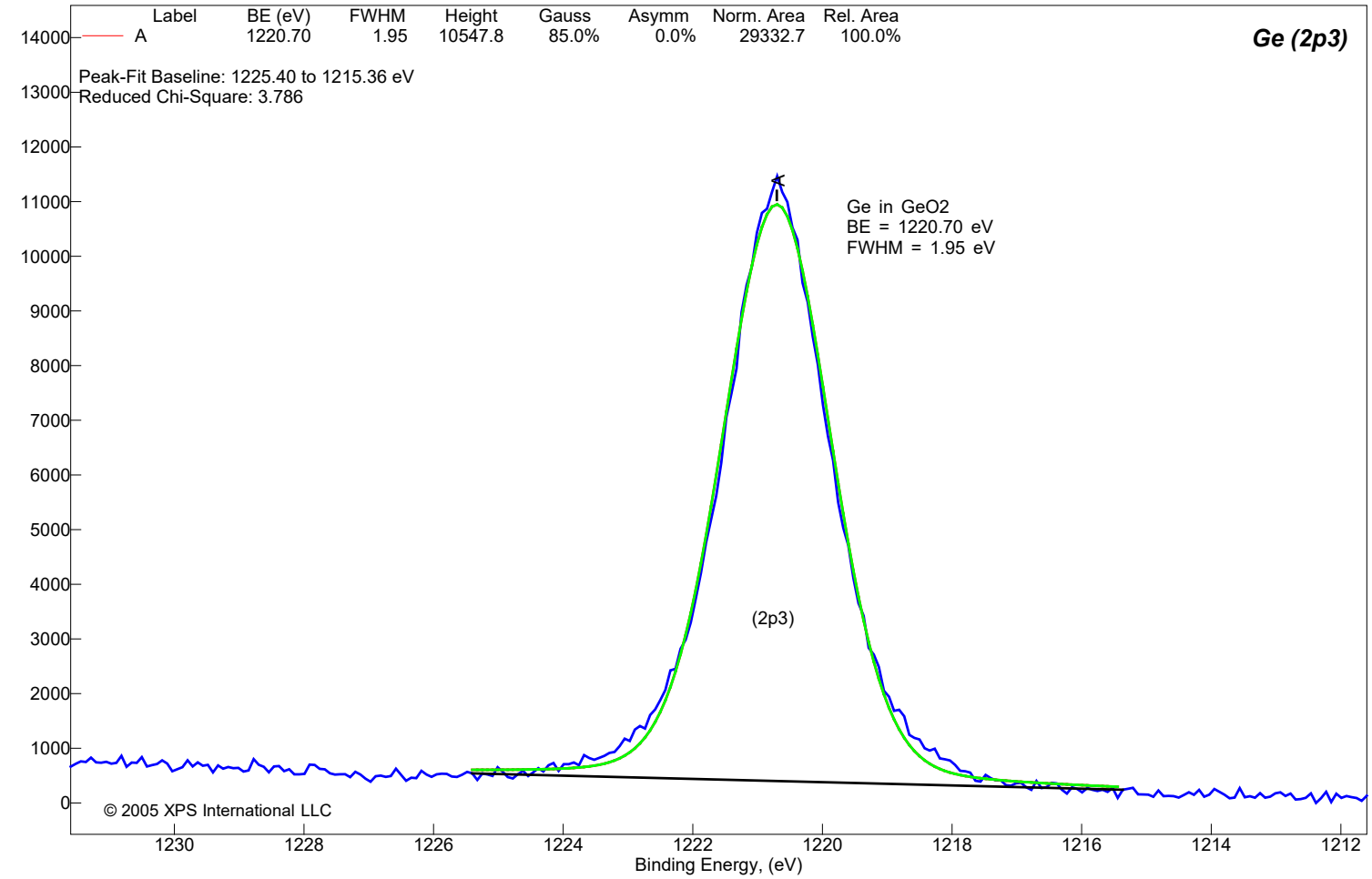
Sample Description: GeO2 (99.999%) Aldrich lot# 02904BW, 3mm pellet, screen, 90 TOA



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Germanium (IV) Oxide (FW = 104.59)

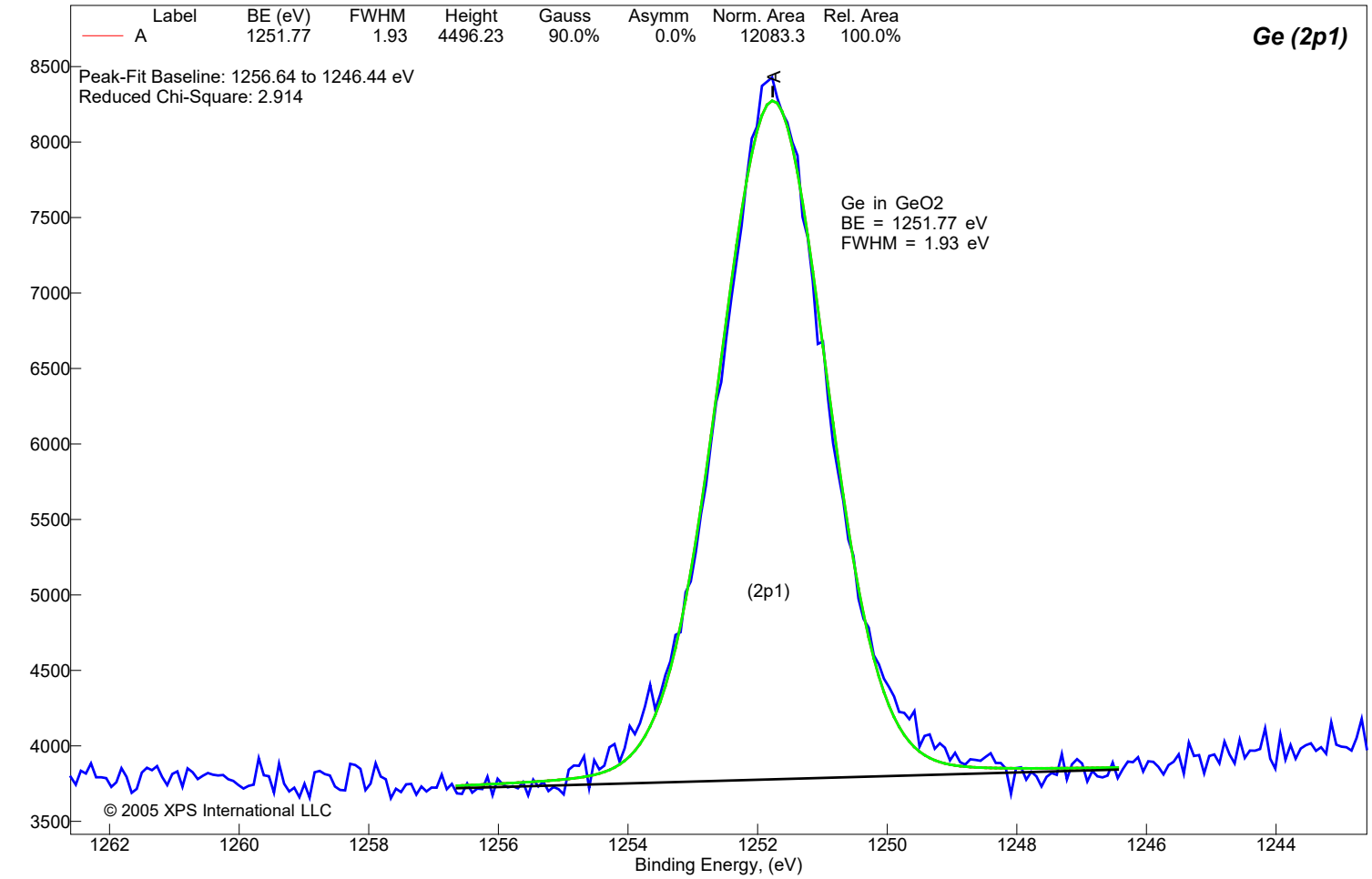
Sample Description: GeO2 (99.999%) Aldr lot# 02904BW, 3mm pellet, screen, 90 TOA



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Germanium (IV) Oxide (FW = 104.59)

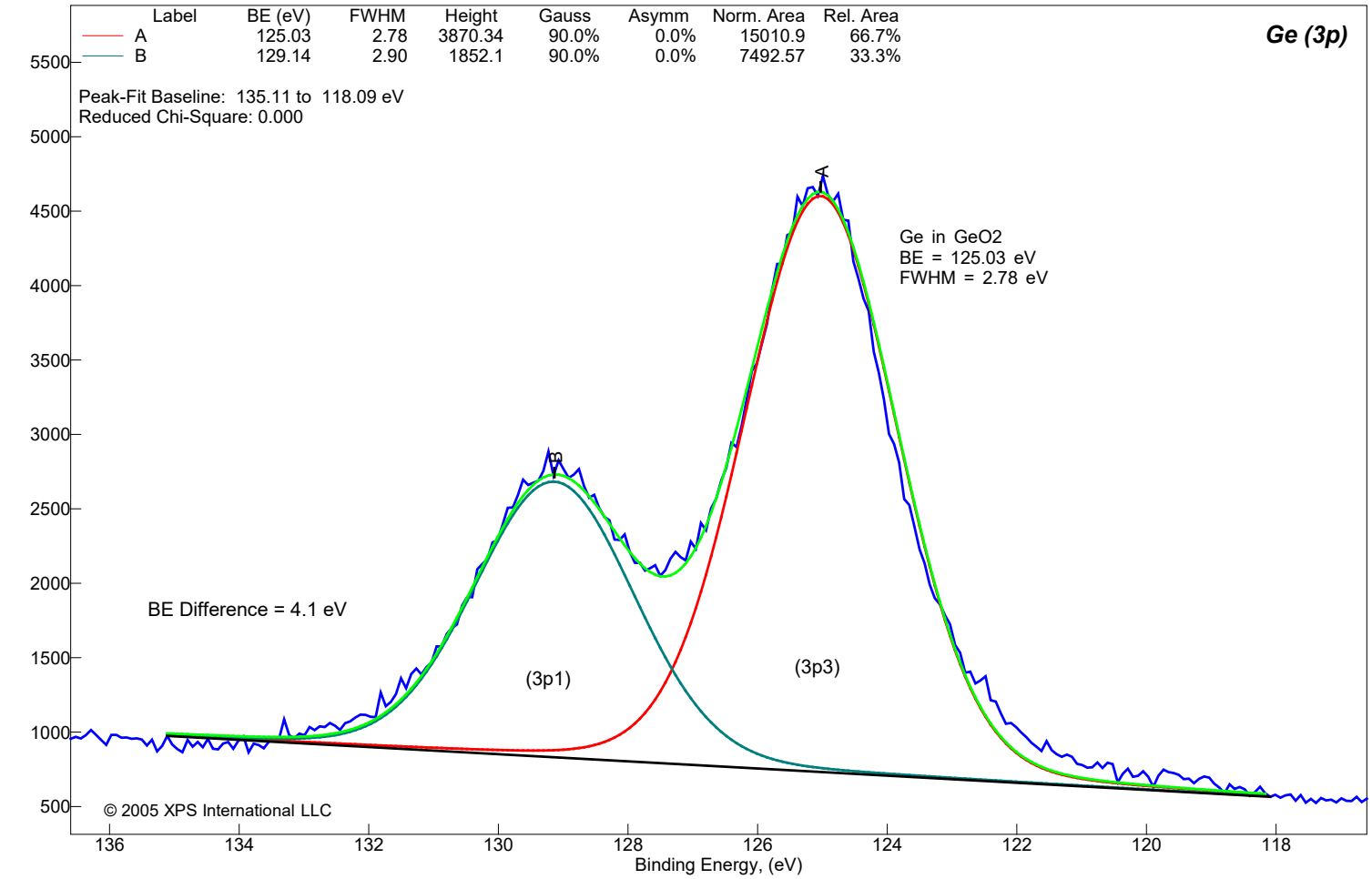
Sample Description: GeO2 (99.999%) Aldr lot# 02904BW, 3mm pellet, screen, 90 TOA



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Germanium (IV) Oxide (FW = 104.59)

Sample Description: GeO2 (99.999%) Aldr lot# 02904BW, 3mm pellet, screen, 90 TOA



HfO_2

Hafnium (IV) Oxide (FW = 210.49)
Surface Composition Table

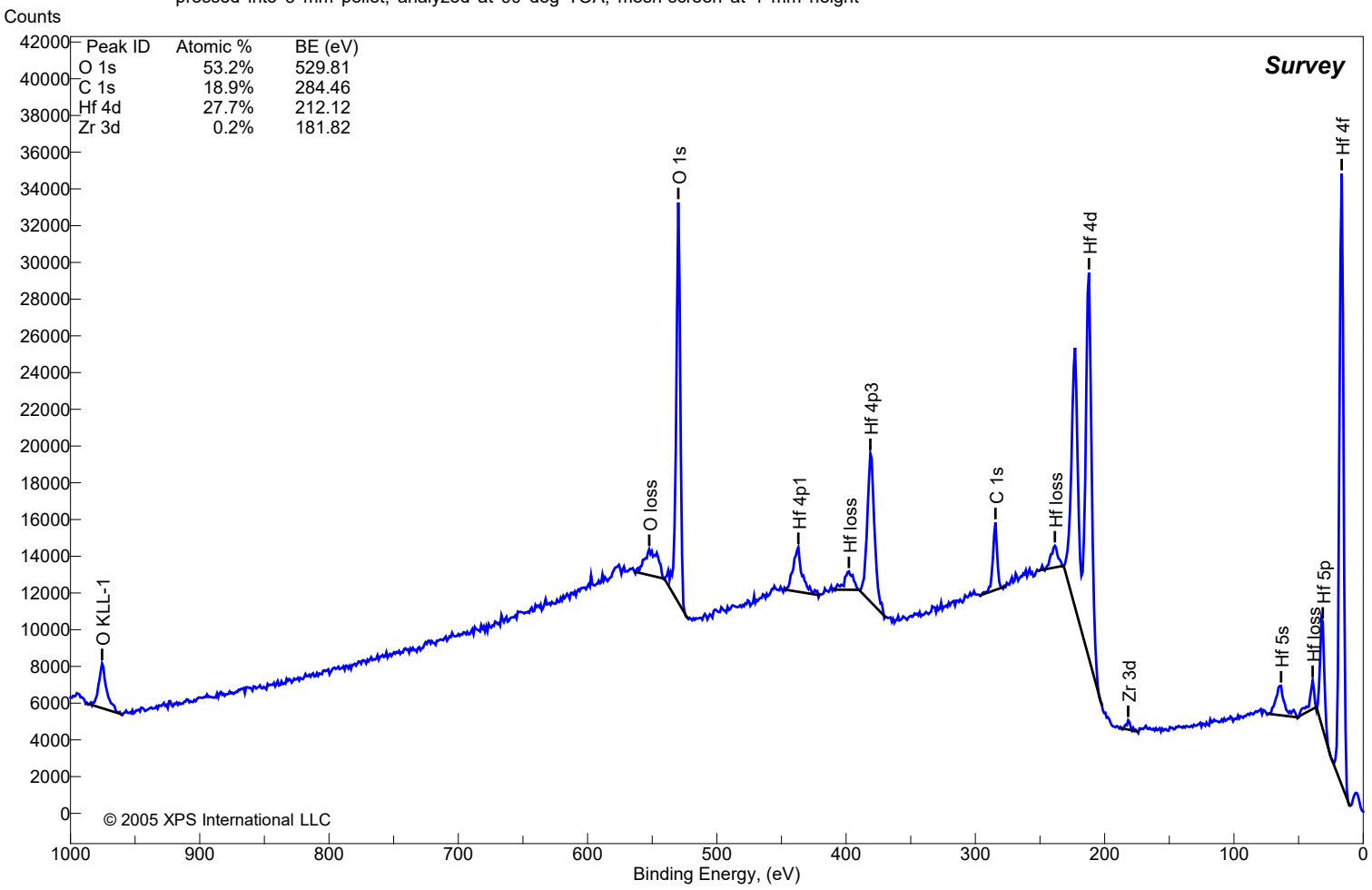
Description: HfO_2 (99.9%, Zr <1%) from Aldrich Co. Lot# 00921JV, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white powder pressed into 3 mm pellet, mp 2774 C, d 9.68

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Hf 4f	21.4	21.4	7.52	1.5	156,696	
Hf 5p3	36.1	36.1	1.40	1.5	30,270	
Hf 3p1	43.9	43.9	0.00	1.5	10,302	
Hf 5s	68.4	68.4	0.34	1.5	12,351	
Zr 3d	186.6	186.6	7.04	1.5	1,800	0.2%
Hf 4d5	217.0	217.0	8.84	1.5	118,412	
Hf 4d3	227.7	227.7	6.13	1.5	78,760	
Hf loss	243.3	243.3	0.00	1.5	9,951	
C 1s	285.2	285.2	1.00	1.1	5,611	12.3%
C 1s	289.3	289.3	1.00	1.5	16,992	18.2%
Hf 4p3	386.1	386.1	4.88	1.5	65,831	16.4%
Hf loss	402.7	402.7	0.00	1.5	9,698	
Hf 4p1	441.8	441.8	2.06	1.5	21,198	
O 1s	534.6	534.6	2.93	1.5	103,166	53.0%
O loss	557.1	557.1	0.00	1.5	23,035	
O KLL-1	980.4	980.4	0.70	1.5	21,348	

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Hafnium (IV) Oxide (FW = 210.49)

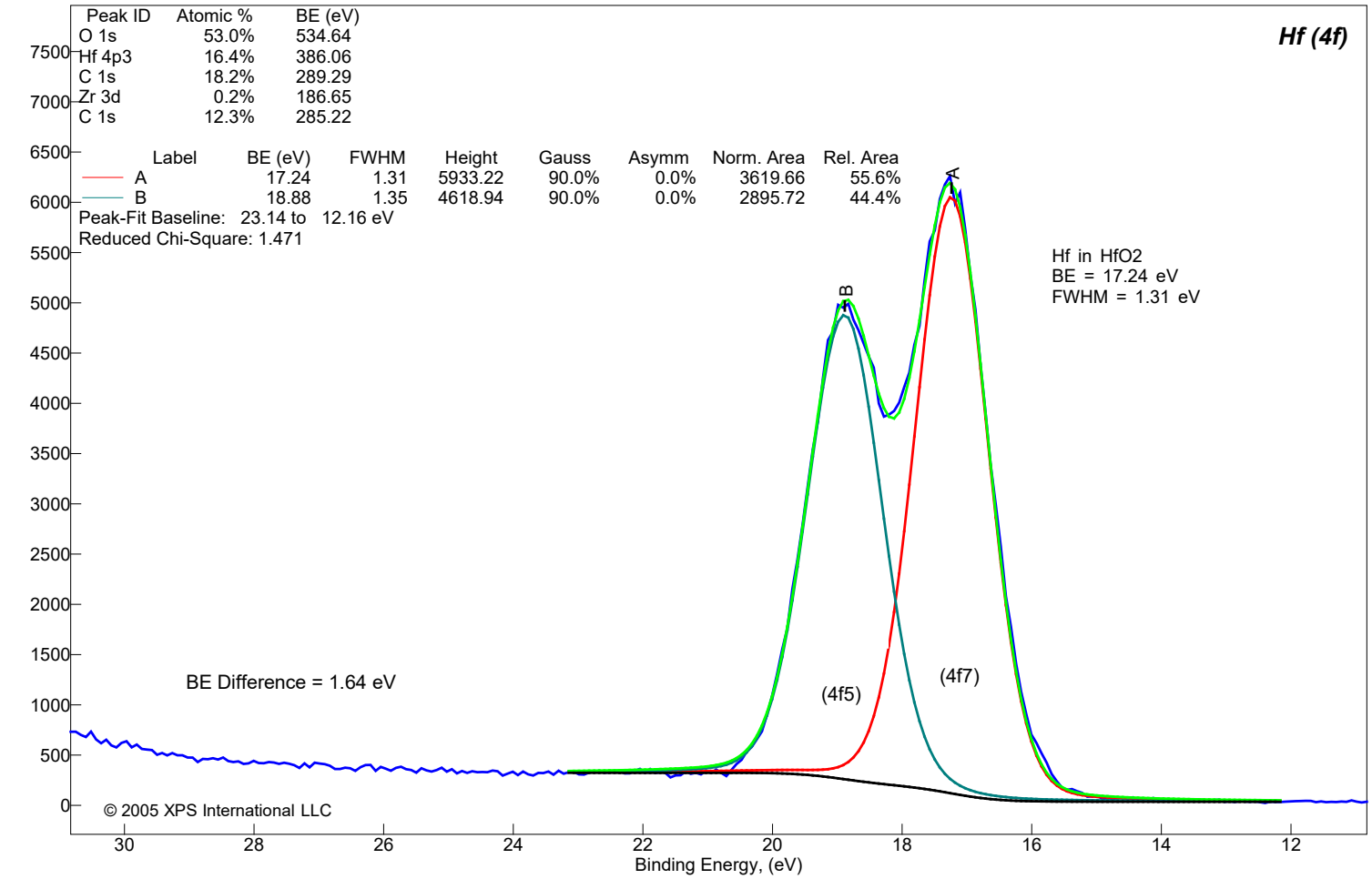
Sample Description: HfO2 (99.9%, Zr <1%) from Aldrich lot# 00921JV
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Hafnium (IV) Oxide (FW = 210.49)

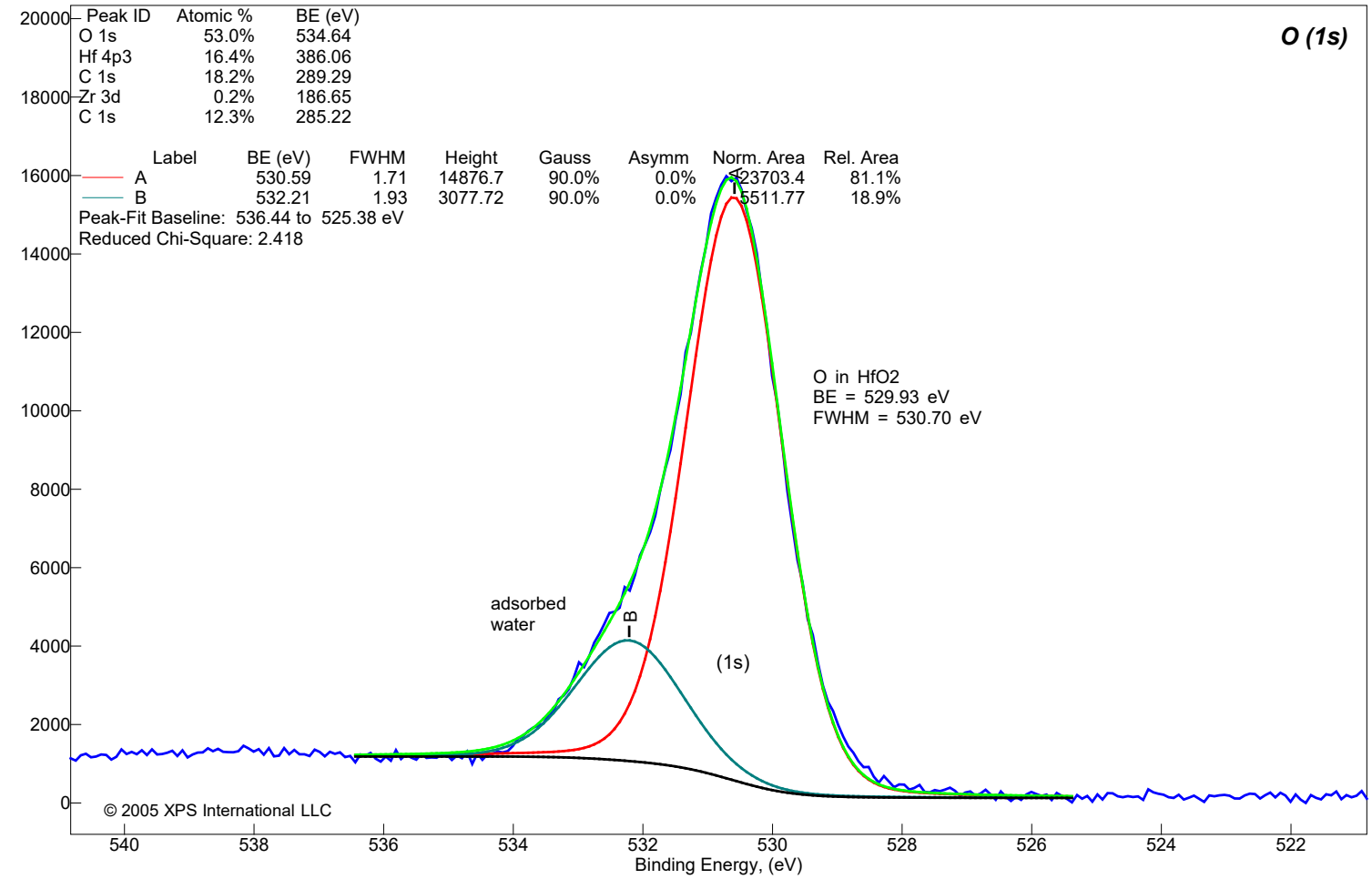
Sample Description: HfO2 (99.9%, Zr <1%) Aldr lot# 00921JV, 3mm pellet, screen, 90 TOA



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Hafnium (IV) Oxide (FW = 210.49)

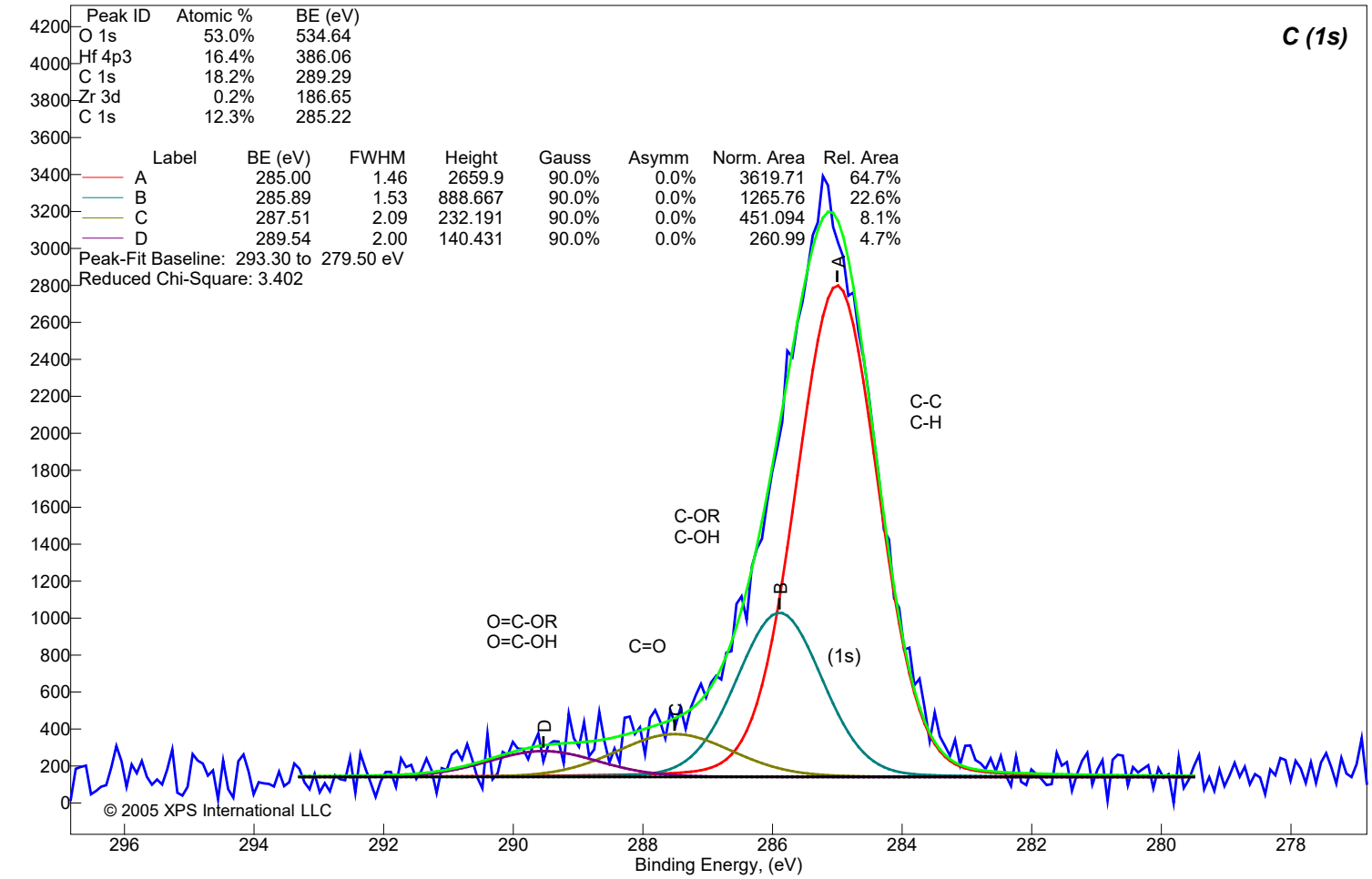
Sample Description: HfO2 (99.9%, Zr <1%) Aldr lot# 00921JV, 3mm pellet, screen, 90 TOA



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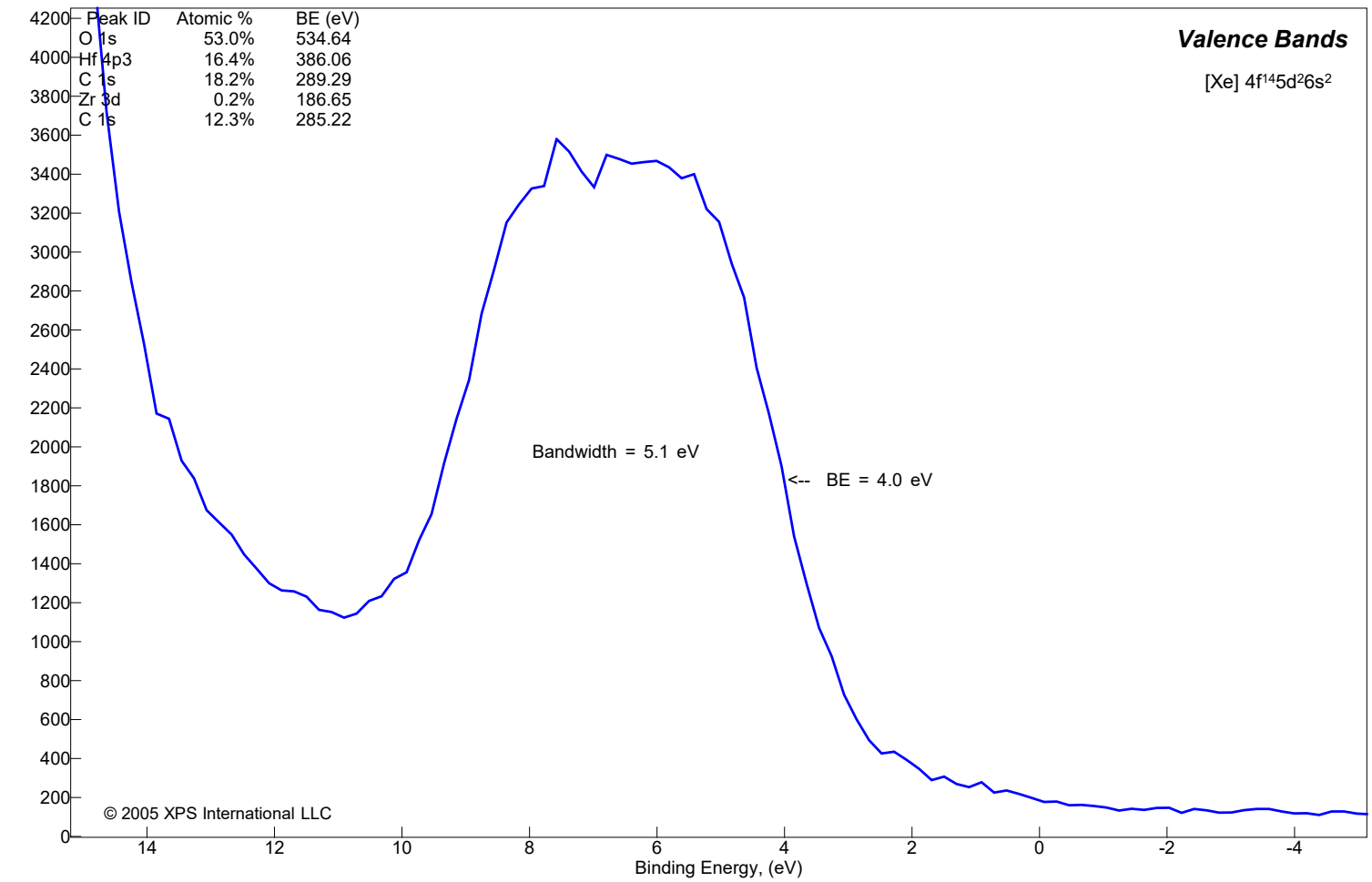
Hafnium (IV) Oxide (FW = 210.49)

Sample Description: HfO2 (99.9%, Zr <1%) Aldr lot# 00921JV, 3mm pellet, screen, 90 TOA



Hafnium (IV) Oxide (FW = 210.49)

Sample Description: HfO2 (99.9%, Zr <1%) Aldr lot# 00921JV, 3mm pellet, screen, 90 TOA

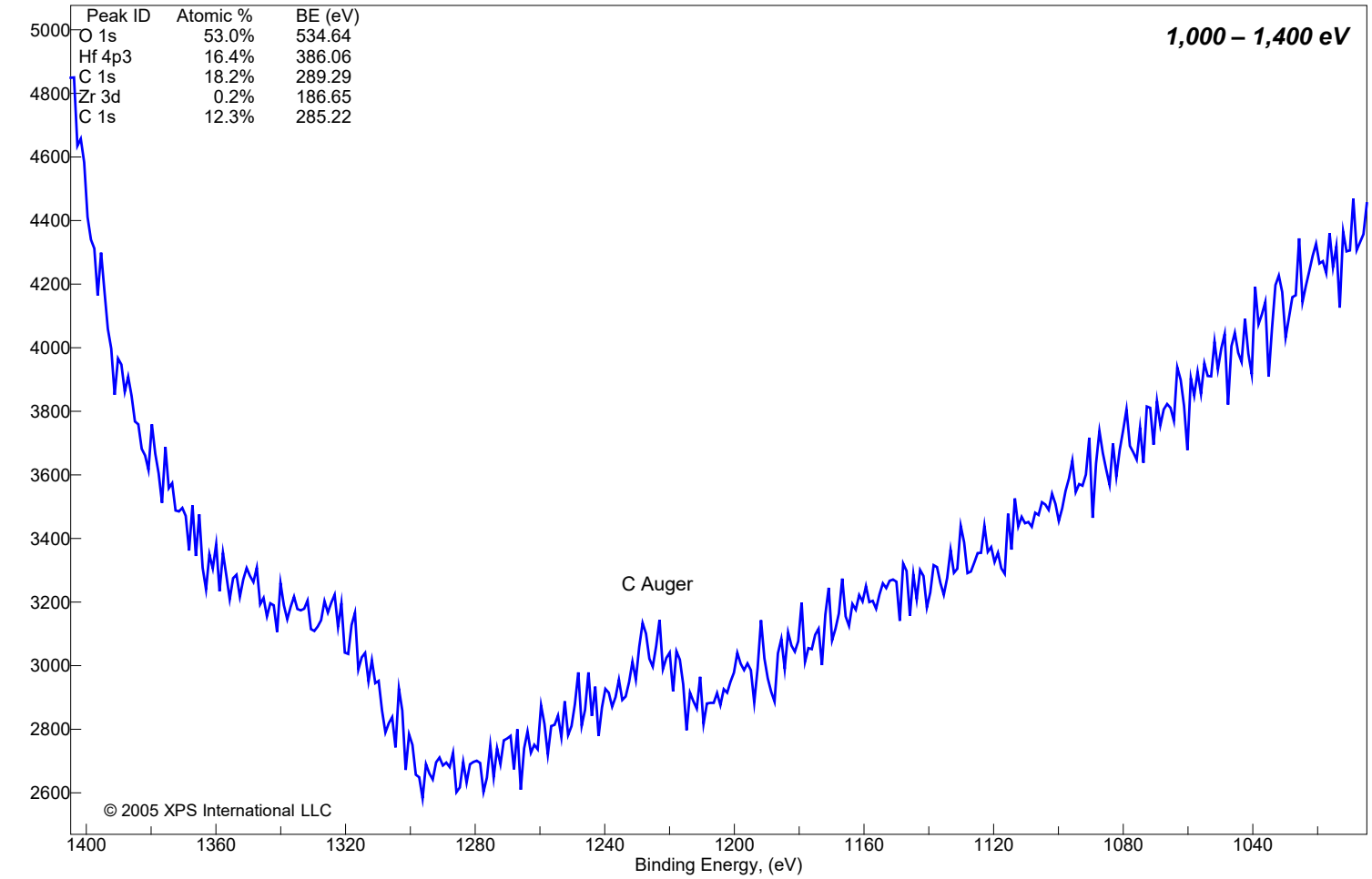


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HfO_2

Hafnium (IV) Oxide (FW = 210.49)

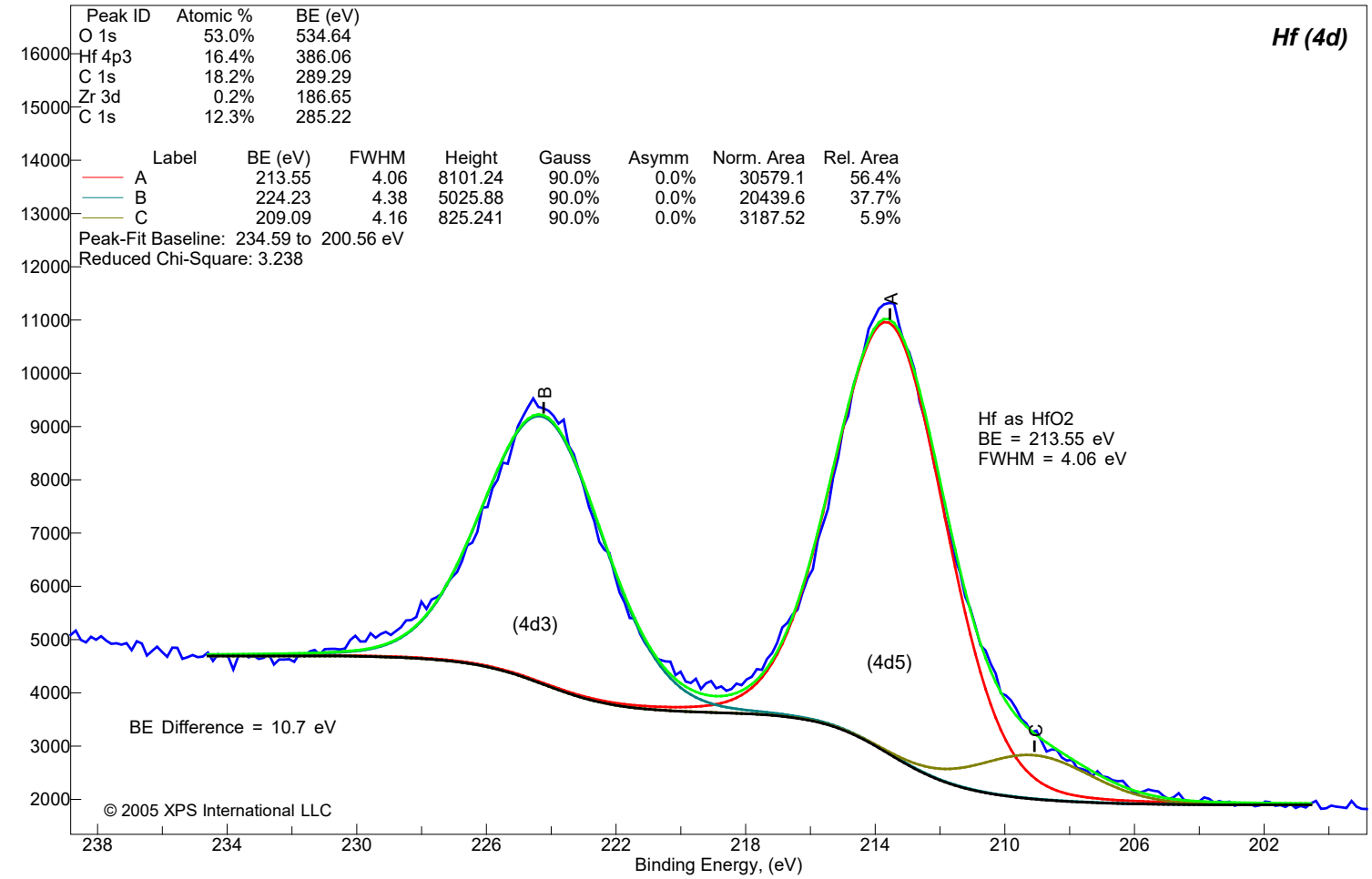
Sample Description: HfO2 (99.9%, Zr <1%) Aldr lot# 00921JV, 3mm pellet, screen, 90 TOA



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Hafnium (IV) Oxide (FW = 210.49)

Sample Description: HfO2 (99.9%, Zr <1%) Aldr lot# 00921JV, 3mm pellet, screen, 90 TOA



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HgO

Mercury (II) Oxide (FW = 232.59)

Surface Composition Table

Description: HgO (99.999%) from Aldrich Co. Lot# 00515TV, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive red powder pressed into 3 mm pellet, mp 500 C, sol in acid

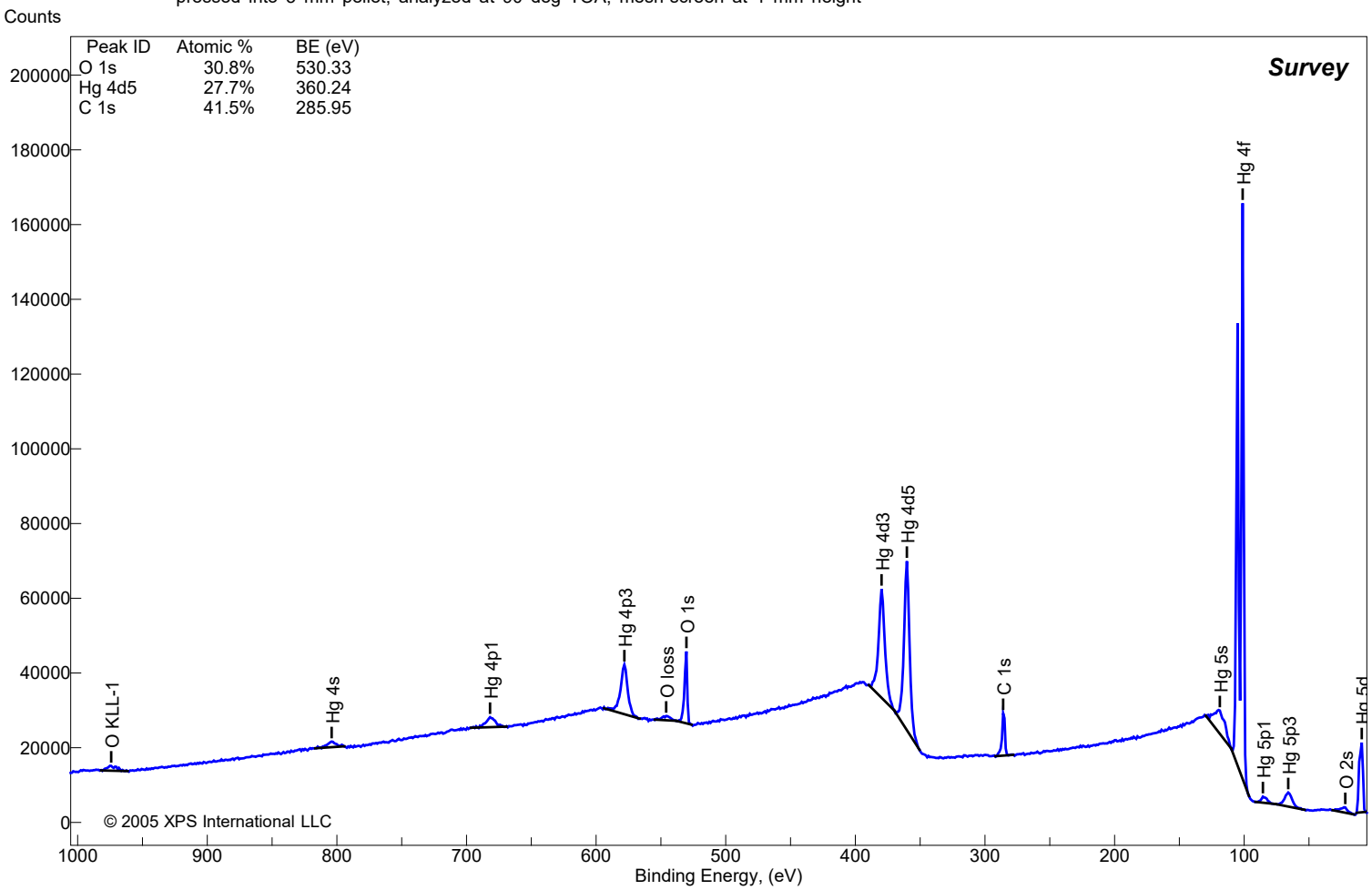
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2p	8.7	8.7	0.02	1.5	80,932	
Hg 5d	9.3	9.3	2.08	1.5	77,352	
O 2s	22.0	22.0	0.14	1.5	12,765	
Hg 5p3	66.0	66.0	1.17	1.5	31,551	
Hg 5p1	85.6	85.6	0.48	1.5	10,629	
Hg 4f	101.2	101.2	18.89	1.5	701,485	
Hg 5s	118.8	118.8	0.50	1.5	81,464	
C 1s	285.1	285.1	1.00	1.1	7,503	
C 1s	285.9	285.9	1.00	1.5	39,175	41.5%
Hg 4d5	360.2	360.2	12.17	1.5	289,147	27.7%
Hg 4d3	379.8	379.8	8.33	1.5	208,979	
O 1s	529.9	529.9	2.93	1.1	14,869	
O 1s	530.3	530.3	2.93	1.5	60,670	30.8%
O loss	546.0	546.0	0.00	1.5	11,791	
Hg 4p3	578.2	578.2	6.04	1.5	104,748	
Hg 4p1	681.8	681.8	2.14	1.5	27,313	
Hg 4s	804.0	804.0	1.94	1.5	16,277	
O KLL-1	974.1	974.1	0.70	1.5	13,062	

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HgO

Mercury (II) Oxide (FW = 232.59)

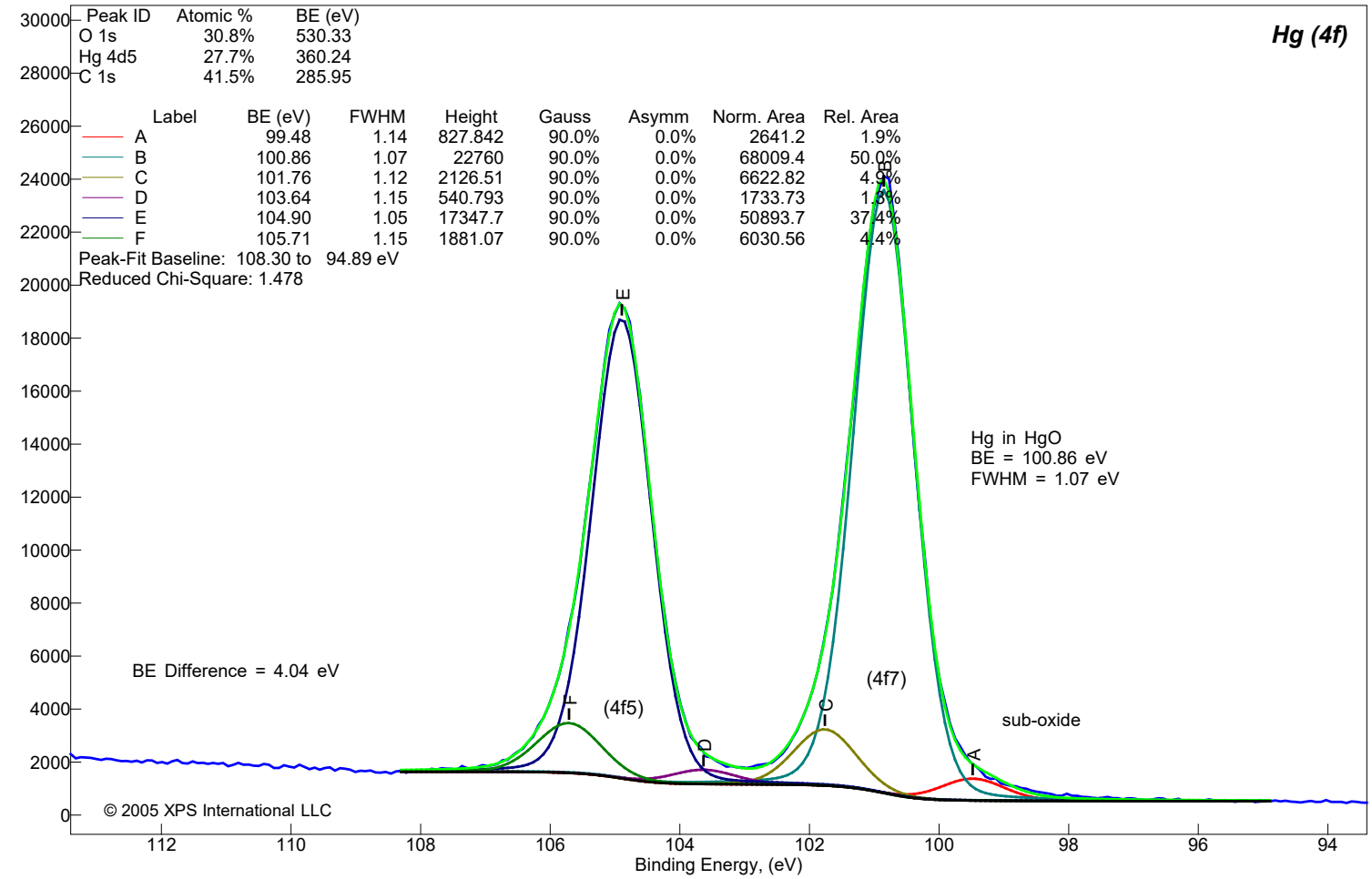
Sample Description: HgO (99.999%) from Aldrich lot# 00515TV
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Mercury (II) Oxide (FW = 232.59)

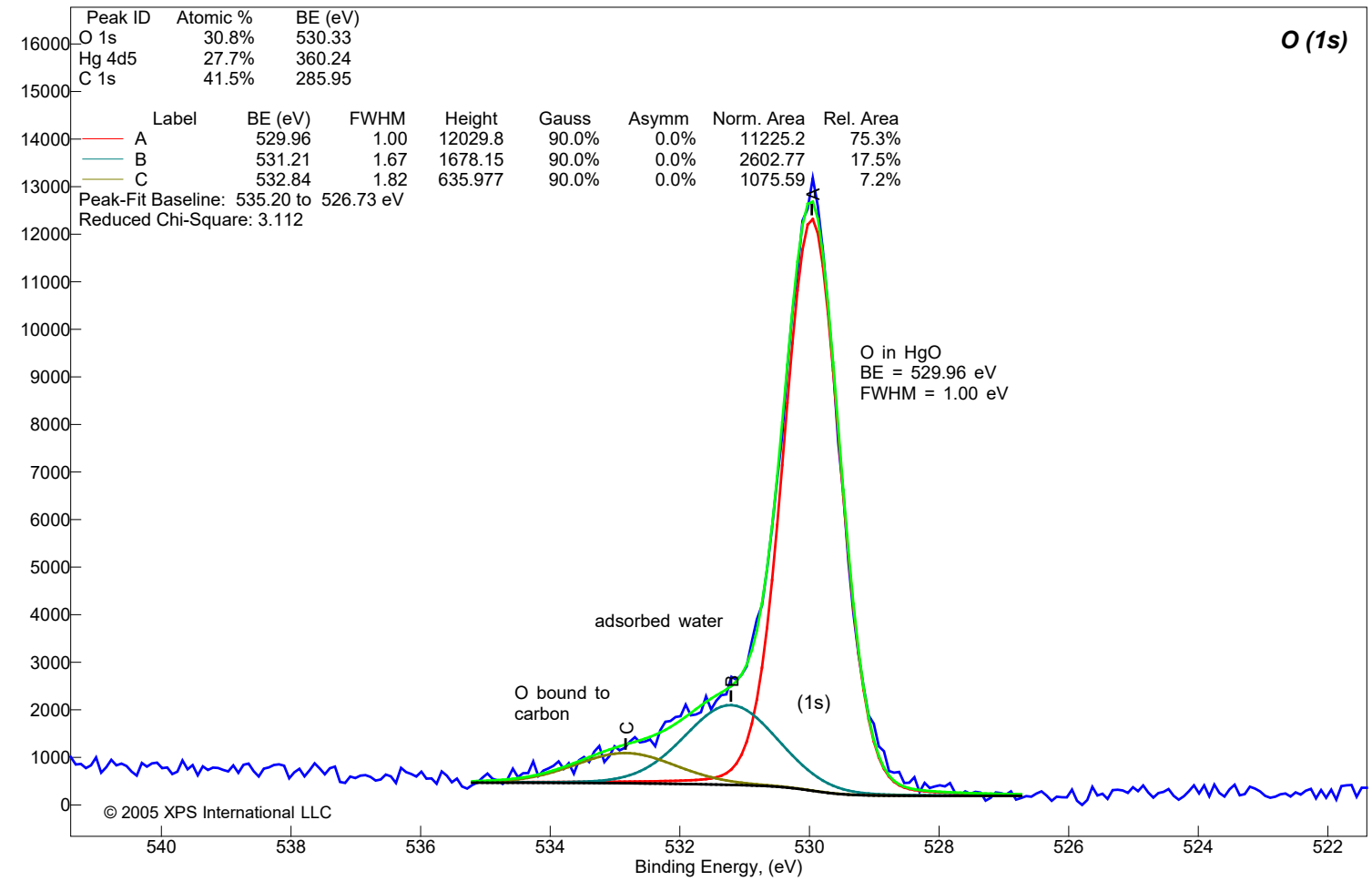
Sample Description: HgO (99.999%) Aldrich lot# 00515TV, 3mm pellet, screen, 90 TOA



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Mercury (II) Oxide (FW = 232.59)

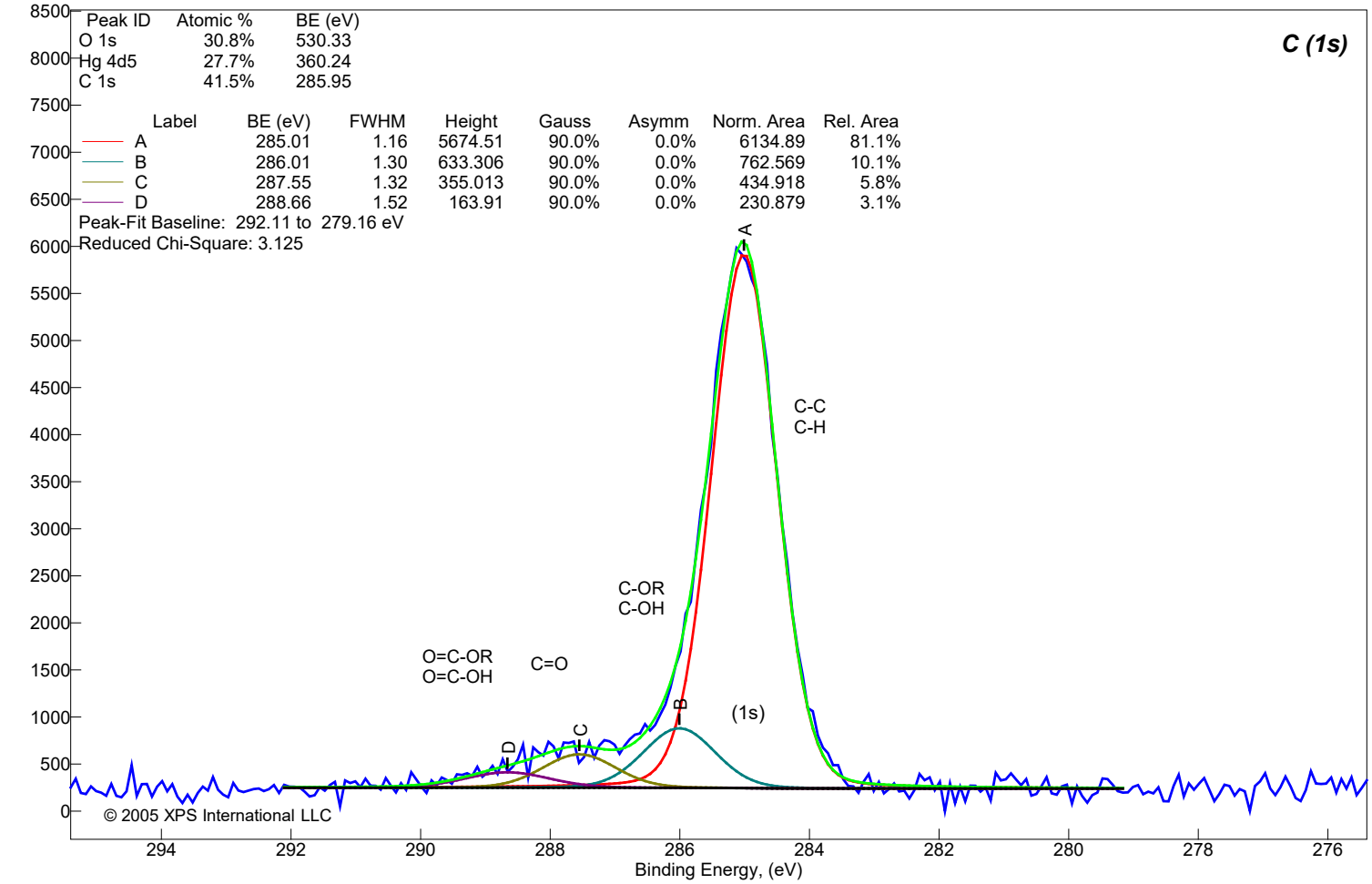
Sample Description: HgO (99.999%) Aldrich lot# 00515TV, 3mm pellet, screen, 90 TOA



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Mercury (II) Oxide (FW = 232.59)

Sample Description: HgO (99.999%) Aldrich lot# 00515TV, 3mm pellet, screen, 90 TOA

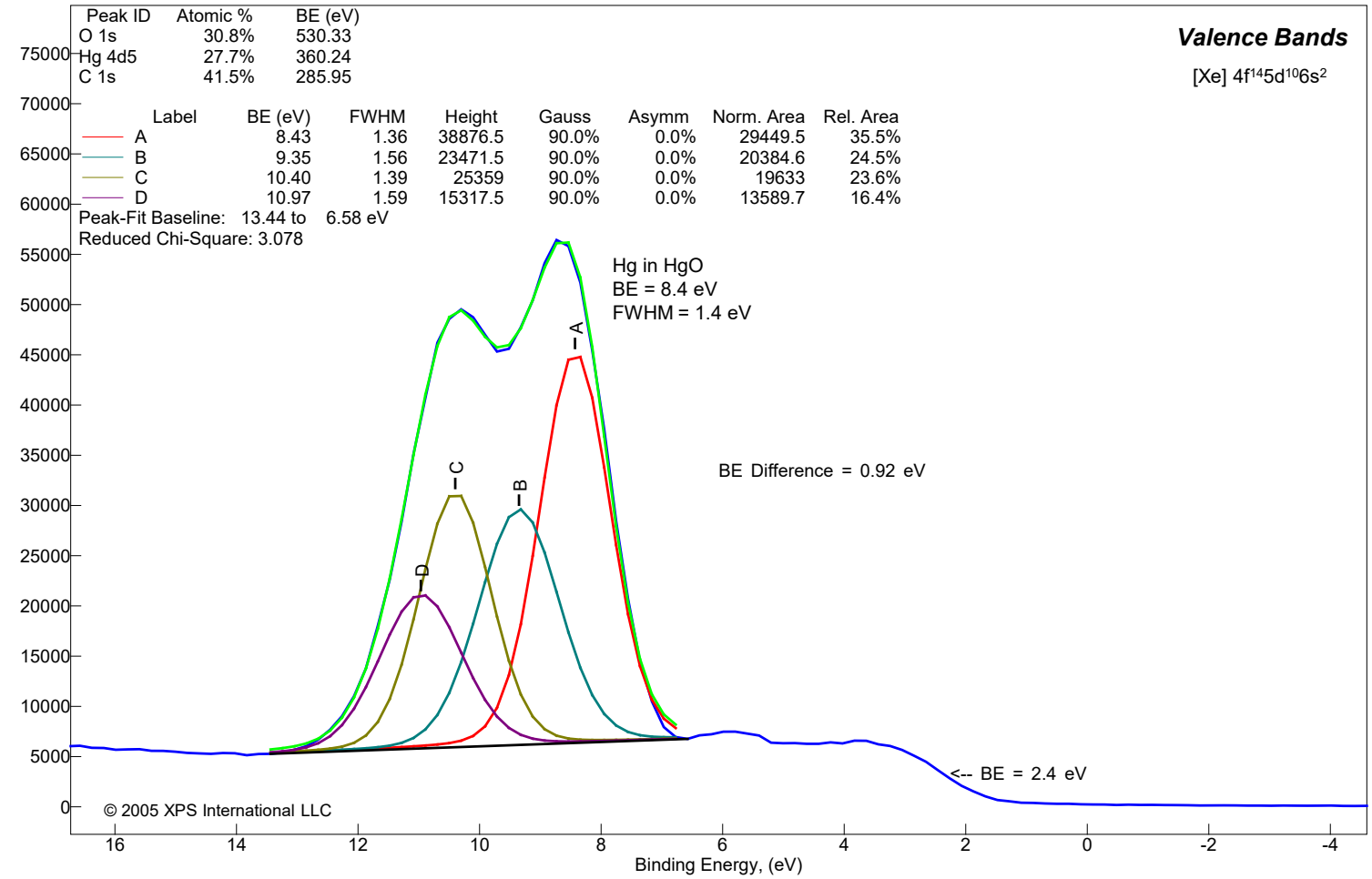


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HgO

Mercury (II) Oxide (FW = 232.59)

Sample Description: HgO (99.999%) Aldrich lot# 00515TV, 3mm pellet, screen, 90 TOA

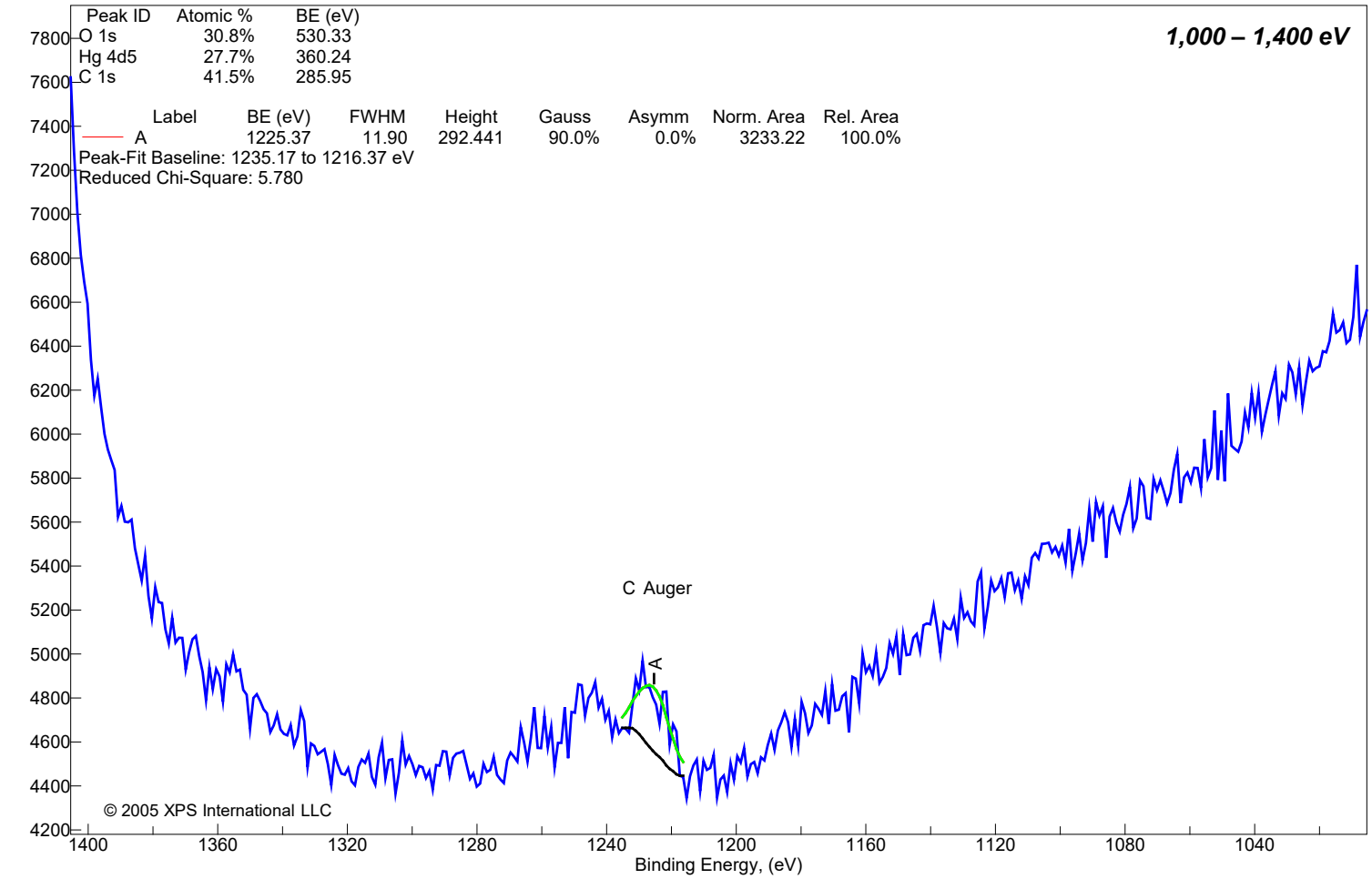


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HgO

Mercury (II) Oxide (FW = 232.59)

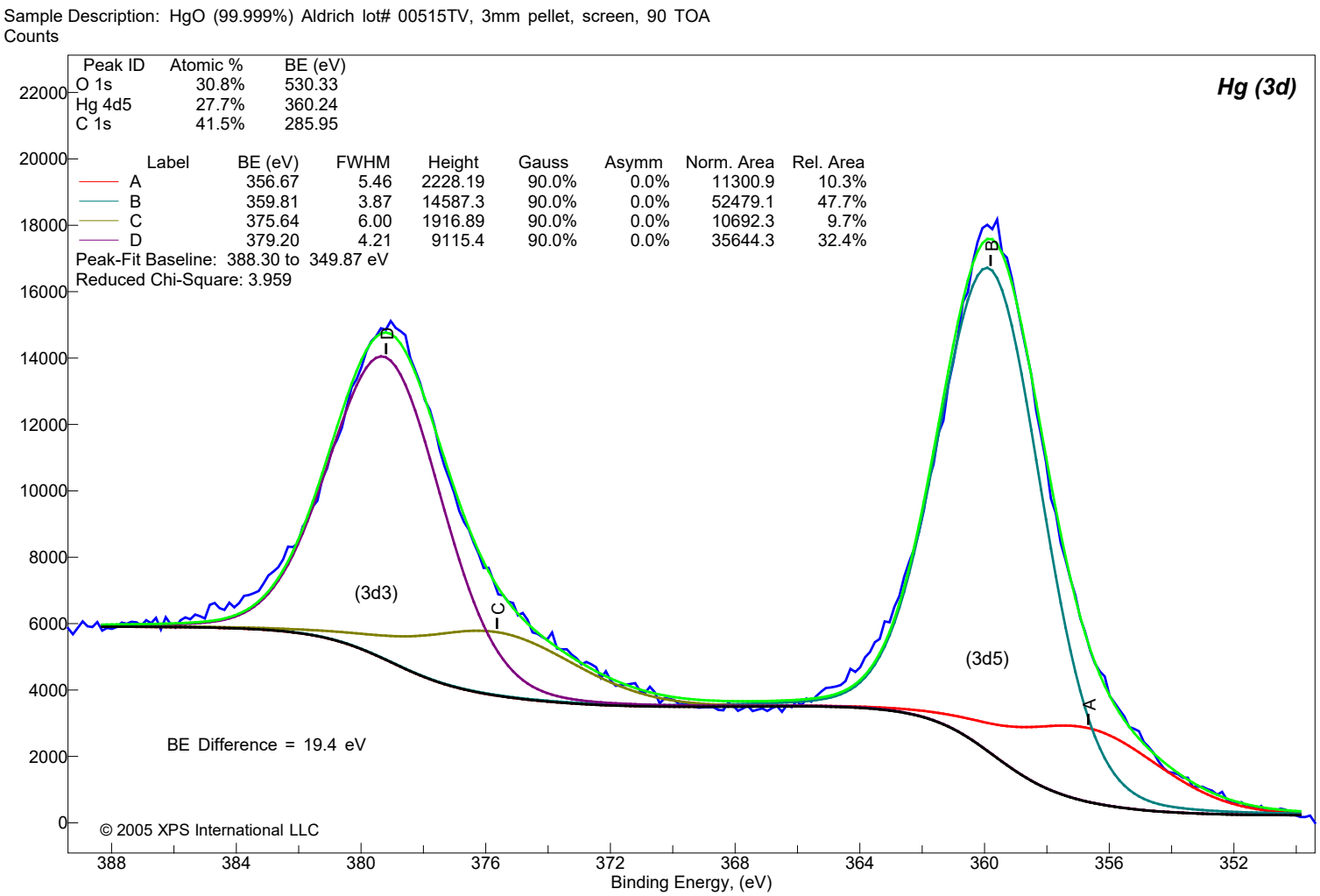
Sample Description: HgO (99.999%) Aldrich lot# 00515TV, 3mm pellet, screen, 90 TOA



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Mercury (II) Oxide (FW = 232.59)

Sample Description: HgO (99.999%) Aldrich lot# 00515TV, 3mm pellet, screen, 90 TOA



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Ho_2O_3

Holmium (III) Oxide (FW = 377.86)
Surface Composition Table

Description: Ho_2O_3 (99.999%) from Aldrich Co. Lot# 07918TX, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white powder pressed into 3 mm pellet, mp 2360 C, very hygroscopic

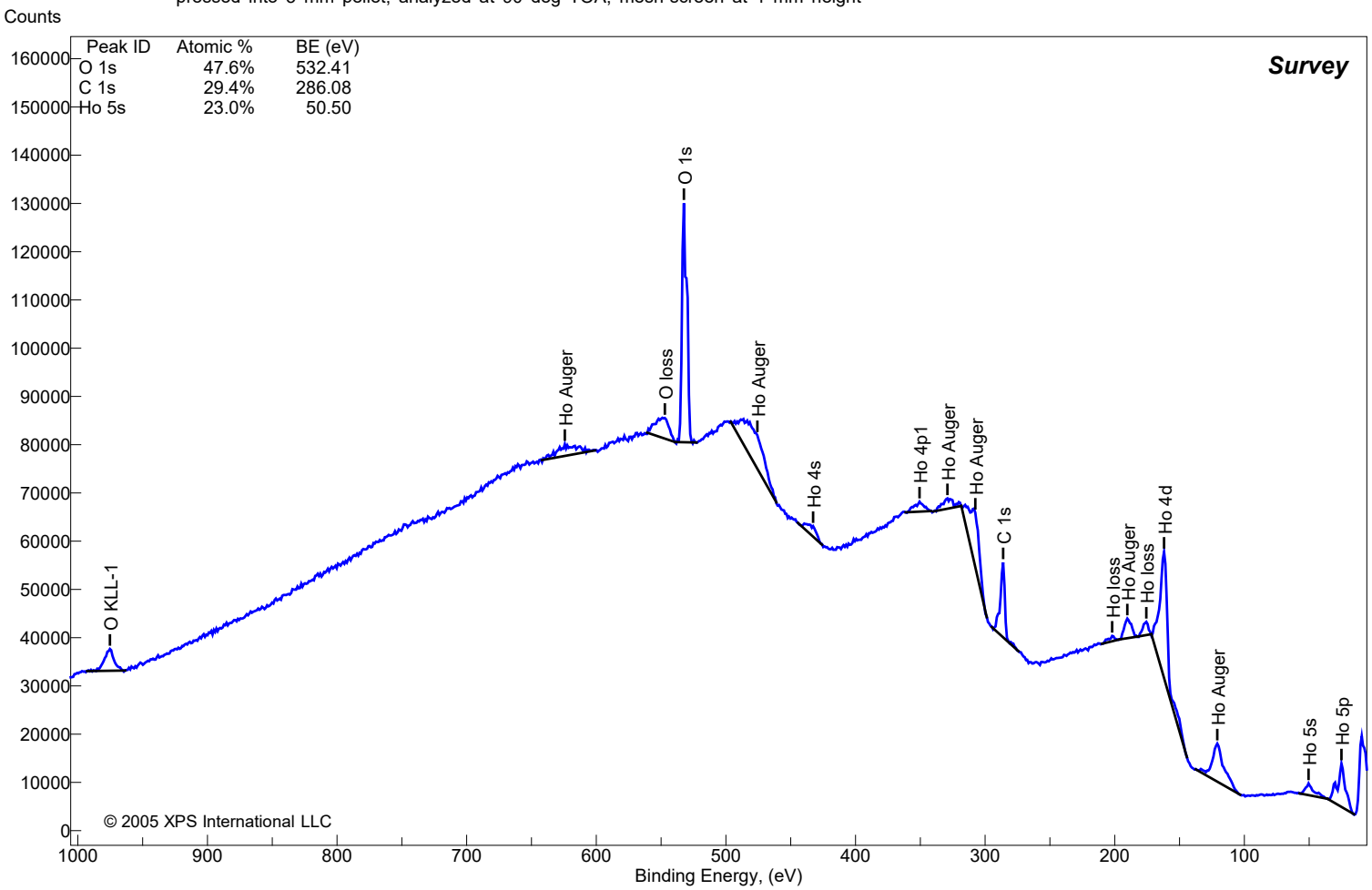
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Ho 5p	26.1	25.1	0.15	1.4	33,124	
Ho 5s	51.5	50.5	0.29	1.4	9,277	23.0%
Ho Auger	121.9	120.9	0.00	1.4	41,271	
Ho 4d	162.9	161.9	12.00	1.4	96,659	
Ho loss	176.6	175.6	0.00	1.4	7,868	
Ho Auger	191.3	190.3	0.00	1.4	13,175	
Ho loss	203.0	202.0	0.00	1.4	3,096	
C 1s	287.1	286.1	1.00	1.4	31,509	29.4%
Ho Auger	308.6	307.6	0.00	1.4	52,326	
Ho Auger	330.1	329.1	0.00	1.4	11,373	
Ho 4p1	351.6	350.6	1.91	1.4	8,567	
Ho 4s	433.7	432.7	1.61	1.4	8,497	
Ho Auger	476.7	475.7	0.00	1.4	70,557	
O 1s	533.4	532.4	2.93	1.4	108,277	47.6%
O loss	548.1	547.1	0.00	1.4	27,992	
Ho Auger	625.3	624.3	0.00	1.4	24,436	
O KLL-1	976.2	975.2	0.70	1.4	18,753	

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Ho_2O_3

Holmium (III) Oxide (FW = 377.86)

Sample Description: Ho2O3 (99.999%) from Aldrich lot# 07918TX
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height

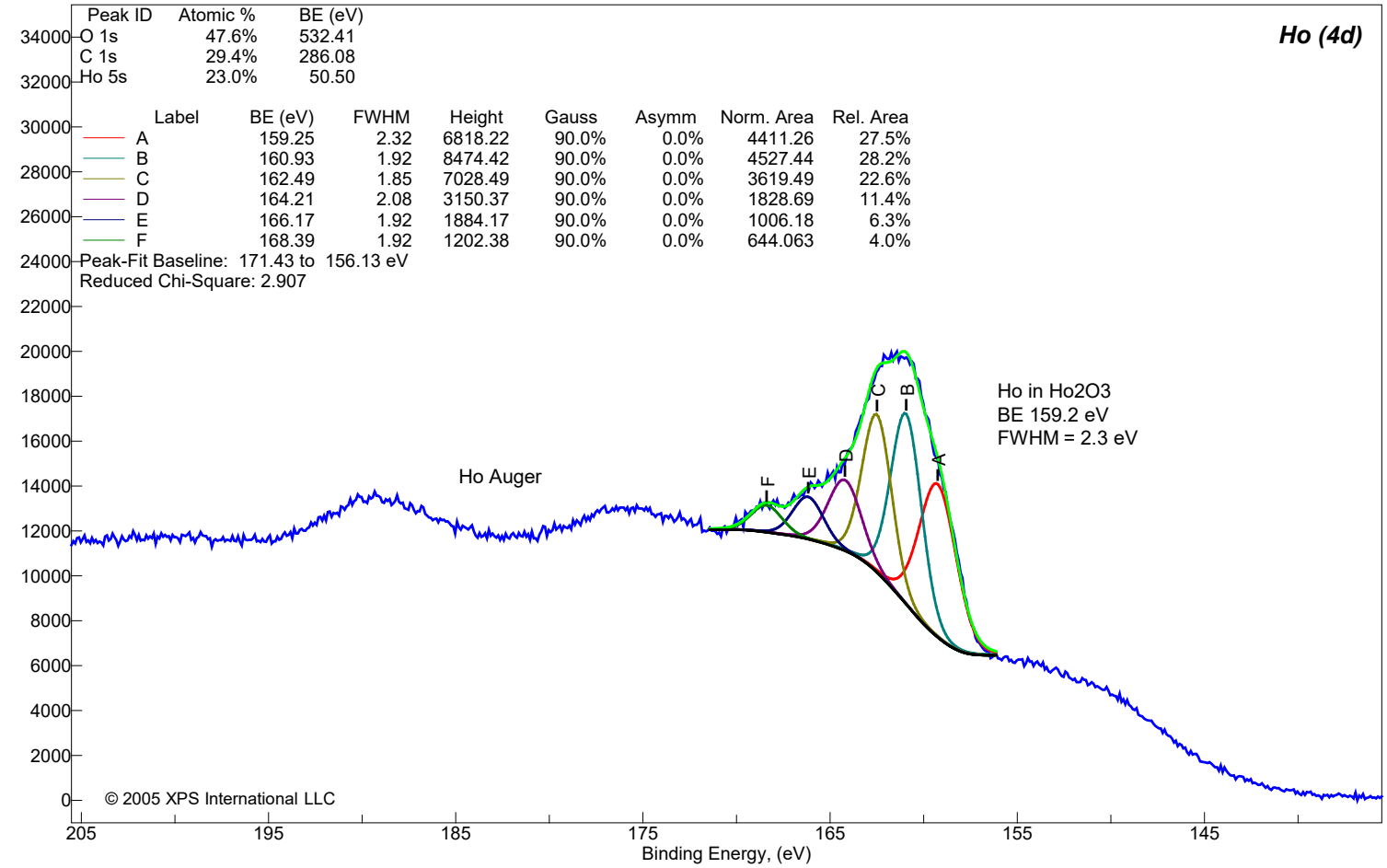


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Ho_2O_3

Holmium (III) Oxide (FW = 377.86)

Sample Description: Ho2O3 99.999% Aldrich 07918TX 3mm plt mesh 90 TOA mesh at 1mm

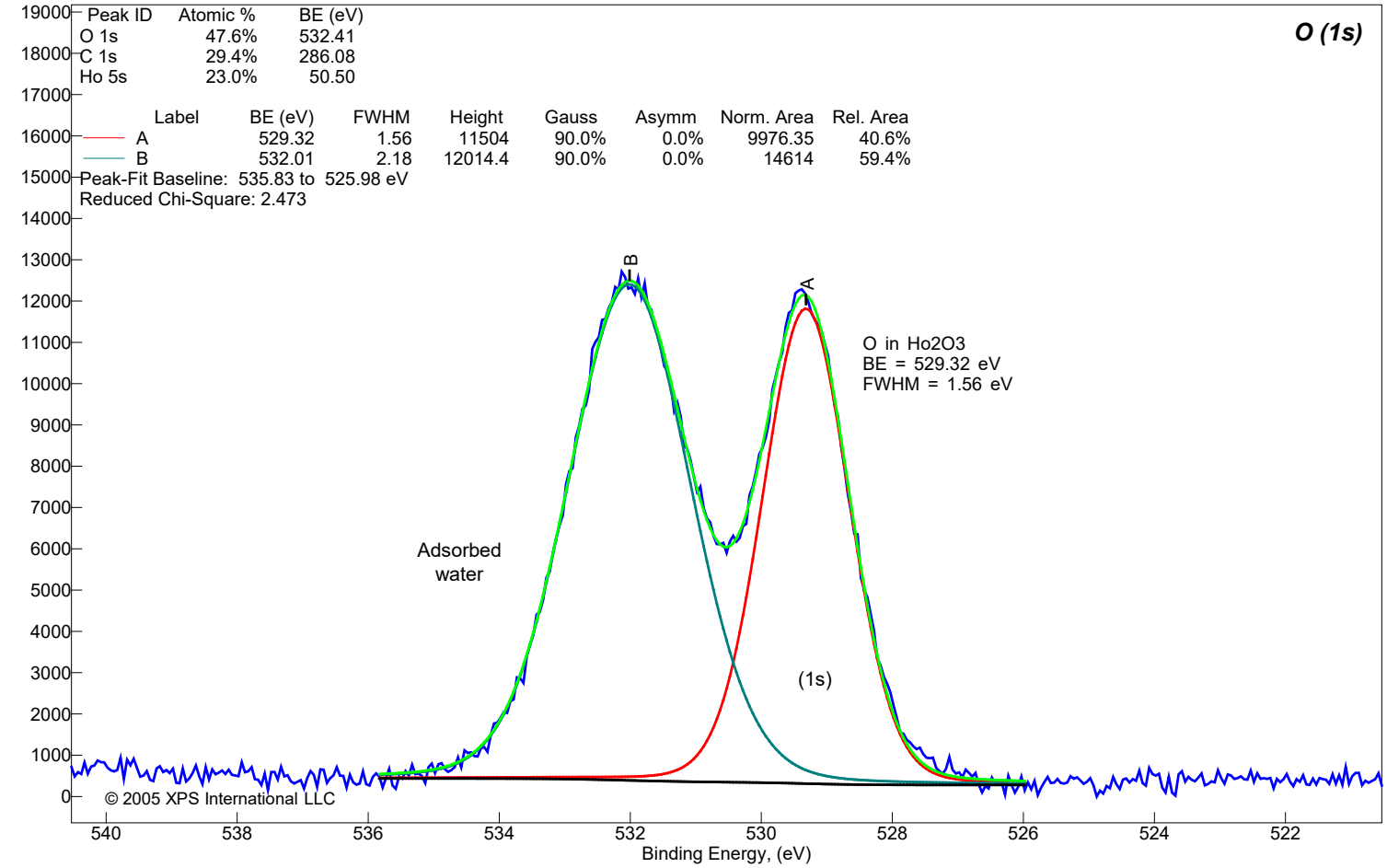


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Ho_2O_3

Holmium (III) Oxide (FW = 377.86)

Sample Description: Ho2O3 99.999% Aldrich 07918TX 3mm plt mesh 90 TOA mesh at 1mm

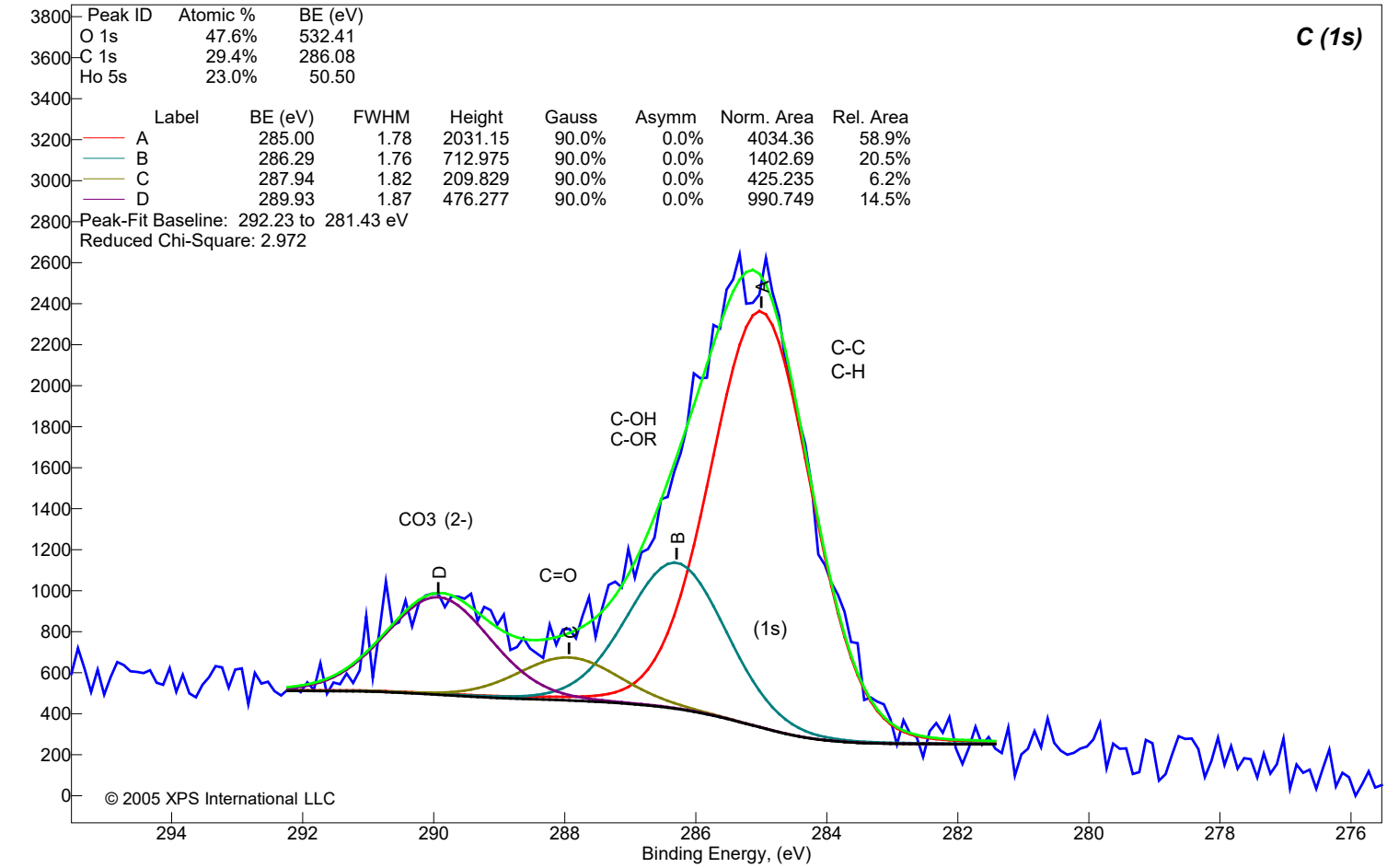


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Ho_2O_3

Holmium (III) Oxide (FW = 377.86)

Sample Description: Ho2O3 99.999% Aldrich 07918TX 3mm plt mesh 90 TOA mesh at 1mm

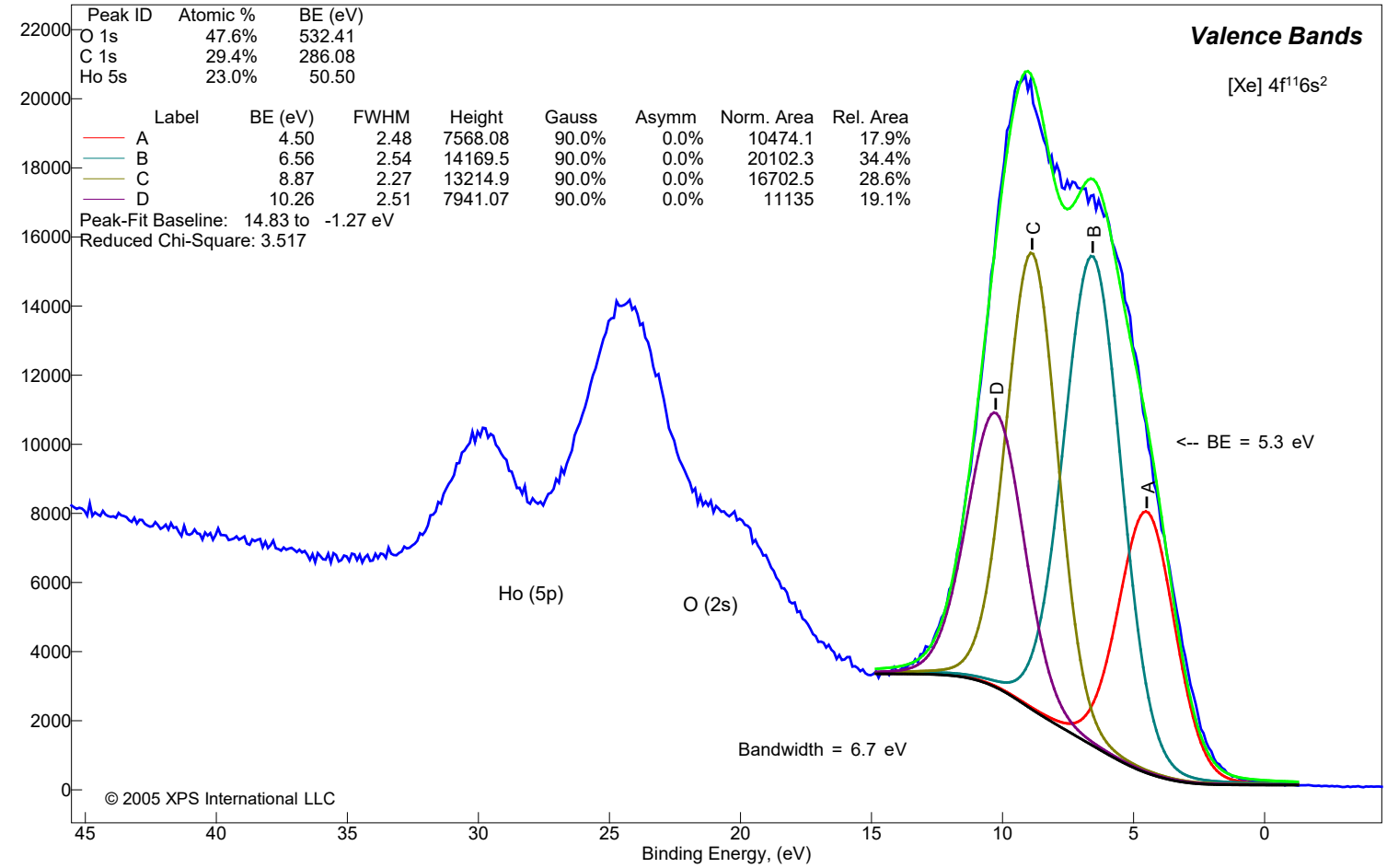


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Ho_2O_3

Holmium (III) Oxide (FW = 377.86)

Sample Description: Ho2O3 99.999% Aldrich 07918TX 3mm plt mesh 90 TOA mesh at 1mm



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In_2O_3

Indium (III) Oxide (FW = 277.64)
Surface Composition Table

Description: In_2O_3 (99.999%) from Aldrich Co. Lot# 07528HY, analyzed at 90 deg TOA, mesh at 1 mm, semi-conductive brown powder pressed into 3 mm pellet, mp 850 C, d 7.18

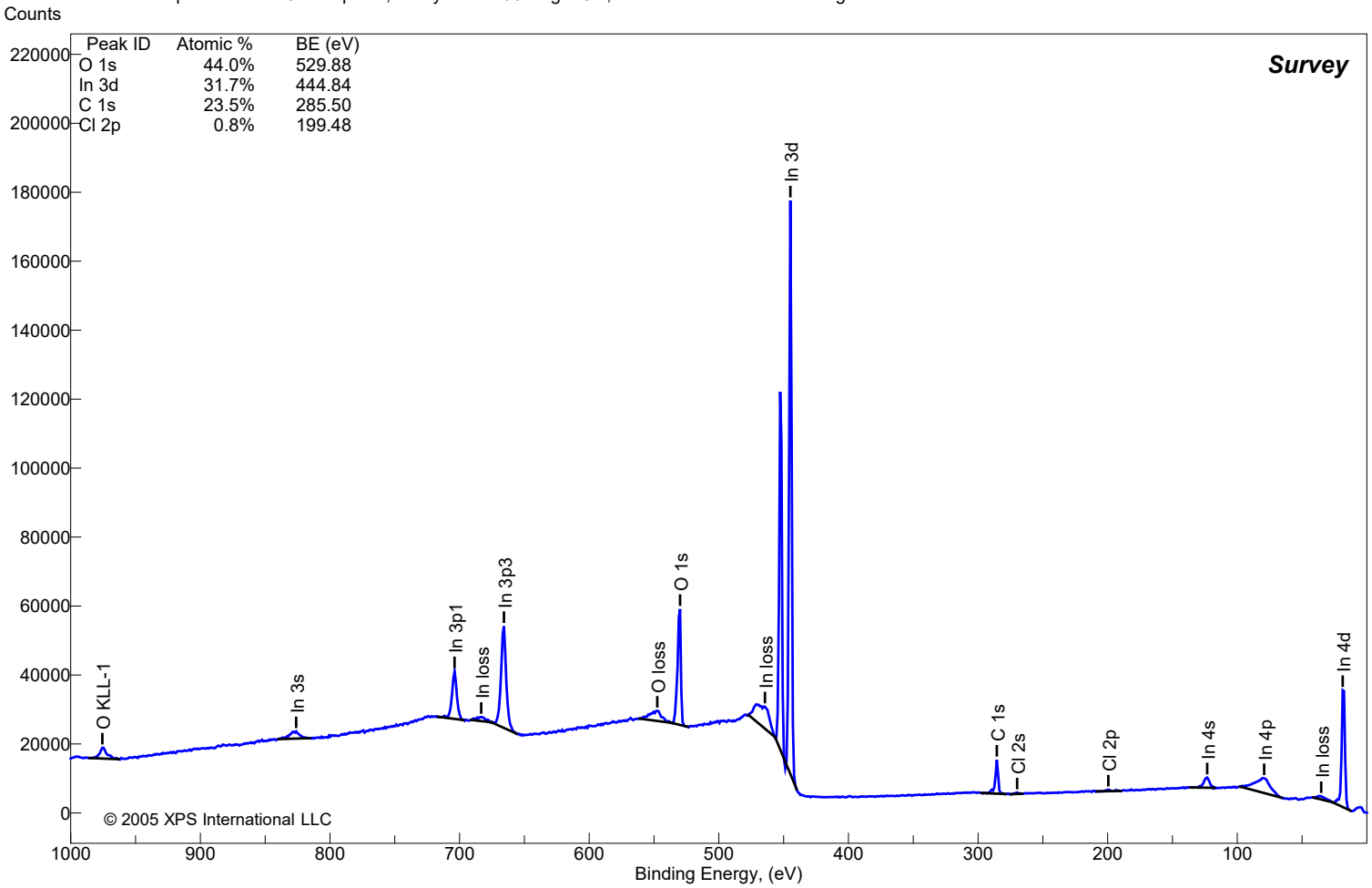
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
In 4d	18.6	15.3	2.28	1.5	87,663	
In loss	35.3	32.0	0.00	1.5	5,979	
In 4p	79.2	75.9	2.45	1.5	50,662	
In 4s	123.2	119.9	0.74	1.5	11,870	
Cl 2p	199.5	196.2	2.28	1.5	1,797	0.8%
Cl 2s	269.9	266.6	1.69	1.5	912	
C 1s	285.5	282.2	1.00	1.5	21,917	23.5%
In 3d	444.8	441.5	22.54	1.5	536,749	31.7%
In loss	464.4	461.1	0.00	1.5	68,257	
O 1s	529.8	526.5	2.93	1.1	19,255	
O 1s	529.9	526.6	2.93	1.5	85,444	44.0%
O loss	547.5	544.2	0.00	1.5	25,161	
In 3p3	665.8	662.5	8.93	1.5	116,641	
In loss	683.4	680.1	0.00	1.5	8,808	
In 3p1	703.9	700.6	4.40	1.5	48,805	
In 3s	826.1	822.8	3.16	1.5	16,140	
O KLL-1	975.6	972.3	0.70	1.5	18,596	

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In_2O_3

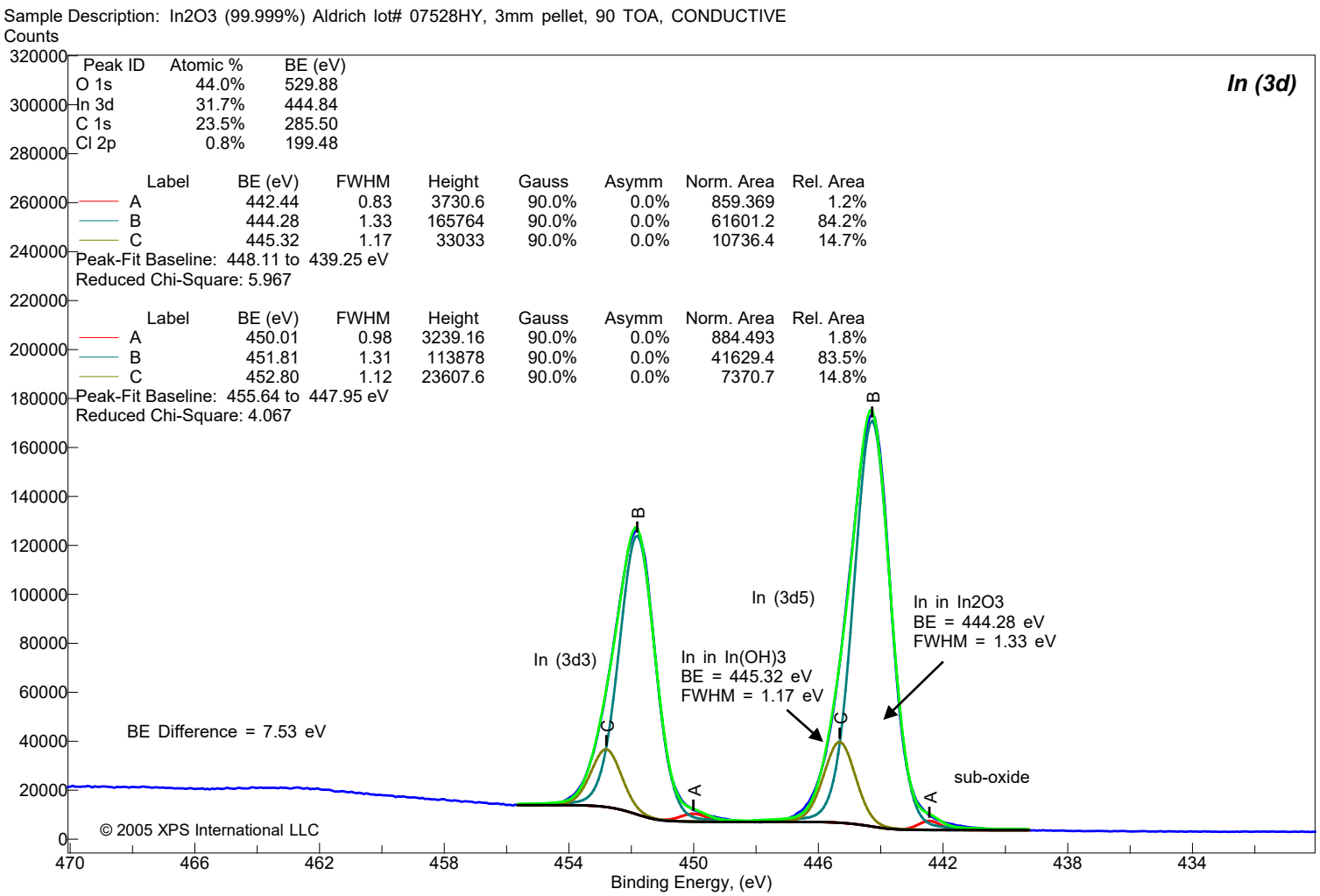
Indium (III) Oxide (FW = 277.64)

Sample Description: In2O3 (99.999%) from Aldrich lot# 07528HY, conductive
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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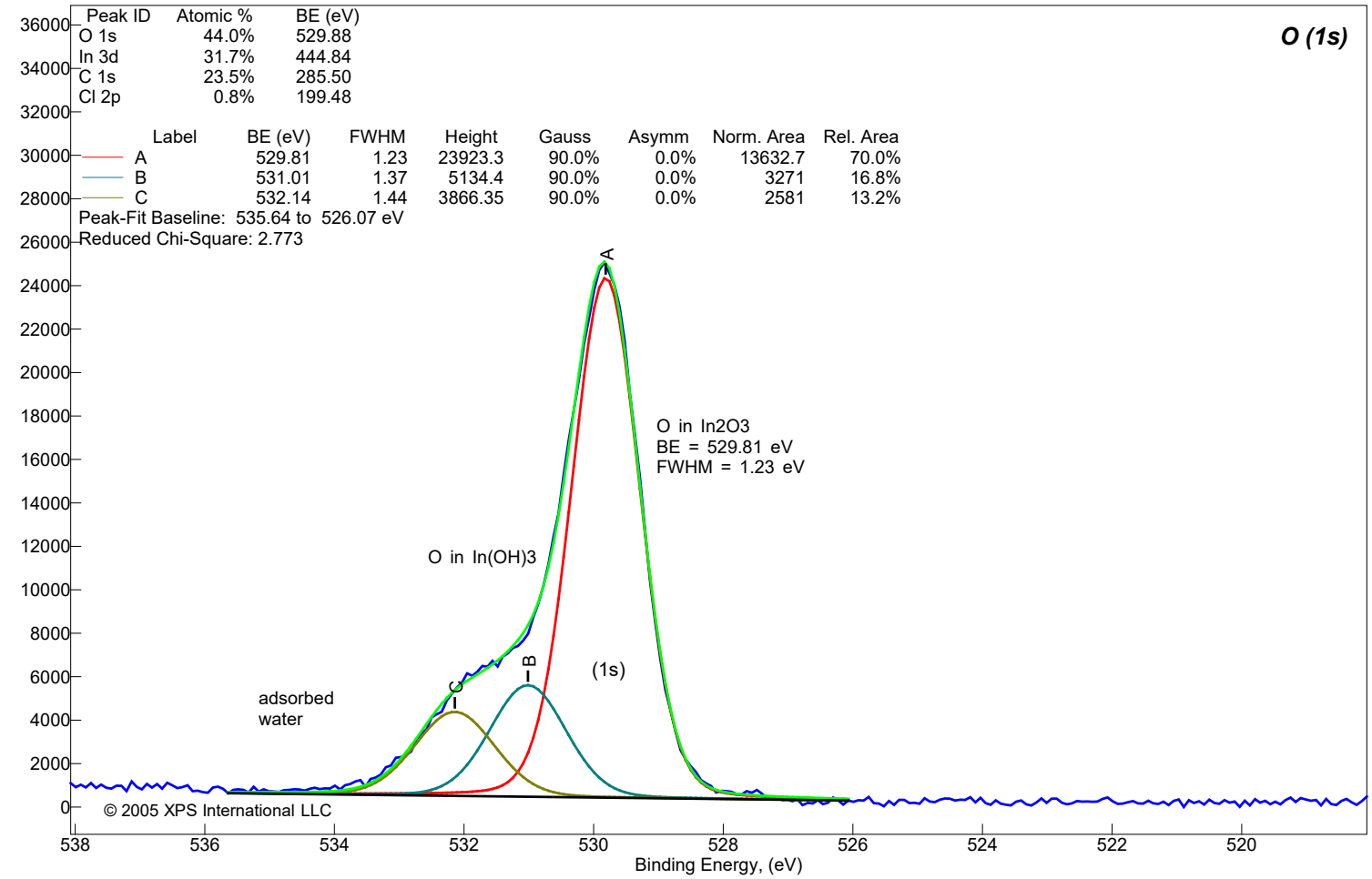
Indium (III) Oxide (FW = 277.64)



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Indium (III) Oxide (FW = 277.64)

Sample Description: In2O3 (99.999%) Aldrich lot# 07528HY, 3mm pellet, 90 TOA, CONDUCTIVE

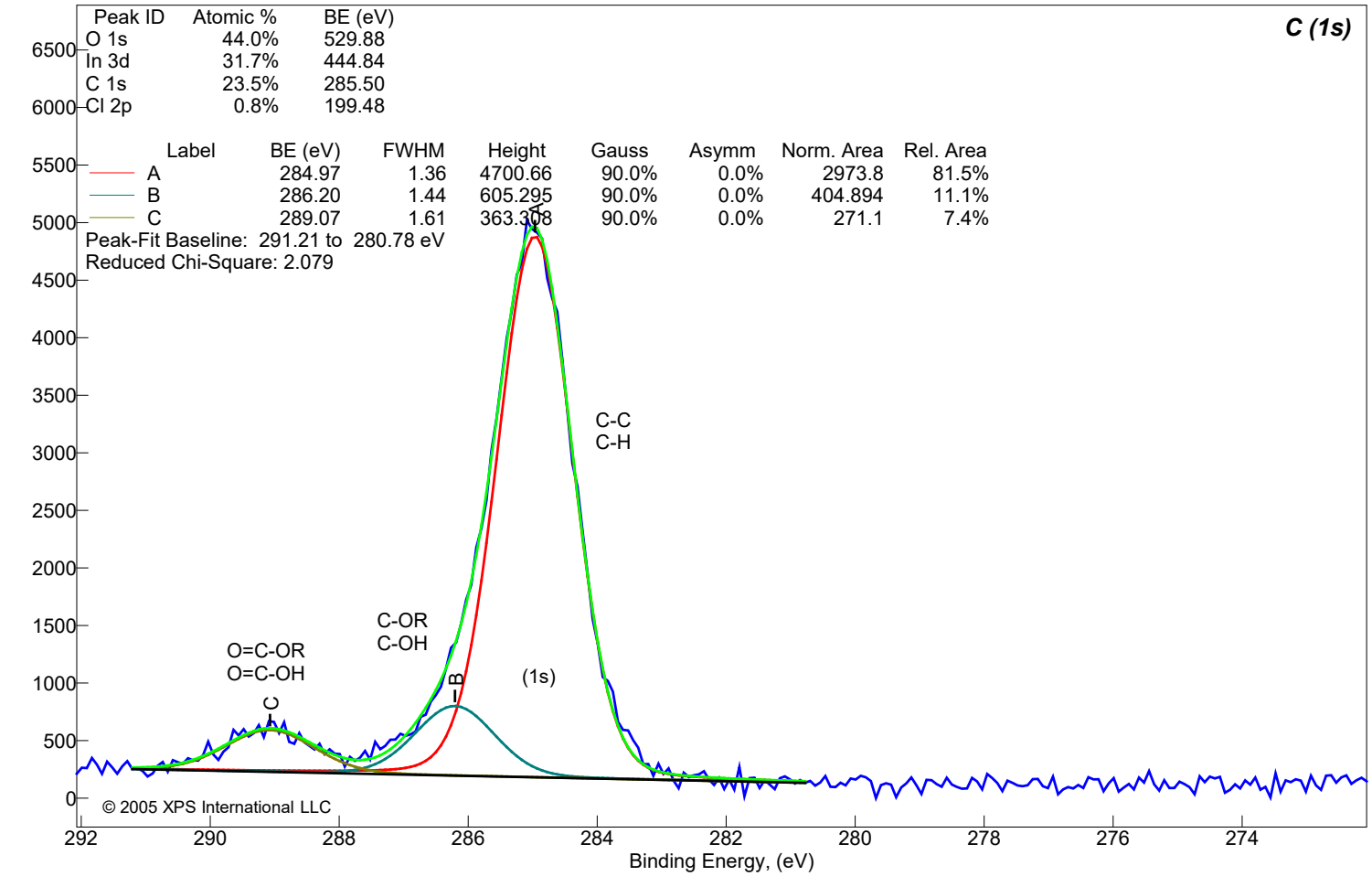


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In_2O_3

Indium (III) Oxide (FW = 277.64)

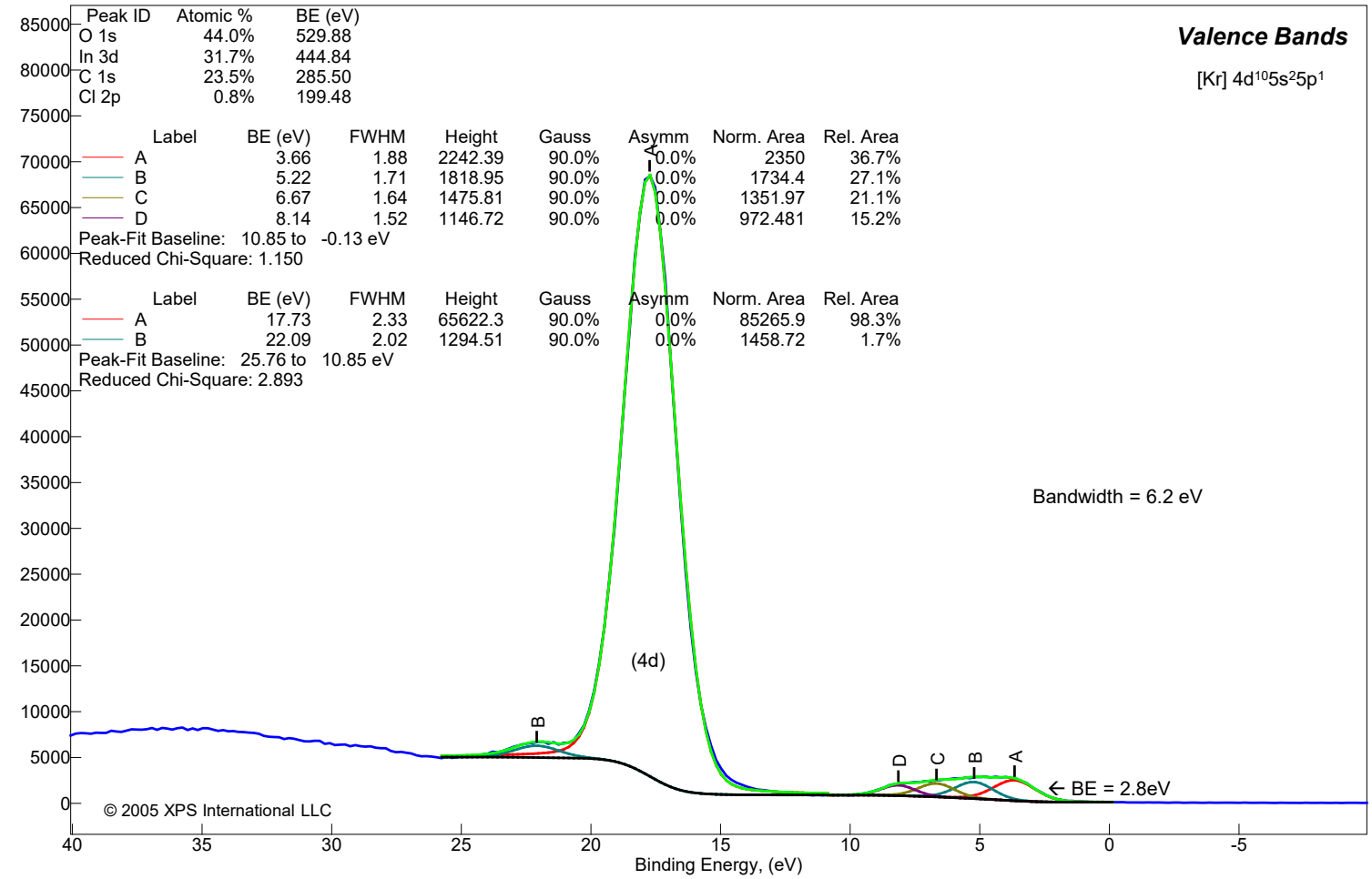
Sample Description: In2O3 (99.999%) Aldrich lot# 07528HY, 3mm pellet, 90 TOA, CONDUCTIVE



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Indium (III) Oxide (FW = 277.64)

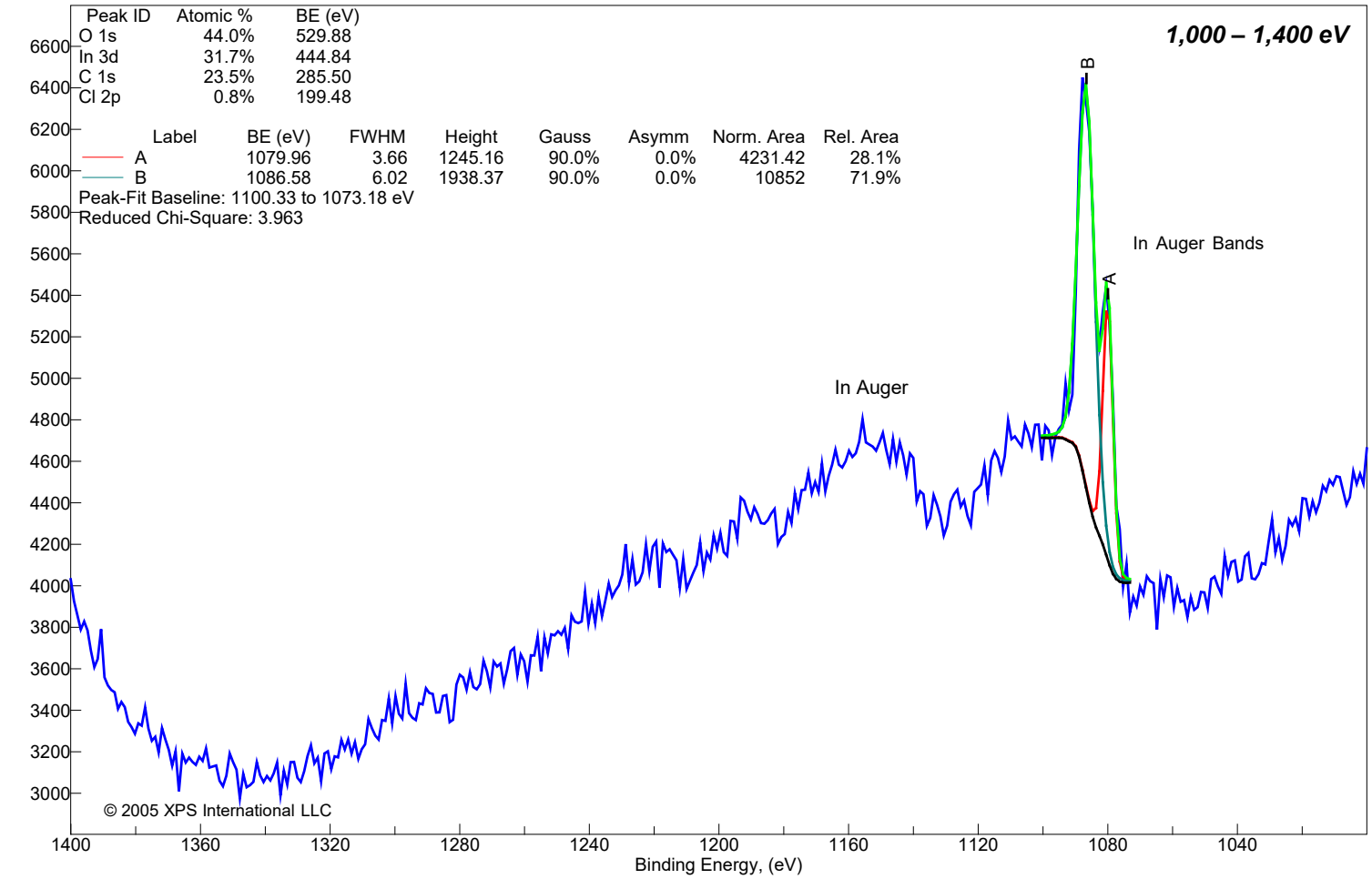
Sample Description: In2O3 (99.999%) Aldrich lot# 07528HY, 3mm pellet, 90 TOA, CONDUCTIVE



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Indium (III) Oxide (FW = 277.64)

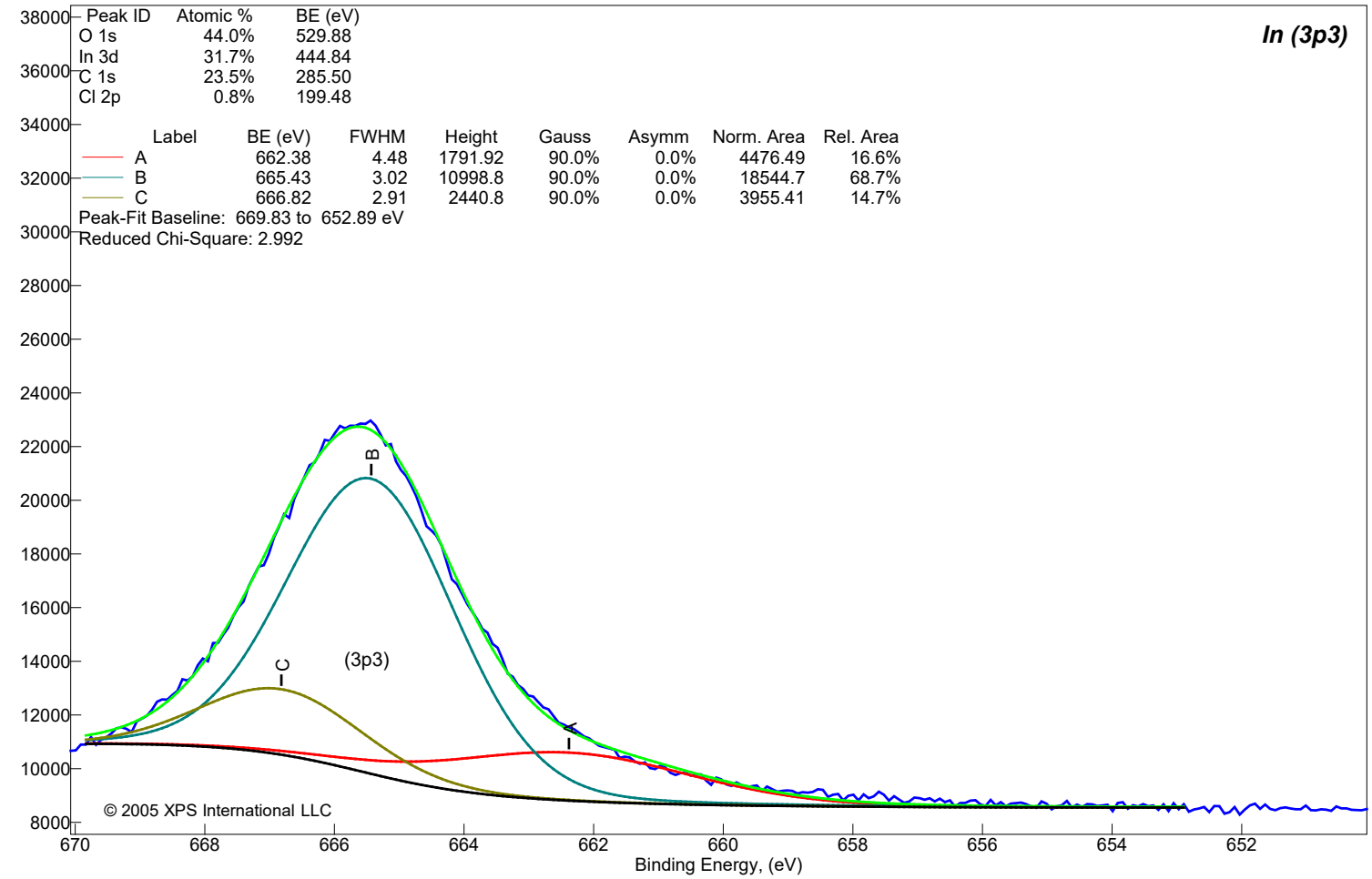
Sample Description: In2O3 (99.999%) Aldrich lot# 07528HY, 3mm pellet, 90 TOA, CONDUCTIVE



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Indium (III) Oxide (FW = 277.64)

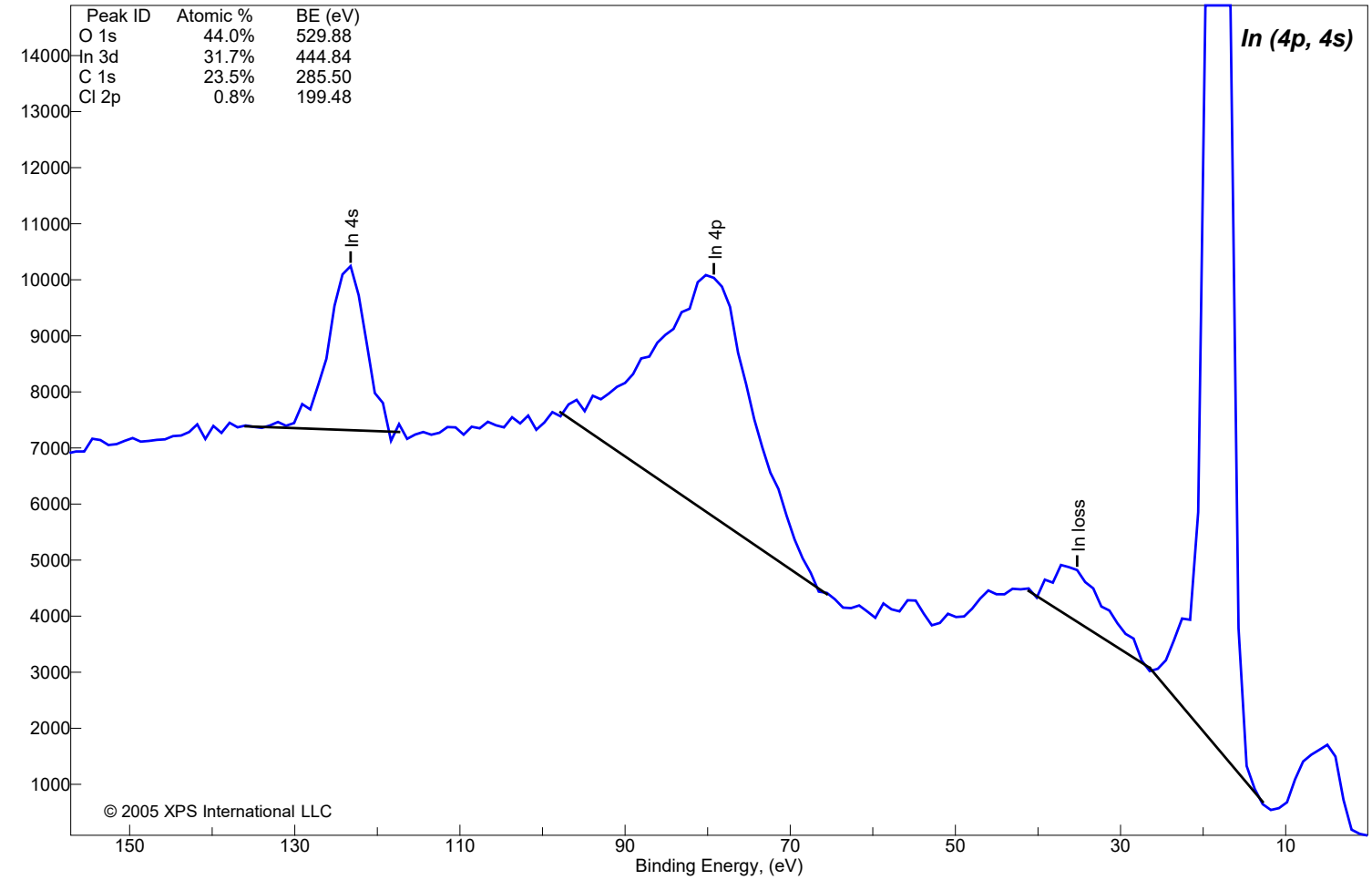
Sample Description: In2O3 (99.999%) Aldrich lot# 07528HY, 3mm pellet, 90 TOA, CONDUCTIVE



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Indium (III) Oxide (FW = 277.64)

Sample Description: In2O3 (99.999%) Aldrich lot# 07528HY, 3mm pellet, 90 TOA, CONDUCTIVE



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IrO_2

Iridium (IV) Oxide (FW = 224.22)
Surface Composition Table

Description: IrO_2 (99+%) from Aldrich Co. Lot# 05301DV, analyzed at 90 deg TOA, mesh at 1 mm, conductive black powder pressed into 3 mm pellet, mp 1100 dec C, d 11.6

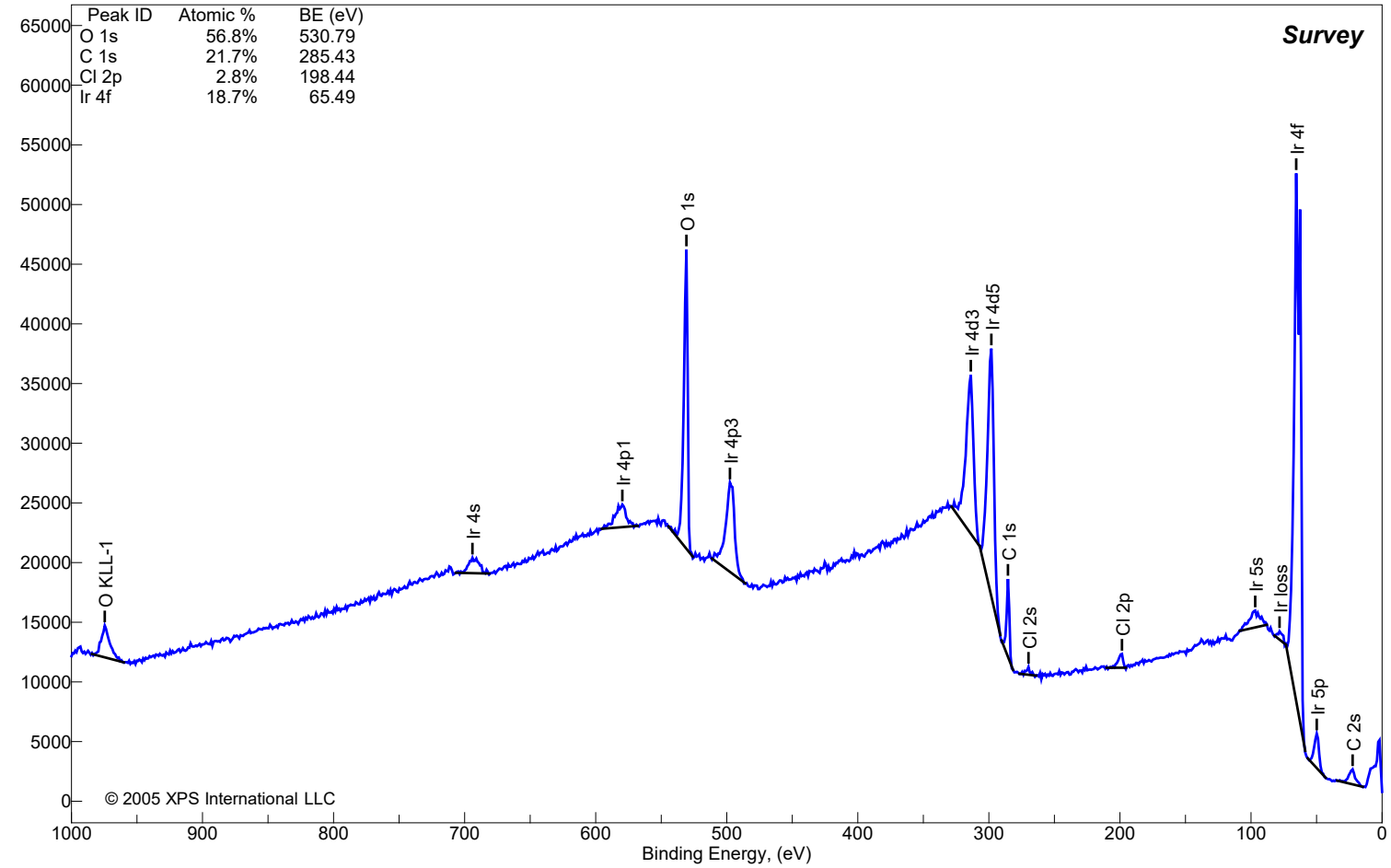
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
C 2s	22.5	22.5	0.15	1.5	9,792	
Ir 5p	49.9	49.9	0.97	1.5	15,629	
Ir 4f	65.5	65.5	13.90	1.5	317,513	18.7%
Ir loss	78.2	78.2	0.00	1.5	3,792	
Ir 5s	96.8	96.8	0.44	1.5	15,577	
Cl 2p	198.4	198.4	2.28	1.5	6,707	2.8%
Cl 2s	269.8	269.8	1.69	1.5	2,719	
C 1s	285.4	285.4	1.00	1.5	20,546	21.70%
Ir 4d5	298.1	298.1	10.90	1.5	150,133	
Ir 4d3	313.8	313.8	7.51	1.5	112,528	
Ir 4p3	497.6	497.6	5.59	1.5	78,112	
O 1s	530.8	530.8	2.93	1.5	111,924	56.8%
Ir 4p1	579.7	579.7	2.14	1.5	23,625	
Ir 4s	694.0	694.0	1.88	1.5	16,686	
O KLL-1	974.6	974.6	0.70	1.5	24,618	

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IrO_2

Iridium (IV) Oxide (FW = 224.22)

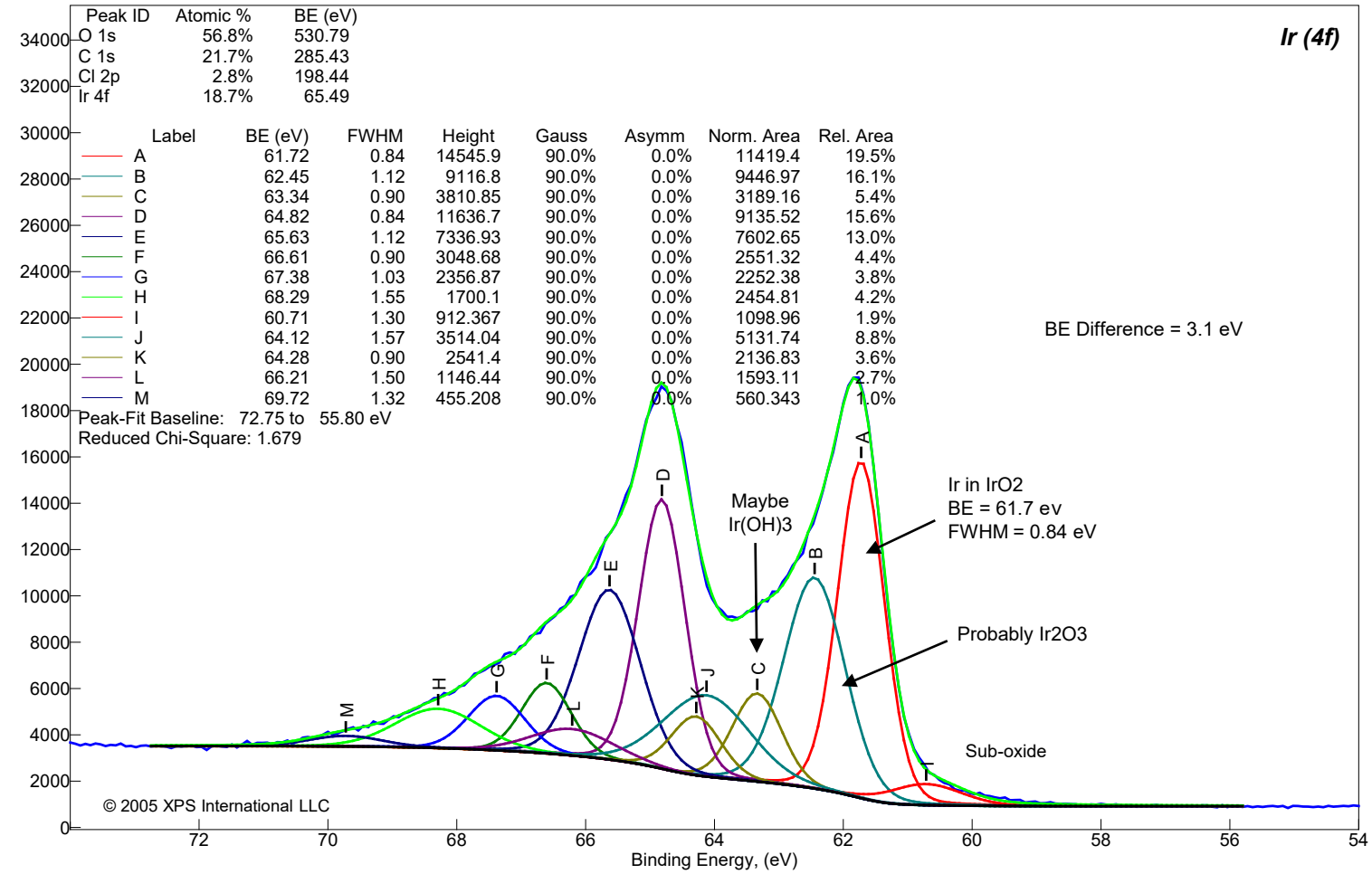
Sample Description: IrO2 (99+%) from Aldrich lot# 05301DV, conductive pressed into 3 mm pellet, analyzed at 90 deg TOA



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Iridium (IV) Oxide (FW = 224.22)

Sample Description: IrO2 (99+%) Aldrich lot# 05301DV, CONDUCTIVE, Screen, 90 TOA

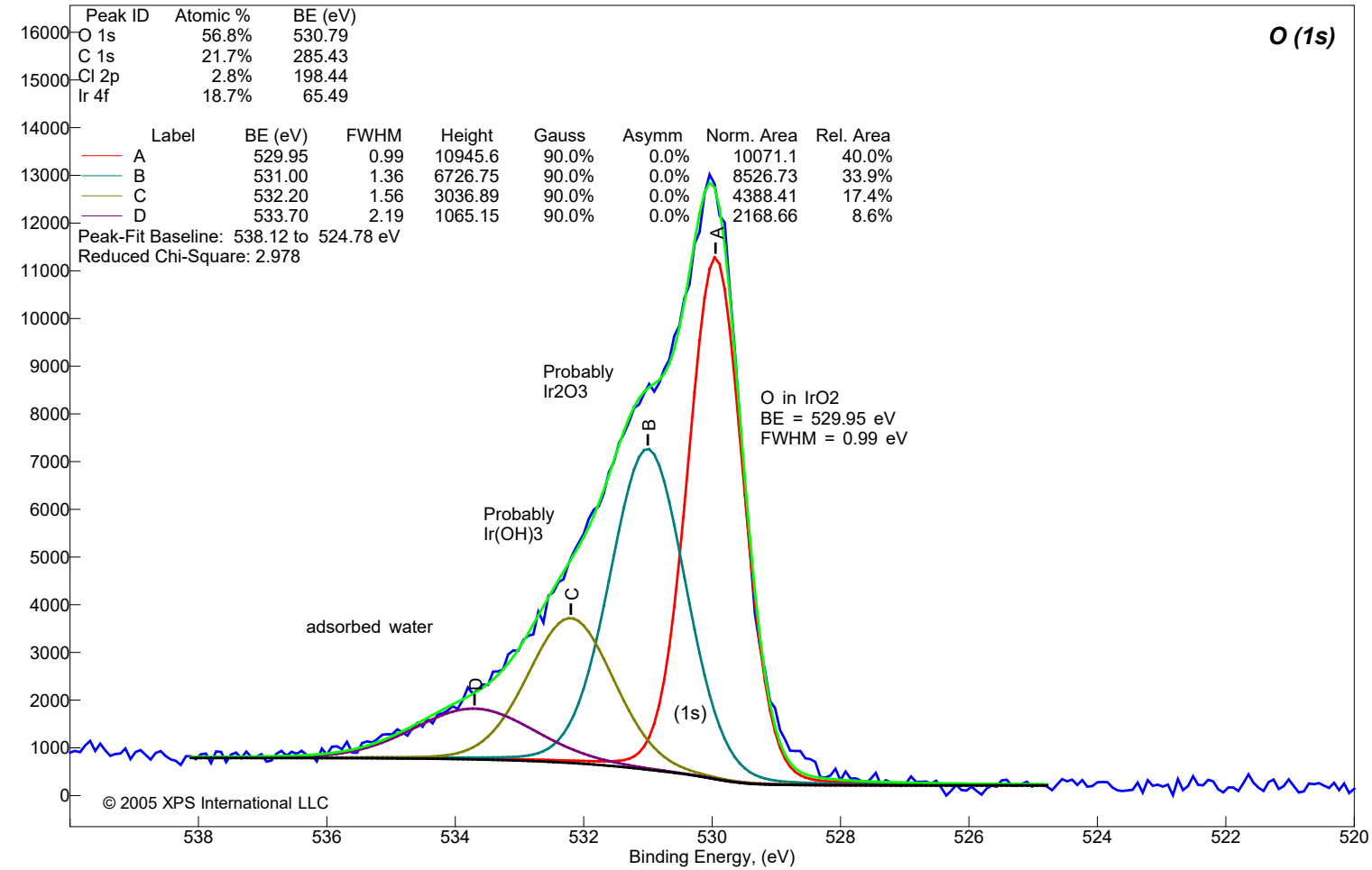


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IrO_2

Iridium (IV) Oxide (FW = 224.22)

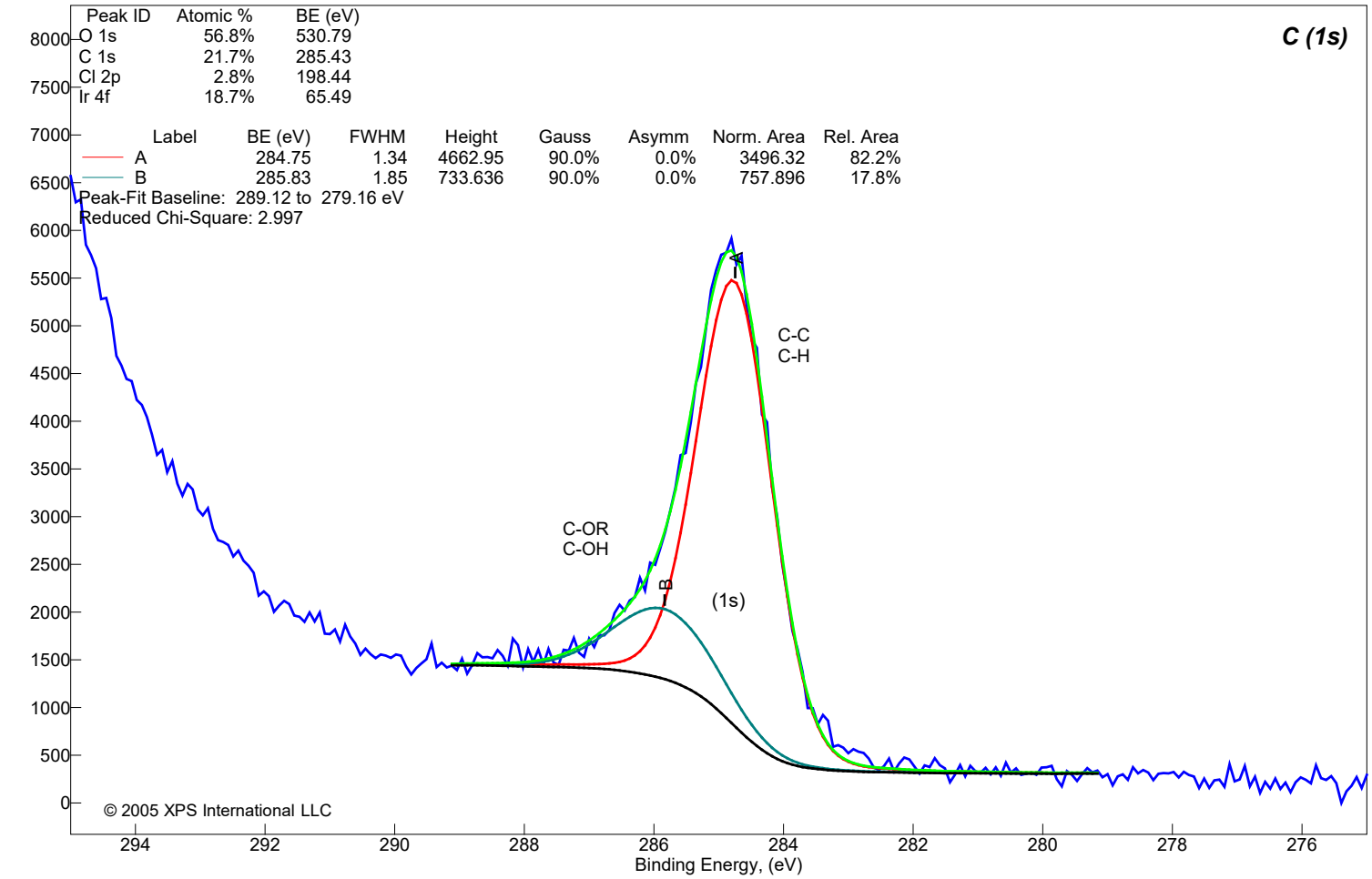
Sample Description: IrO2 (99+%) Aldrich lot# 05301DV, CONDUCTIVE, Screen, 90 TOA



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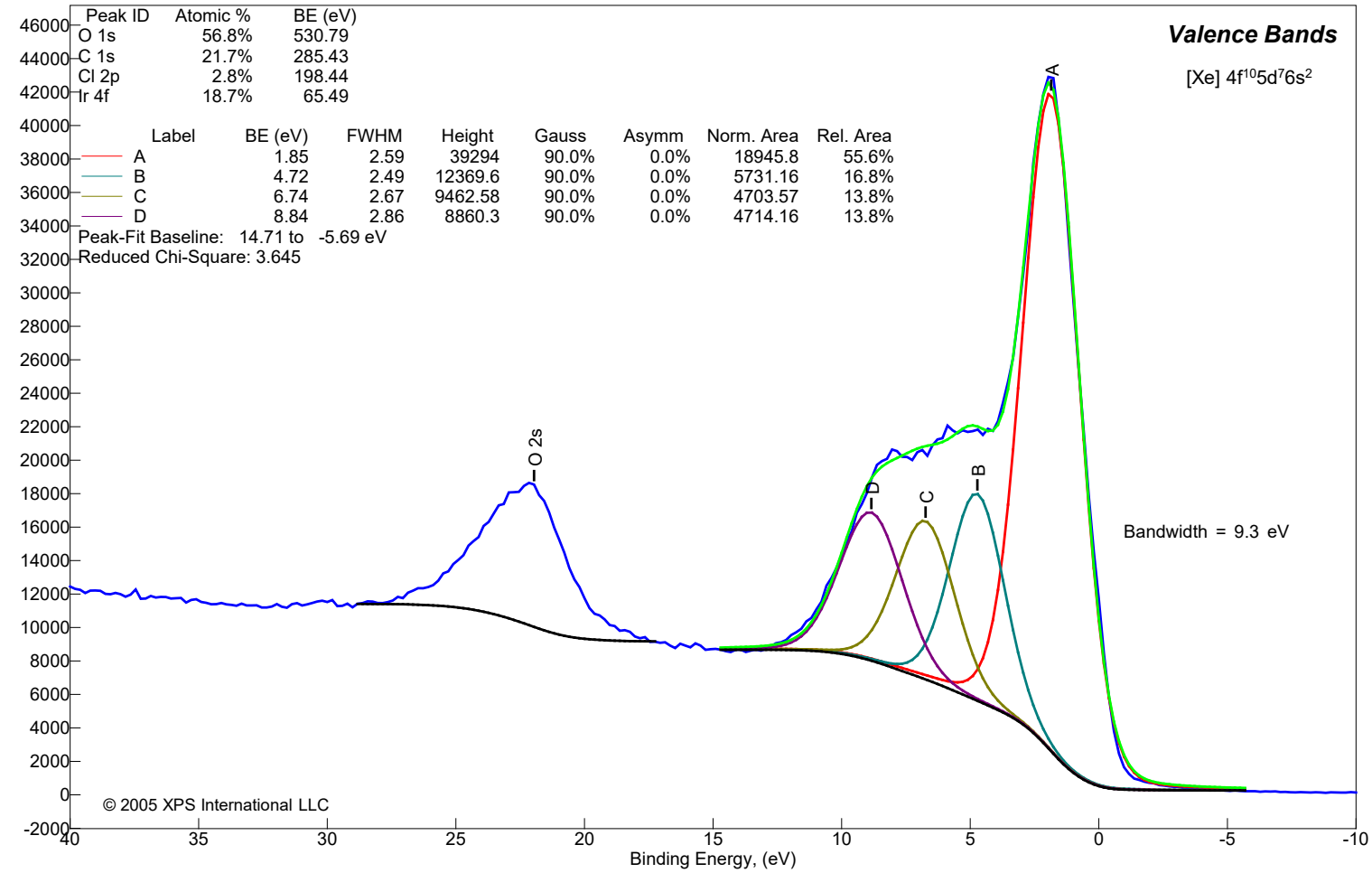
Iridium (IV) Oxide (FW = 224.22)

Sample Description: IrO2 (99+%) Aldrich lot# 05301DV, CONDUCTIVE, Screen, 90 TOA



Iridium (IV) Oxide (FW = 224.22)

Sample Description: IrO2 (99+%) Aldrich lot# 05301DV, CONDUCTIVE, Screen, 90 TOA

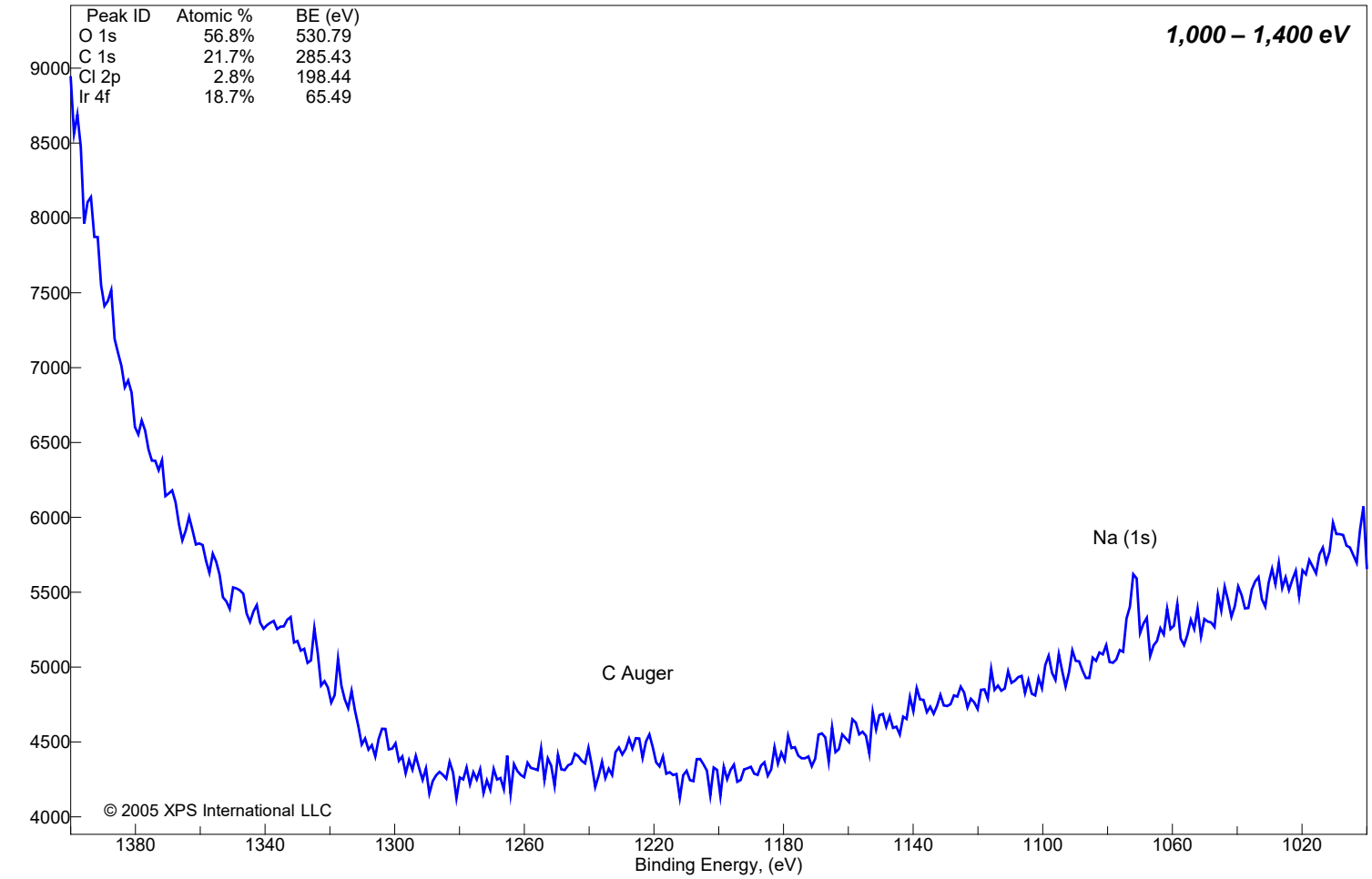


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IrO_2

Iridium (IV) Oxide (FW = 224.22)

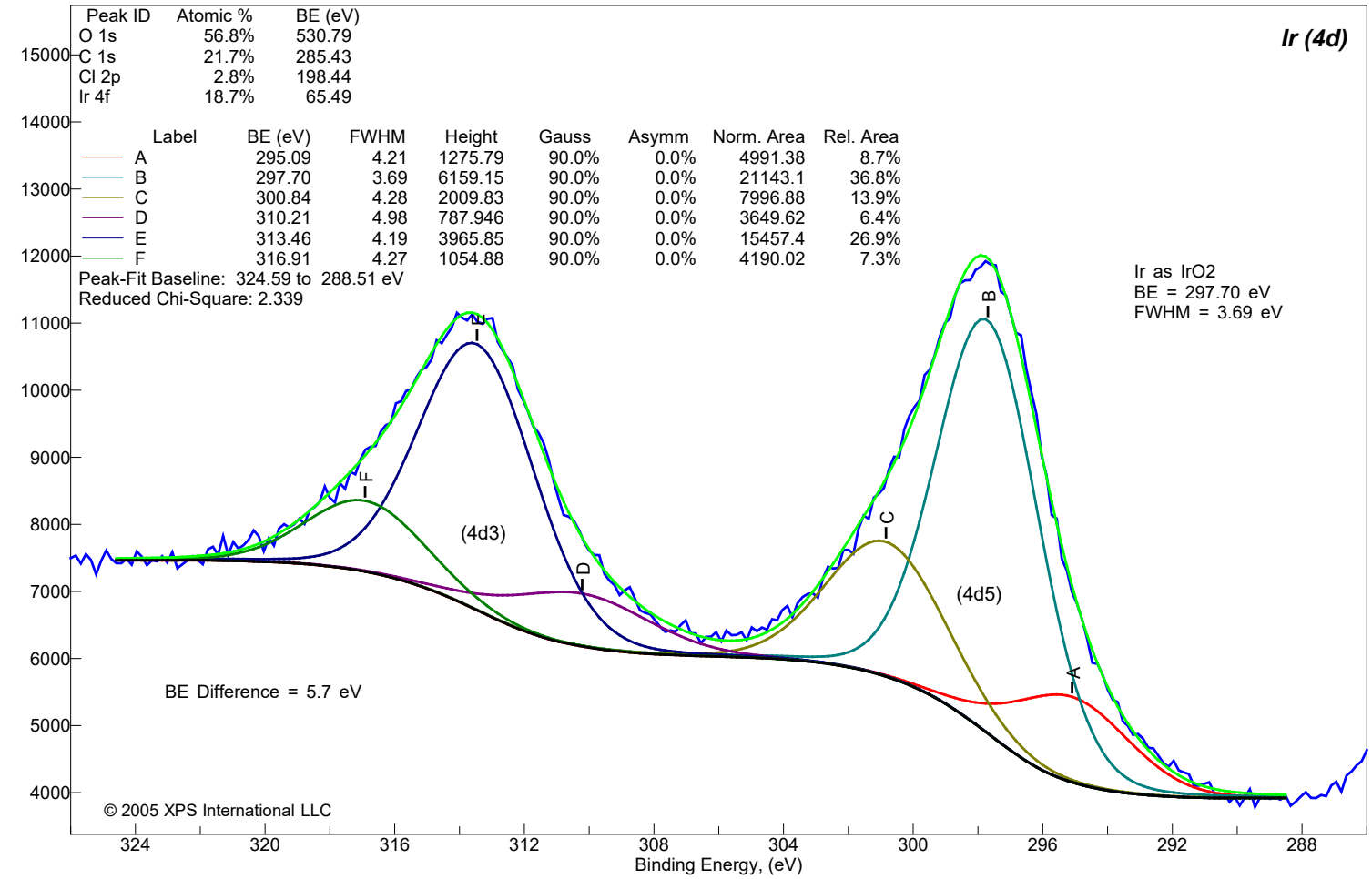
Sample Description: IrO2 (99+%) Aldrich lot# 05301DV, CONDUCTIVE, Screen, 90 TOA



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Iridium (IV) Oxide (FW = 224.22)

Sample Description: IrO2 (99+%) Aldrich lot# 05301DV, CONDUCTIVE, Screen, 90 TOA



K_2O

Potassium (I) Oxide (FW = 94.20)
Surface Composition Table

Description: K_2O in a translucent lump of synthetic K_2O:SiO_2 (75:25) glass (Okayama Univ, Japan)
bulk freshly exposed before analysis, analyzed at 90 deg TOA, mesh at 1mm, non-conductive

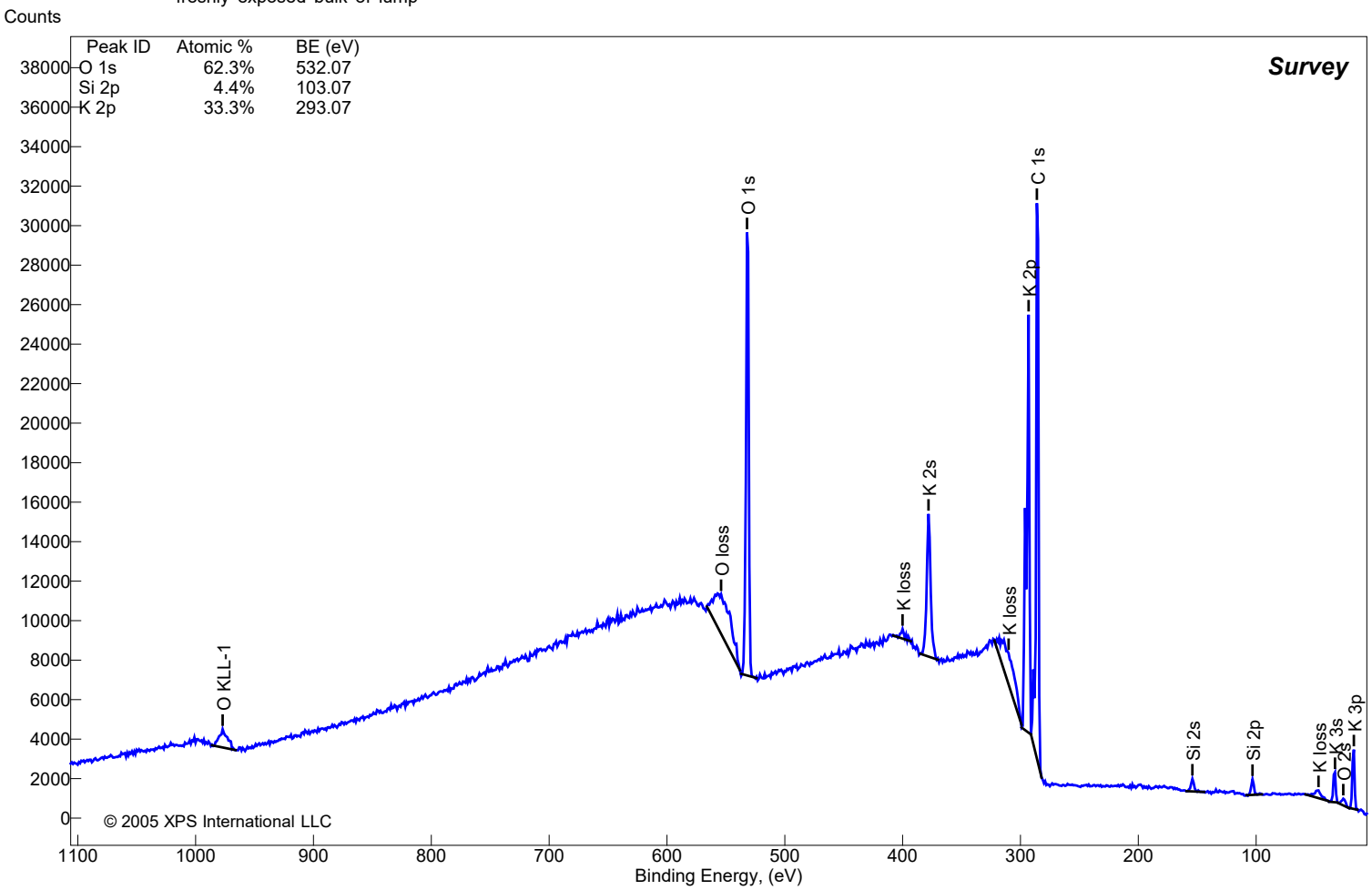
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
K 3p	17.1	12.8	0.36	1.4	6,615	
O 2s	26.1	21.8	0.14	1.4	1,371	
K 3s	33.1	28.8	0.29	1.4	3,755	
K loss	47.1	42.8	0.00	1.4	2,615	
Si 2p	103.1	98.8	0.82	1.4	2,124	4.4%
Si 2s	154.1	149.8	0.96	1.4	1,955	
C 1s	286.1	281.8	1.00	1.4	71,586	
K 2p	293.1	288.8	3.97	1.4	63,390	33.3%
K loss	310.1	305.8	0.00	1.4	23,975	
K 2s	378.1	373.8	2.27	1.4	27,973	
K loss	400.1	395.8	0.00	1.4	2,180	
O 1s	532.1	527.8	2.93	1.4	63,962	62.3%
O loss	554.1	549.8	0.00	1.4	33,889	
O KLL-1	977.1	972.8	0.70	1.4	7,102	

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K_2O

Potassium (I) Oxide (FW = 94.20)

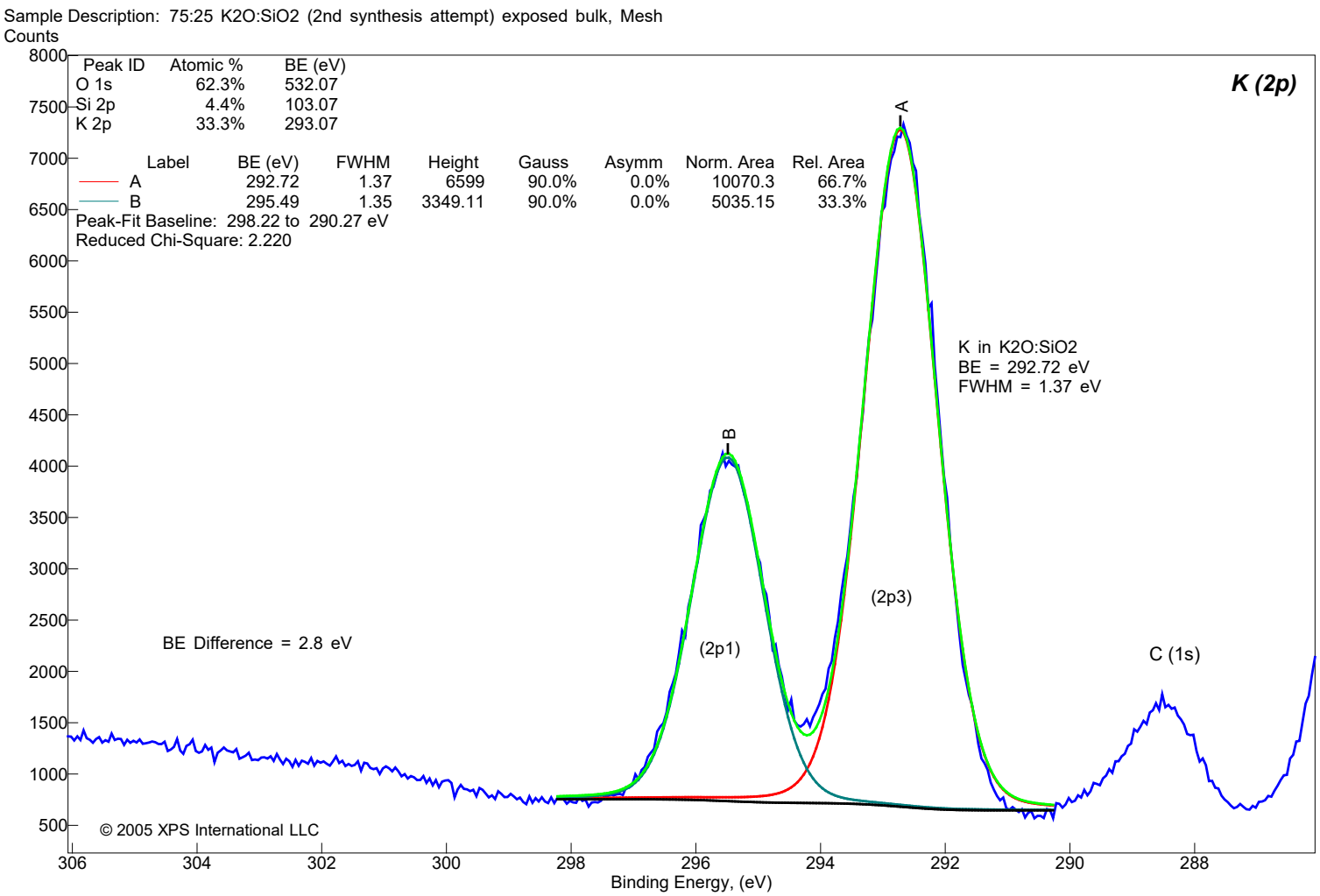
Sample Description: K2O:SiO2 (75:25) synthesized at Tokuyama University
freshly exposed bulk of lump



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K_2O

Potassium (I) Oxide (FW = 94.20)

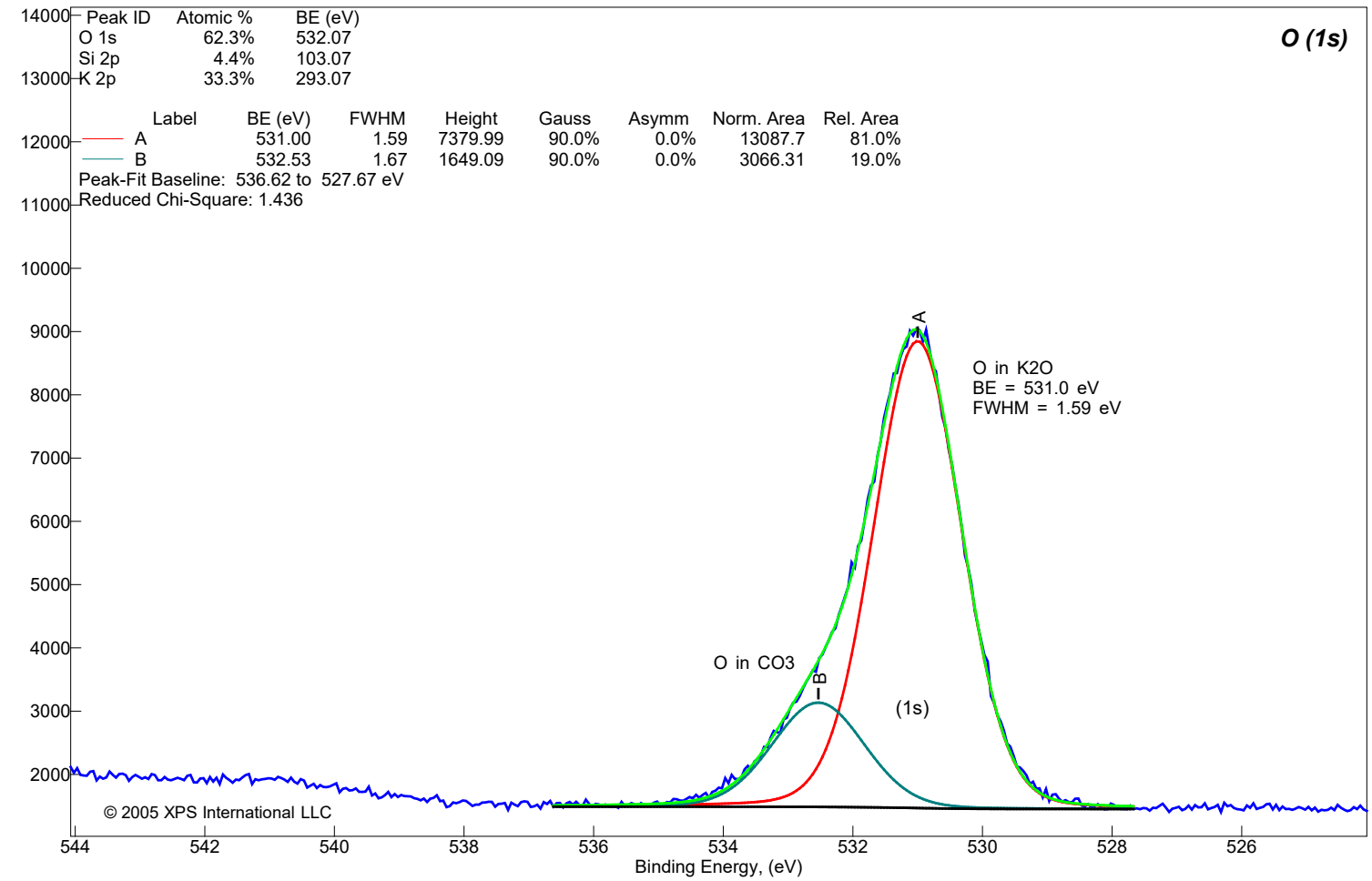


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K_2O

Potassium (I) Oxide (FW = 94.20)

Sample Description: 75:25 K2O:SiO2 (2nd synthesis attempt) exposed bulk, Mesh

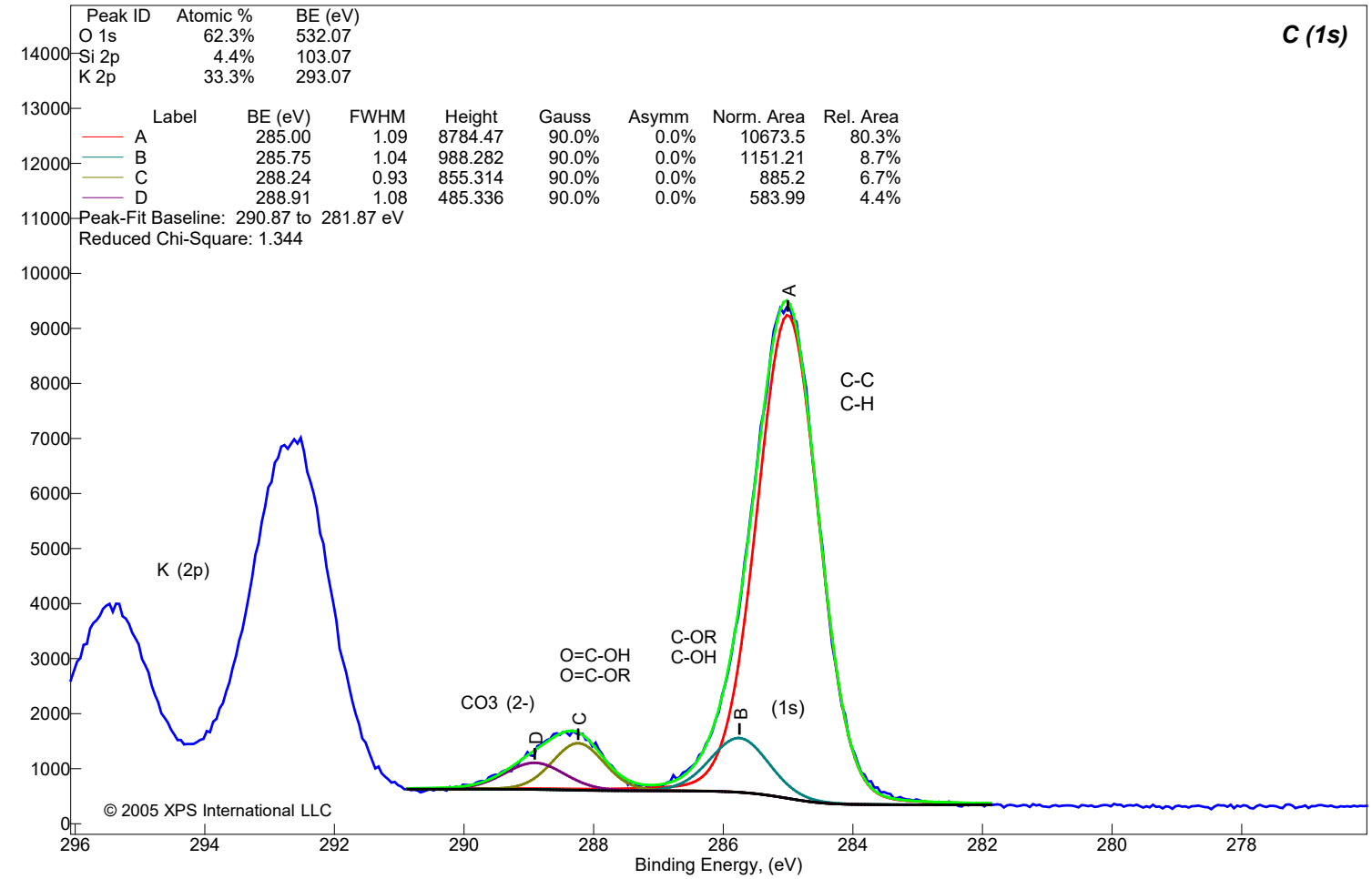


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K_2O

Potassium (I) Oxide (FW = 94.20)

Sample Description: 75:25 K2O:SiO2 (2nd synthesis attempt) exposed bulk, Mesh

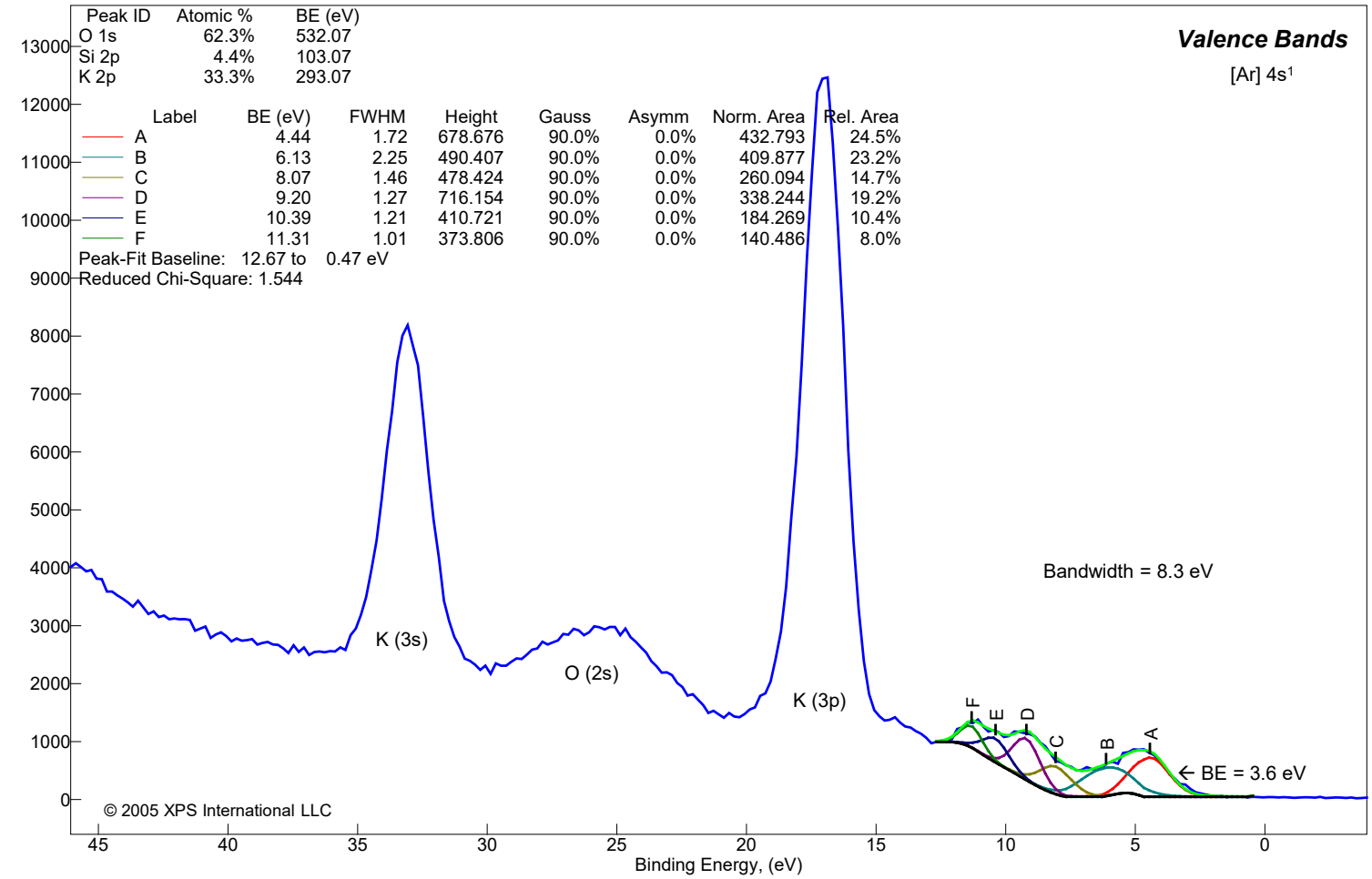


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K_2O

Potassium (I) Oxide (FW = 94.20)

Sample Description: 75:25 K2O:SiO2 (2nd synthesis attempt) exposed bulk, Mesh

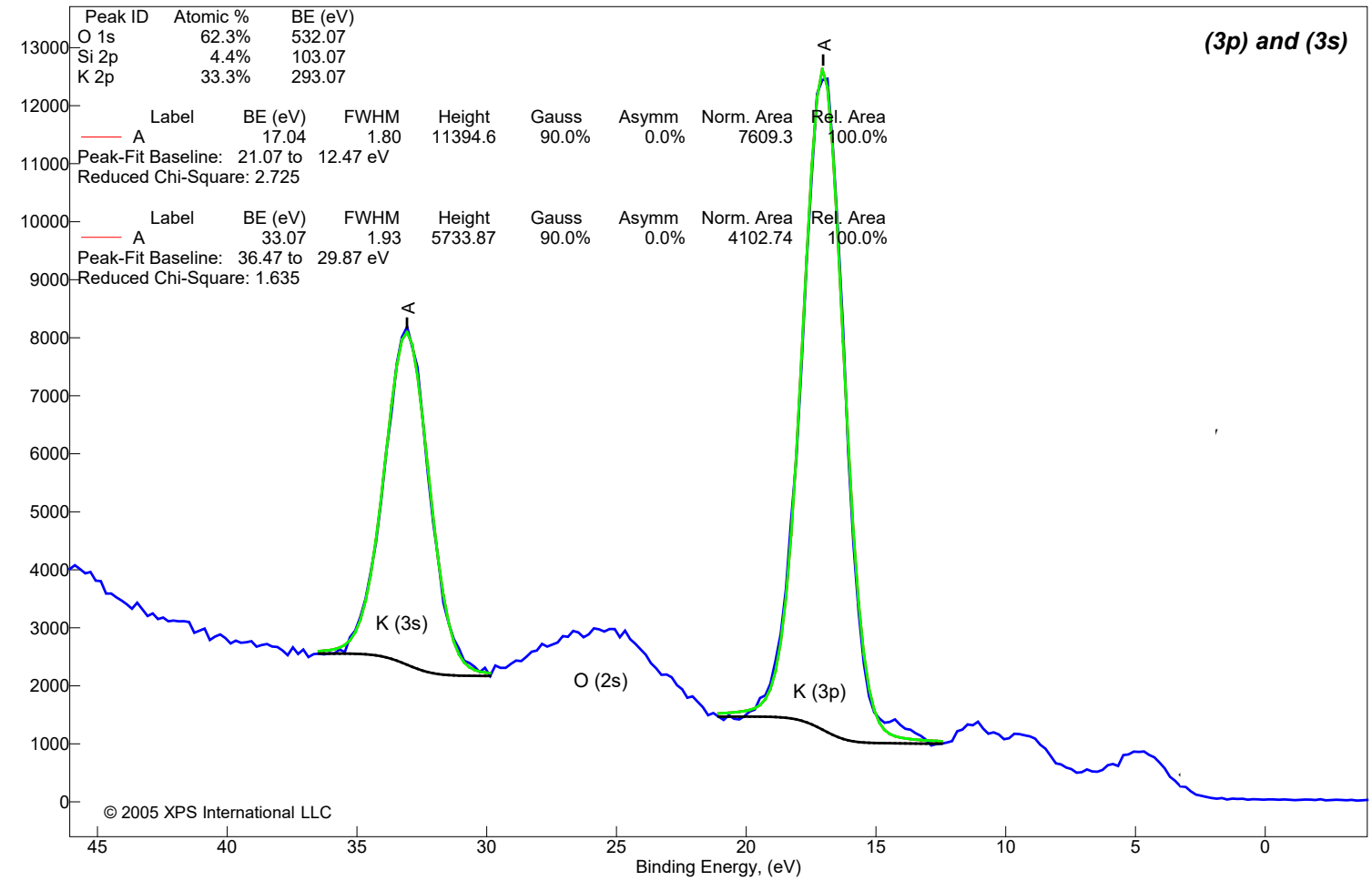


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K_2O

Potassium (I) Oxide (FW = 94.20)

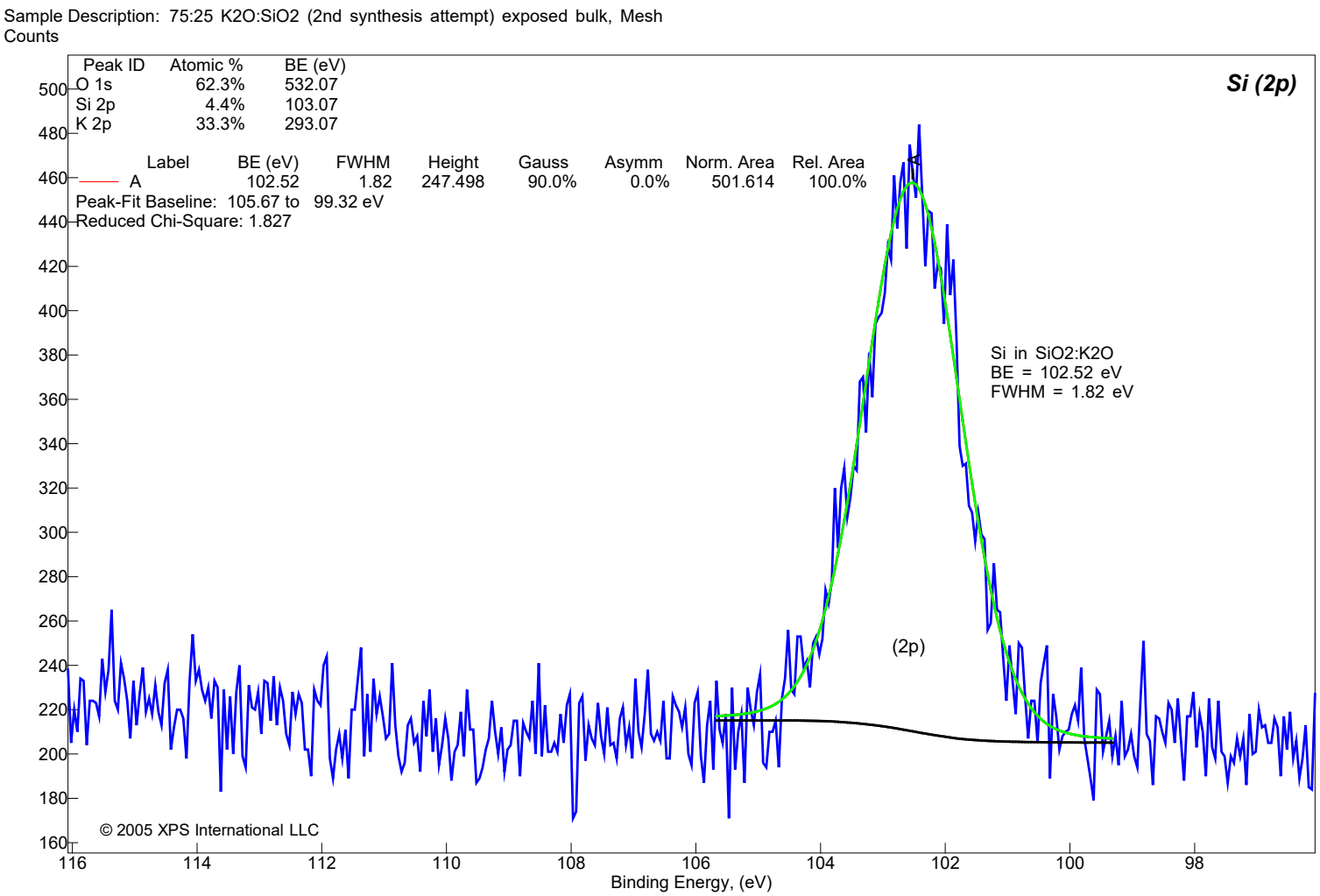
Sample Description: 75:25 K2O:SiO2 (2nd synthesis attempt) exposed bulk, Mesh



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K_2O

Potassium (I) Oxide (FW = 94.20)



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Lanthanum (III) Oxide (FW = 325.82)
Surface Composition Table

Description: La_2O_3 (99%) from Aldrich Co., analyzed at 90 deg TOA, no mesh, non-conductive white powder pressed onto double sided tape, mp 2307 C, d 6.51, sol in dil acid, very hygroscopic

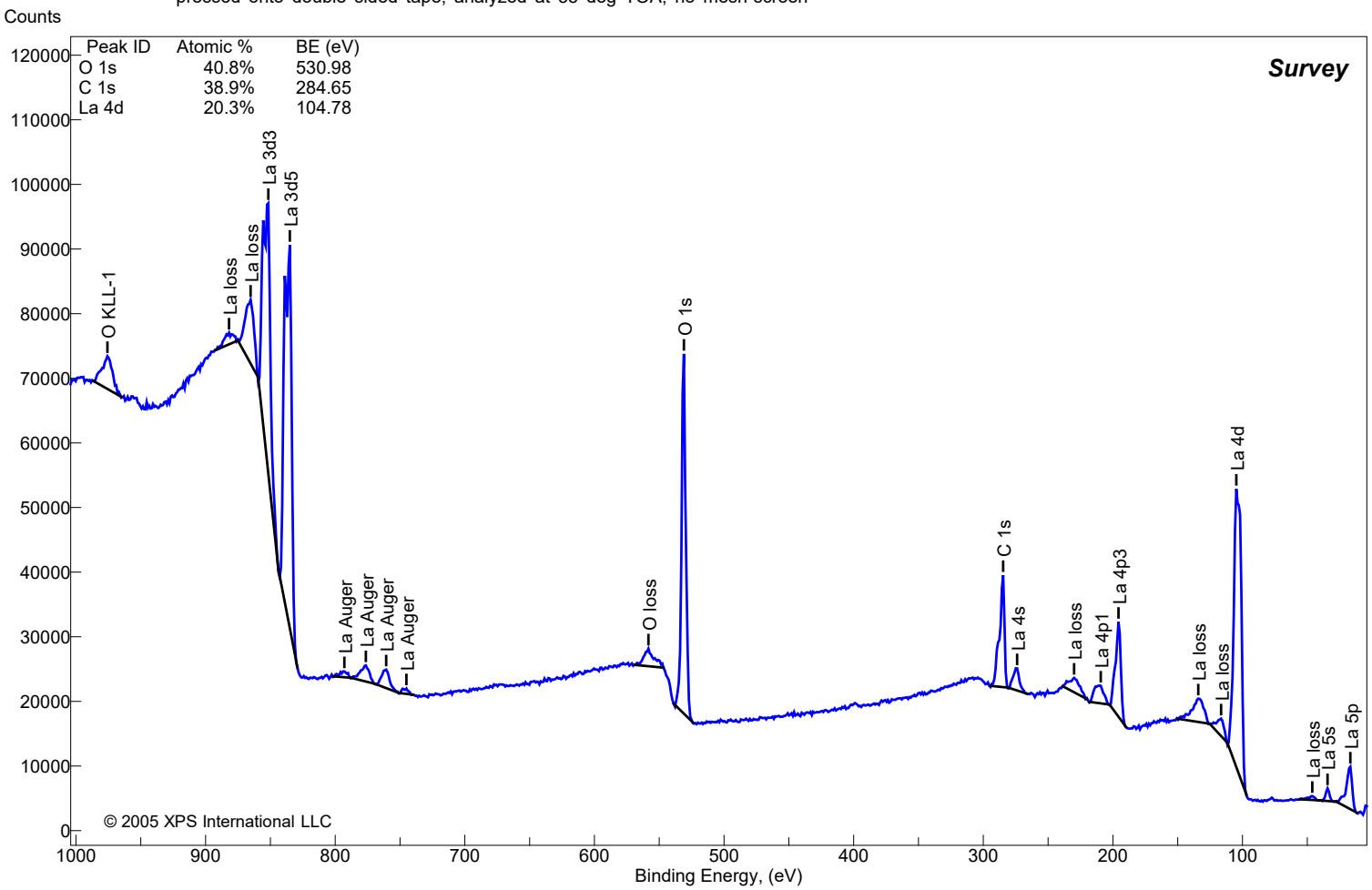
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
La 5p	16.8	12.2	0.69	0.6	2,951	
La 5s	34.4	29.8	0.23	0.6	516	
La loss	46.1	41.5	0.00	0.6	322	
La 4d	104.8	100.2	6.52	0.6	24,335	20.3%
La loss	116.5	111.9	0.00	0.6	1,651	
La loss	134.1	129.5	0.00	0.6	3,327	
La 4p3	195.7	191.1	2.91	0.6	5,998	
La 4p1	209.4	204.8	1.42	0.6	2,088	
La loss	229.9	225.3	0.00	0.6	1,640	
La 4s	273.9	269.3	1.19	0.6	1,690	
C 1s	284.6	280.0	1.00	0.6	6,591	38.9%
O 1s	531.0	526.4	2.93	0.6	17,666	40.8%
O loss	558.4	553.8	0.00	0.6	2,142	
La Auger	745.1	740.5	0.00	0.6	374	
La Auger	760.7	756.1	0.00	0.6	1,752	
La Auger	776.3	771.7	0.00	0.6	1,733	
La Auger	793.0	788.4	0.00	0.6	619	
La 3d5	835.0	830.4	28.12	0.6	31,769	
La 3d3	851.6	847.0	19.50	0.6	23,406	
La loss	865.3	860.7	0.00	0.6	6,732	
La loss	881.9	877.3	0.00	0.6	1,043	
O KLL-1	975.8	971.2	0.70	0.6	4,146	

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La_2O_3

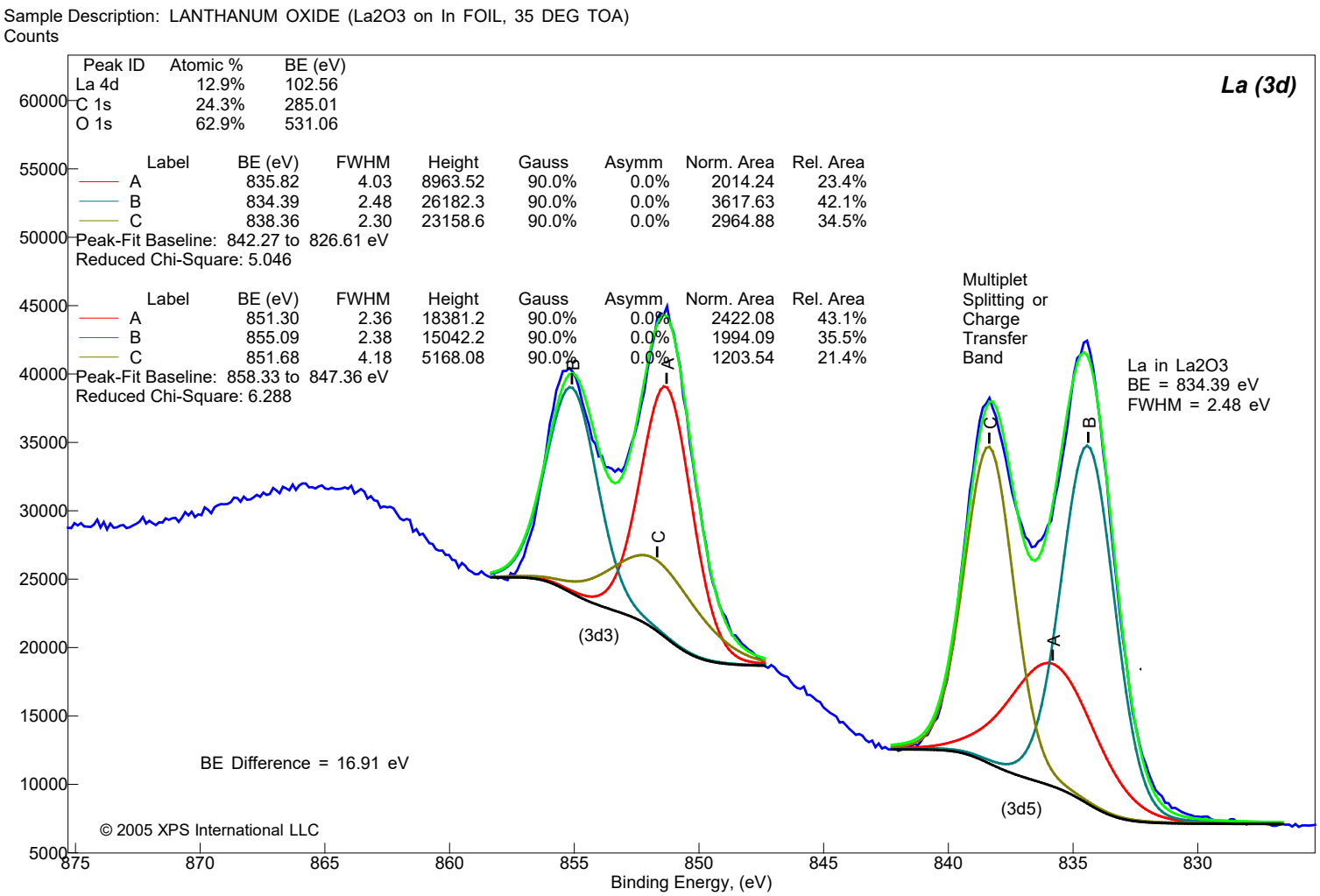
Lanthanum (III) Oxide (FW = 325.82)

Sample Description: La2O3 (99%) powder
pressed onto double sided tape, analyzed at 35 deg TOA, no mesh-screen



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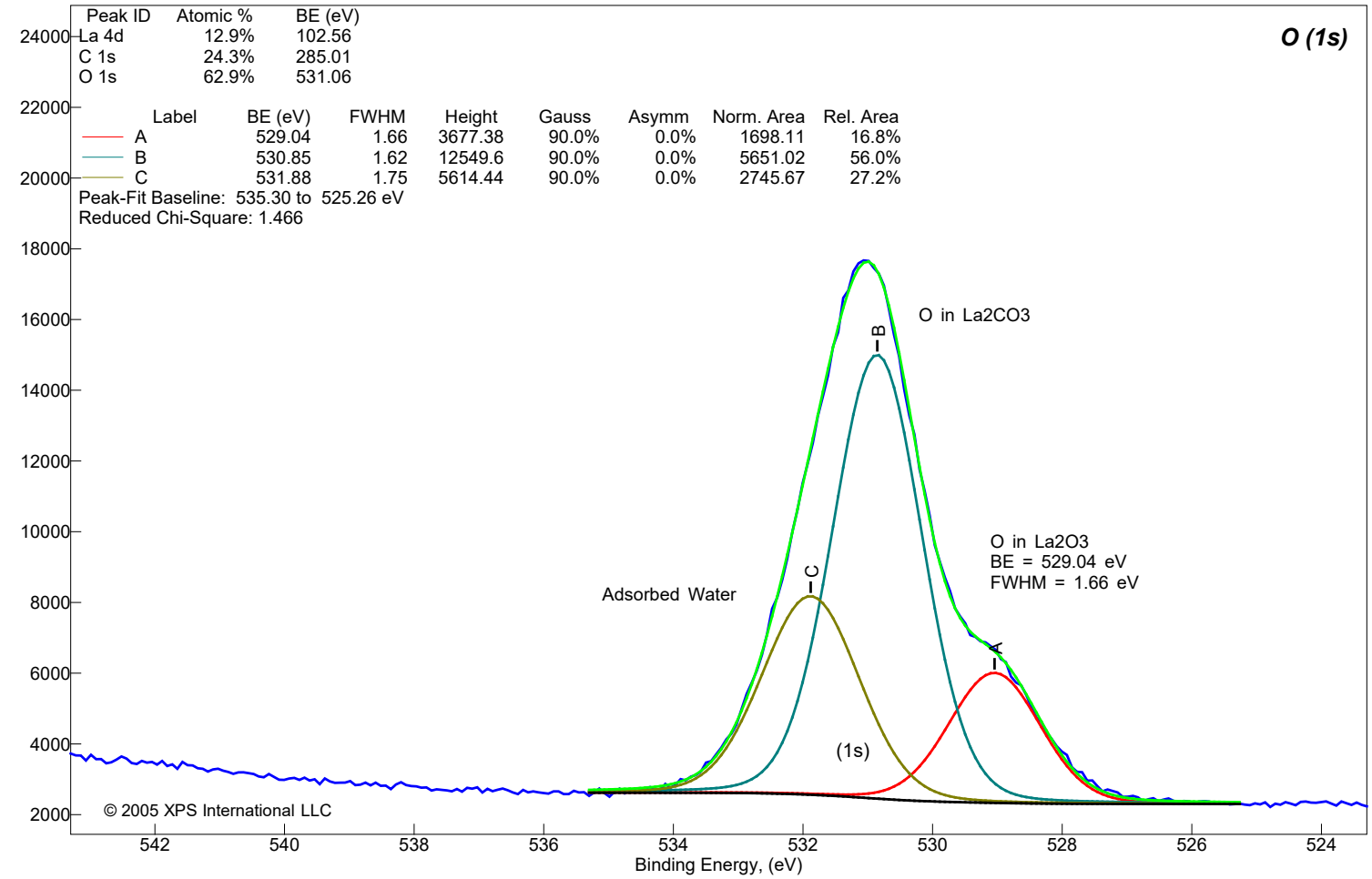
Lanthanum (III) Oxide (FW = 325.82)



La_2O_3

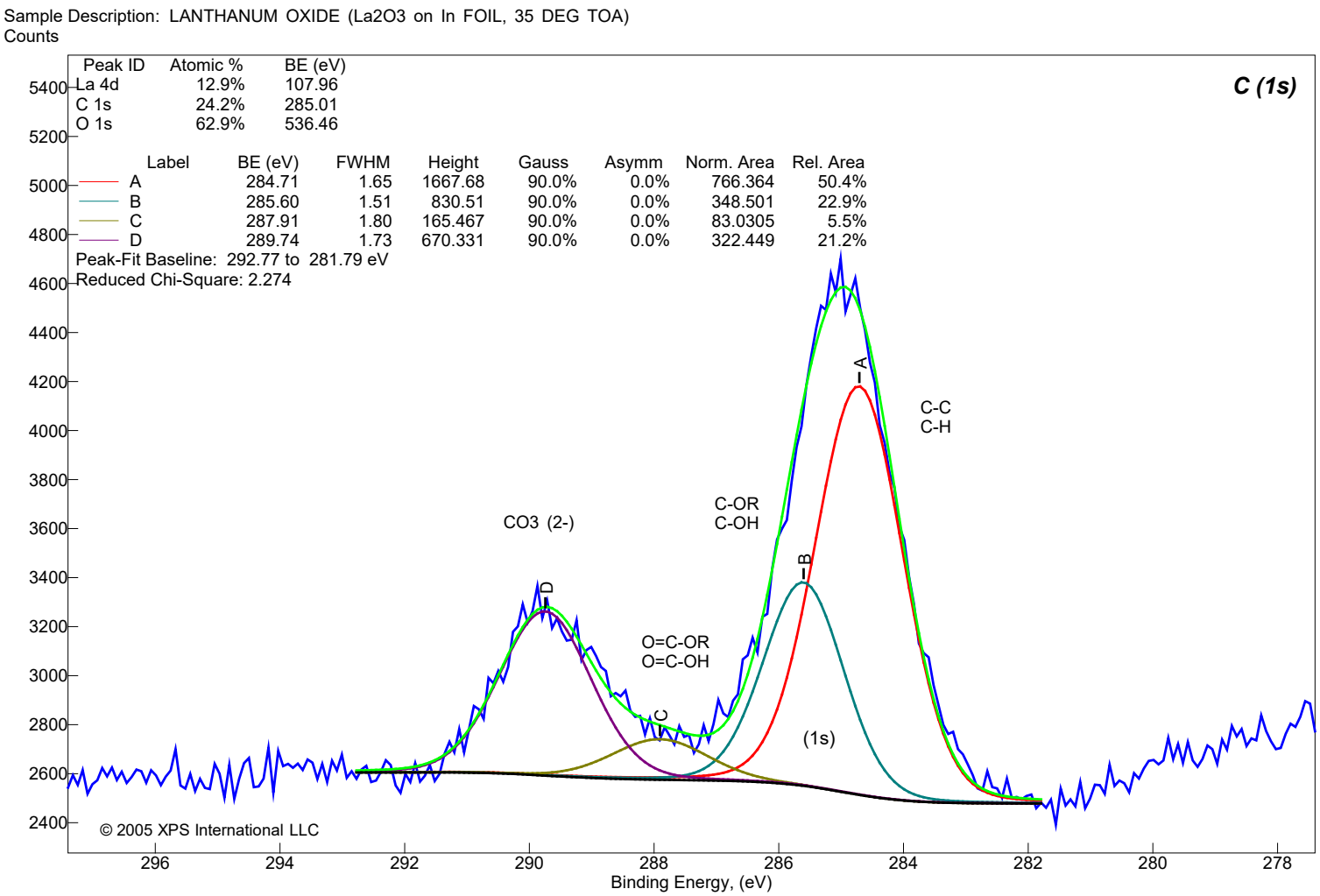
Lanthanum (III) Oxide (FW = 325.82)

Sample Description: LANTHANUM OXIDE (La2O3 on In FOIL, 35 DEG TOA)



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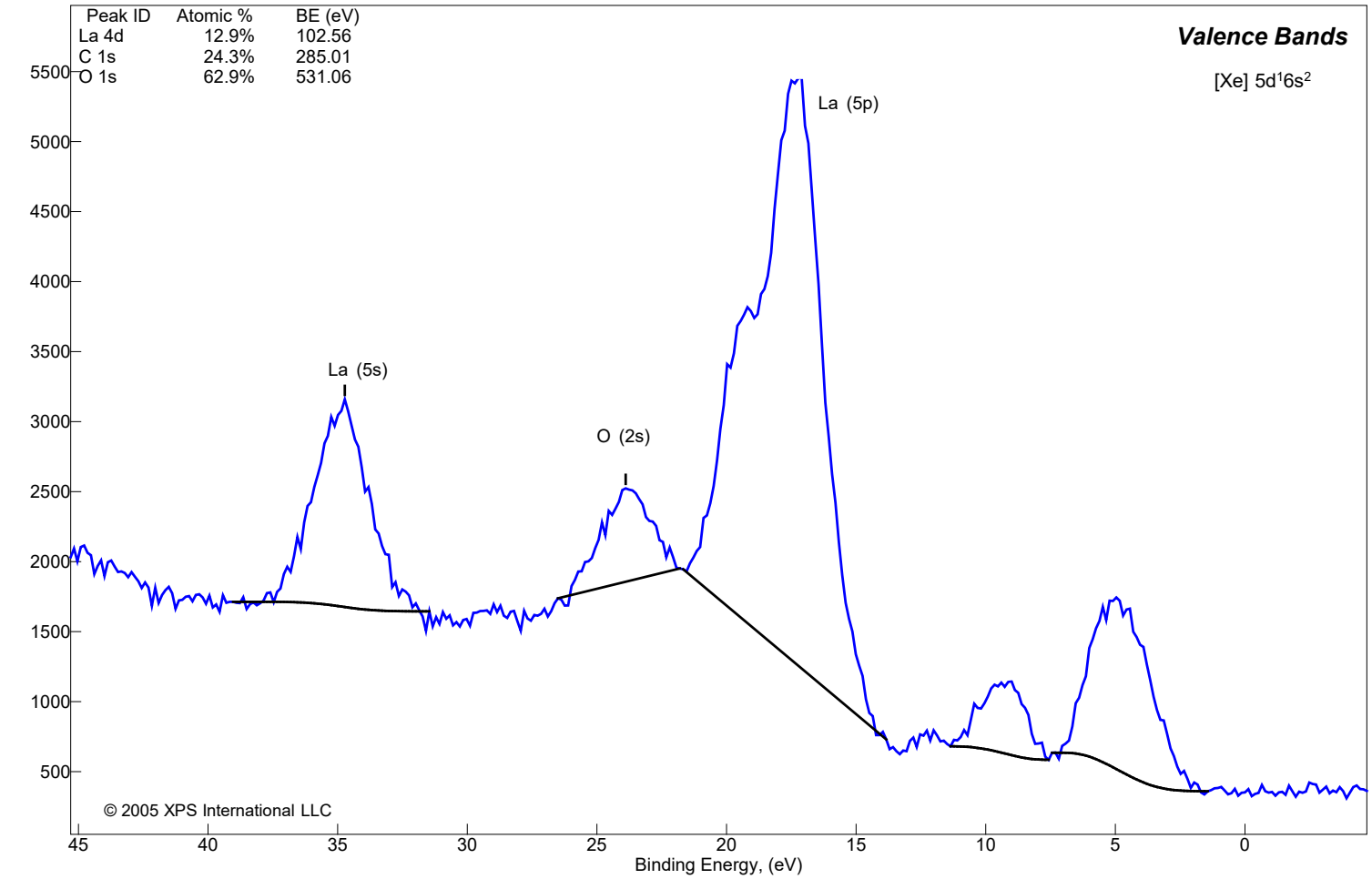
Lanthanum (III) Oxide (FW = 325.82)



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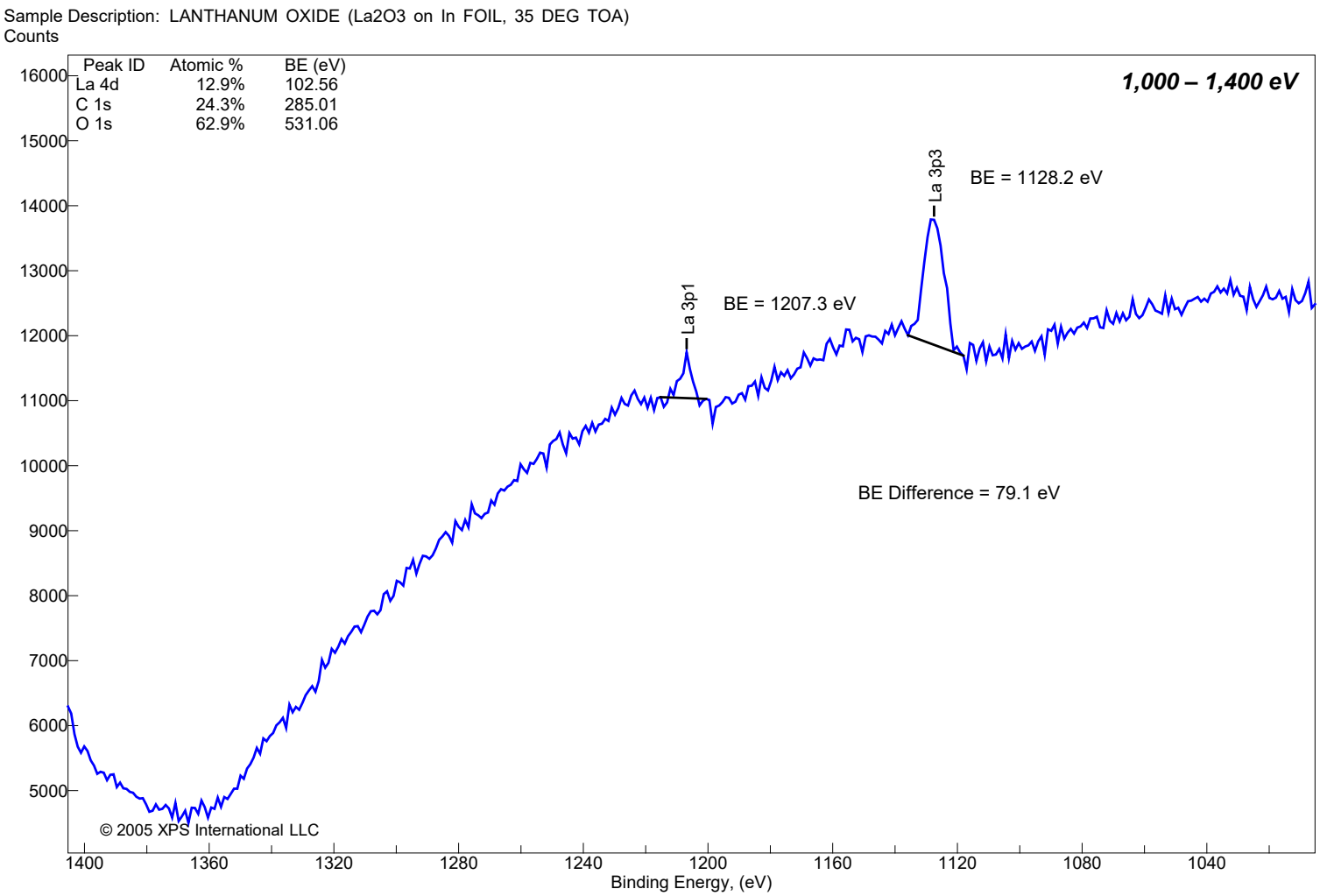
Lanthanum (III) Oxide (FW = 325.82)

Sample Description: LANTHANUM OXIDE (La2O3 on In FOIL, 35 DEG TOA)



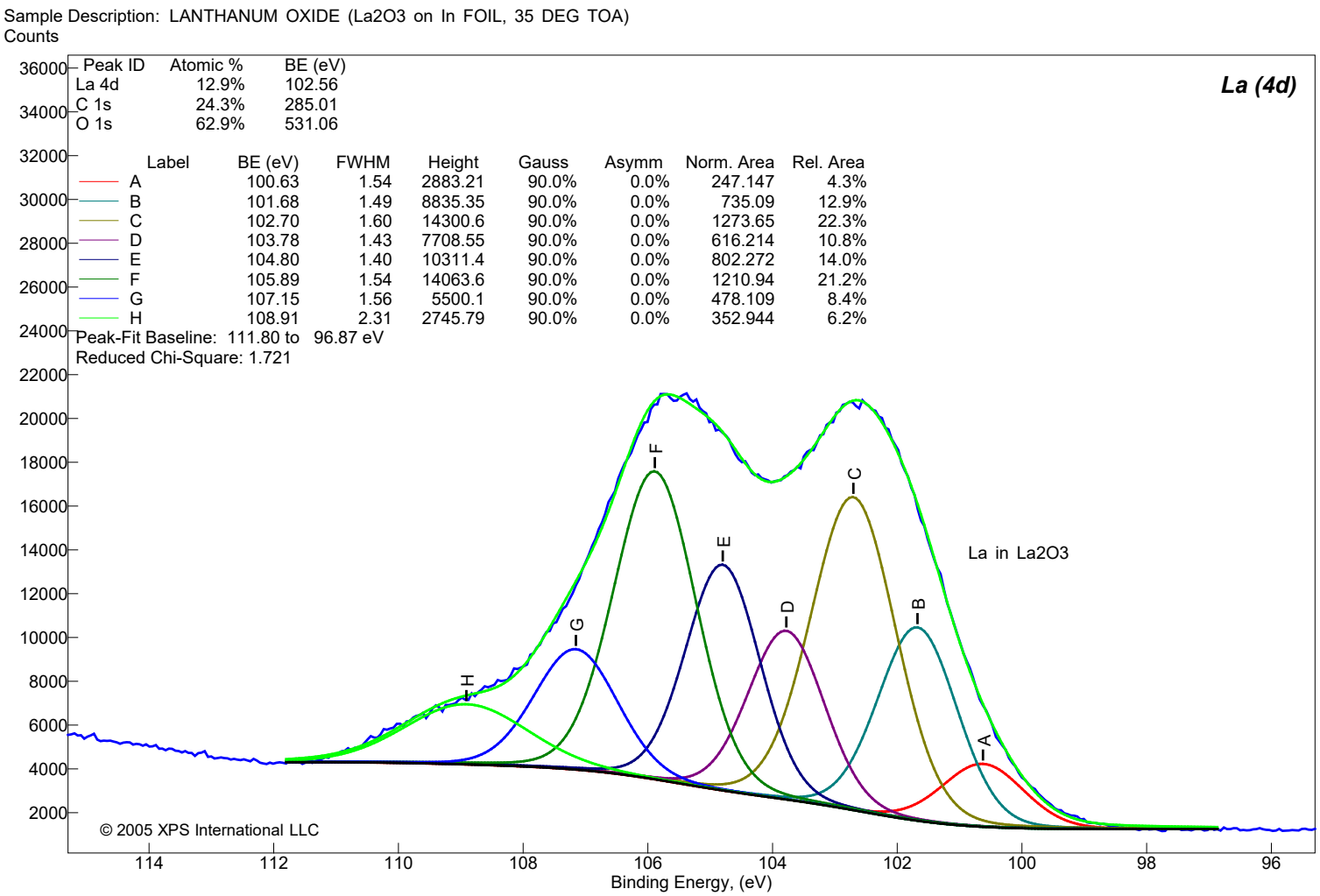
La_2O_3

Lanthanum (III) Oxide (FW = 325.82)



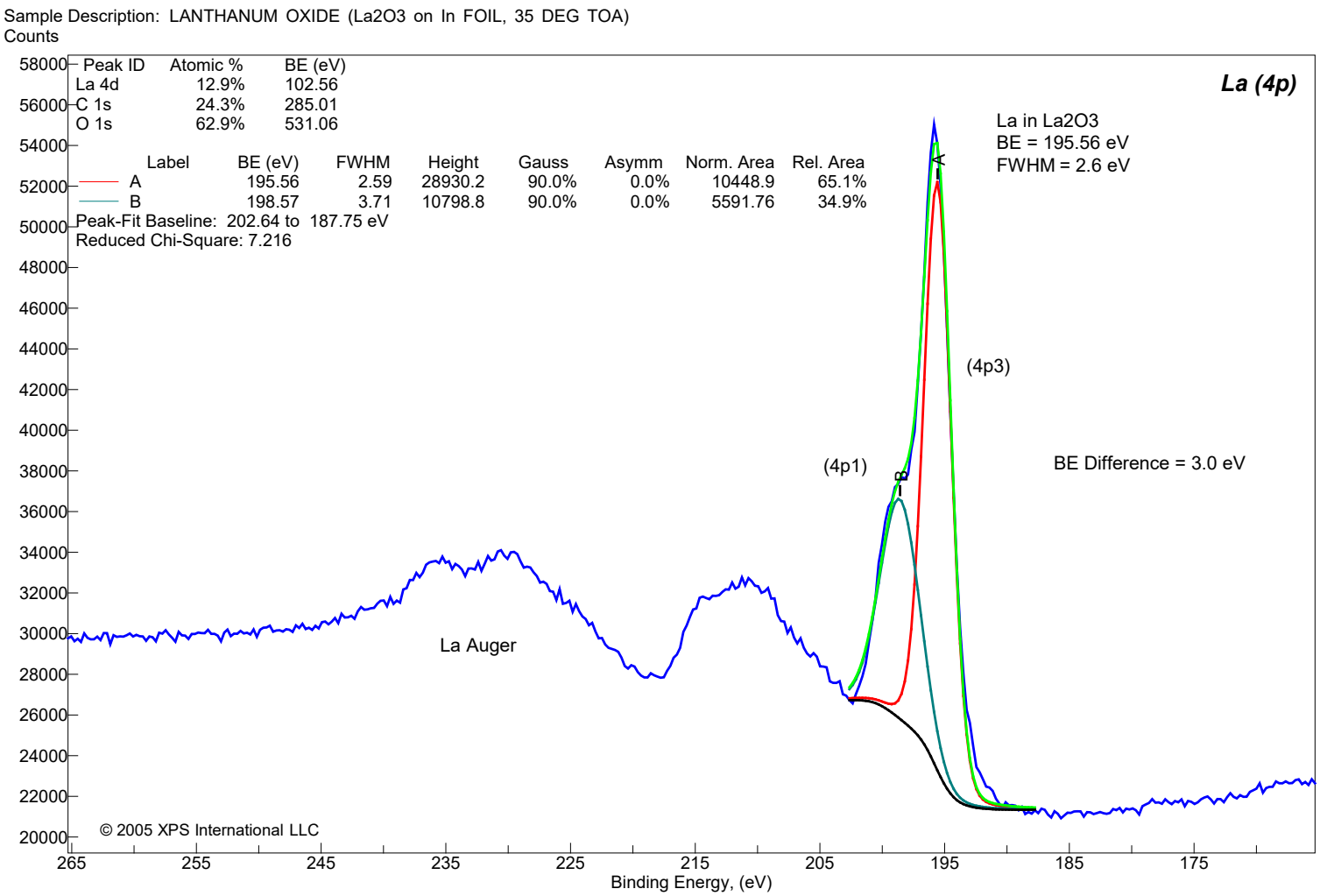
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Lanthanum (III) Oxide (FW = 325.82)



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Lanthanum (III) Oxide (FW = 325.82)



Li_2O

Lithium (I) Oxide (FW = 29.88)
Surface Composition Table

Description: Li_2O in a translucent lump of synthetic Li_2O:SiO_2 (25:75) glass (Okayama Univ, Japan)
bulk freshly exposed before analysis, analyzed at 90 deg TOA, mesh at 1mm, non-conductive

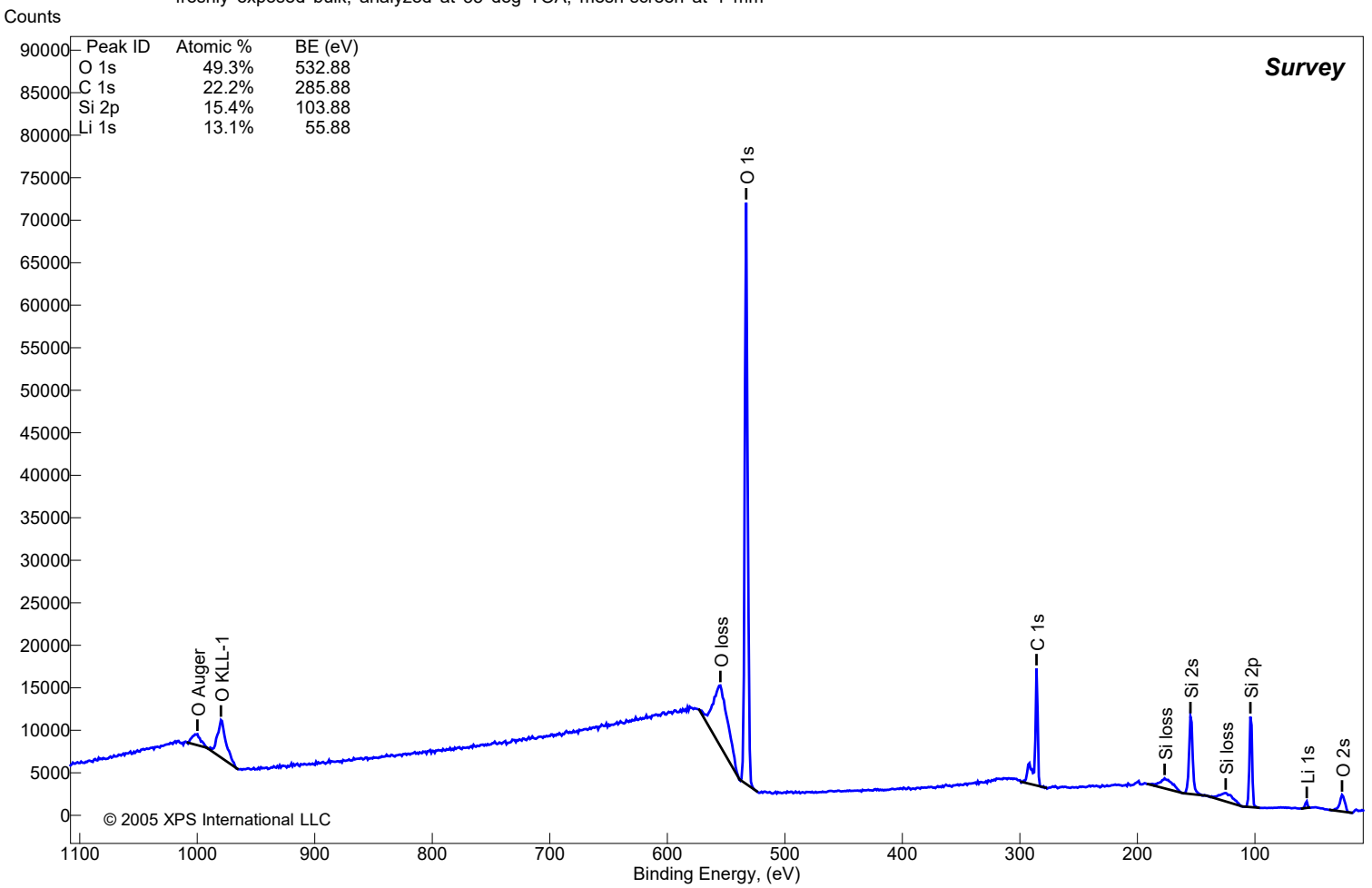
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	25.9	20.6	0.14	1.4	6,234	
Li 1s	55.9	50.6	0.06	1.4	1,128	13.1%
Si 2p	103.9	98.6	0.82	1.4	18,161	15.4%
Si loss	124.9	119.6	0.00	1.4	8,072	
Si 2s	154.9	149.6	0.96	1.4	20,657	
Si loss	176.9	171.6	0.00	1.4	9,251	
C 1s	285.9	280.6	1.00	1.4	26,433	22.2%
O 1s	532.9	527.6	2.93	1.4	124,737	49.3%
O loss	554.9	549.6	0.00	1.4	66,163	
O KLL-1	979.9	974.6	0.70	1.4	24,029	
O Auger	999.9	994.6	0.00	1.4	7,341	

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Li_2O

Lithium (I) Oxide (FW = 29.88)

Sample Description: Li2O:SiO2 (25:75) synthesized at Tokuyama University
freshly exposed bulk, analyzed at 35 deg TOA, mesh-screen at 1 mm

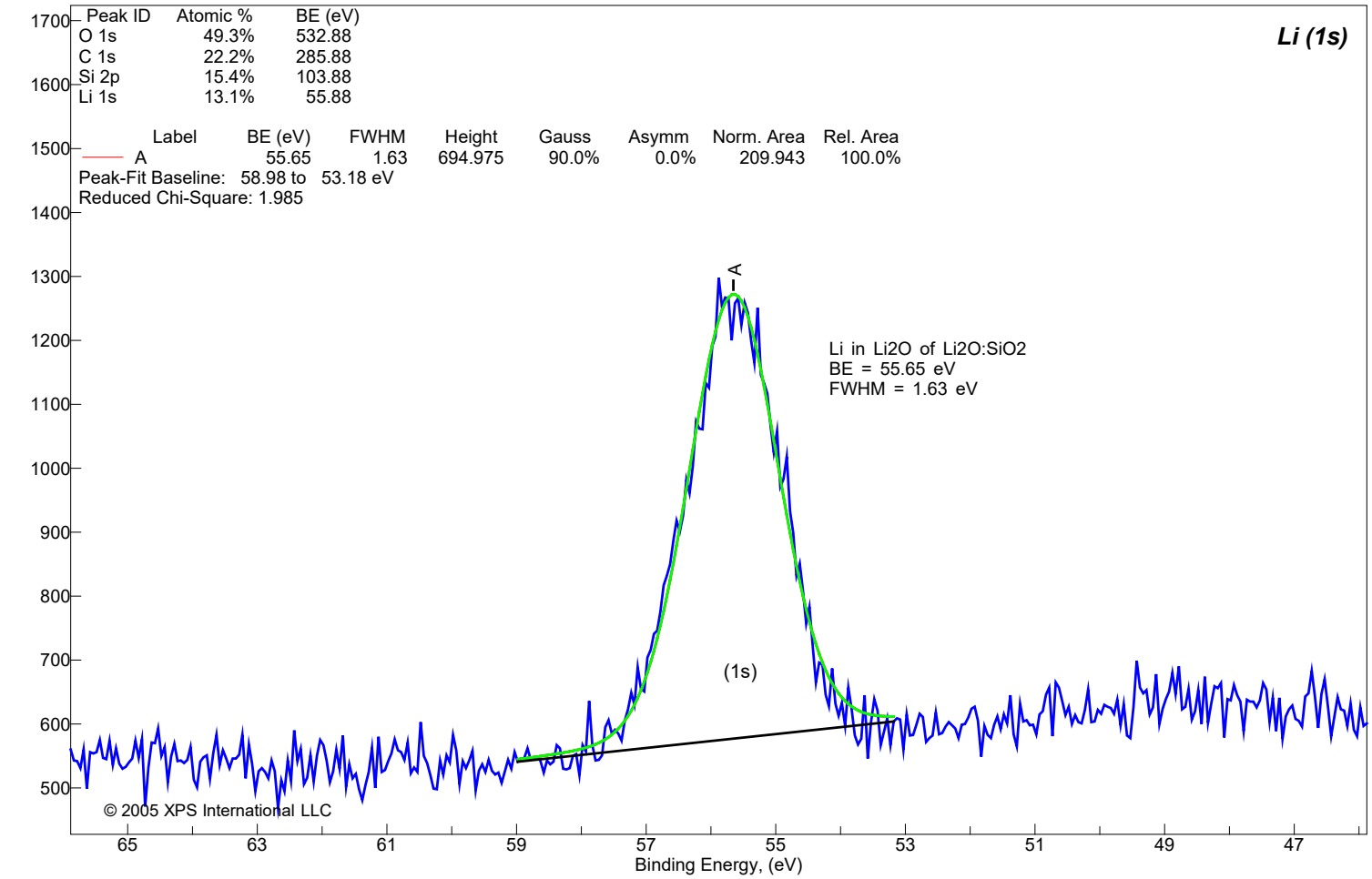


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Li_2O

Lithium (I) Oxide (FW = 29.88)

Sample Description: Synthesis of 25:75 Li2O:SiO2 (fresh exposed bulk, 35 TOA, mesh)

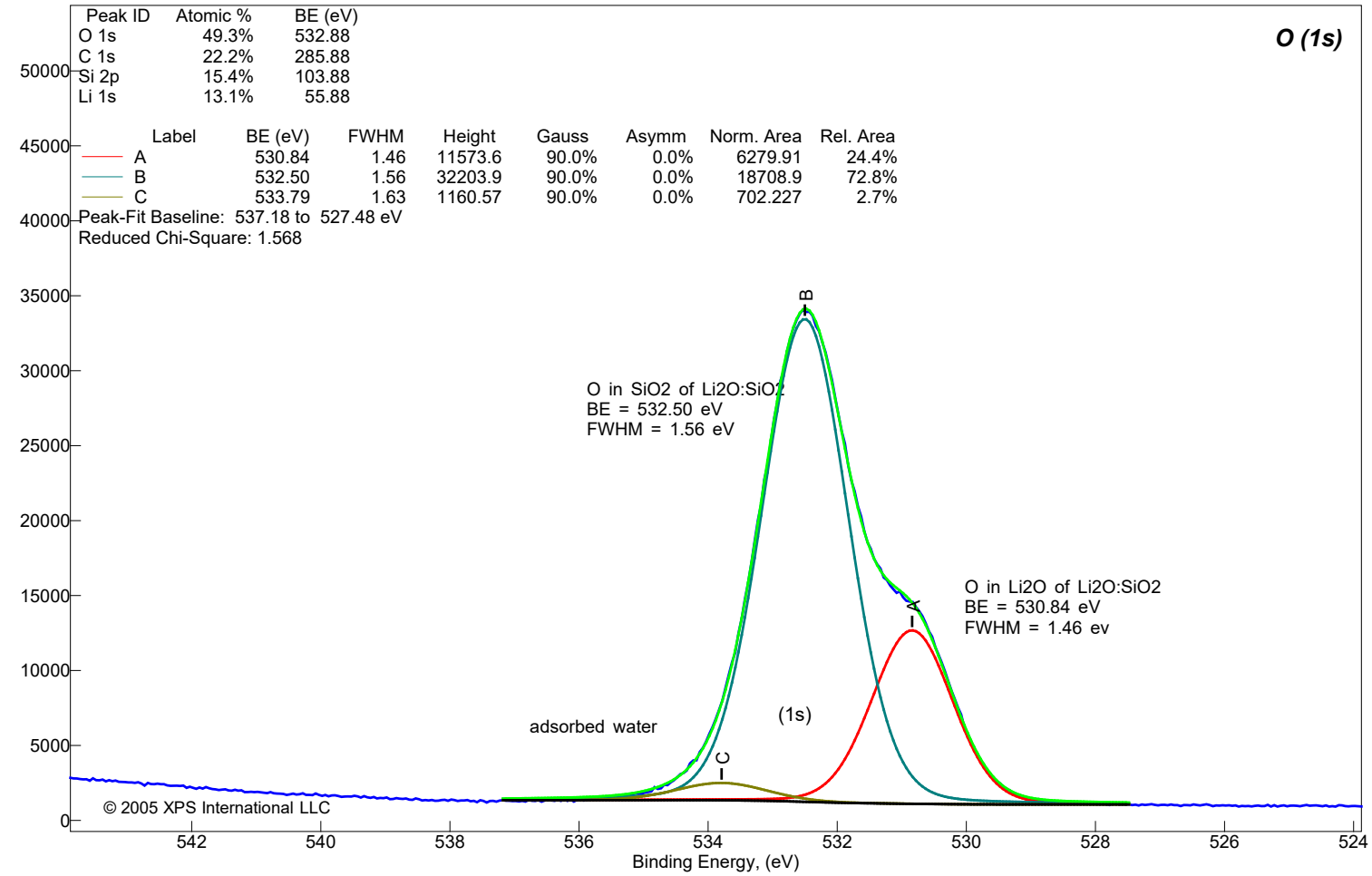


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Li_2O

Lithium (I) Oxide (FW = 29.88)

Sample Description: Synthesis of 25:75 Li2O:SiO2 (fresh exposed bulk, 35 TOA, mesh)

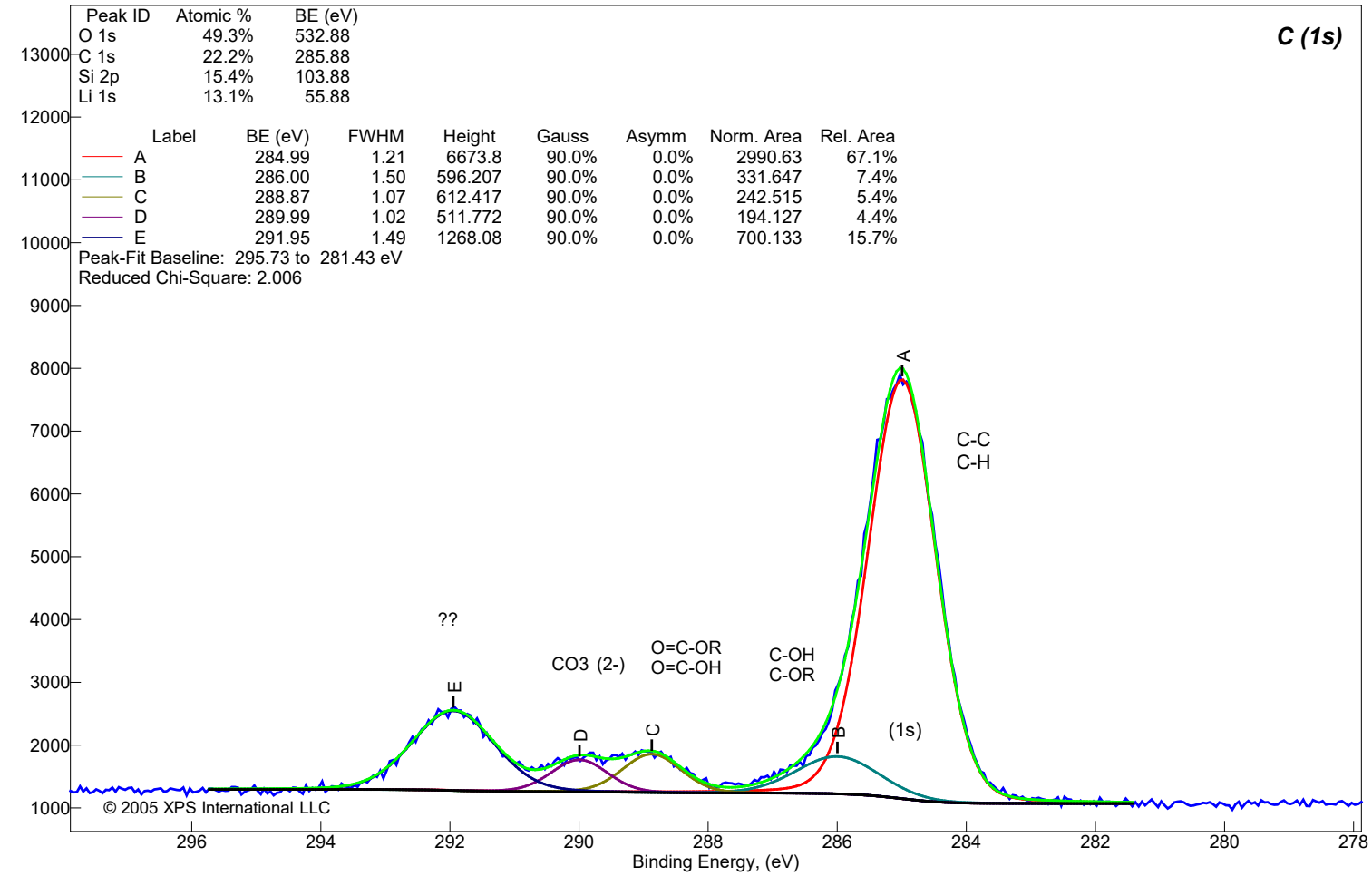


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Li_2O

Lithium (I) Oxide (FW = 29.88)

Sample Description: Synthesis of 25:75 Li2O:SiO2 (fresh exposed bulk, 35 TOA, mesh)

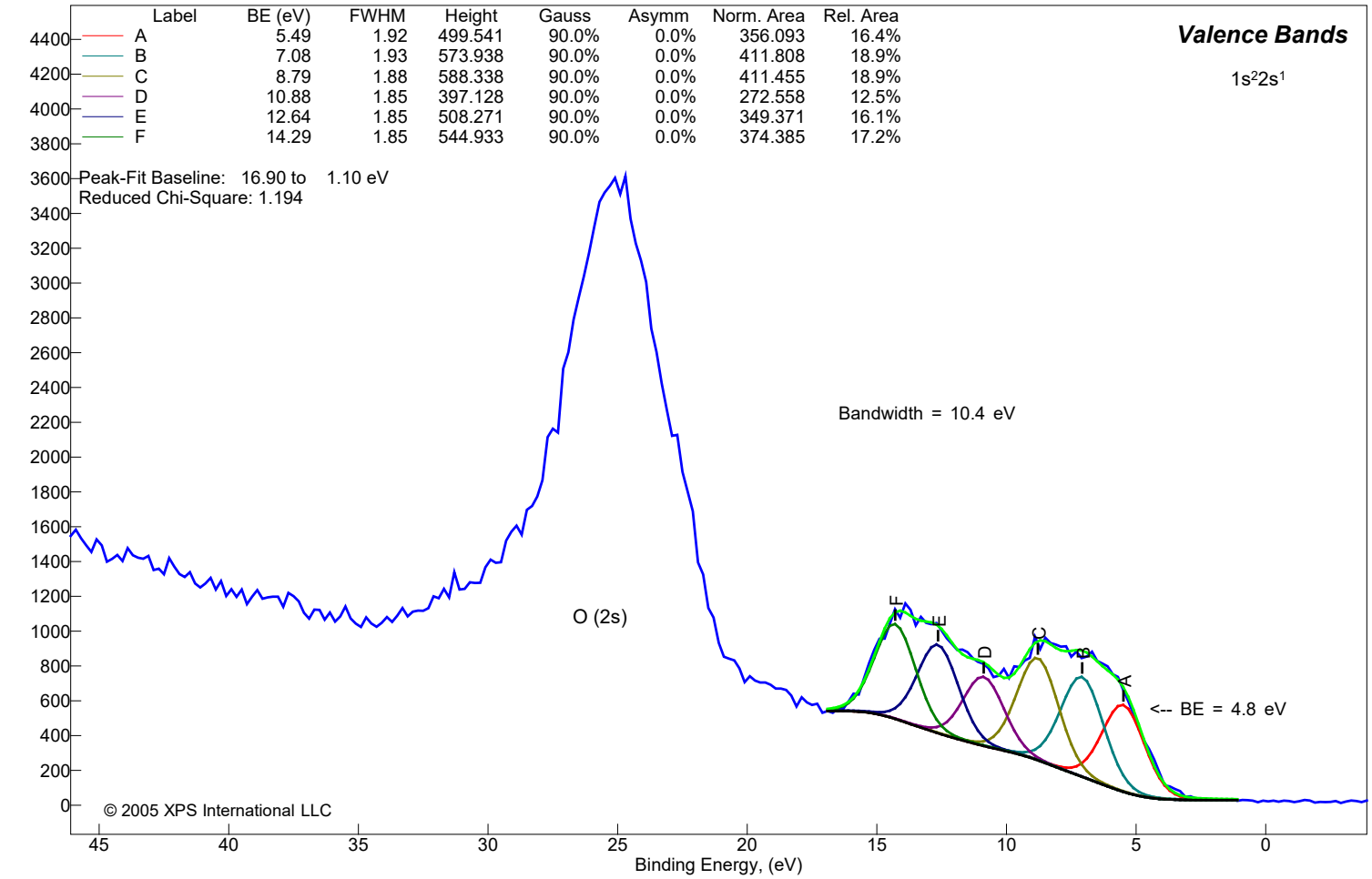


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Li_2O

Lithium (I) Oxide (FW = 29.88)

Sample Description: 25:75 Li2O:SiO2 (2nd synthesis attempt) exposed bulk, Mesh

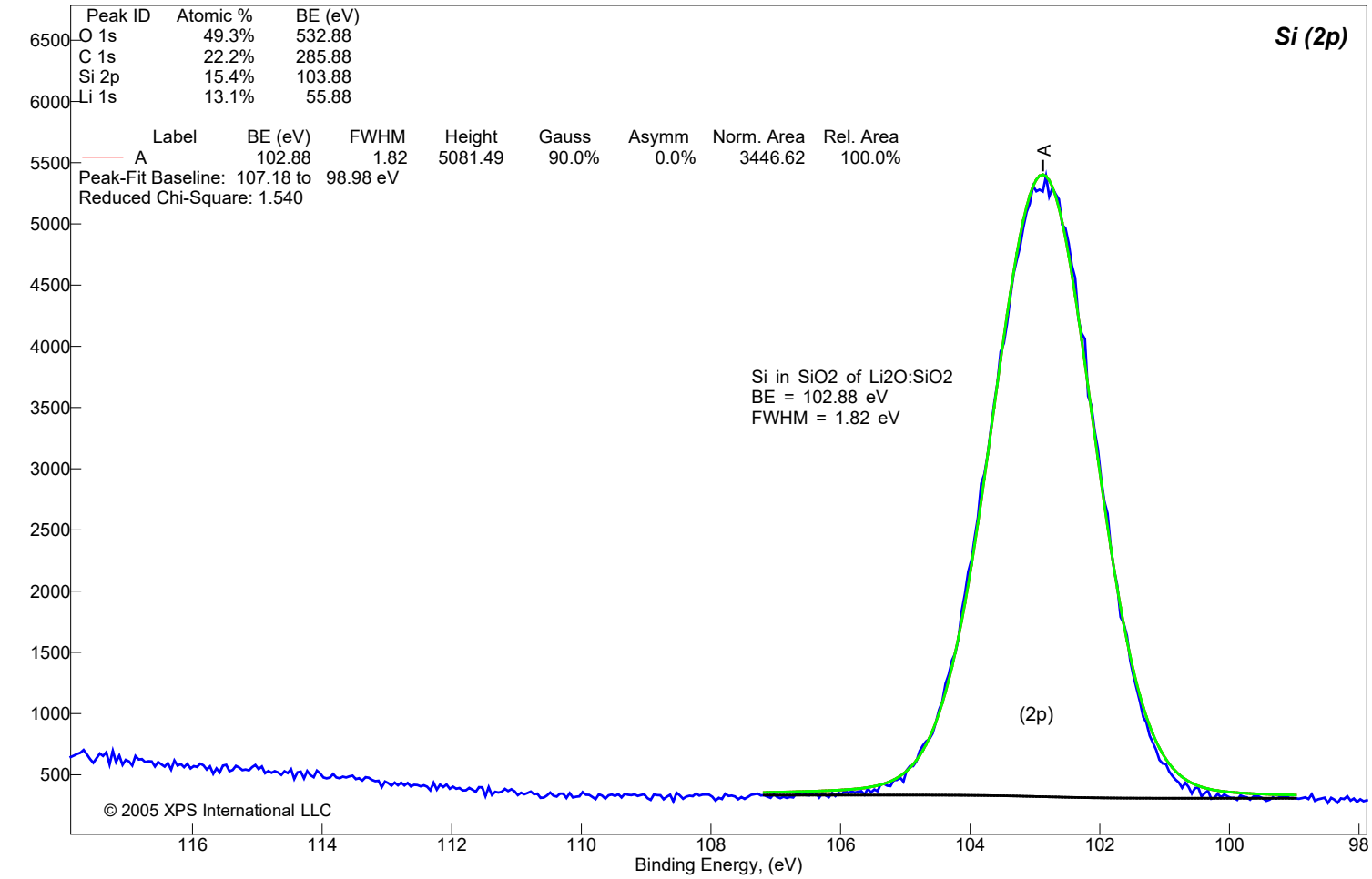


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Li_2O

Lithium (I) Oxide (FW = 29.88)

Sample Description: Synthesis of 25:75 Li2O:SiO2 (fresh exposed bulk, 35 TOA, mesh)



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Li_2CO_3

Lithium (I) Carbonate (FW = 73.89)
Surface Composition Table

Description: Li_2CO_3 from exposing LiOH to the CO_2 in air, analyzed at 90 deg TOA, no mesh, non-conductive powder pressed onto Indium metal foil, mp 723 dec C, d 2.11, sol in water

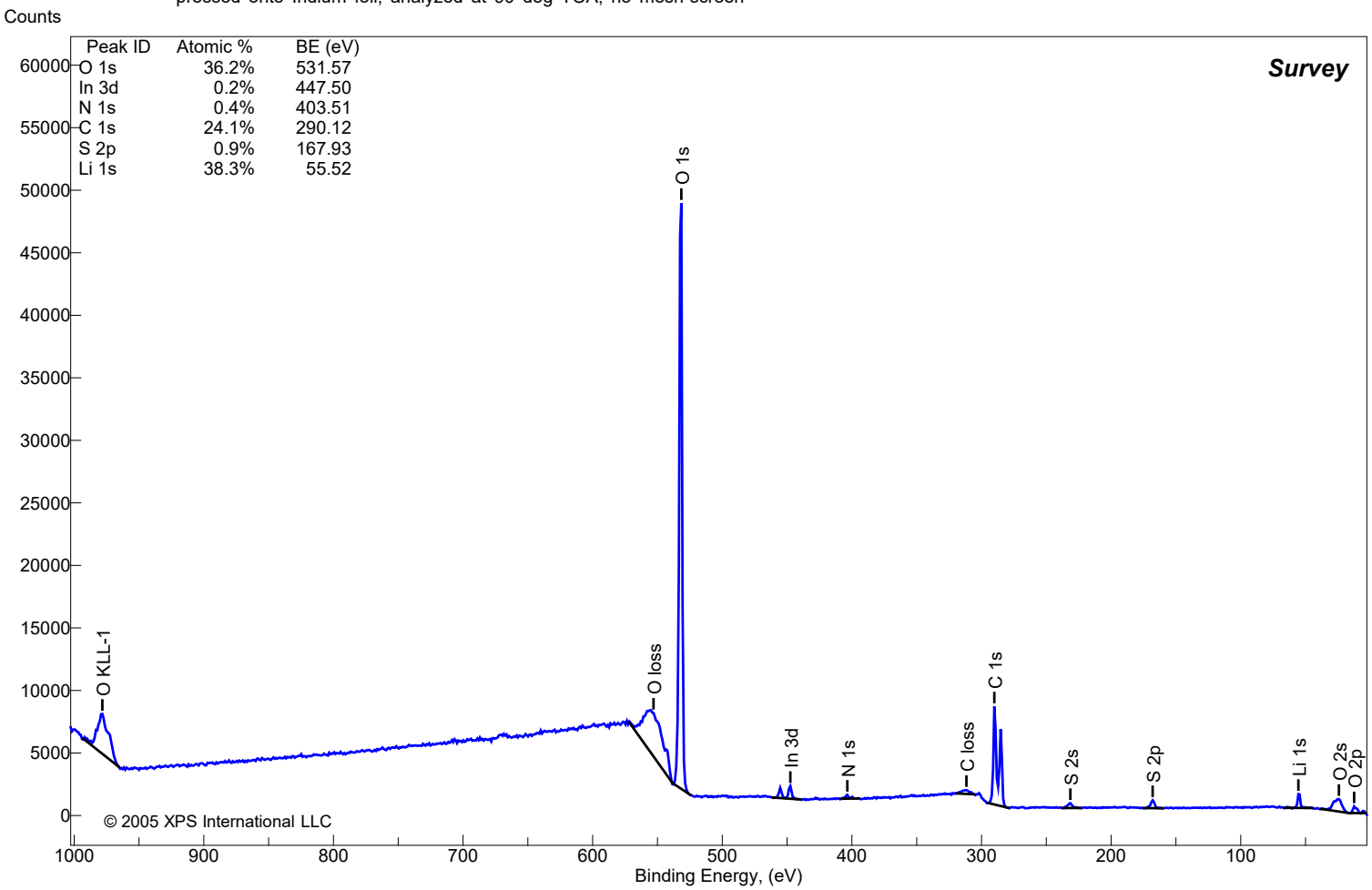
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2p	7.5	12.5	0.02	0.6	1,413	
O 2s	19.2	24.2	0.14	0.6	4,875	
Li 1s	50.5	55.5	0.06	0.6	2,144	38.3%
S 2p	162.9	167.9	1.68	0.6	1,489	0.9%
S 2s	226.5	231.5	1.43	0.6	1,063	
C 1s	285.1	290.1	1.00	0.6	21,326	24.1%
C loss	306.6	311.6	0.00	0.6	1,316	
N 1s	398.5	403.5	1.80	0.6	628	0.4%
In 3d	442.5	447.5	22.54	0.6	3,078	0.2%
O 1s	526.6	531.6	2.93	0.6	82,051	36.2%
O loss	548.1	553.1	0.00	0.6	38,818	
O KLL-1	973.3	978.3	0.70	0.6	21,261	

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Li_2CO_3

Lithium (I) Carbonate (FW = 73.89)

Sample Description: LiCO3 from exposing LiOH powder to the air
pressed onto Indium foil, analyzed at 90 deg TOA, no mesh-screen

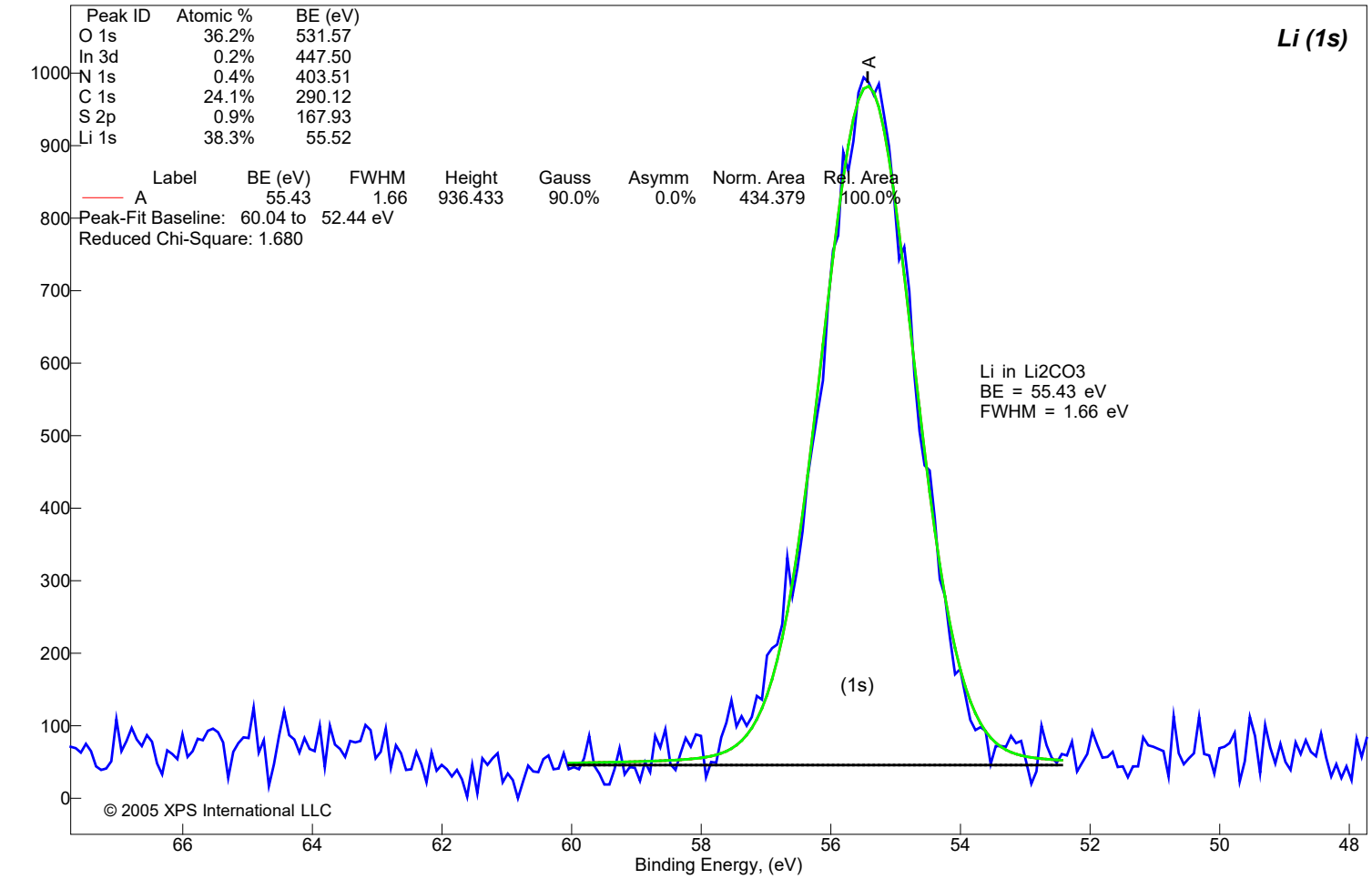


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Li_2CO_3

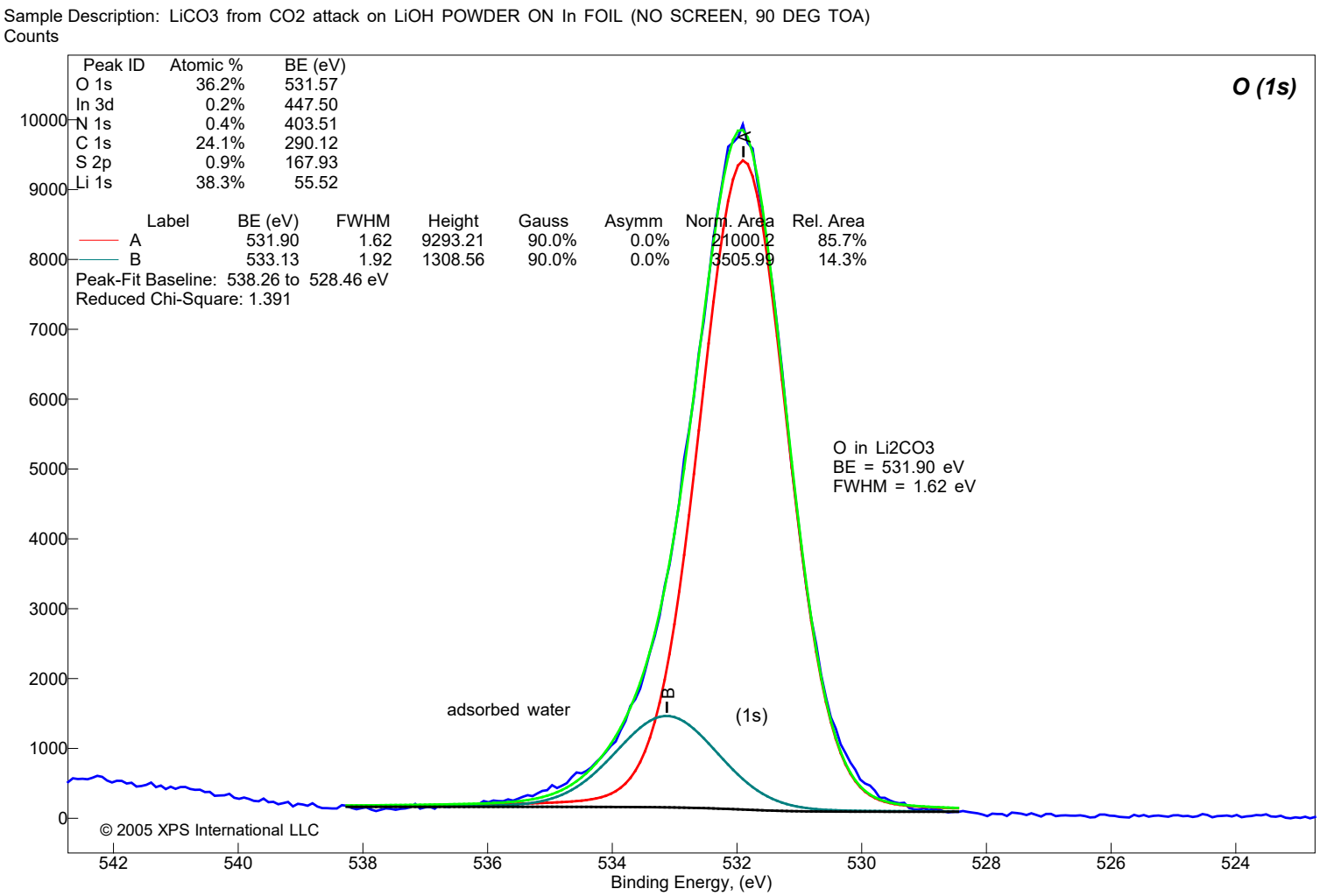
Lithium (I) Carbonate (FW = 73.89)

Sample Description: LiCO3 from CO2 attack on LiOH POWDER ON In FOIL (NO SCREEN, 90 DEG TOA)



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Lithium (I) Carbonate (FW = 73.89)

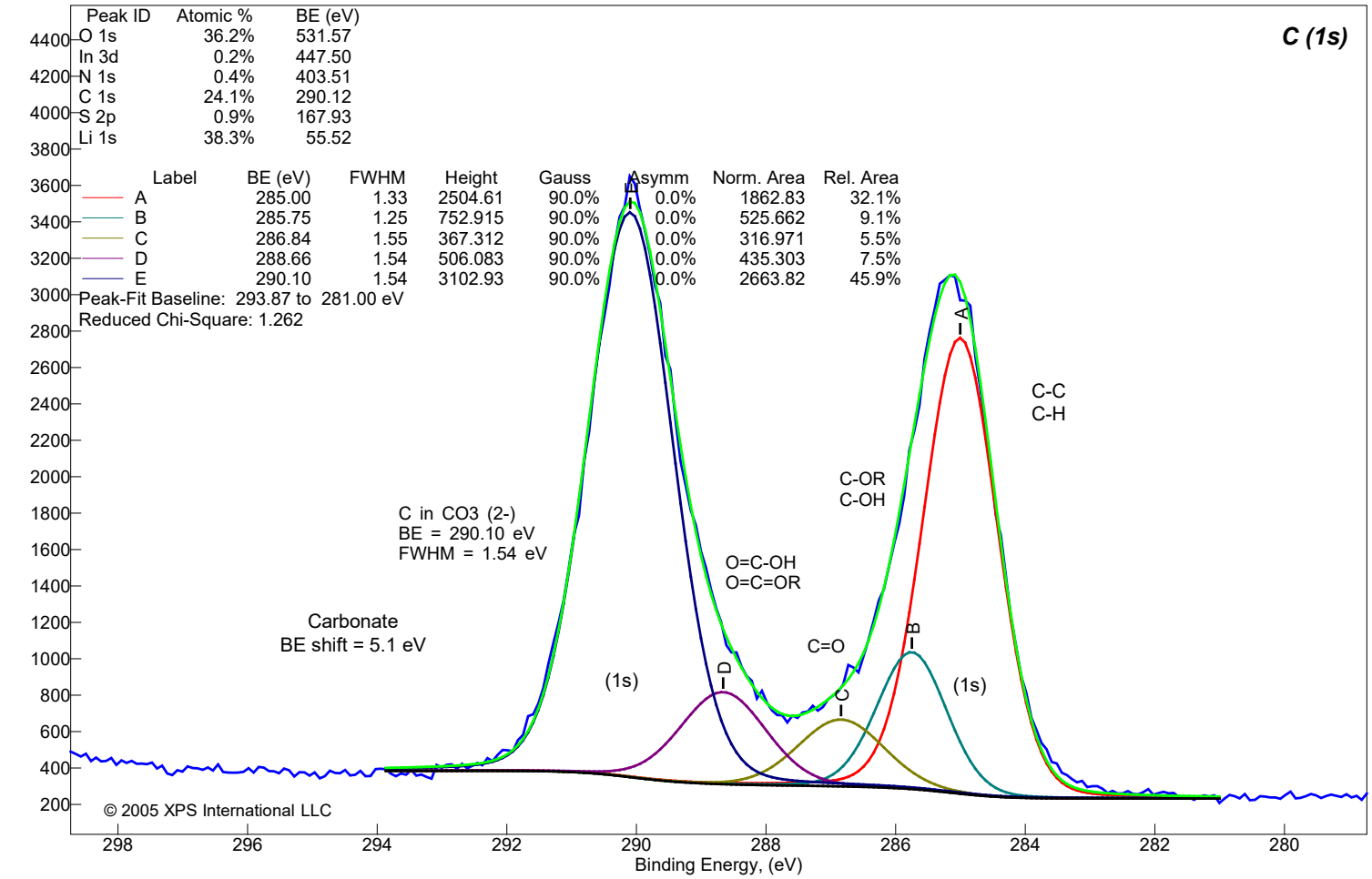


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Li_2CO_3

Lithium (I) Carbonate (FW = 73.89)

Sample Description: LiCO3 from CO2 attack on LiOH POWDER ON In FOIL (NO SCREEN, 90 DEG TOA)



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Lutetium (III) Oxide (FW = 397.94)
Surface Composition Table

Description: Lu_2O_3 (99.99%) from Aldrich Co. Lot# 03208AV, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white powder pressed into 3 mm pellet, mp 2487 dec C, d 9.42, very hygroscopic

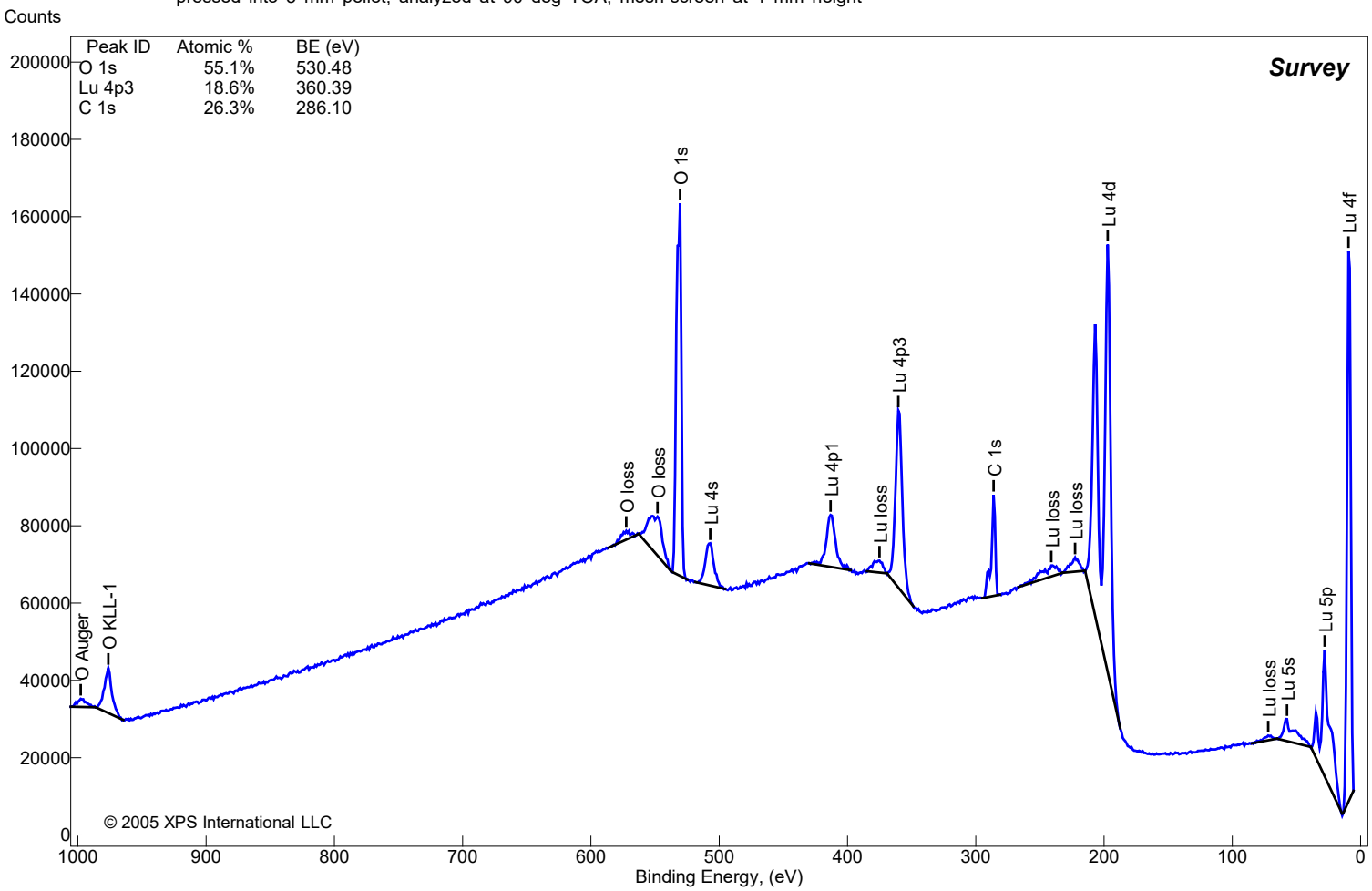
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Lu 4f	9.5	9.5	6.50	1.4	121,654	
Lu 5p	28.0	28.0	0.95	1.4	67,831	
Lu 5s	57.4	57.4	0.33	1.4	15,234	
Lu loss	72.0	72.0	0.00	1.4	1,926	
Lu 4d	197.1	197.1	8.45	1.4	242,083	
Lu loss	222.6	222.6	0.00	1.4	7,146	
Lu loss	241.1	241.1	0.00	1.4	10,324	
C 1s	286.1	286.1	1.00	1.4	23,906	26.3%
Lu 4p3	360.4	360.4	4.74	1.4	73,056	18.6%
Lu loss	375.1	375.1	0.00	1.4	7,789	
Lu 4p1	413.2	413.2	2.03	1.4	27,465	
Lu 4s	507.0	507.0	1.73	1.4	21,007	
O 1s	530.5	530.5	2.93	1.4	106,573	55.1%
O loss	548.1	548.1	0.00	1.4	32,230	
O loss	572.5	572.5	0.00	1.4	4,759	
O KLL-1	976.2	976.2	0.70	1.4	20,436	
O Auger	997.7	997.7	0.00	1.4	4,658	

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Lu_2O_3

Lutetium (III) Oxide (FW = 397.94)

Sample Description: Lu2O3 (99.99%) from Aldrich lot# 003208AV
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height

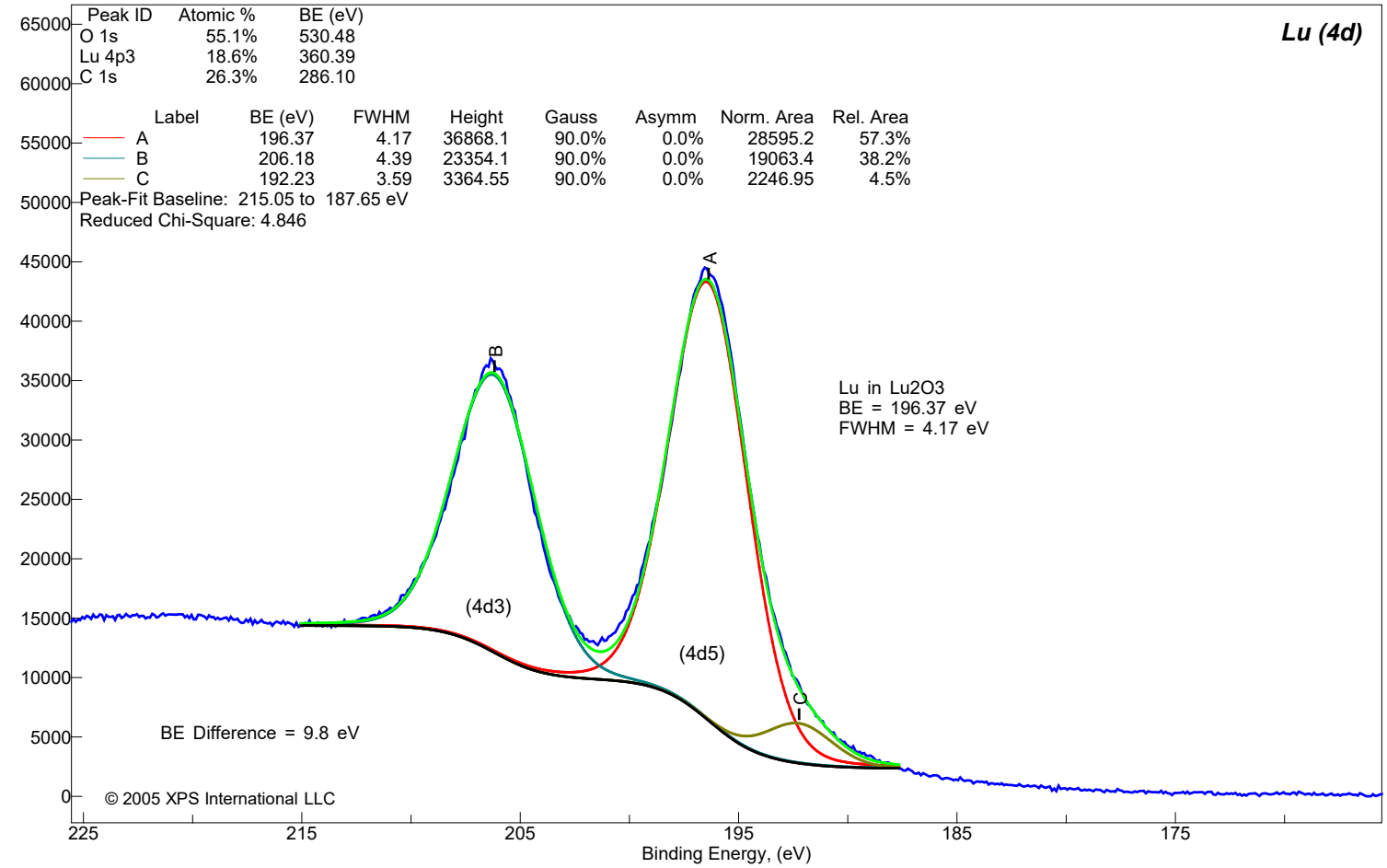


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Lu_2O_3

Lutetium (III) Oxide (FW = 397.94)

Sample Description: Lu2O3 99.99% Aldr lot#003208AV 3mm plt 90TOA mesh
mesh at <1mm

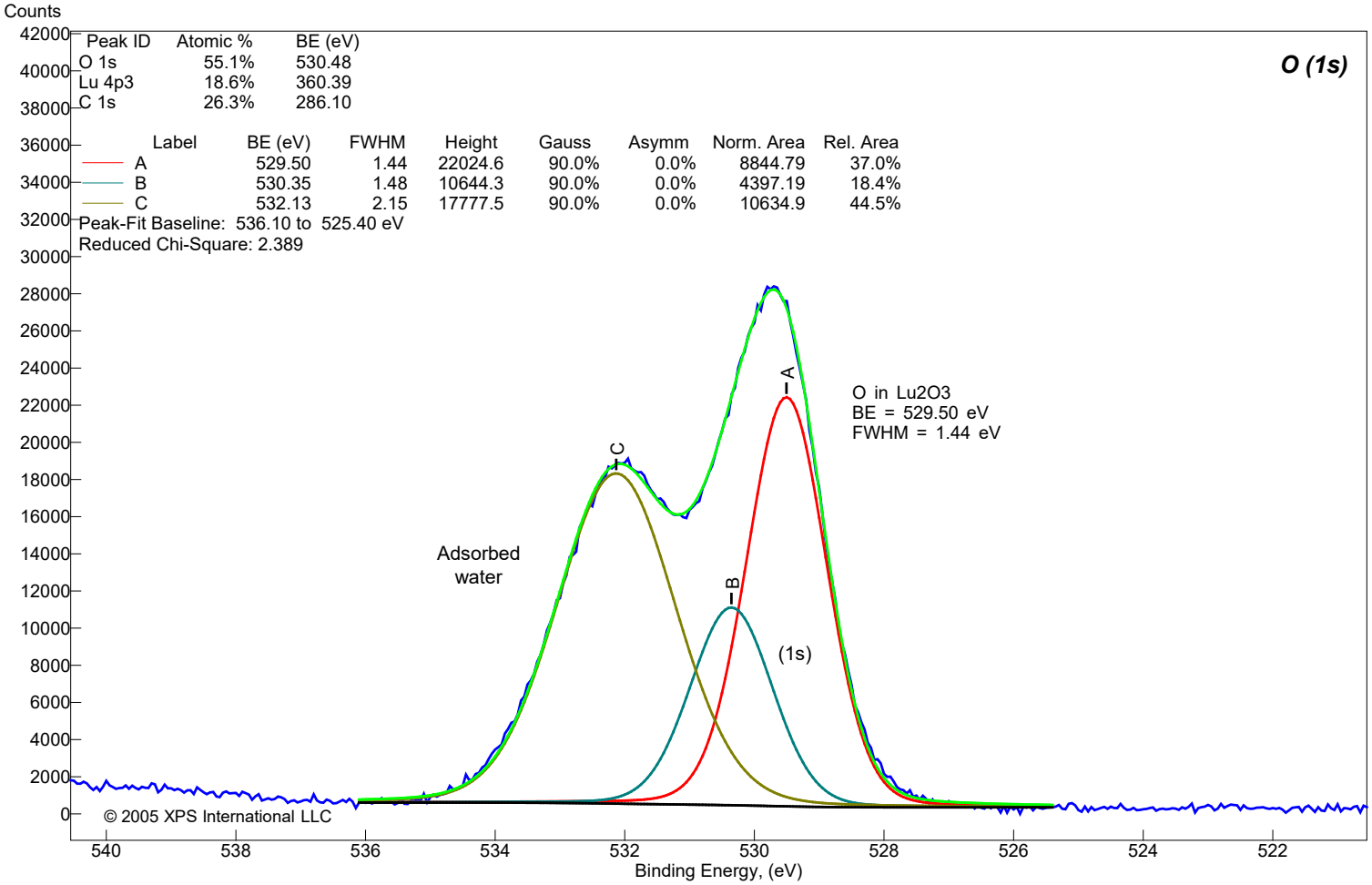


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Lu_2O_3

Lutetium (III) Oxide (FW = 397.94)

Sample Description: Lu2O3 99.99% Aldr lot#003208AV 3mm plt 90TOA mesh
mesh at <1mm

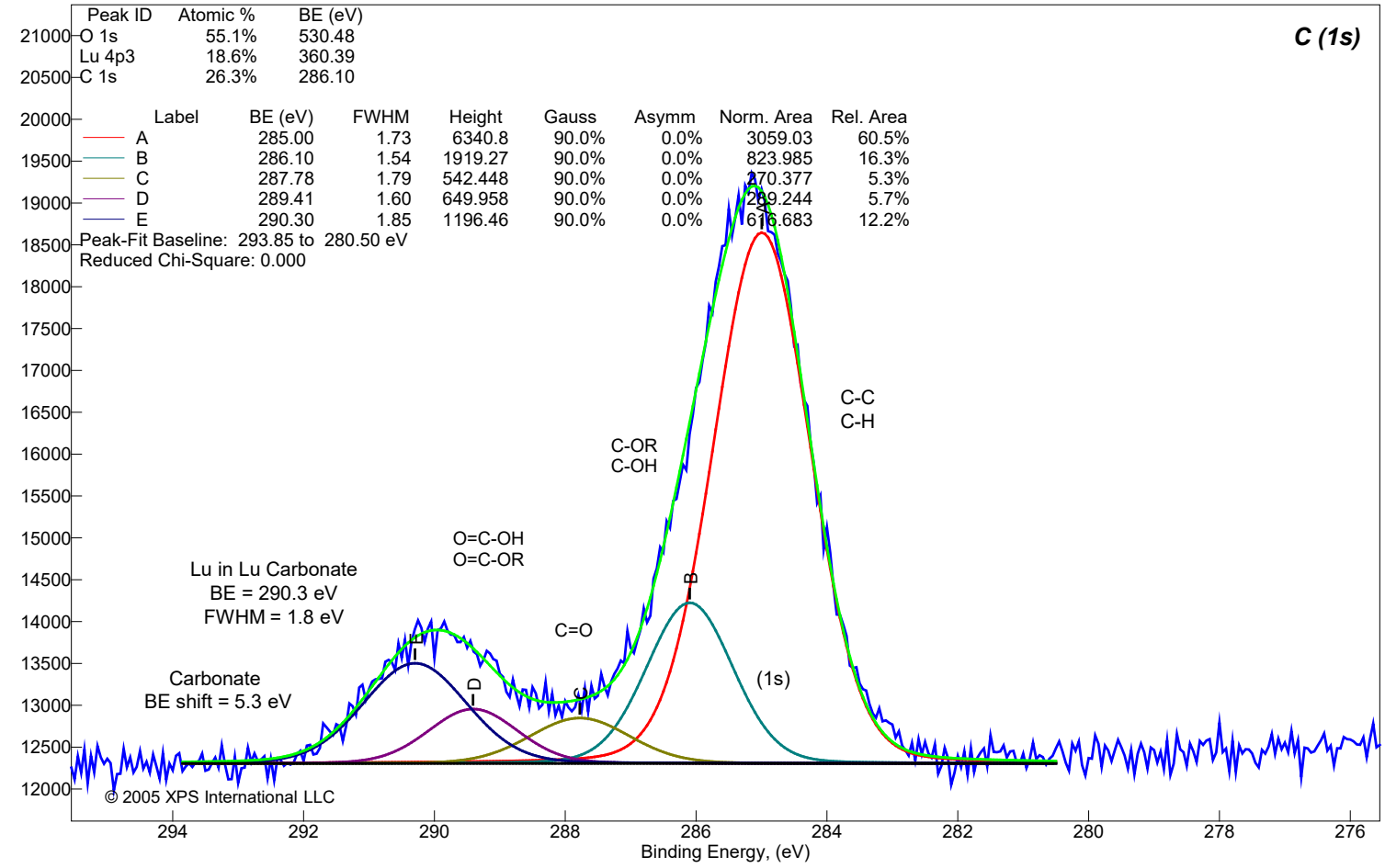


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Lu_2O_3

Lutetium (III) Oxide (FW = 397.94)

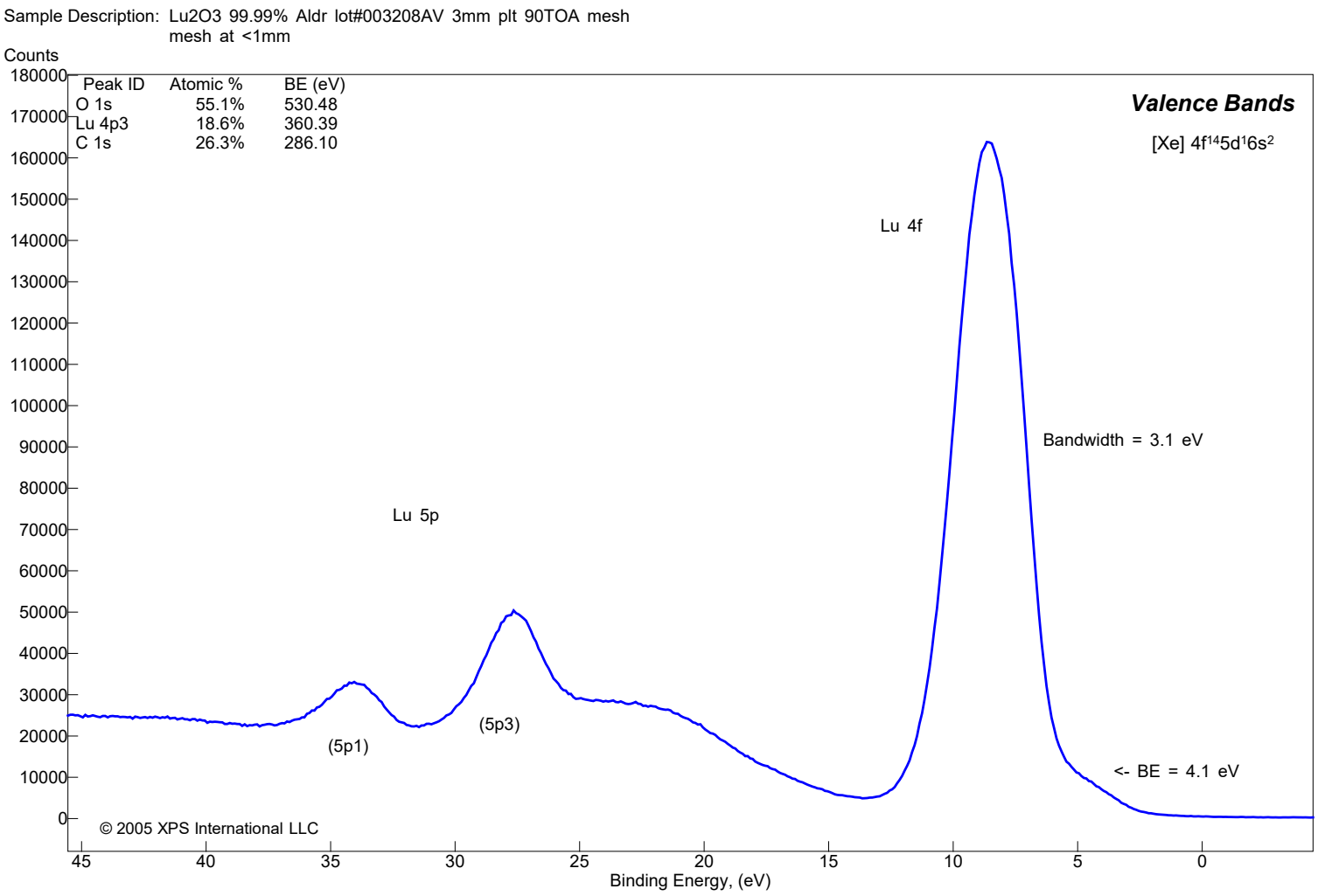
Sample Description: Lu2O3 99.99% Aldr lot#003208AV 3mm plt 90TOA mesh
mesh at <1mm



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Lu_2O_3

Lutetium (III) Oxide (FW = 397.94)

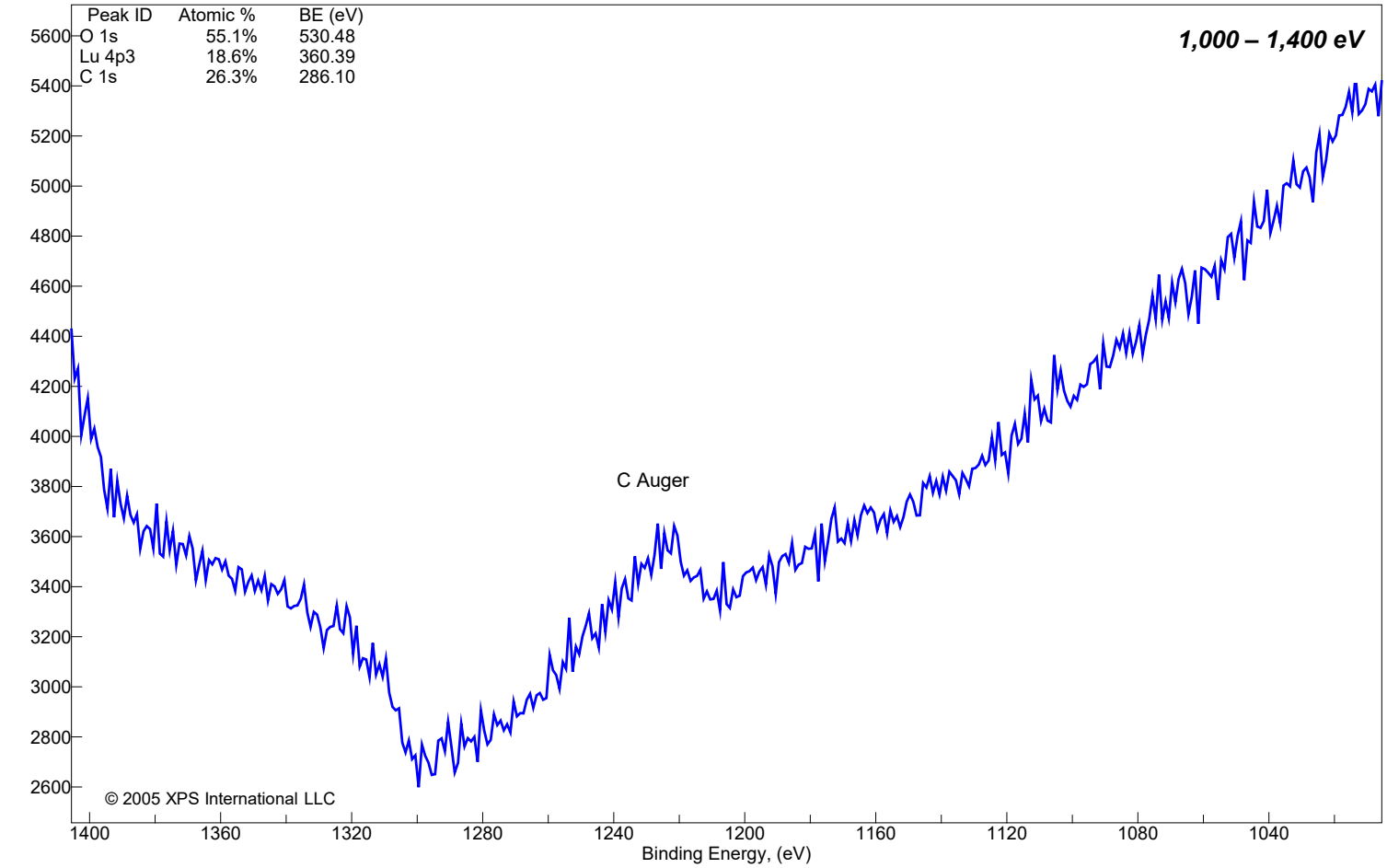


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Lu_2O_3

Lutetium (III) Oxide (FW = 397.94)

Sample Description: Lu2O3 99.99% Aldr lot#003208AV 3mm plt 90TOA mesh
mesh at <1mm



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MgO

Magnesium (II) Oxide (FW = 40.31)
Surface Composition Table

Description: MgO (99.999%) single crystal from Japan Energy Co., analyzed edge at 55 deg TOA, no mesh, non-conductive freshly fractured in air, clear sheet, mp 2852 dec C, d 3.58, sol in acid

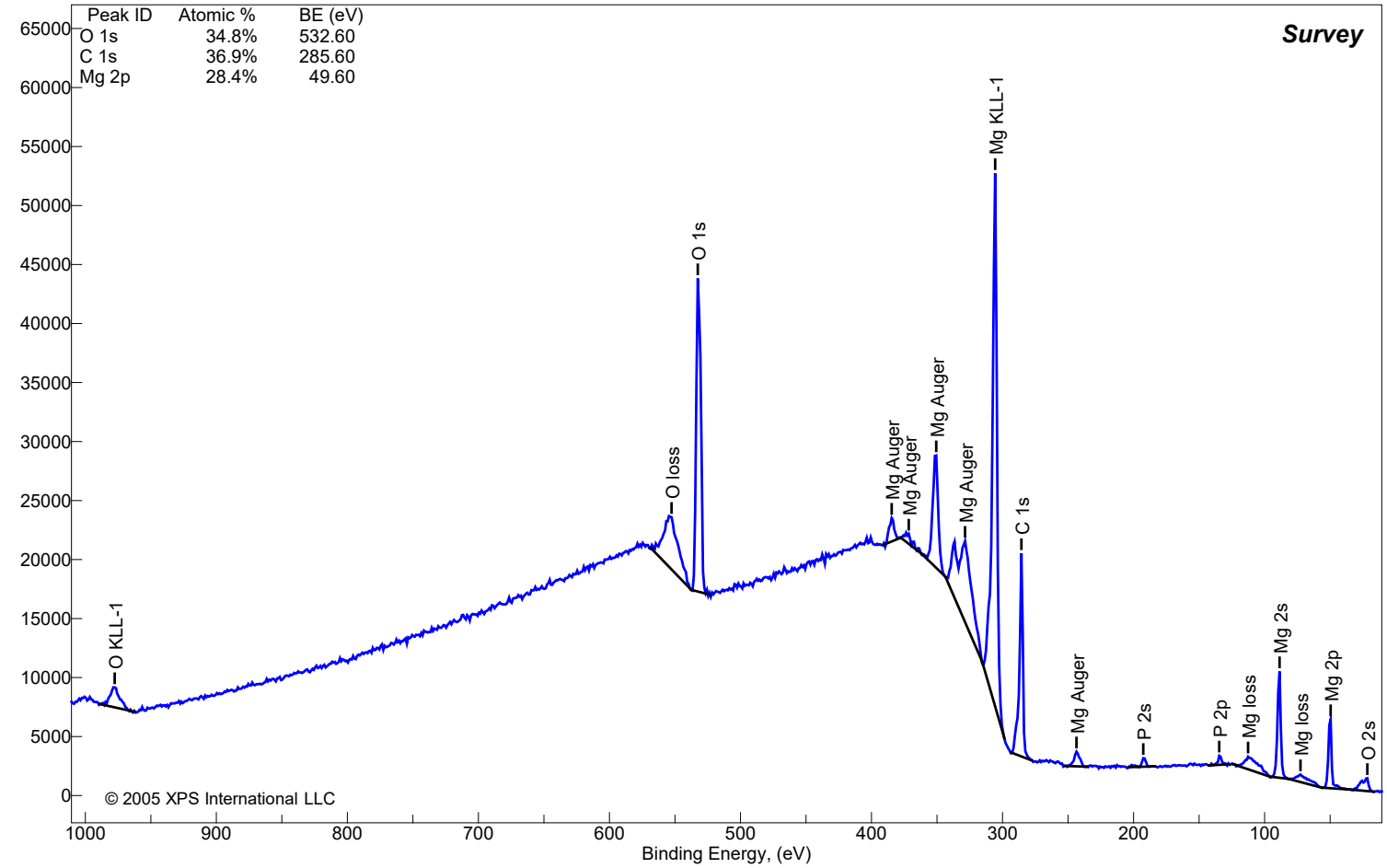
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	21.6	16.3	0.14	1.4	18,904	
Mg 2p	49.6	44.3	0.33	1.4	44,555	28.4%
Mg loss	72.6	67.3	0.00	1.4	19,028	
Mg 2s	88.6	83.3	0.58	1.4	67,073	
Mg loss	112.6	107.3	0.00	1.4	34,565	
P 2p	134.6	129.3	1.19	1.4	5,235	
P 2s	192.6	187.3	1.18	1.4	6,106	
Mg Auger	243.6	238.3	0.00	1.4	14,683	
C 1s	285.6	280.3	1.00	1.4	135,199	36.9%
Mg KLL-1	305.6	300.3	0.12	1.4	482,335	
Mg Auger	328.6	323.3	0.00	1.4	239,166	
Mg Auger	350.6	345.3	0.00	1.4	120,191	
Mg Auger	371.6	366.3	0.00	1.4	15,628	
Mg Auger	384.6	379.3	0.00	1.4	20,605	
O 1s	532.6	527.3	2.93	1.4	271,075	34.8%
O loss	552.6	547.3	0.00	1.4	152,130	
O KLL-1	977.6	972.3	0.70	1.4	33,253	

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MgO

Magnesium (II) Oxide (FW = 40.31)

Sample Description: MgO (99.999%) "single crystal"
analyzed edge of crystal as received at 55 deg TOA, no mesh screen,

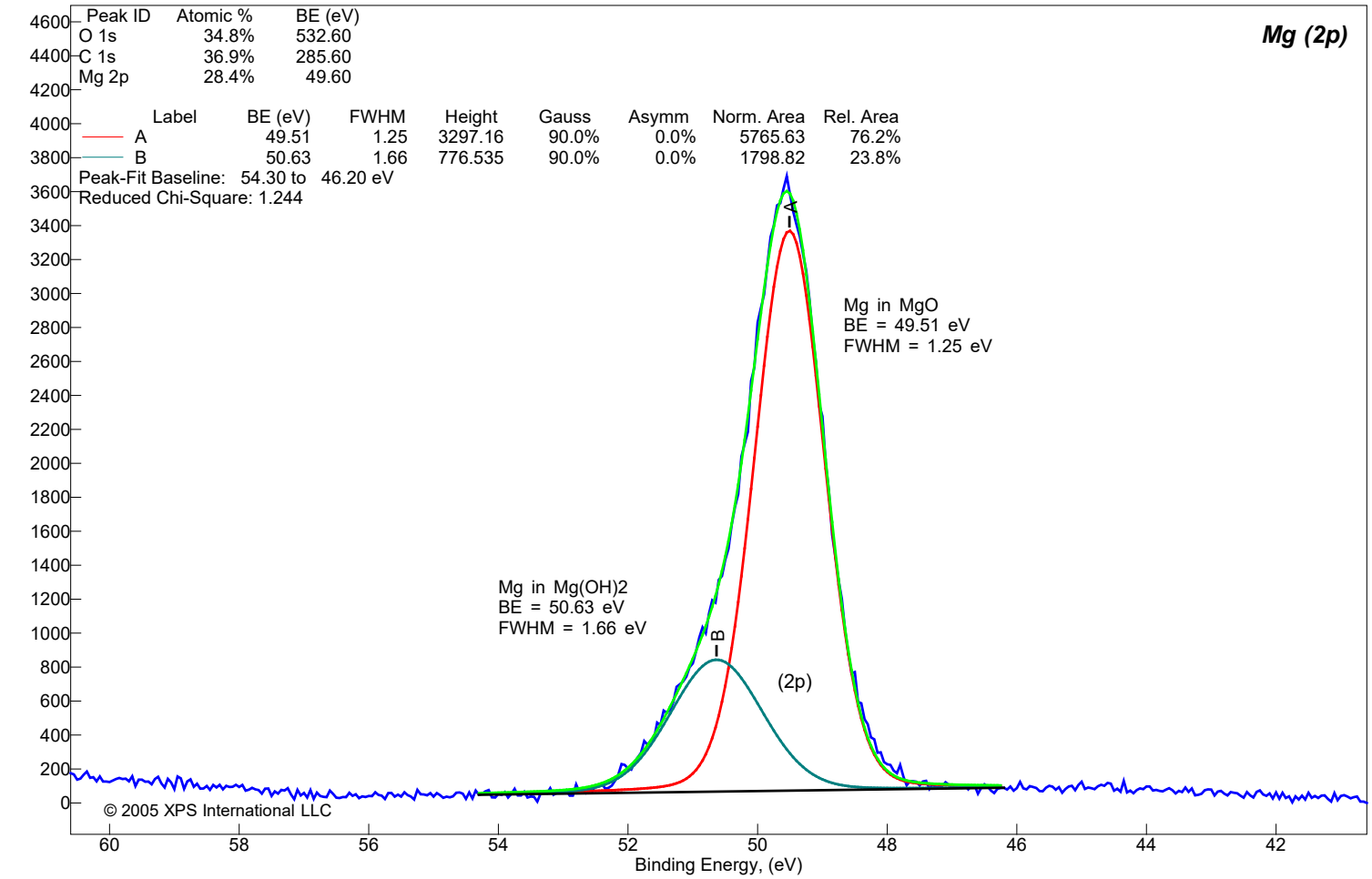


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MgO

Magnesium (II) Oxide (FW = 40.31)

Sample Description: MgO "single crystal" as rec'd, no mesh, at edge, 90% flood-gun current

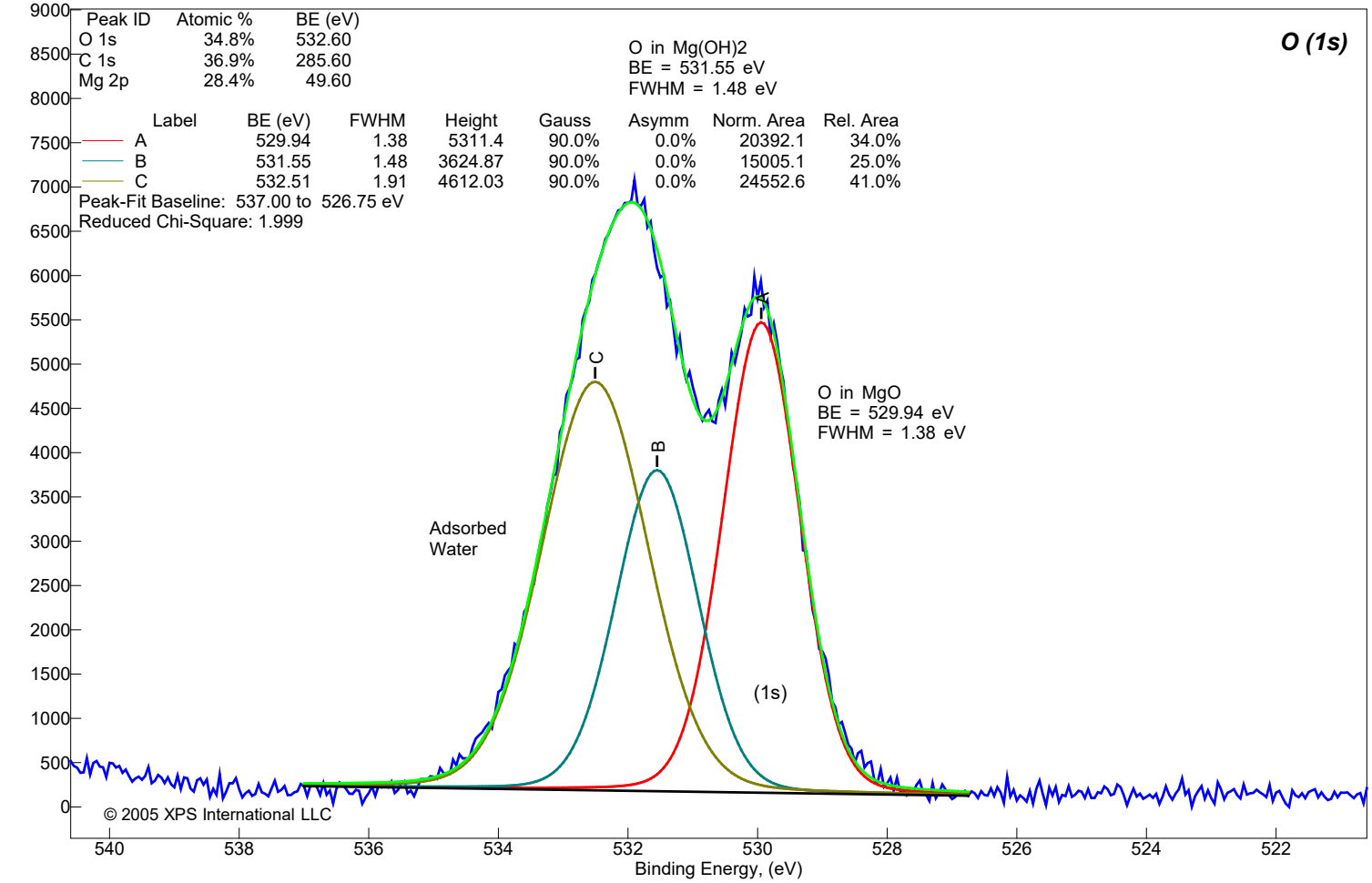


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MgO

Magnesium (II) Oxide (FW = 40.31)

Sample Description: MgO "single crystal" as rec'd, no mesh, at edge, 90% flood-gun current

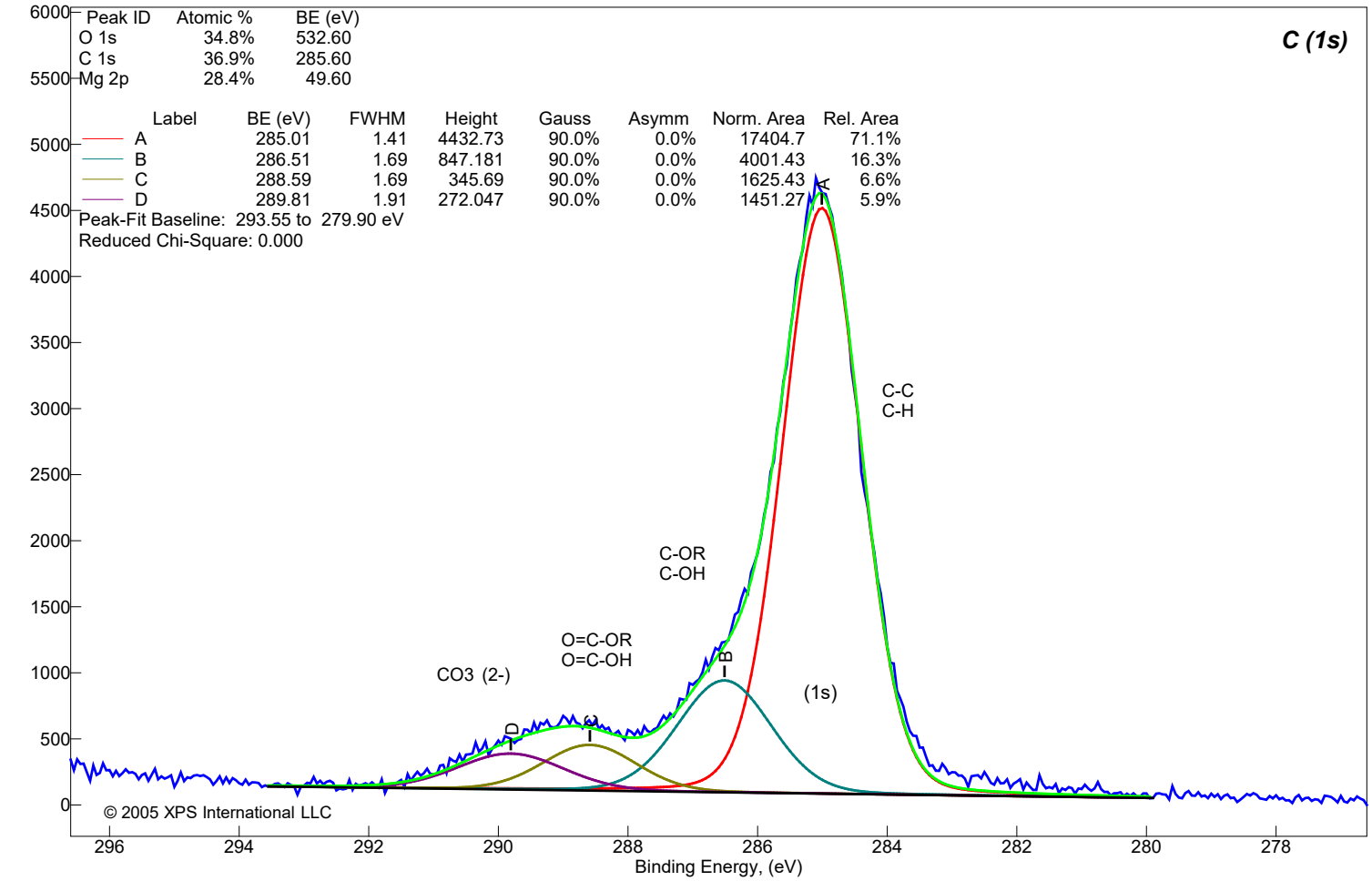


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MgO

Magnesium (II) Oxide (FW = 40.31)

Sample Description: MgO "single crystal" as rec'd, no mesh, at edge, 90% flood-gun current

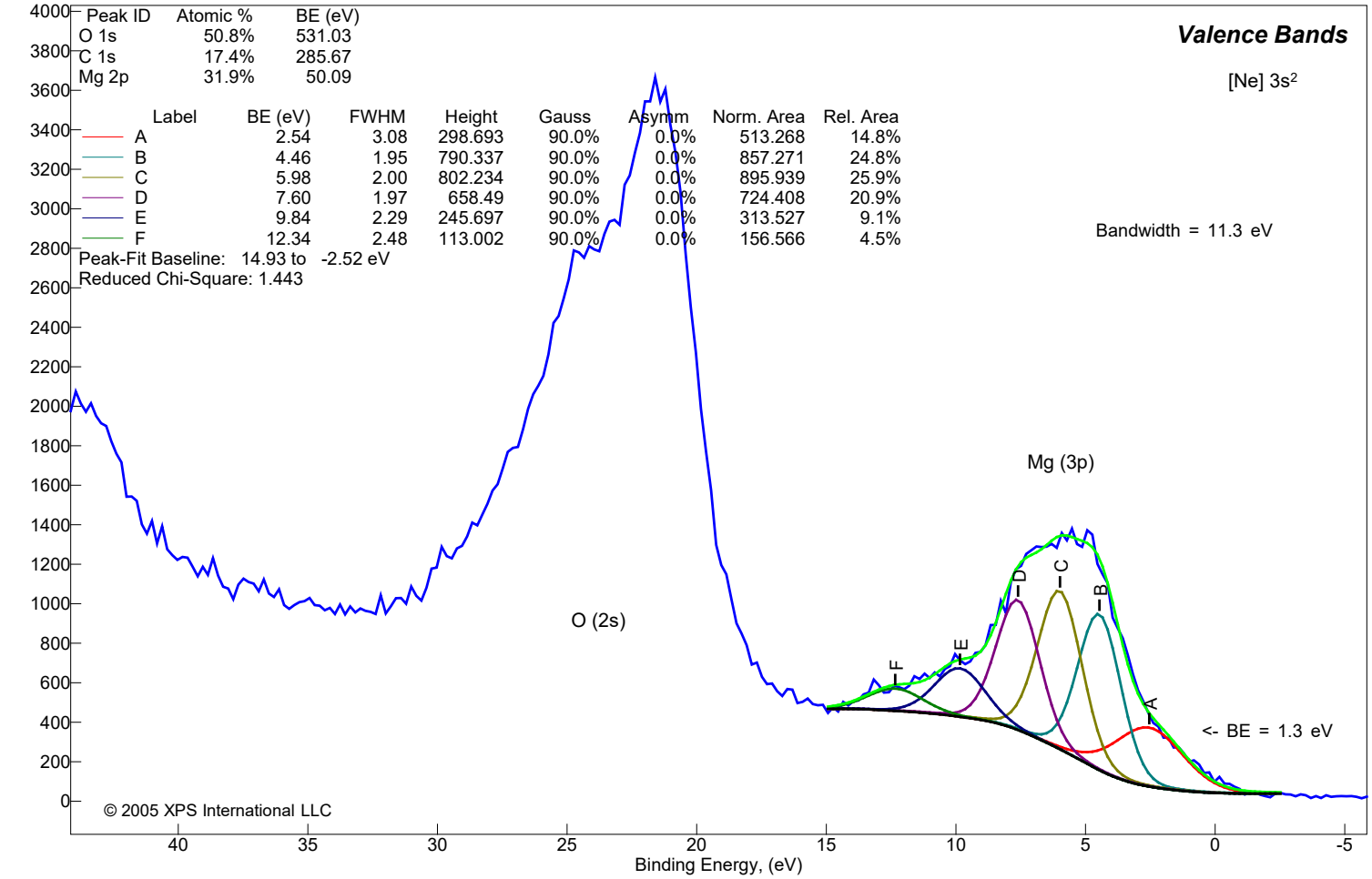


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MgO

Magnesium (II) Oxide (FW = 40.31)

Sample Description: MgO (99.99%) Aldrich lot# 00616CW, screen, 90 deg TOA

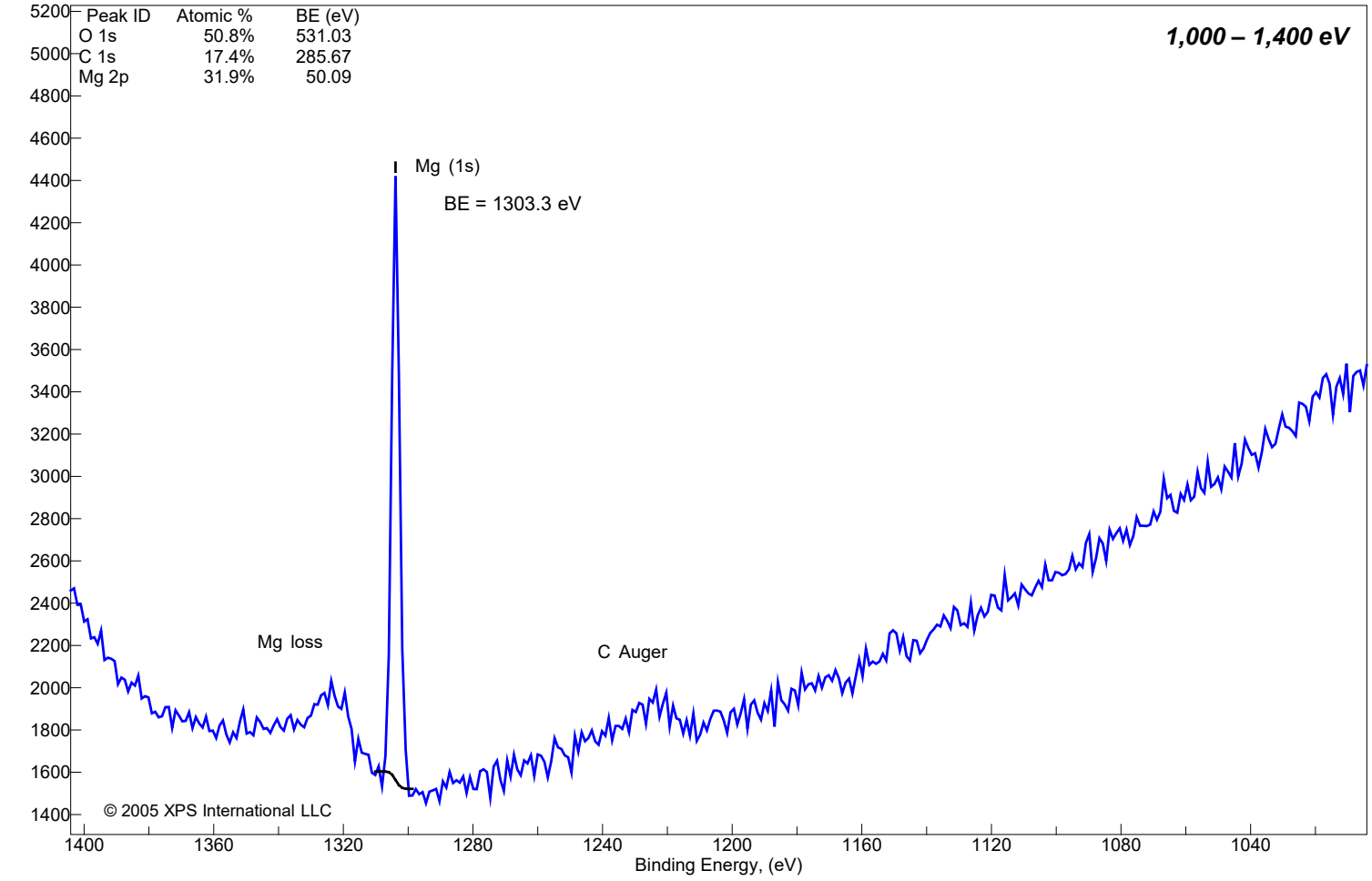


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MgO

Magnesium (II) Oxide (FW = 40.31)

Sample Description: MgO (99.99%) Aldrich lot# 00616CW, screen, 90 deg TOA

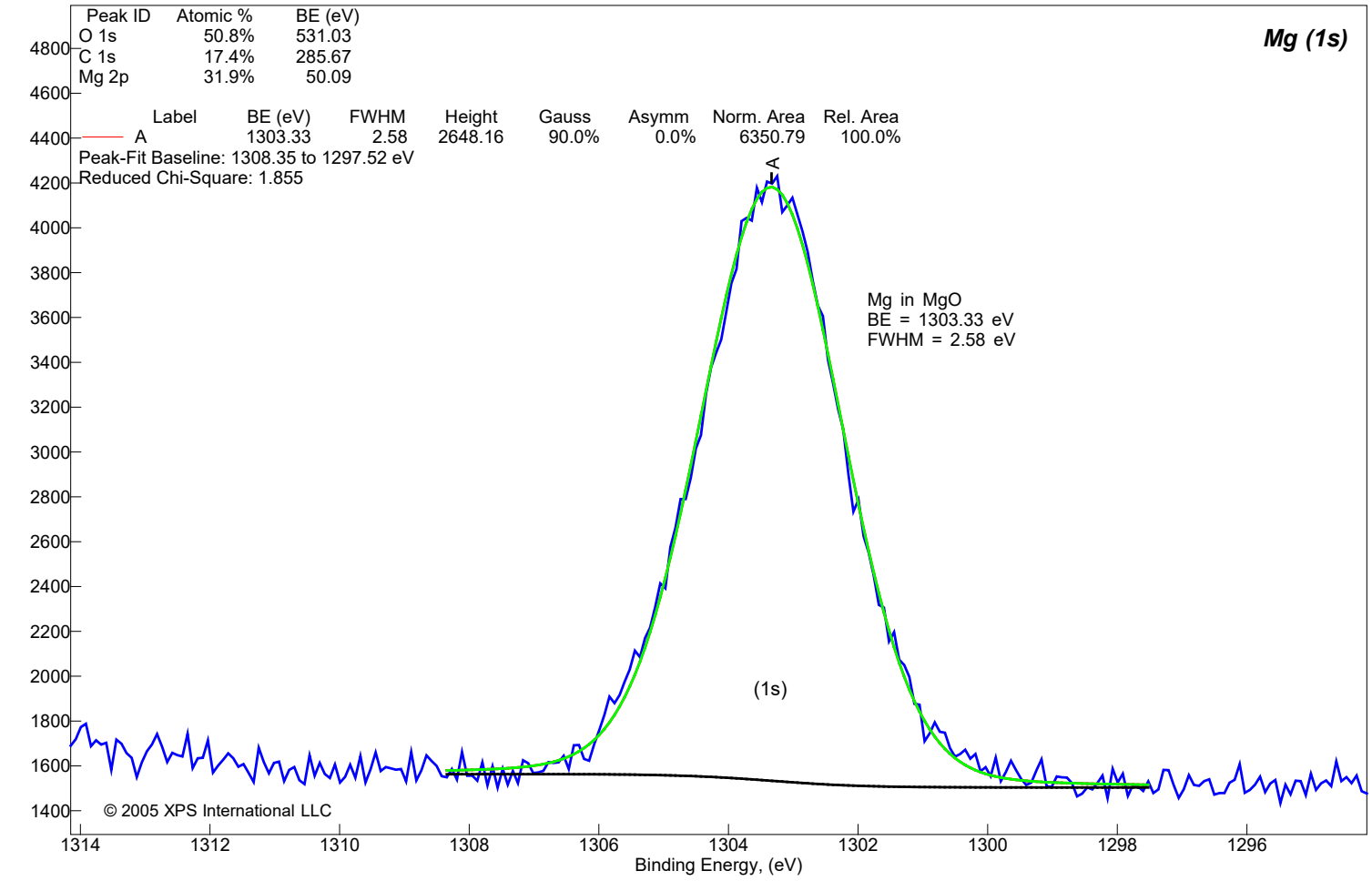


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MgO

Magnesium (II) Oxide (FW = 40.31)

Sample Description: MgO (99.99%) Aldrich lot# 00616CW, screen, 90 deg TOA



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$Mg(OH)_2$

Magnesium (II) Hydroxide (FW = 58.33)
Surface Composition Table

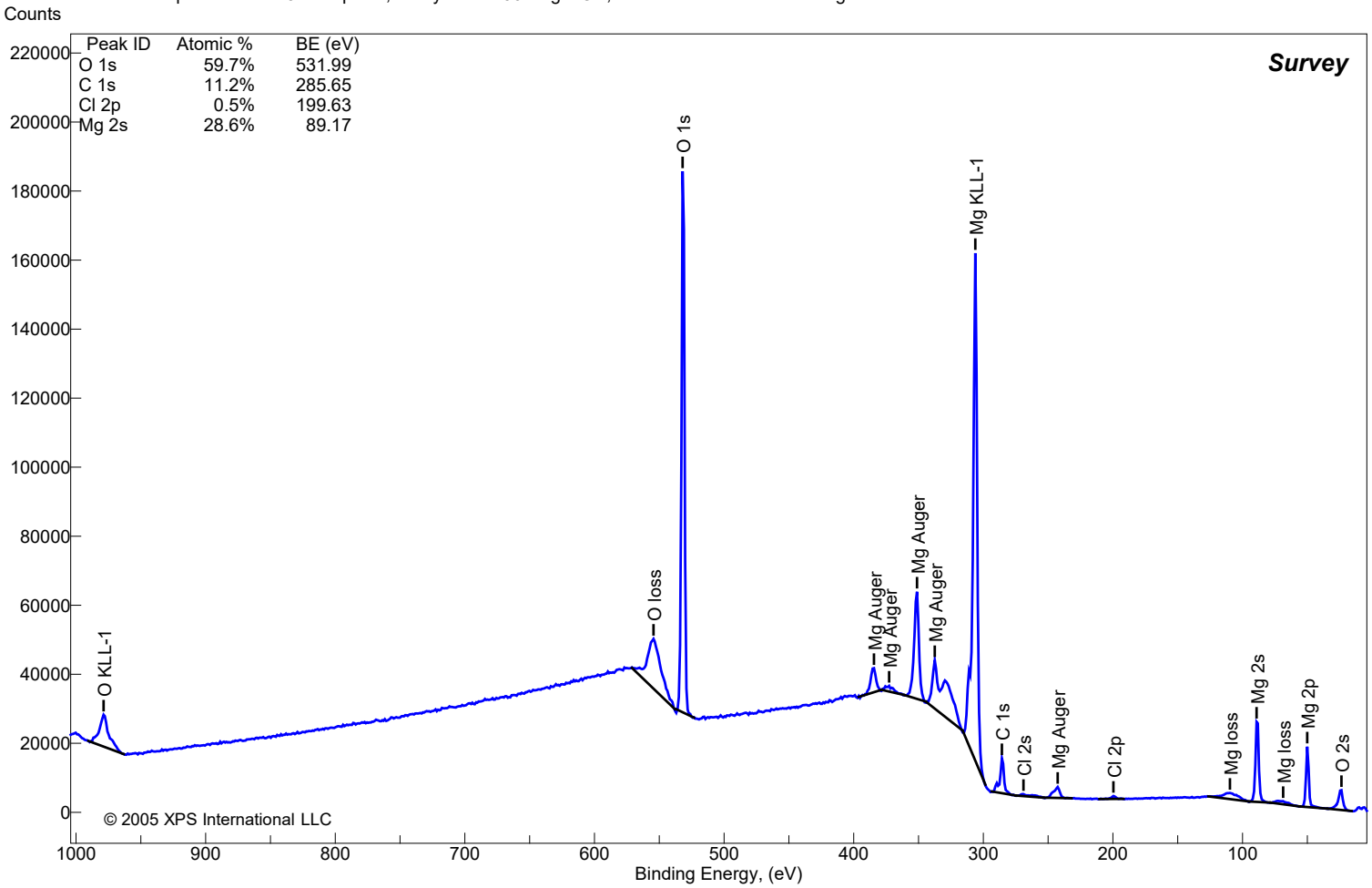
Description: $Mg(OH)_2$ (95%) from Aldrich Co. Lot# 07712DY, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white powder pressed into 3 mm pellet, mp 350 C dec, d 2.36, sol in dil acid

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2p	5.7	2.2	0.02	1.5	4,355	
O 2s	23.7	20.2	0.14	1.5	13,127	
Mg 2p	50.1	46.6	0.33	1.5	22,634	
Mg loss	68.6	65.1	0.00	1.5	4,889	
Mg 2s	89.2	85.7	0.58	1.5	36,730	28.6%
Mg loss	109.7	106.2	0.00	1.5	13,555	
Cl 2p	199.6	196.1	2.28	1.5	2,346	0.5%
Mg Auger	242.6	239.1	0.00	1.5	9,491	
Cl 2s	269.0	265.5	1.69	1.5	3,427	
C 1s	285.7	282.2	1.00	1.5	19,911	11.2%
Mg KLL-1	306.2	302.7	0.12	1.5	292,539	
Mg Auger	337.5	334.0	0.00	1.5	94,758	
Mg Auger	351.1	347.6	0.00	1.5	69,011	
Mg Auger	372.7	369.2	0.00	1.5	7,128	
Mg Auger	384.4	380.9	0.00	1.5	17,092	
O 1s	532.0	528.5	2.93	1.5	220,650	59.7%
O loss	554.5	551.0	0.00	1.5	93,151	
O KLL-1	978.7	975.2	0.70	1.5	39,621	
Mg 1s	1303.5	1300.0	0.00	1.1	15,261	

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Magnesium (II) Hydroxide (FW = 58.33)

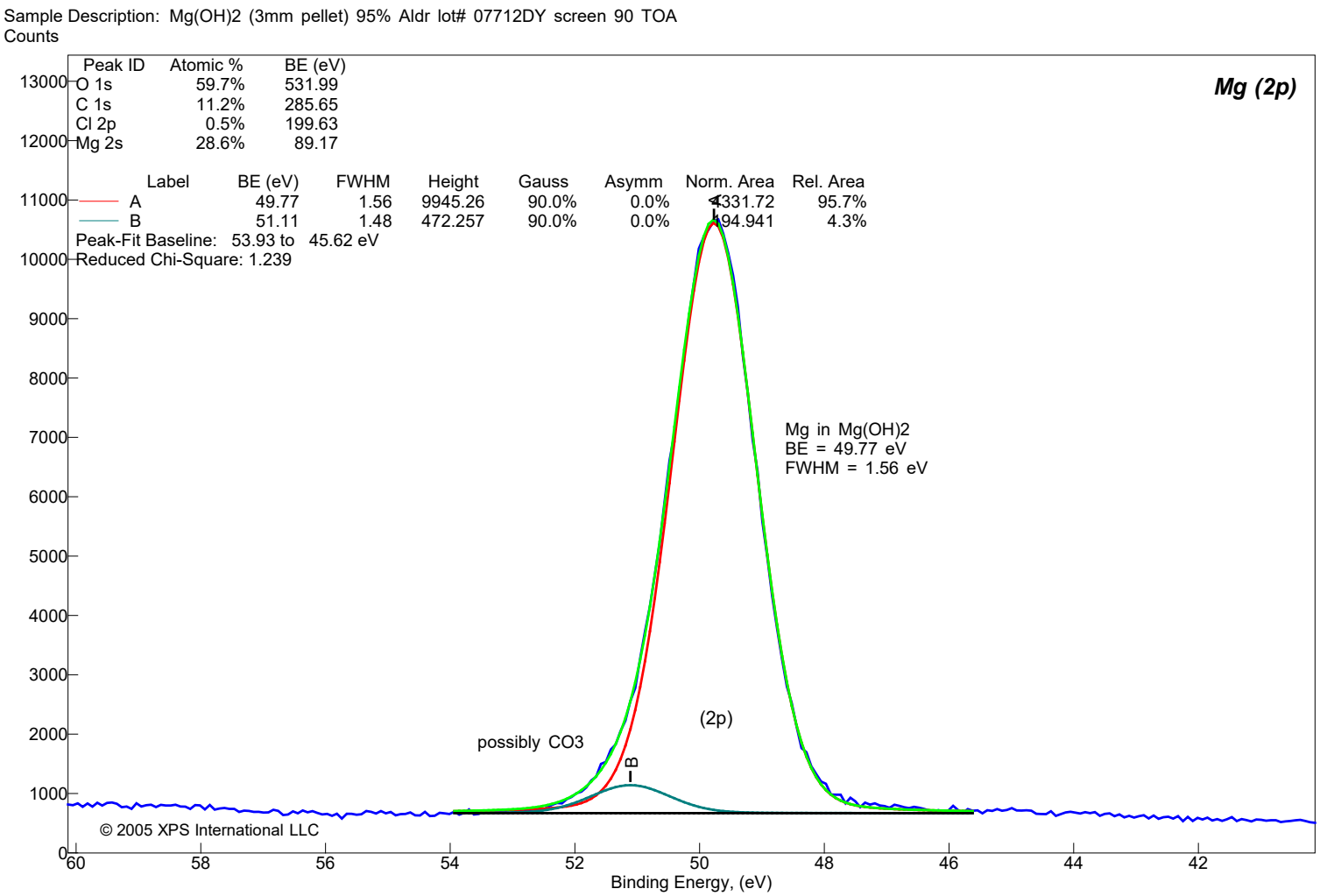
Sample Description: Mg(OH)2 (95%) from Aldrich lot# 07712DY
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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$Mg(OH)_2$

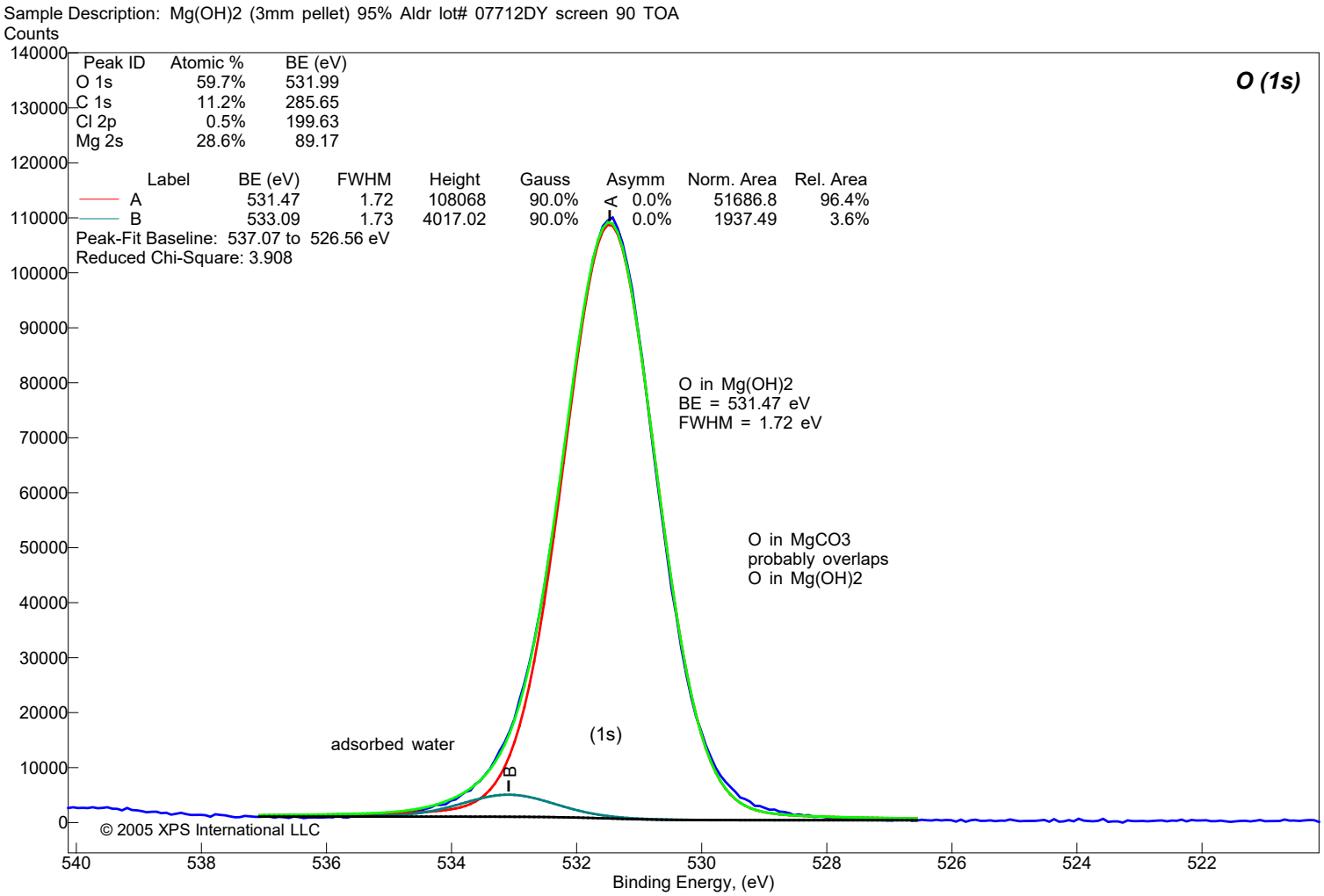
Magnesium (II) Hydroxide (FW = 58.33)



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$Mg(OH)_2$

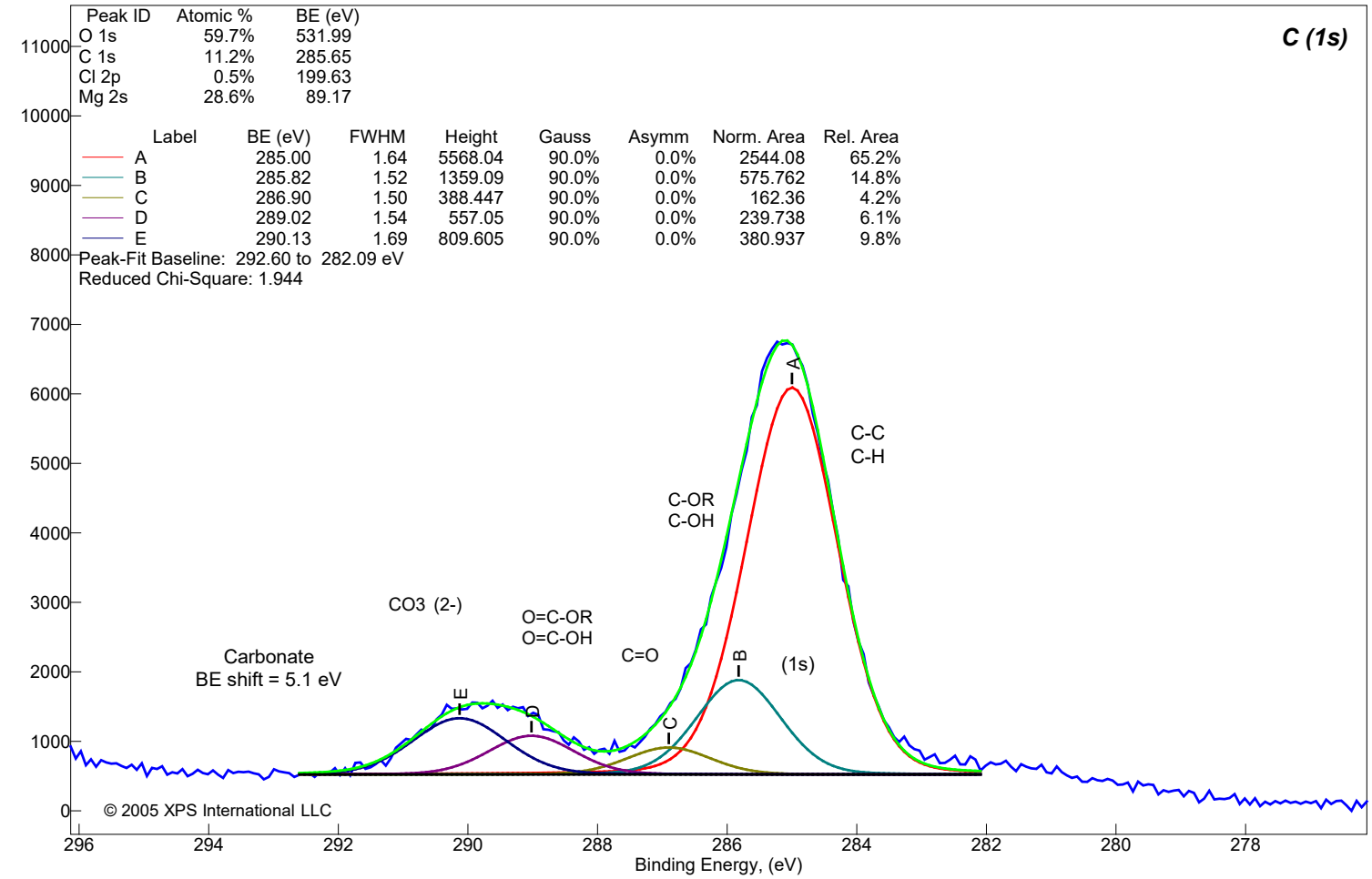
Magnesium (II) Hydroxide (FW = 58.33)



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Magnesium (II) Hydroxide (FW = 58.33)

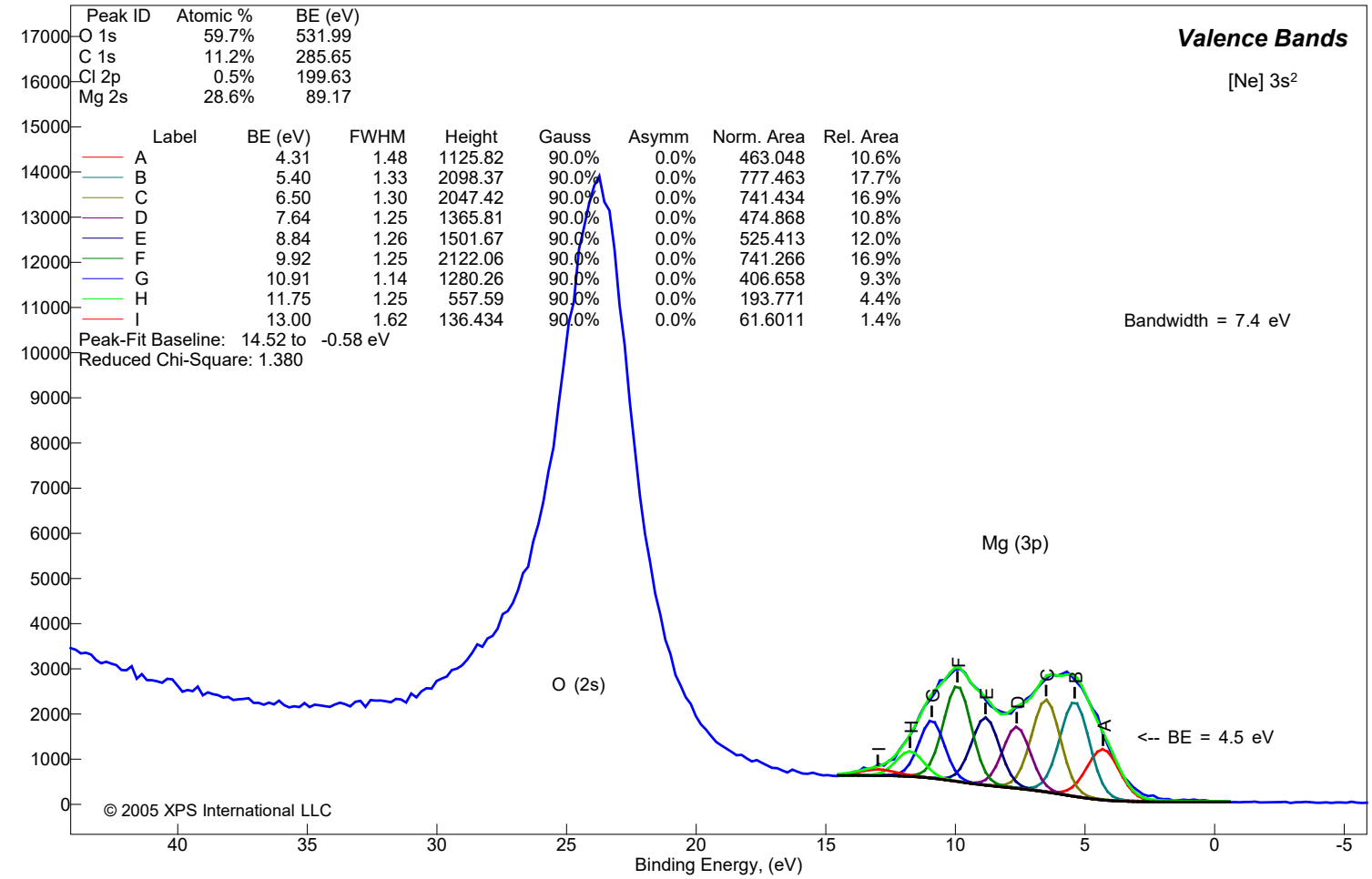
Sample Description: Mg(OH)2 (3mm pellet) 95% Aldr lot# 07712DY screen 90 TOA



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Magnesium (II) Hydroxide (FW = 58.33)

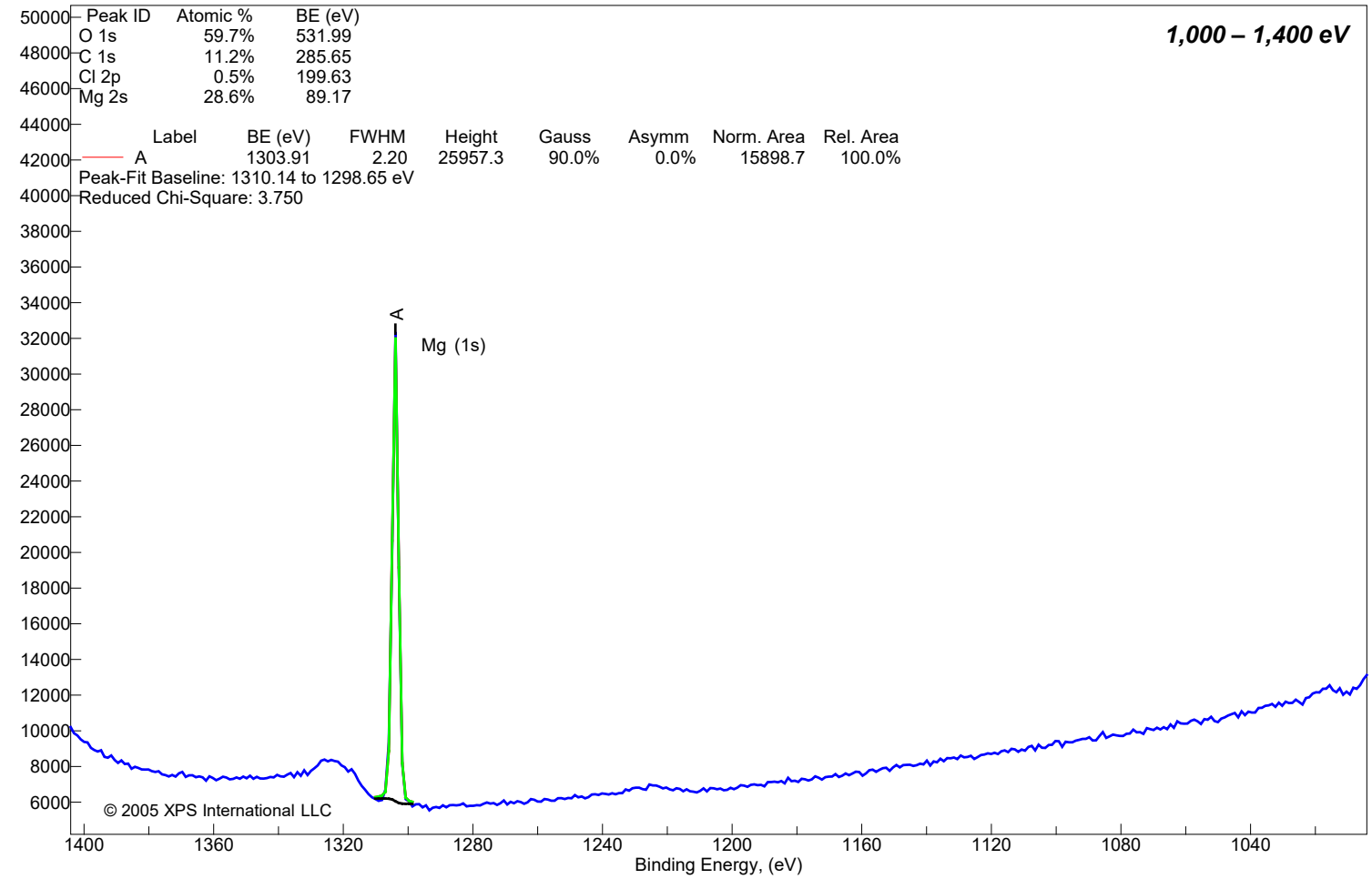
Sample Description: Mg(OH)2 (3mm pellet) 95% Aldr lot# 07712DY screen 90 TOA



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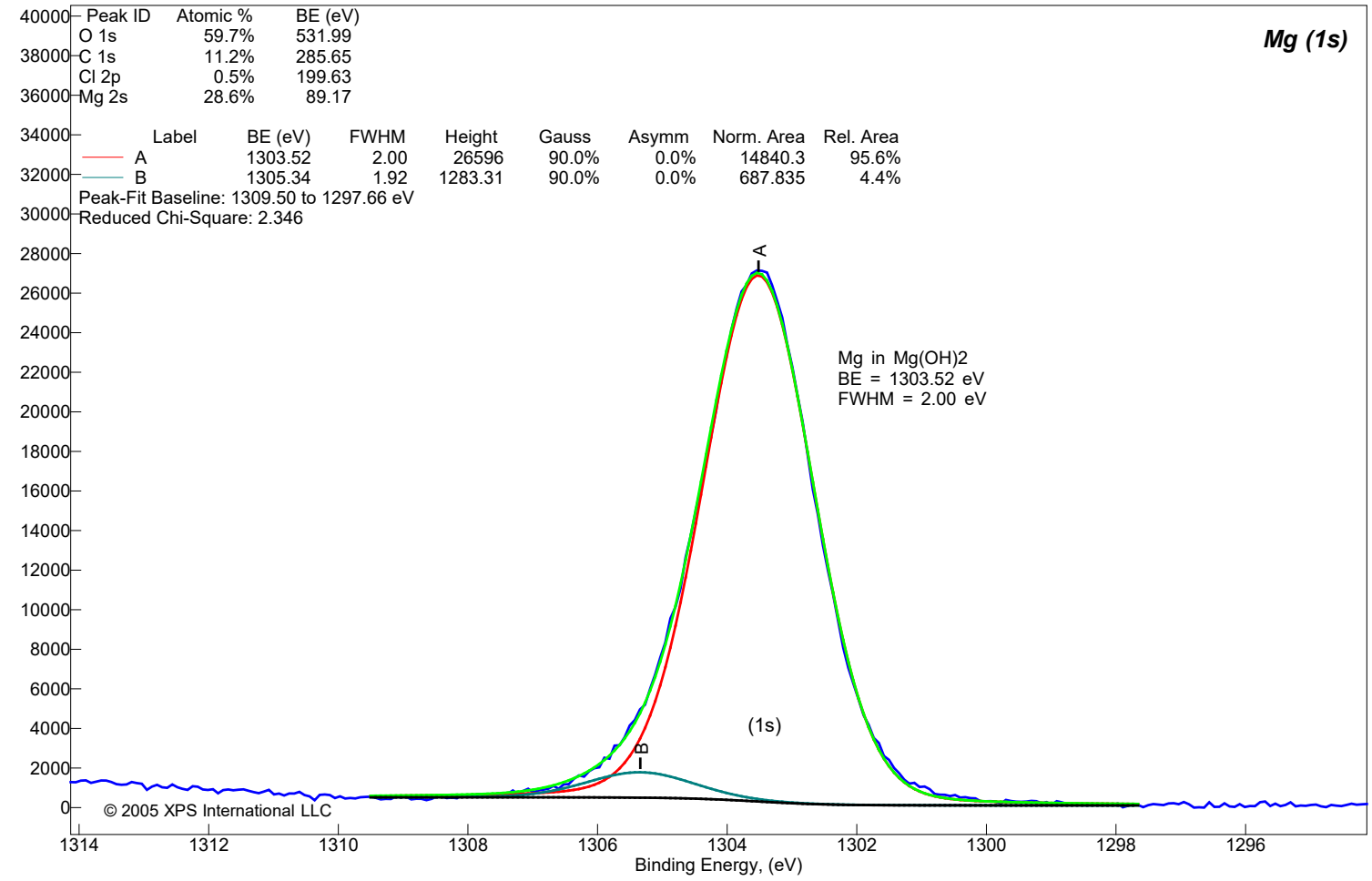
Magnesium (II) Hydroxide (FW = 58.33)

Sample Description: Mg(OH)2 (3mm pellet) 95% Aldr lot# 07712DY screen 90 TOA



Magnesium (II) Hydroxide (FW = 58.33)

Sample Description: Mg(OH)2 (3mm pellet) 95% Aldr lot# 07712DY screen 90 TOA

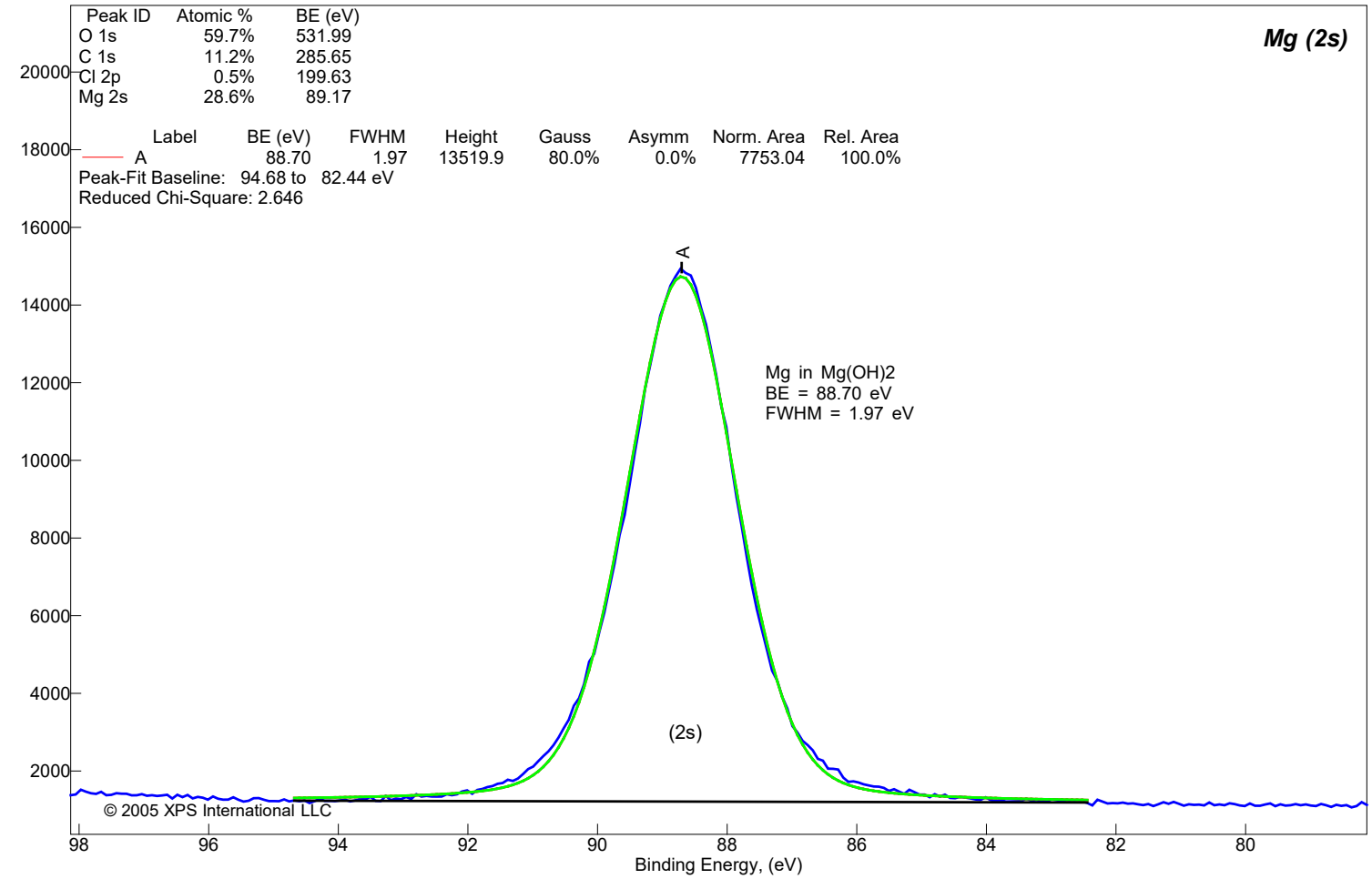


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$Mg(OH)_2$

Magnesium (II) Hydroxide (FW = 58.33)

Sample Description: Mg(OH)2 (3mm pellet) 95% Aldr lot# 07712DY screen 90 TOA

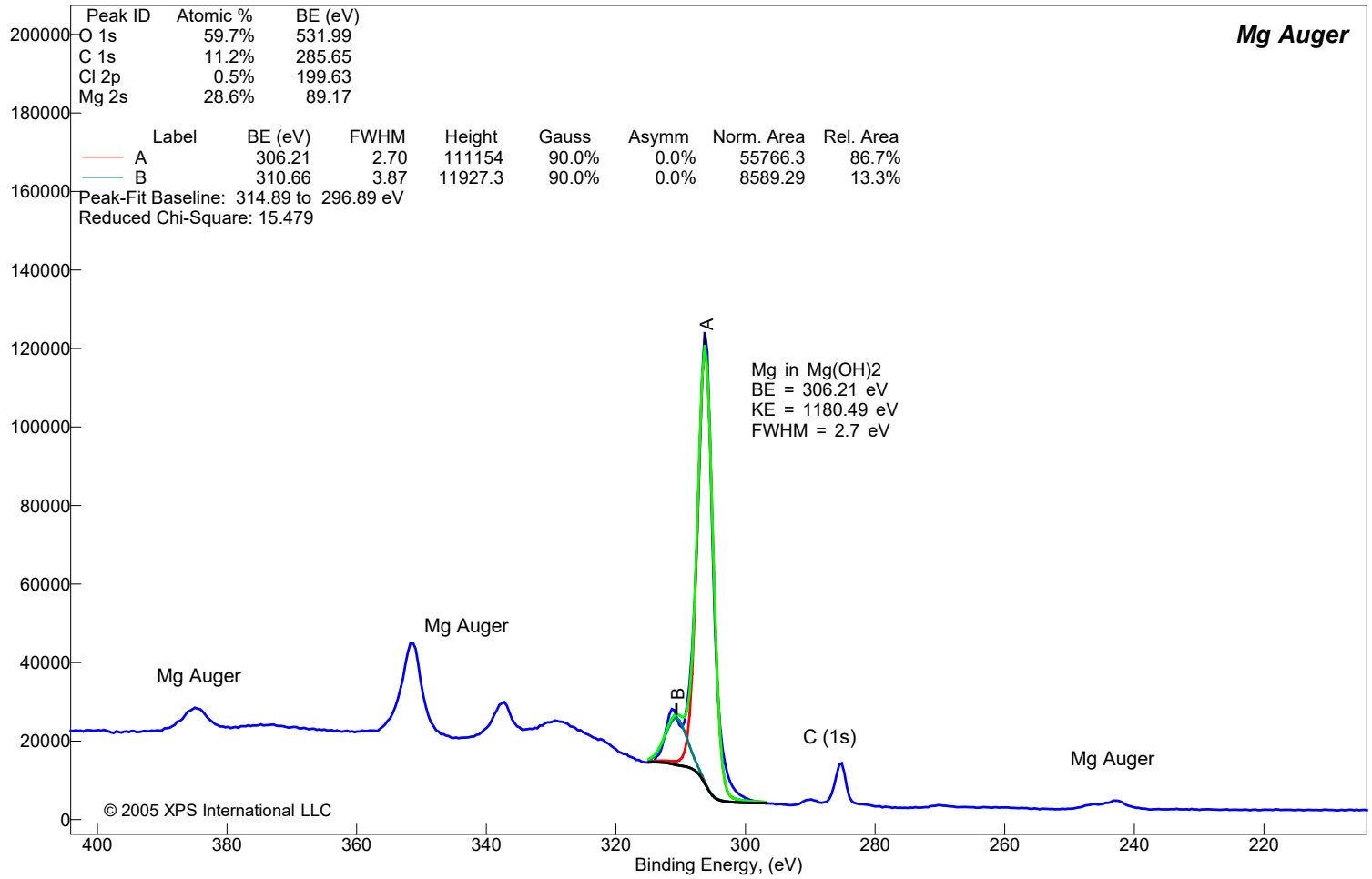


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$Mg(OH)_2$

Magnesium (II) Hydroxide (FW = 58.33)

Sample Description: Mg(OH)2 (3mm pellet) 95% Aldr lot# 07712DY screen 90 TOA



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$MgCO_3$

Magnesium (II) Carbonate (FW = 84.32)
Surface Composition Table

Description: $MgCO_3$ (Tech.) from Perfect Parts Chem. Co., analyzed at 35 deg TOA, no mesh, non-conductive white powder pressed onto double sided tape, mp 350 C dec, d 2.96

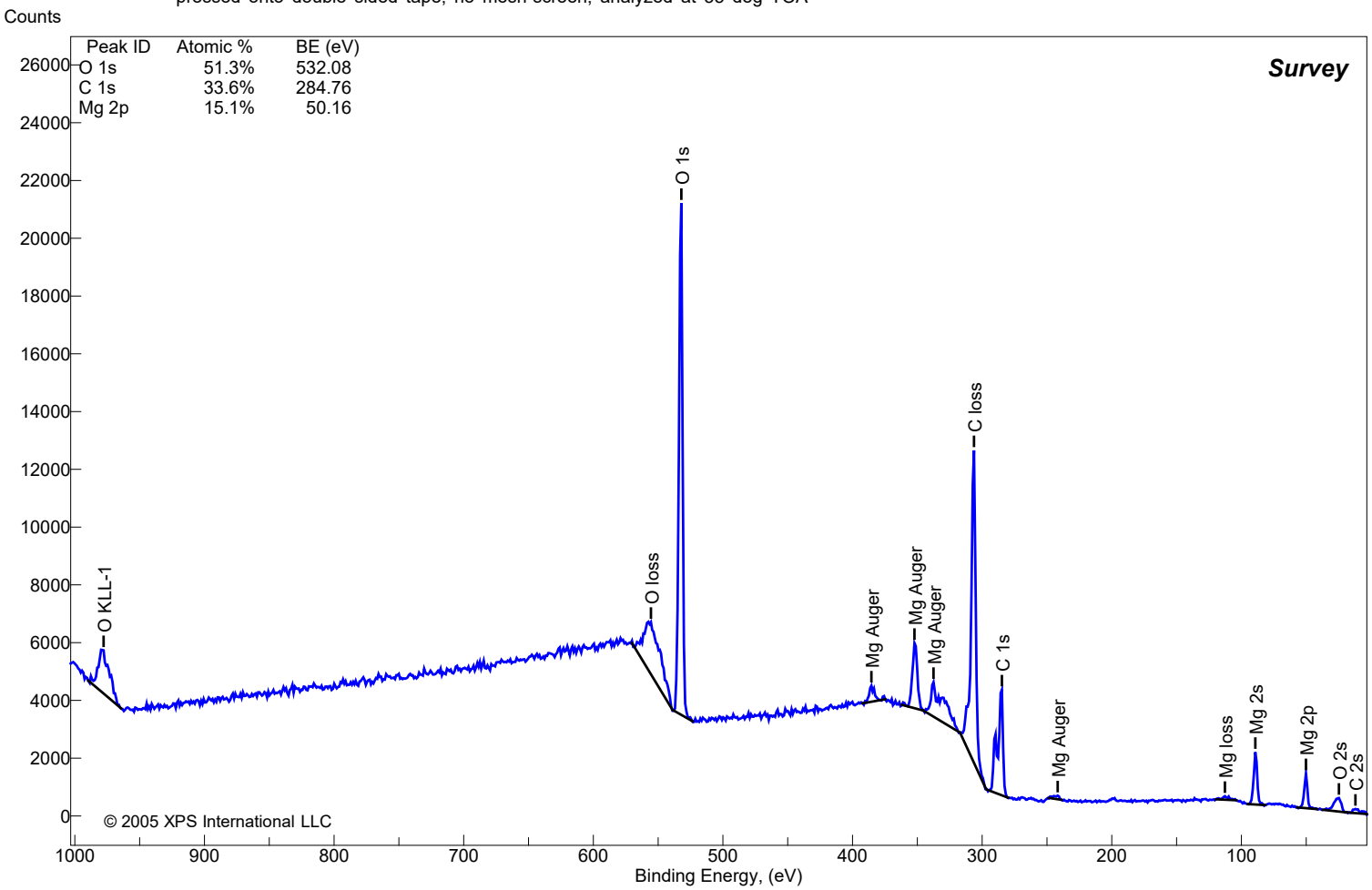
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
C 2s	12.0	8.3	0.15	0.6	1,394	
O 2s	24.7	21.0	0.14	0.6	3,909	
Mg 2p	50.2	46.5	0.33	1.4	4,410	15.1%
Mg 2s	89.3	85.6	0.58	0.6	7,326	
Mg loss	112.7	109.0	0.00	0.6	1,006	
Mg Auger	241.8	238.1	0.00	0.6	930	
C 1s	284.8	281.1	1.00	1.4	22,947	33.6%
C loss	306.3	302.6	0.00	0.6	58,475	
Mg Auger	337.6	333.9	0.00	0.6	17,054	
Mg Auger	352.2	348.5	0.00	0.6	13,090	
Mg Auger	385.4	381.7	0.00	0.6	3,503	
O 1s	532.1	528.4	2.93	1.4	74,204	51.3%
O loss	555.5	551.8	0.00	0.6	33,804	
O KLL-1	977.8	974.1	0.70	0.6	19,082	

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$MgCO_3$

Magnesium (II) Carbonate (FW = 84.32)

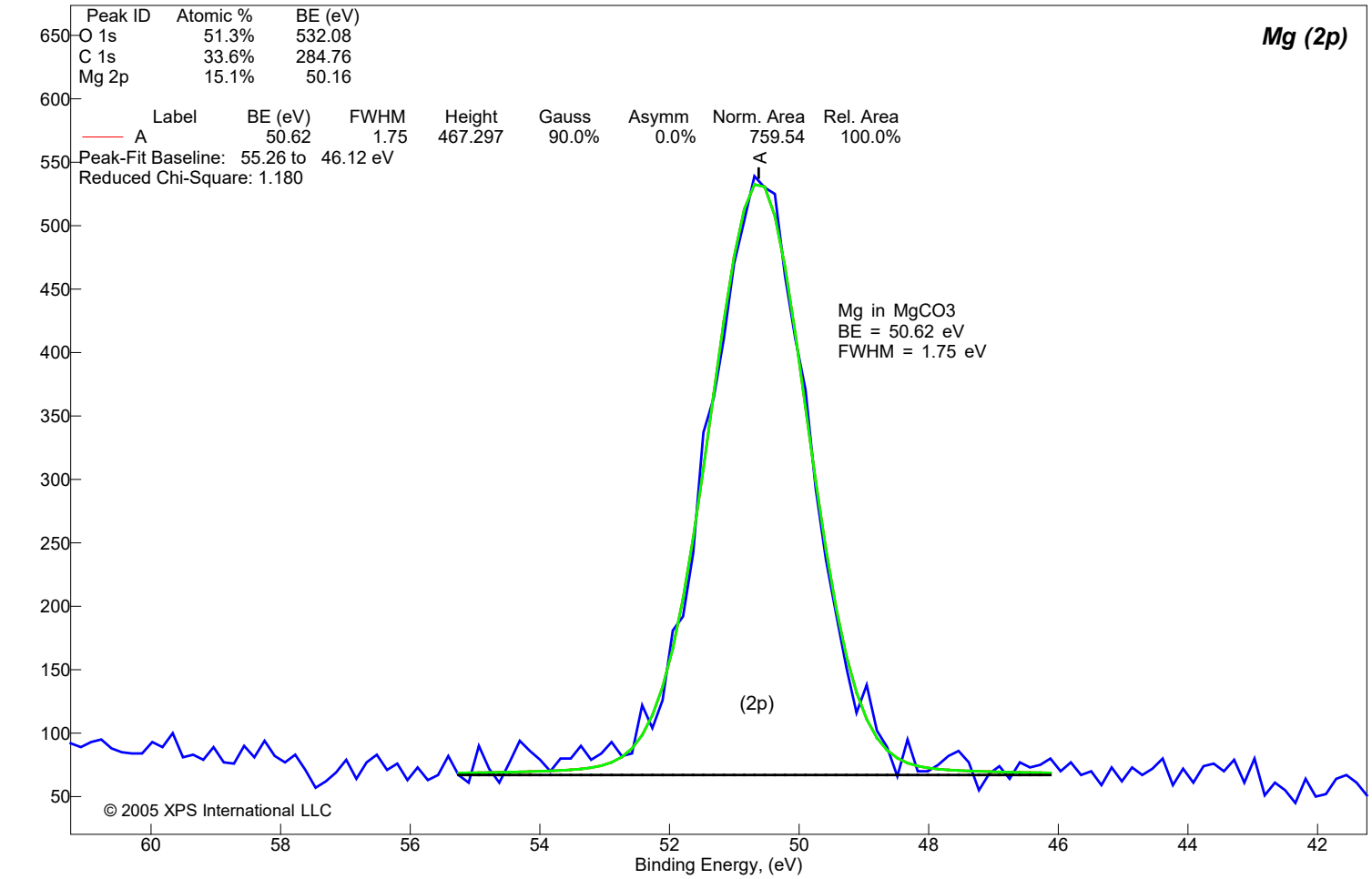
Sample Description: MgCO3 (TEch Grade) from Perfect Parts Co.
pressed onto double sided tape, no mesh-screen, analyzed at 35 deg TOA



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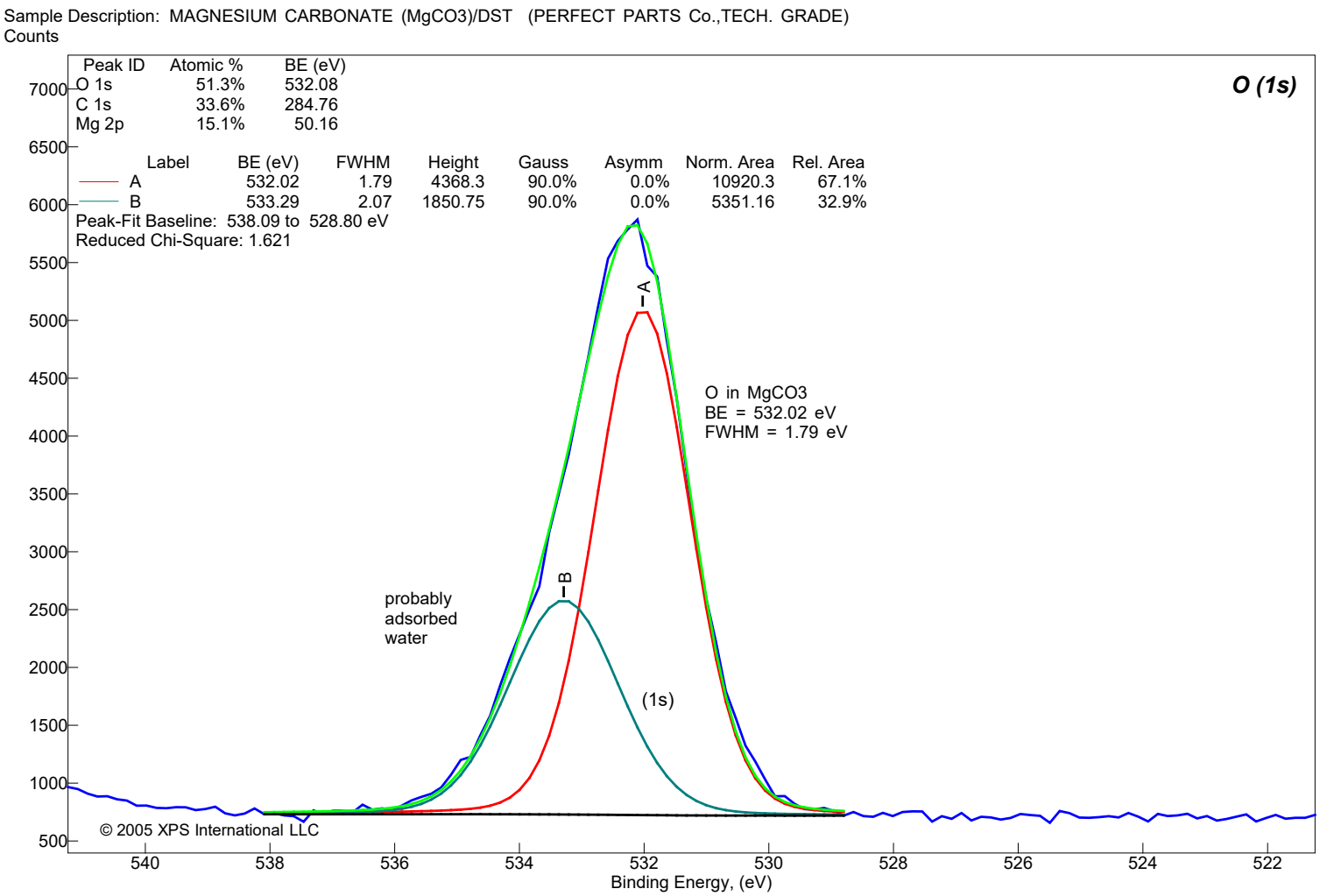
Magnesium (II) Carbonate (FW = 84.32)

Sample Description: MAGNESIUM CARBONATE (MgCO3)/DST (PERFECT PARTS Co.,TECH. GRADE)



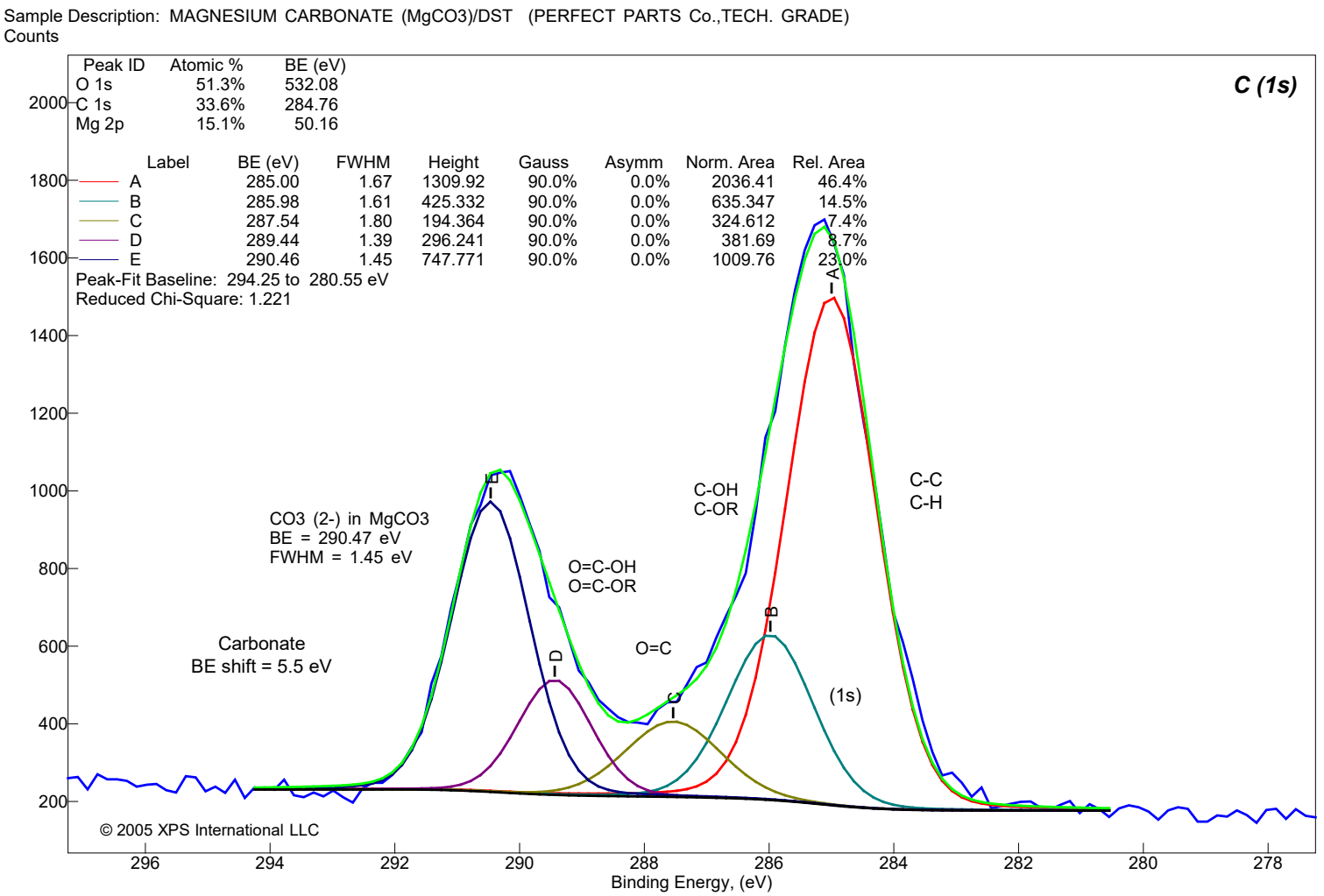
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Magnesium (II) Carbonate (FW = 84.32)



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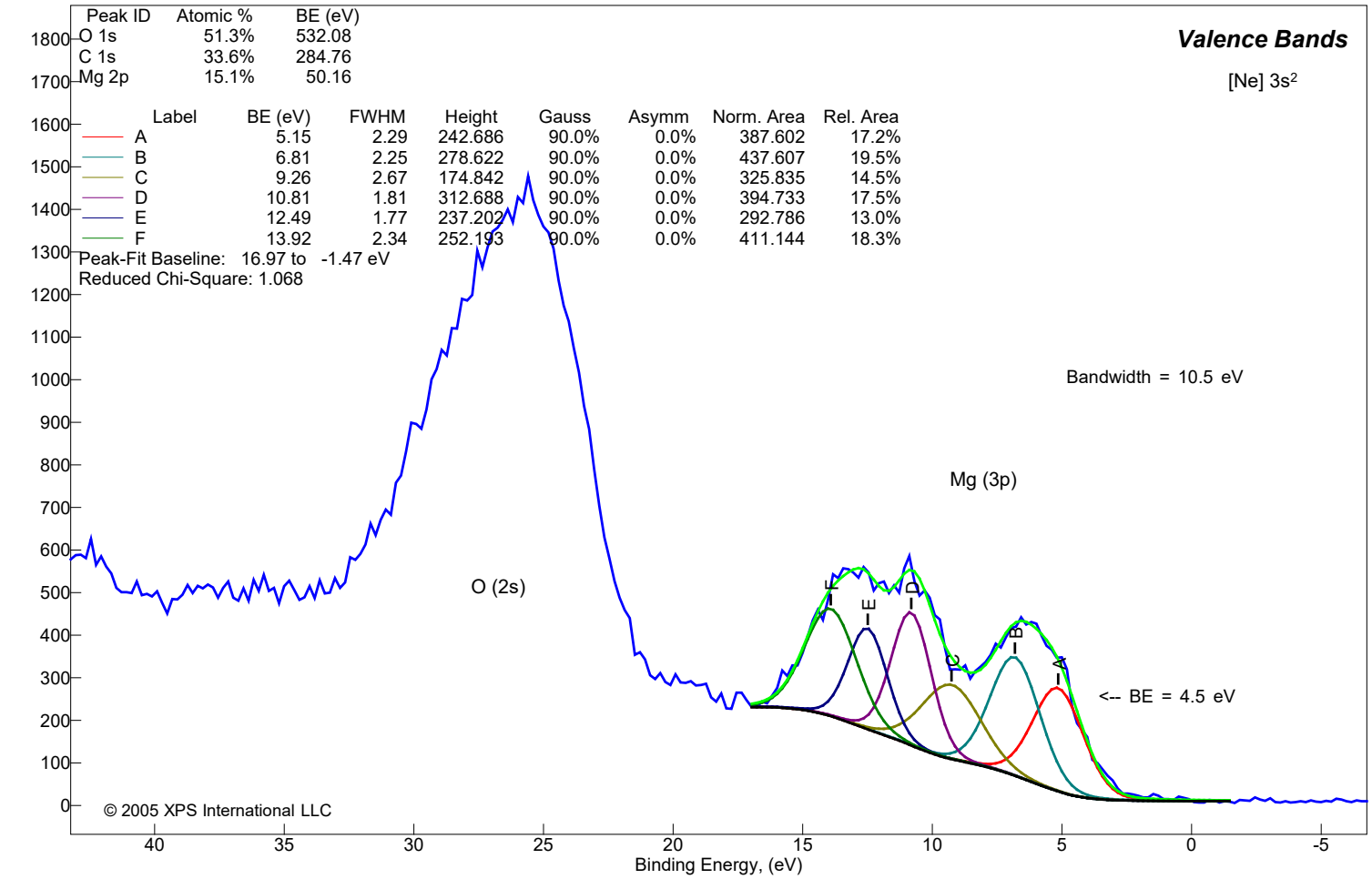
Magnesium (II) Carbonate (FW = 84.32)



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Magnesium (II) Carbonate (FW = 84.32)

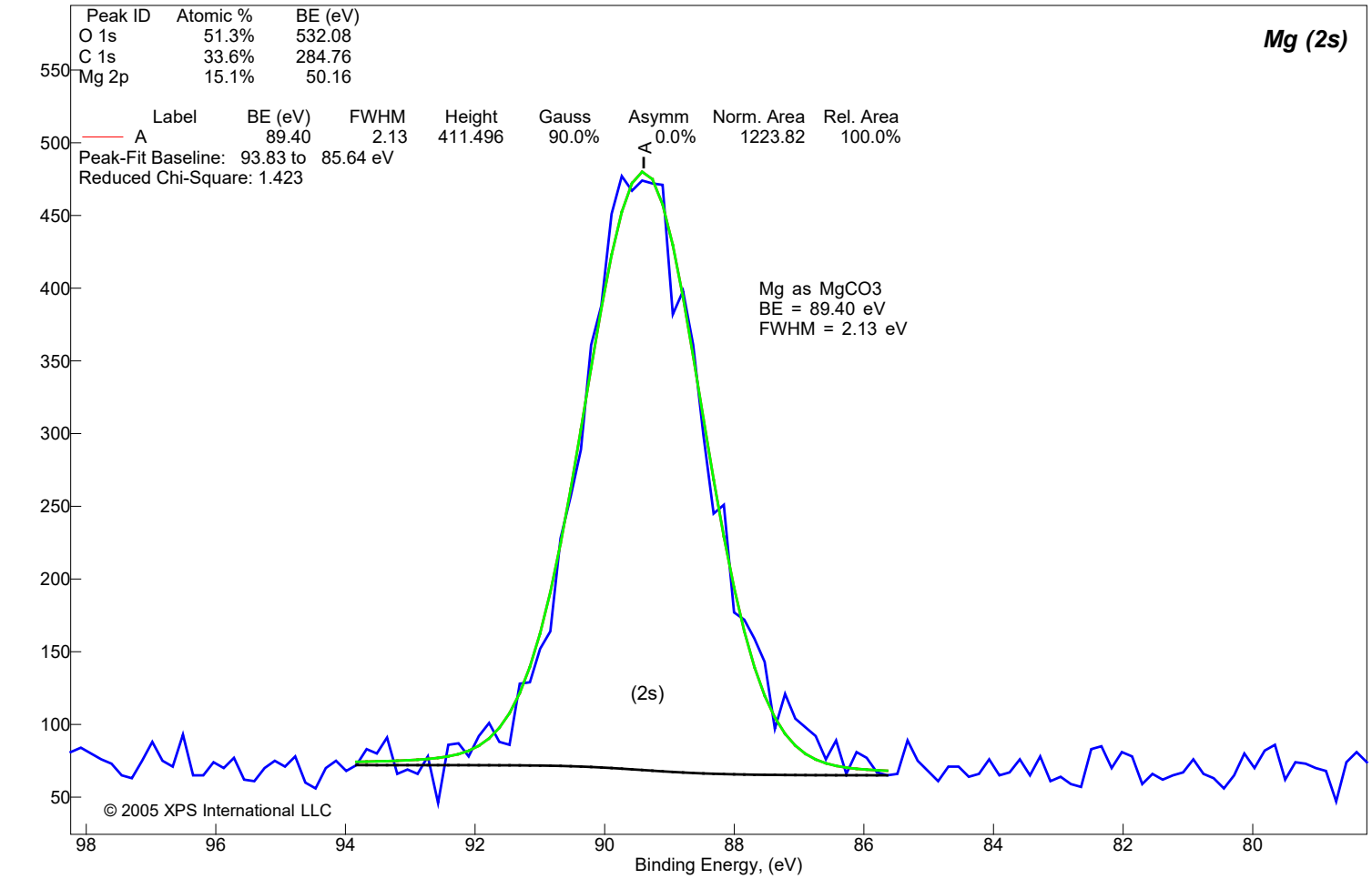
Sample Description: MAGNESIUM CARBONATE (MgCO3)/DST (PERFECT PARTS Co.,TECH. GRADE)



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Magnesium (II) Carbonate (FW = 84.32)

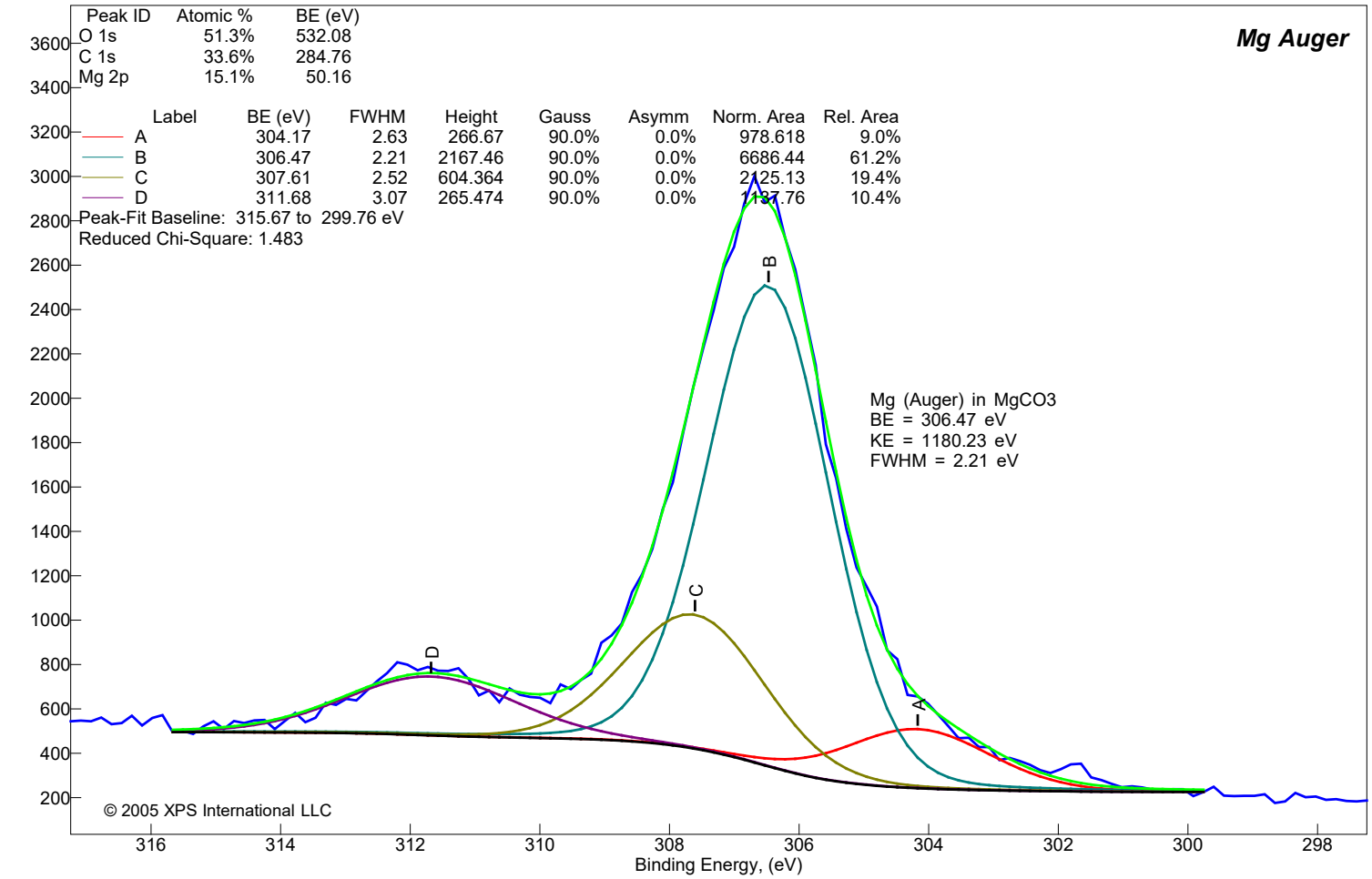
Sample Description: MAGNESIUM CARBONATE (MgCO3)/DST (PERFECT PARTS Co.,TECH. GRADE)



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Magnesium (II) Carbonate (FW = 84.32)

Sample Description: MAGNESIUM CARBONATE (MgCO3)/DST (PERFECT PARTS Co.,TECH. GRADE)



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$MnCO_3$
Rhodochrosite

Manganese (II) Carbonate (FW = 114.95)
Surface Composition Table

Description: $MnCO_3$ (99%) from Argentina Rhodochrosite (natural crystal), analyzed at 90 deg TOA, mesh at 1mm, non-conductive pink crystal cleaved in air just before analysis, mp 350 C dec., d 3.125, sol in dil acid

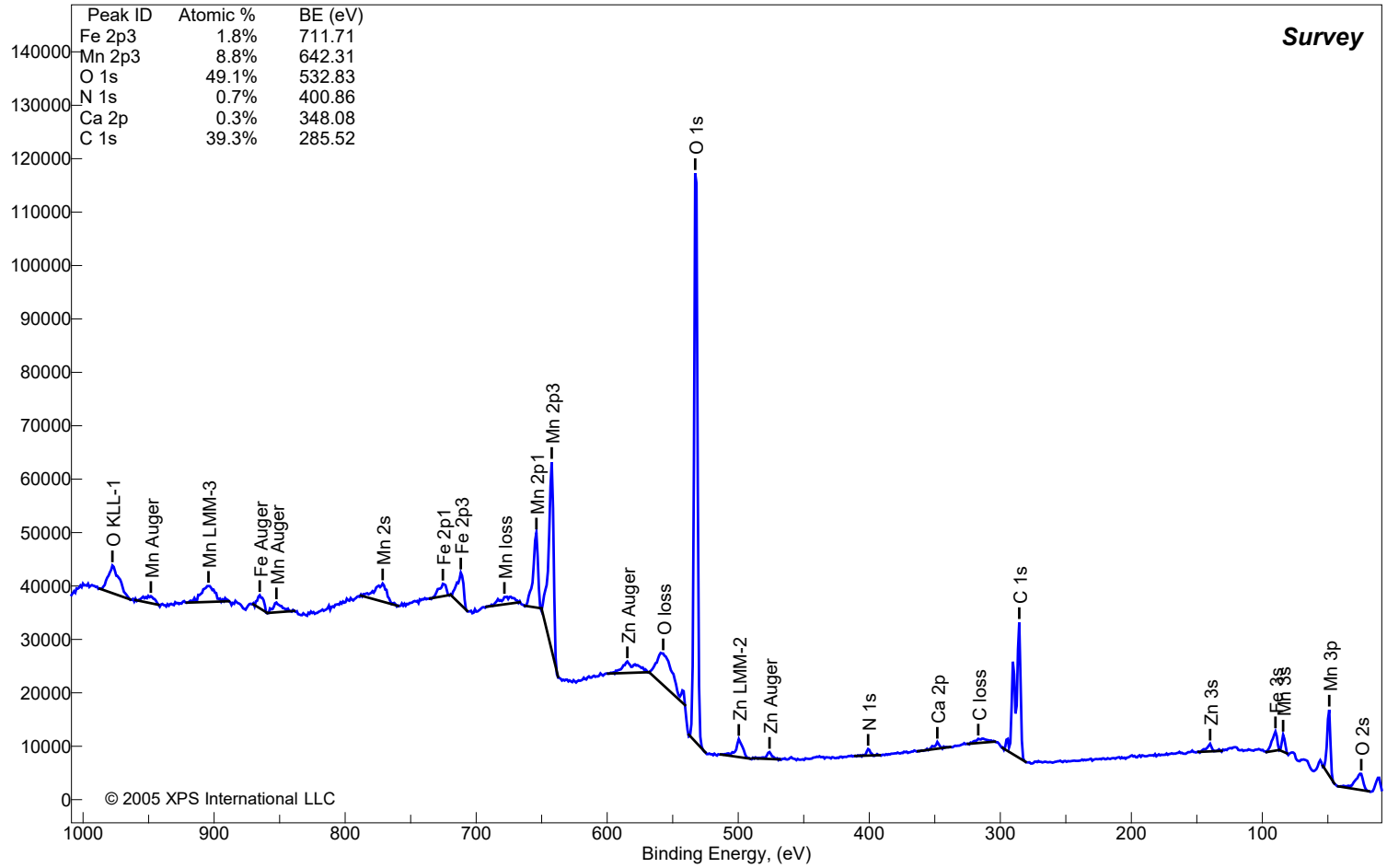
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	24.5	20.7	0.14	1.4	5,561	
Mn 3p	49.0	45.2	1.42	1.4	9,204	
Mn 3s	84.1	80.3	0.67	1.4	2,177	
Fe 3s	90.0	86.2	0.75	1.4	4,045	
Zn 3s	139.9	136.1	1.04	1.4	1,872	
C 1s	285.5	281.7	1.00	1.4	31,654	39.3%
C loss	316.8	313.0	0.00	1.4	1,932	
Ca 2p	348.1	344.3	5.07	1.4	1,188	0.3%
N 1s	400.9	397.1	1.80	1.4	938	0.7%
Zn Auger	476.1	472.3	0.00	1.4	1,132	
Zn LMM-2	499.6	495.8	0.29	1.4	5,246	
O 1s	532.8	529.0	2.93	1.4	83,885	49.1%
O loss	557.3	553.5	0.00	1.4	22,567	
Zn Auger	584.6	580.8	0.00	1.4	7,285	
Mn 2p3	642.3	638.5	9.17	1.4	39,612	8.8%
Mn 2p1	654.0	650.2	4.74	1.4	15,882	
Mn loss	678.5	674.7	0.00	1.4	3,462	
Fe 2p3	711.7	707.9	10.82	1.4	8,414	1.8%
Fe 2p1	725.4	721.6	5.60	1.4	3,406	
Mn 2s	771.3	767.5	4.23	1.4	8,035	
Mn Auger	852.5	848.7	0.00	1.4	3,701	
Fe Auger	865.2	861.4	0.00	1.4	3,109	
Mn LMM-3	904.3	900.5	0.48	1.4	9,738	
Mn Auger	948.3	944.5	0.00	1.4	2,423	
O KLL-1	977.6	973.8	0.70	1.4	12,933	

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$MnCO_3$
Rhodochrosite

Manganese (II) Carbonate (FW = 114.95)

Sample Description: MnCO3 (natural crystal of Rhodochrosite from Argentina)
analyzed freshly exposed bulk at 90 deg TOA, mesh-screen at 1 mm

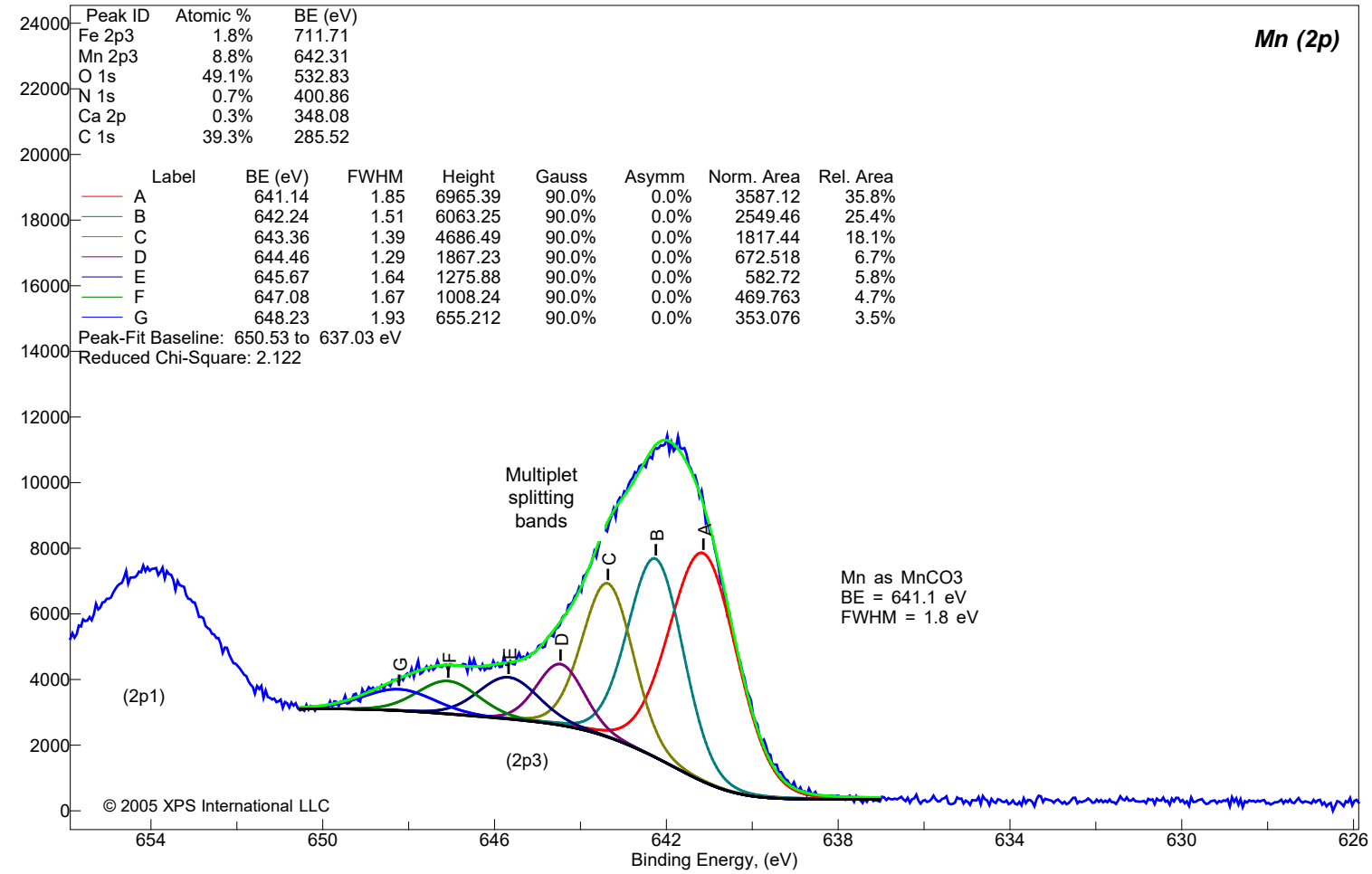


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$MnCO_3$
Rhodochrosite

Manganese (II) Carbonate (FW = 114.95)

Sample Description: MnCO3 xtl (Rhodochrosite, Argentina) fresh bulk 90

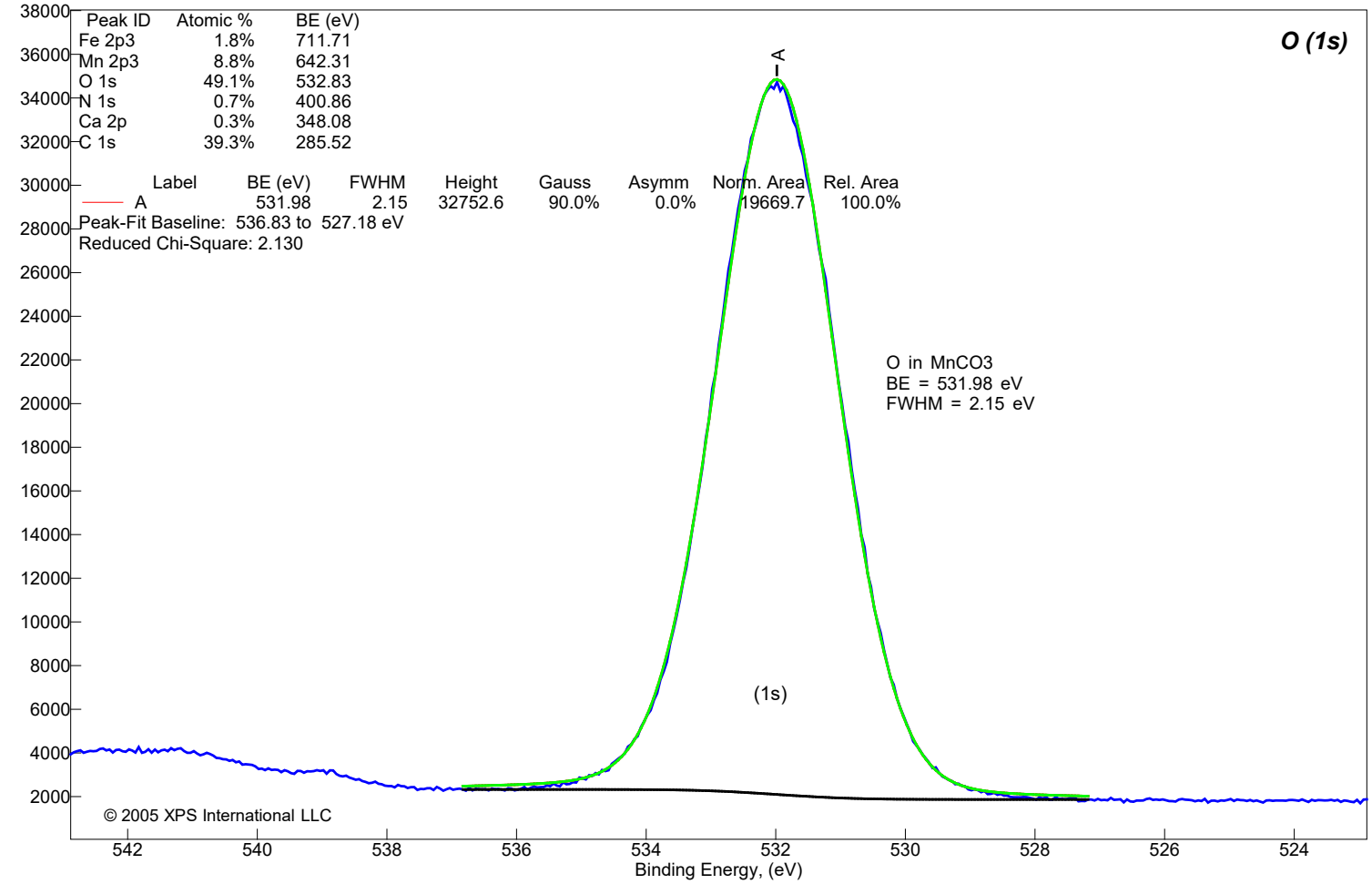


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$MnCO_3$
Rhodochrosite

Manganese (II) Carbonate (FW = 114.95)

Sample Description: MnCO3 xtl (Rhodochrosite, Argentina) fresh bulk 90

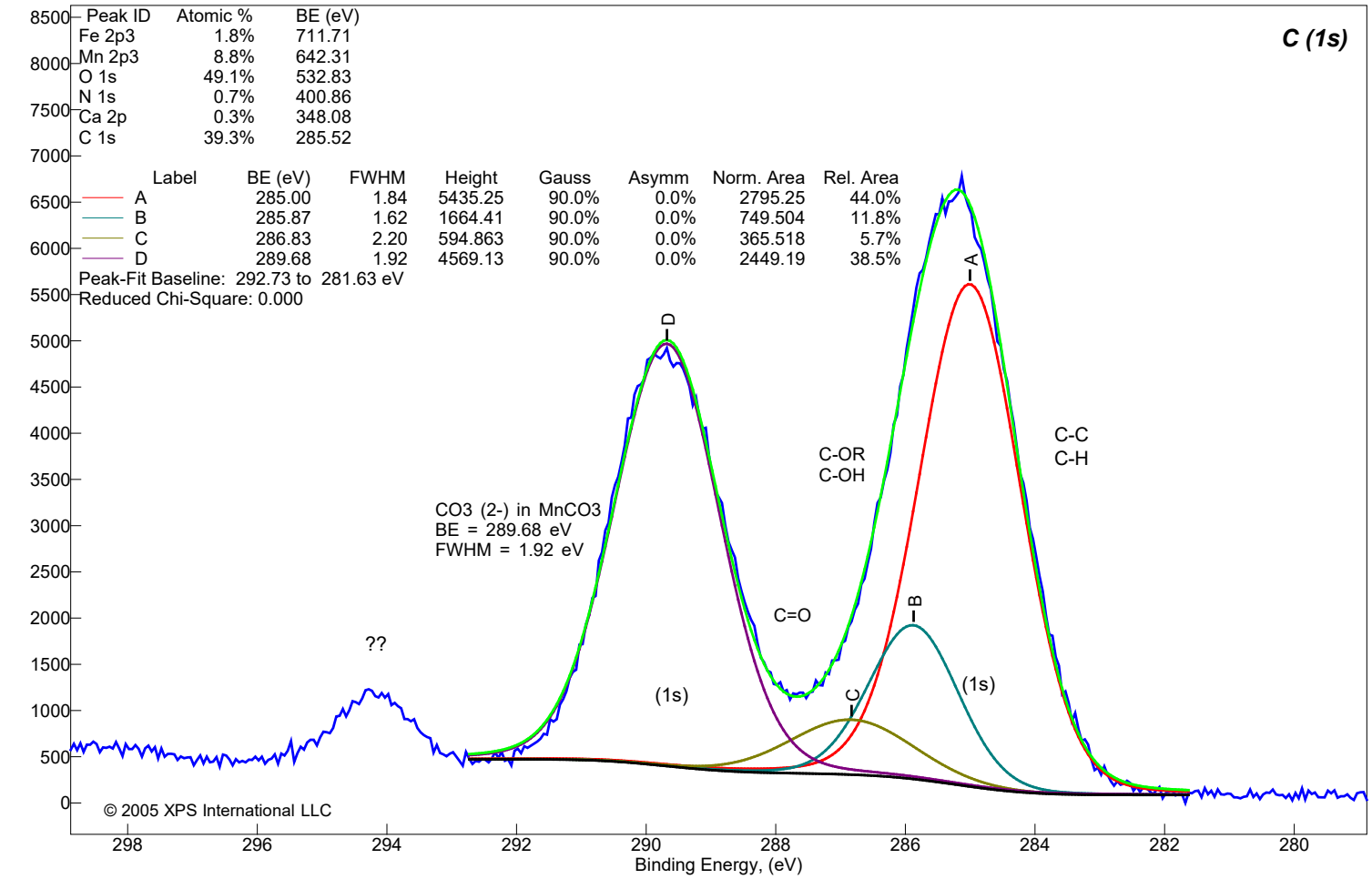


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$MnCO_3$
Rhodochrosite

Manganese (II) Carbonate (FW = 114.95)

Sample Description: MnCO3 xtl (Rhodochrosite, Argentina) fresh bulk 90

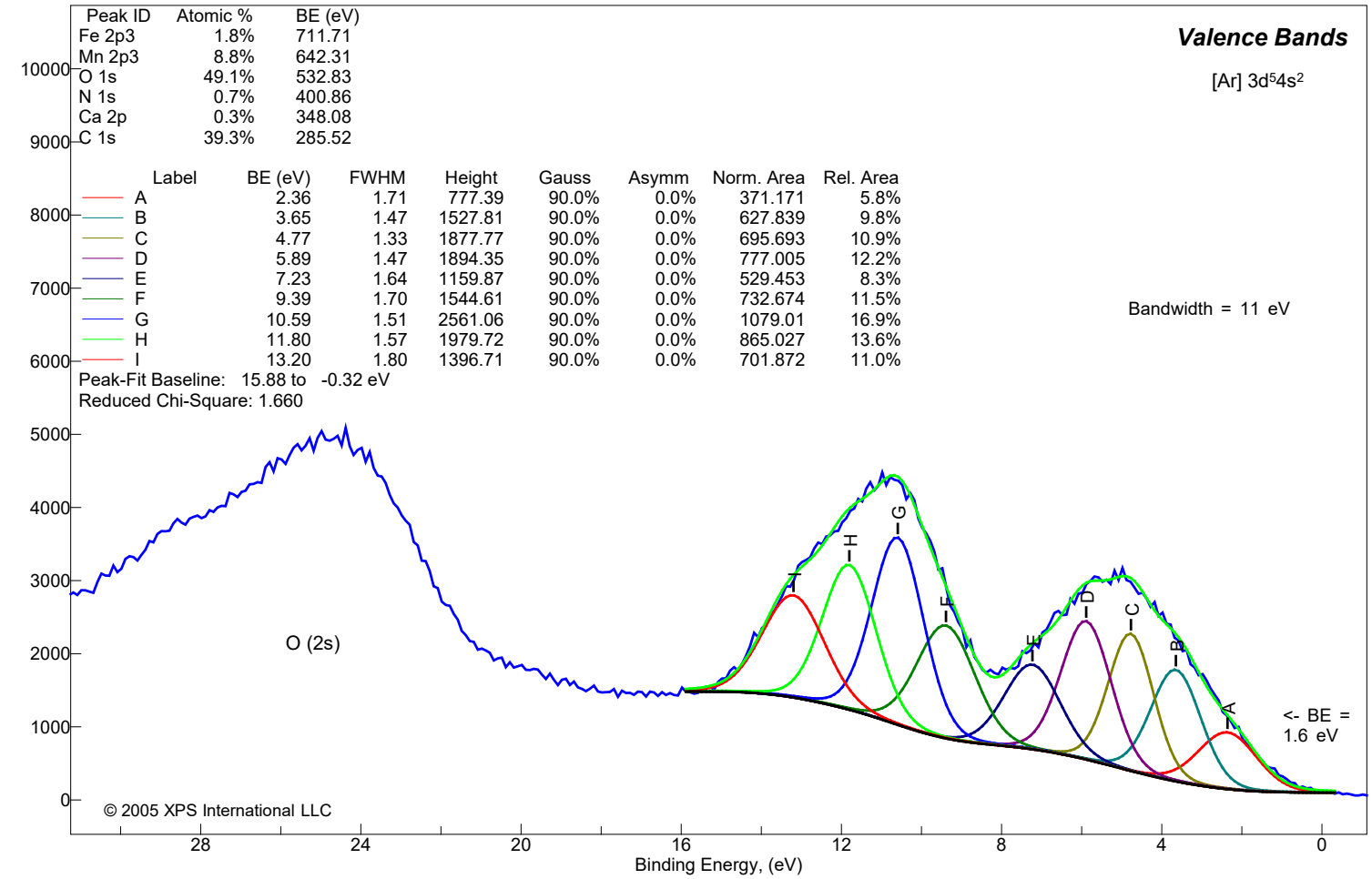


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$MnCO_3$
Rhodochrosite

Manganese (II) Carbonate (FW = 114.95)

Sample Description: MnCO3 xtl (Rhodochrosite, Argentina) fresh bulk 90

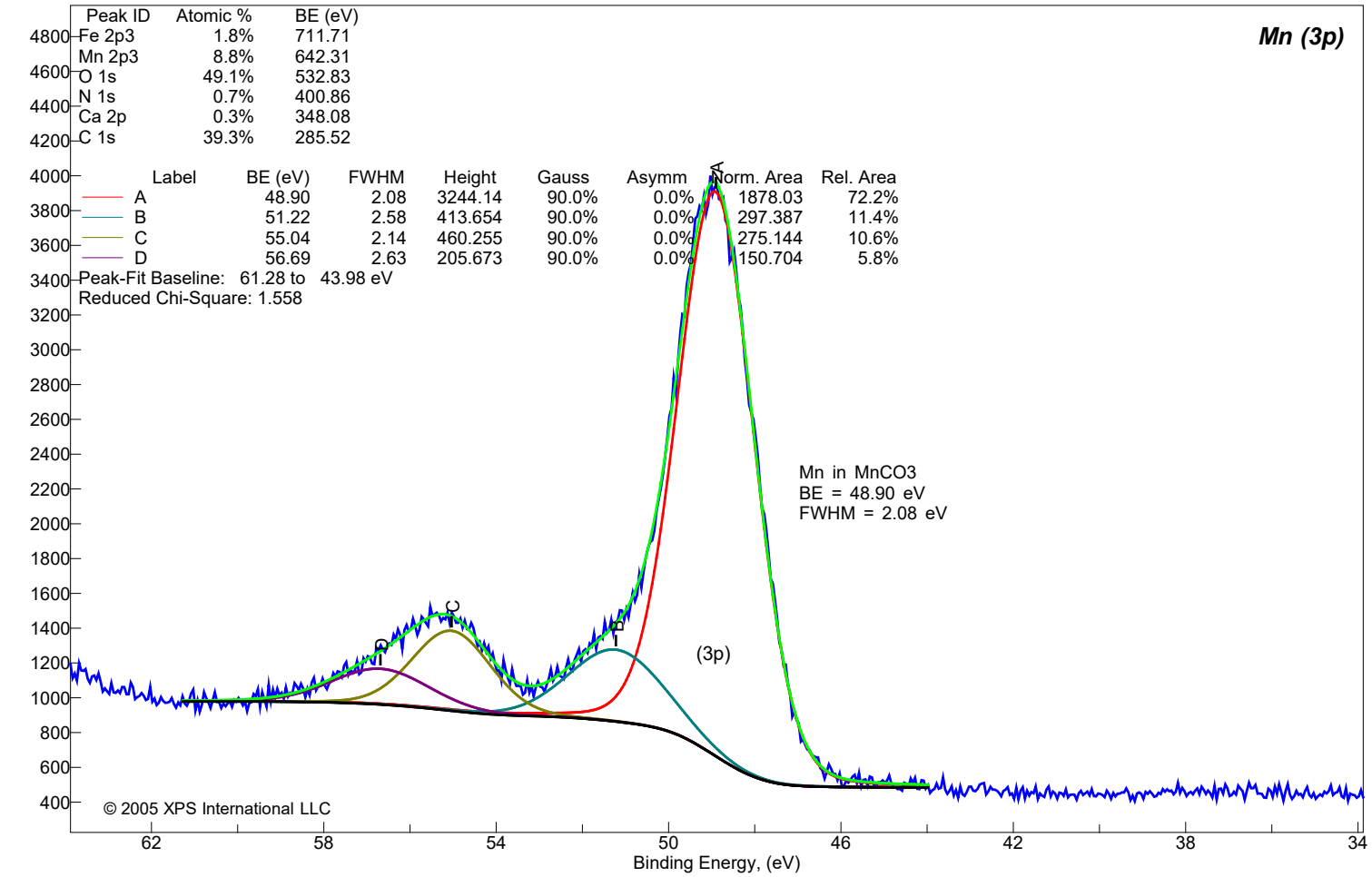


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$MnCO_3$
Rhodochrosite

Manganese (II) Carbonate (FW = 114.95)

Sample Description: MnCO3 xtl (Rhodochrosite, Argentina) fresh bulk 90



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MnO

Manganese (II) Oxide (FW = 70.94)
Surface Composition Table

Description: MnO (99.9%) from Rare Metallics Co. Lot# 10924-30, analyzed at 90 deg TOA, mesh at 1 mm, semi-conductive gray-green powder pressed into 3 mm pellet, d 5.43, sol in acid

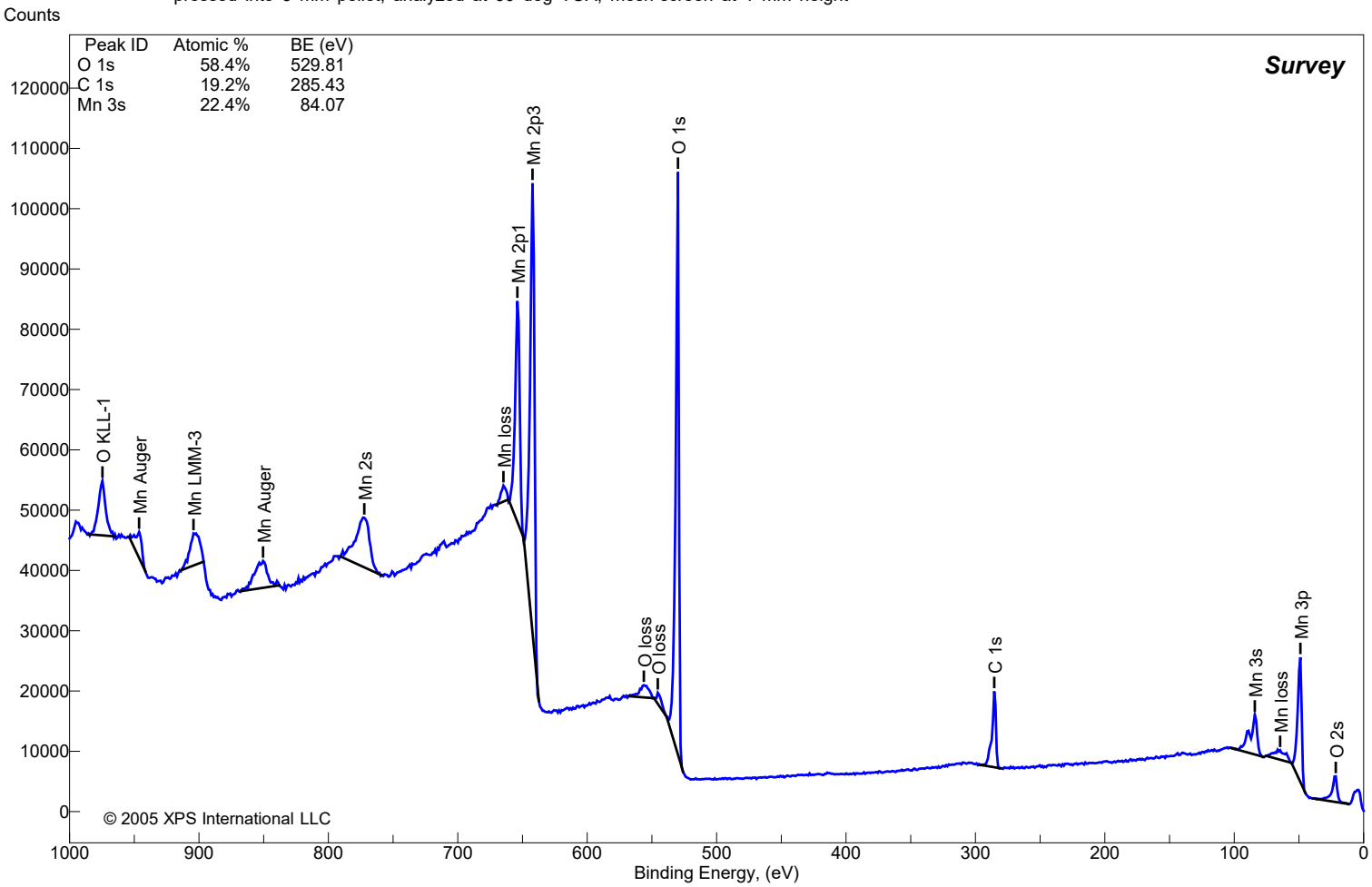
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	21.5	21.5	0.14	1.5	10,988	
Mn 3p	48.9	48.9	1.42	1.5	38,125	
Mn loss	64.5	64.5	0.00	1.5	8,408	
Mn 3s	84.1	84.1	0.67	1.5	22,179	22.4%
C 1s	285.4	285.4	1.00	1.5	22,369	19.2%
O 1s	529.8	529.8	2.93	1.5	141,394	58.4%
O loss	545.5	545.5	0.00	1.5	4,216	
O loss	556.2	556.2	0.00	1.5	8,720	
Mn 2p3	642.2	642.2	9.17	1.5	152,160	
Mn 2p1	654.0	654.0	4.74	1.5	78,987	
Mn loss	664.7	664.7	0.00	1.5	6,893	
Mn 2s	772.2	772.2	4.23	1.5	51,772	
Mn Auger	850.4	850.4	0.00	1.5	28,474	
Mn LMM-3	904.2	904.2	0.48	1.5	24,803	
Mn Auger	946.2	946.2	0.00	1.5	13,432	
O KLL-1	974.6	974.6	0.70	1.5	27,783	

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MnO

Manganese (II) Oxide (FW = 70.94)

Sample Description: MnO (99.9%) from Rare Metallics Corp. lot# 10924-30, semi-conductive
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height

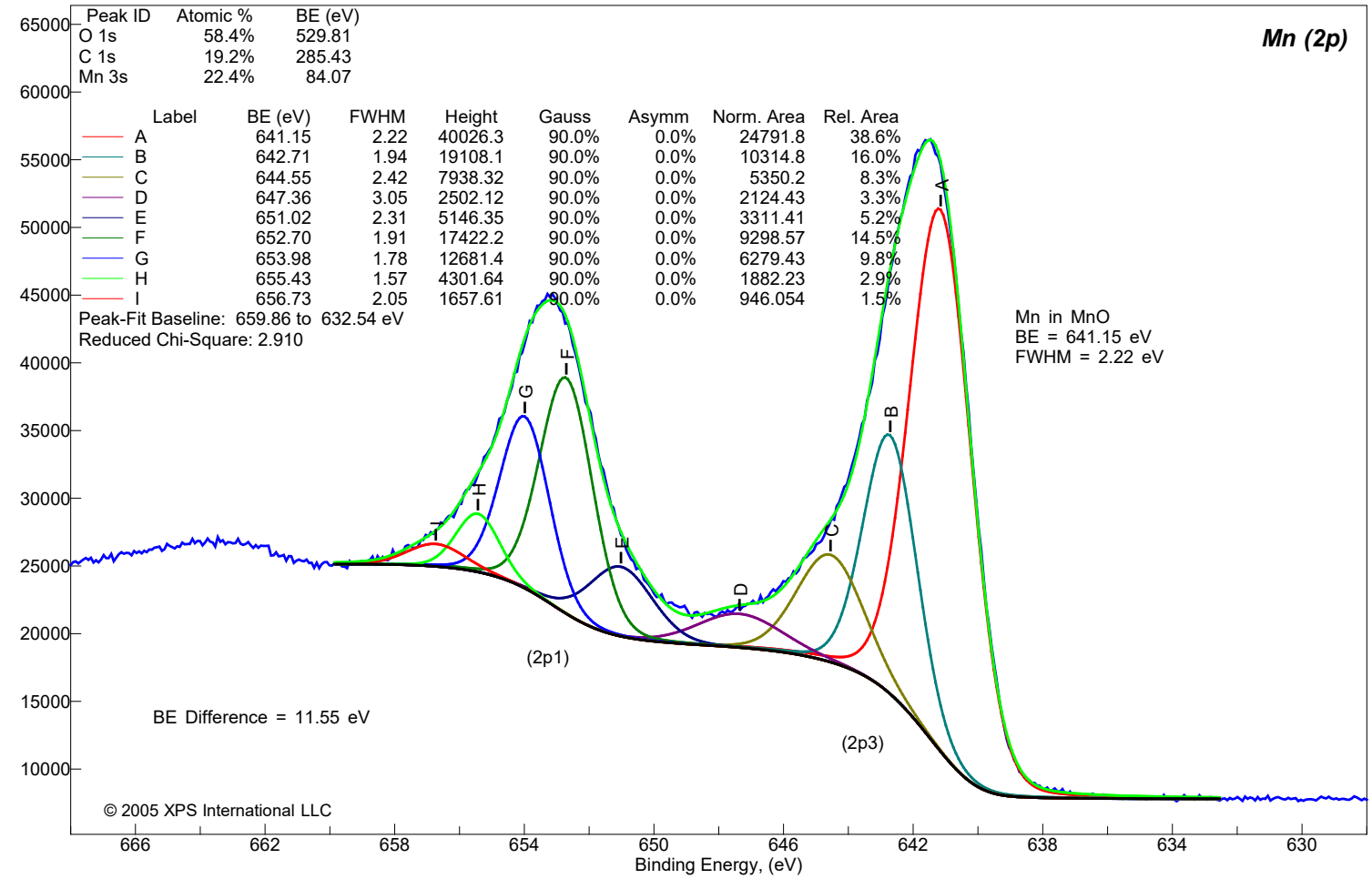


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MnO

Manganese (II) Oxide (FW = 70.94)

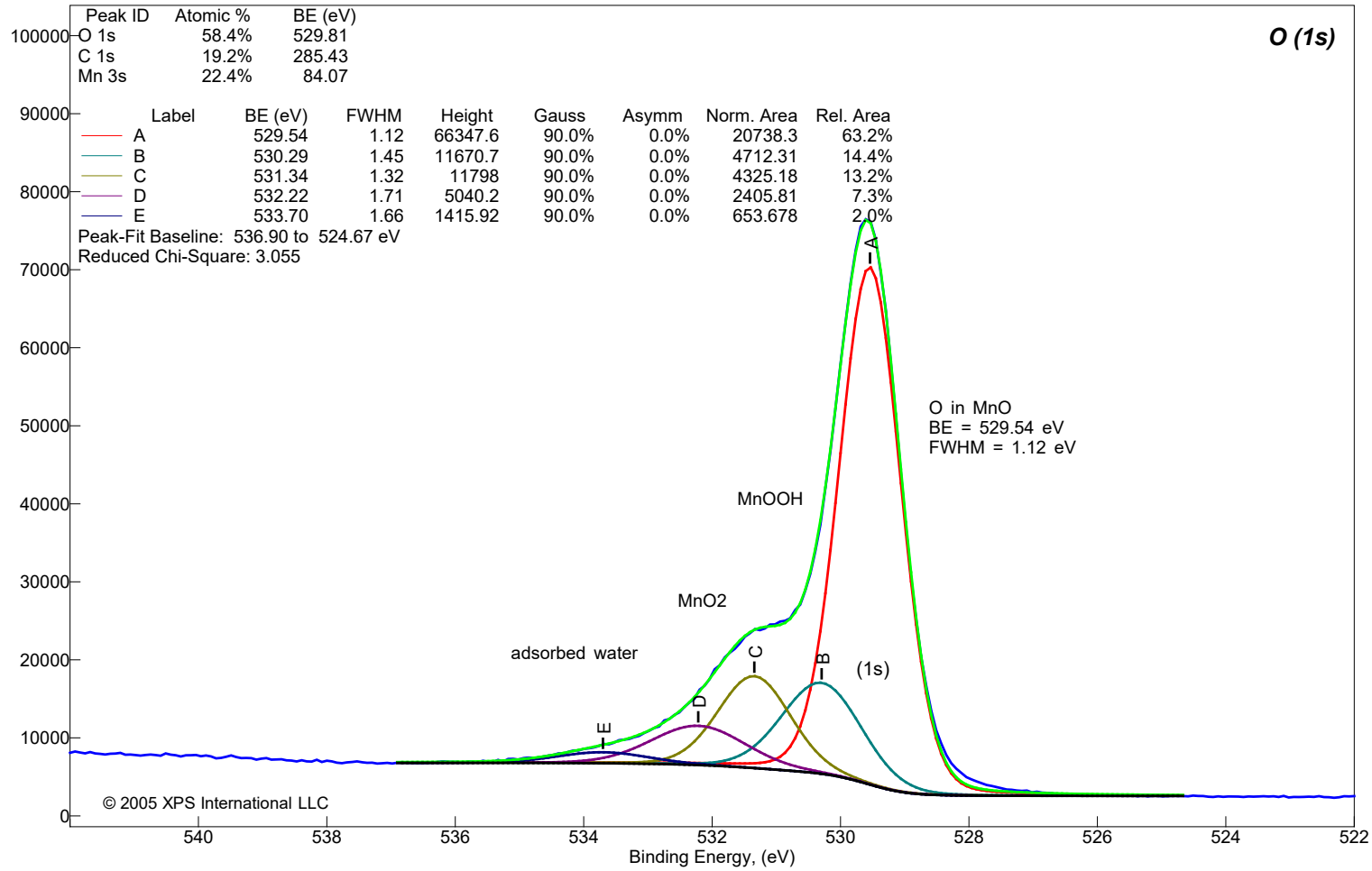
Sample Description: MnO (99.9%) RMC lot# 10924-30, 3mm pellet, SemiConductive, 90 TOA



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Manganese (II) Oxide (FW = 70.94)

Sample Description: MnO (99.9%) RMC lot# 10924-30, 3mm pellet, SemiConductive, 90 TOA

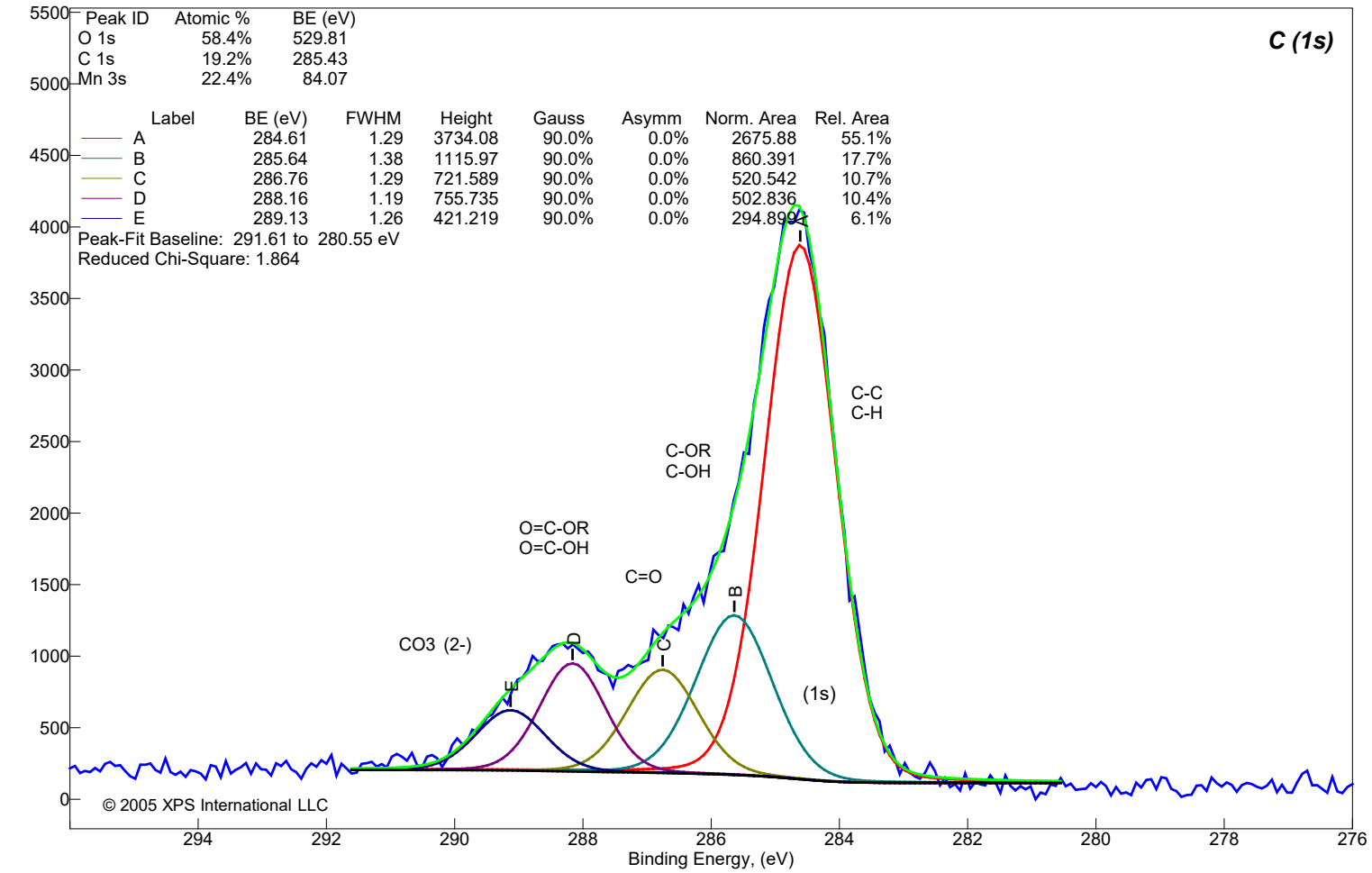


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MnO

Manganese (II) Oxide (FW = 70.94)

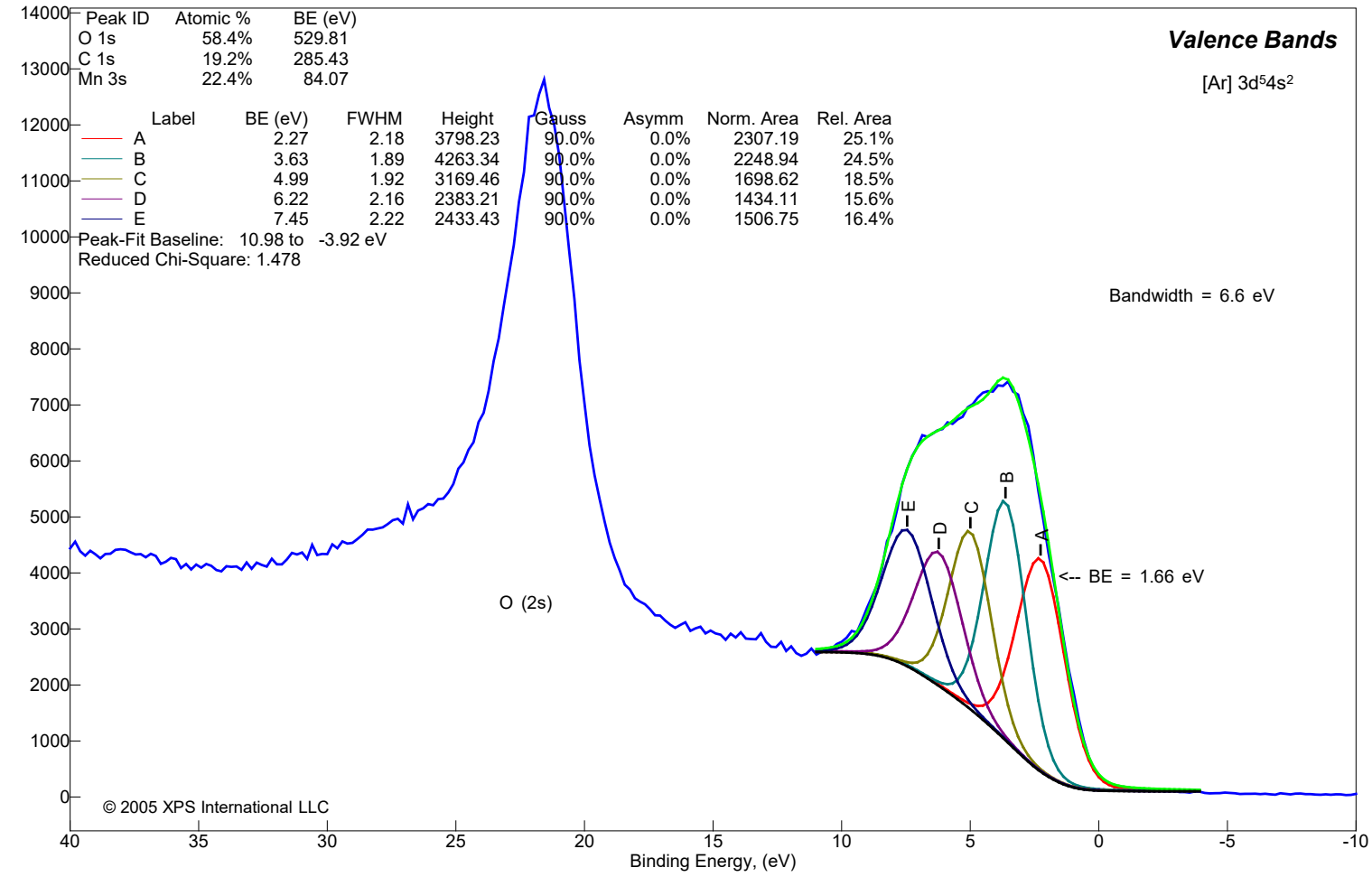
Sample Description: MnO (99.9%) RMC lot# 10924-30, 3mm pellet, SemiConductive, 90 TOA



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Manganese (II) Oxide (FW = 70.94)

Sample Description: MnO (99.9%) RMC lot# 10924-30, 3mm pellet, SemiConductive, 90 TOA

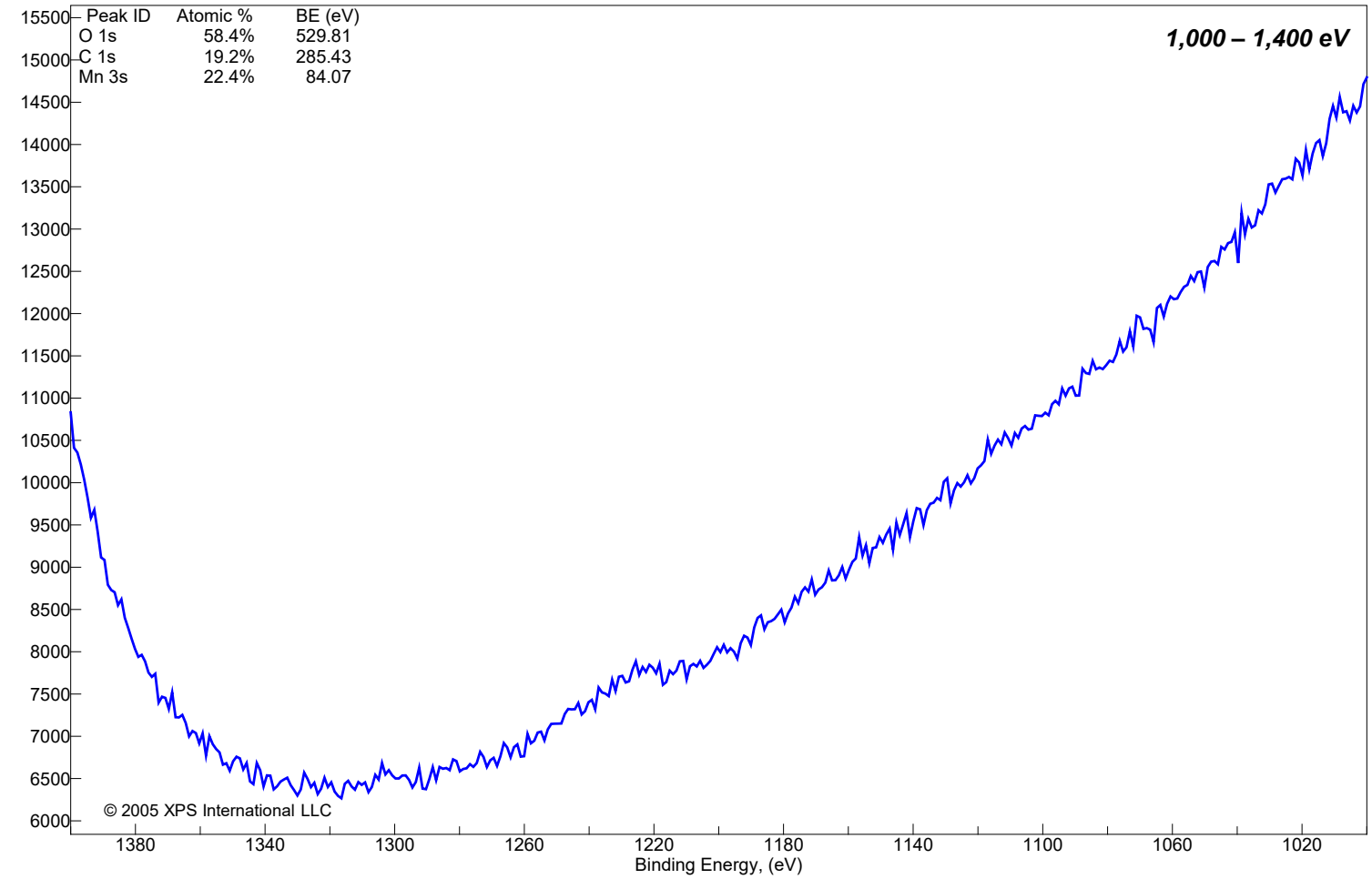


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MnO

Manganese (II) Oxide (FW = 70.94)

Sample Description: MnO (99.9%) RMC lot# 10924-30, 3mm pellet, SemiConductive, 90 TOA

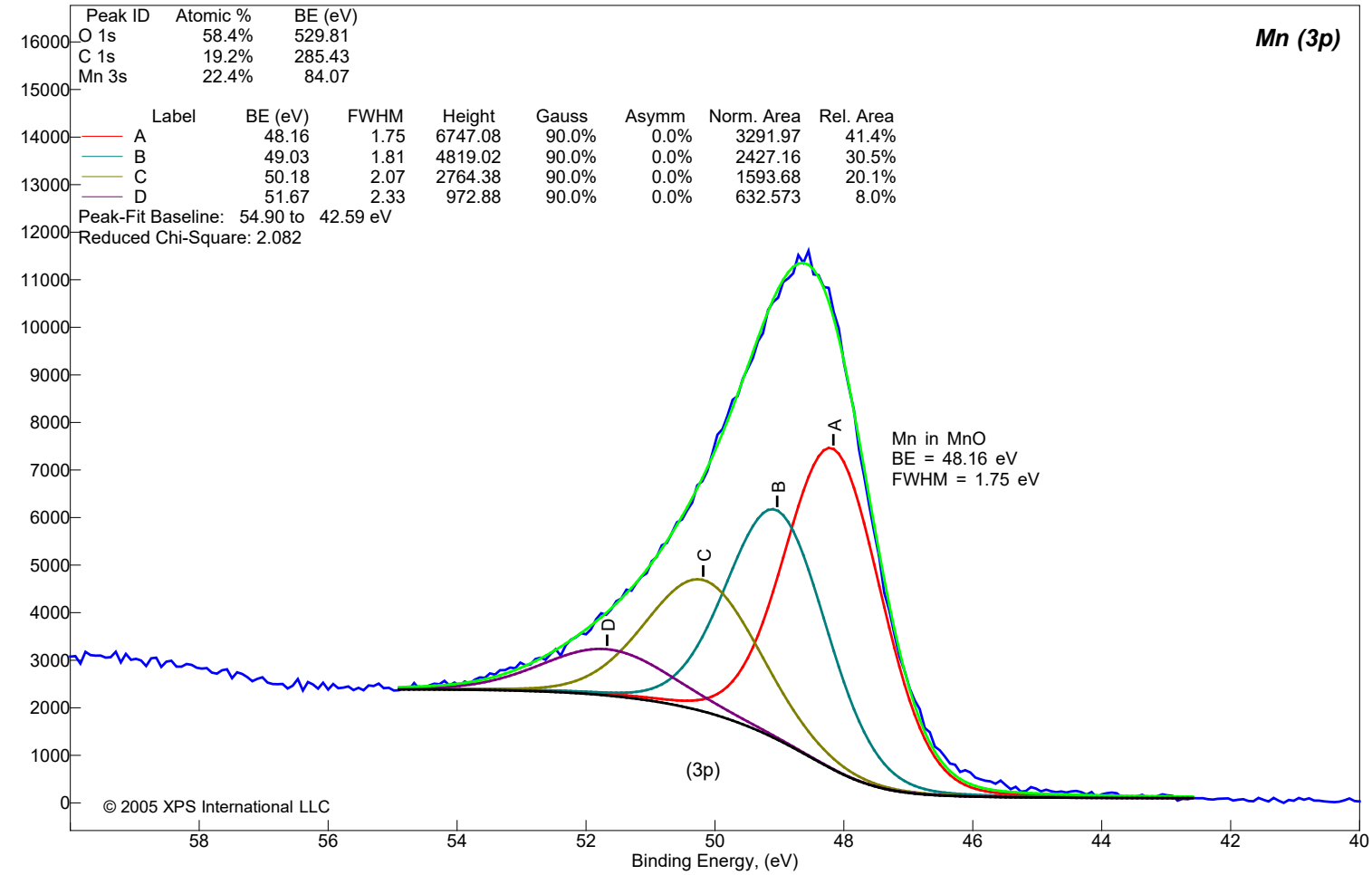


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MnO

Manganese (II) Oxide (FW = 70.94)

Sample Description: MnO (99.9%) RMC lot# 10924-30, 3mm pellet, SemiConductive, 90 TOA



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Manganese (IV) Oxide (FW = 86.94)
Surface Composition Table

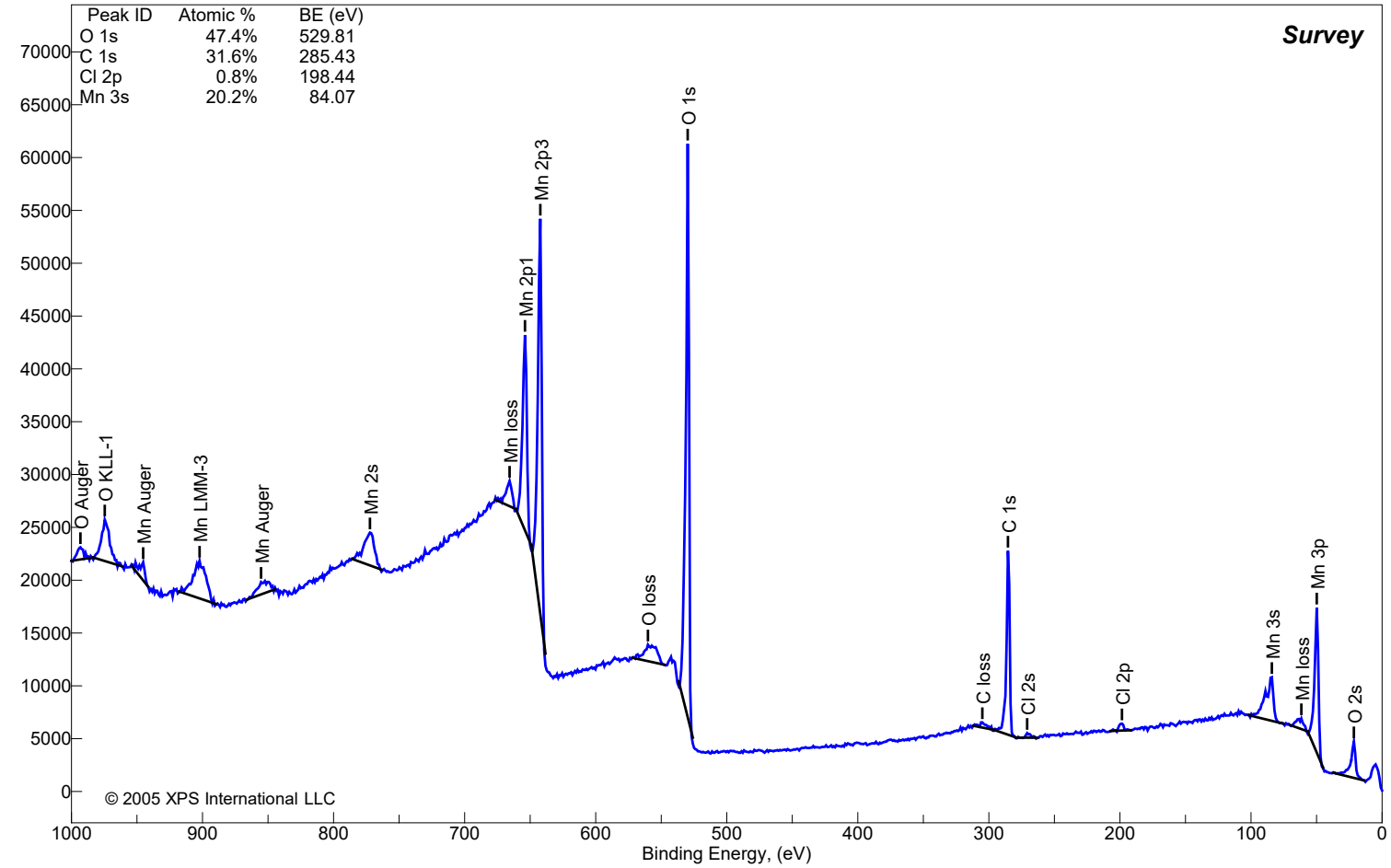
Description: MnO_2 (99.99%) from Aldrich Co. Lot# 04728PV, analyzed at 90 deg TOA, mesh at 1 mm, conductive black chip scraped with knife edge, mp 535 C dec, d 5.03, sol in HCl

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	21.5	21.5	0.14	1.5	7,574	
Mn 3p	49.9	49.9	1.42	1.5	24,634	
Mn 3p	51.1	51.1	1.42	1.1	4,347	
Mn loss	61.6	61.6	0.00	1.5	3,798	
Mn 3s	84.1	84.1	0.67	1.5	14,454	20.2%
Cl 2p	198.4	198.4	2.28	1.5	1,707	0.8%
Cl 2s	270.8	270.8	1.69	1.5	1,130	
C 1s	285.4	285.4	1.00	1.5	26,524	31.6%
C loss	305.0	305.0	0.00	1.5	1,848	
O 1s	529.8	529.8	2.93	1.5	82,893	47.4%
O loss	560.1	560.1	0.00	1.5	8,749	
Mn 2p3	642.2	642.2	9.17	1.5	69,667	
Mn 2p1	654.0	654.0	4.74	1.5	37,978	
Mn loss	665.7	665.7	0.00	1.5	6,211	
Mn 2s	772.2	772.2	4.23	1.5	15,872	
Mn Auger	855.3	855.3	0.00	1.5	5,367	
Mn LMM-3	902.2	902.2	0.48	1.5	20,789	
Mn Auger	945.3	945.3	0.00	1.5	3,707	
O KLL-1	974.6	974.6	0.70	1.5	16,020	
O Auger	993.2	993.2	0.00	1.5	4,294	

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Manganese (IV) Oxide (FW = 86.94)

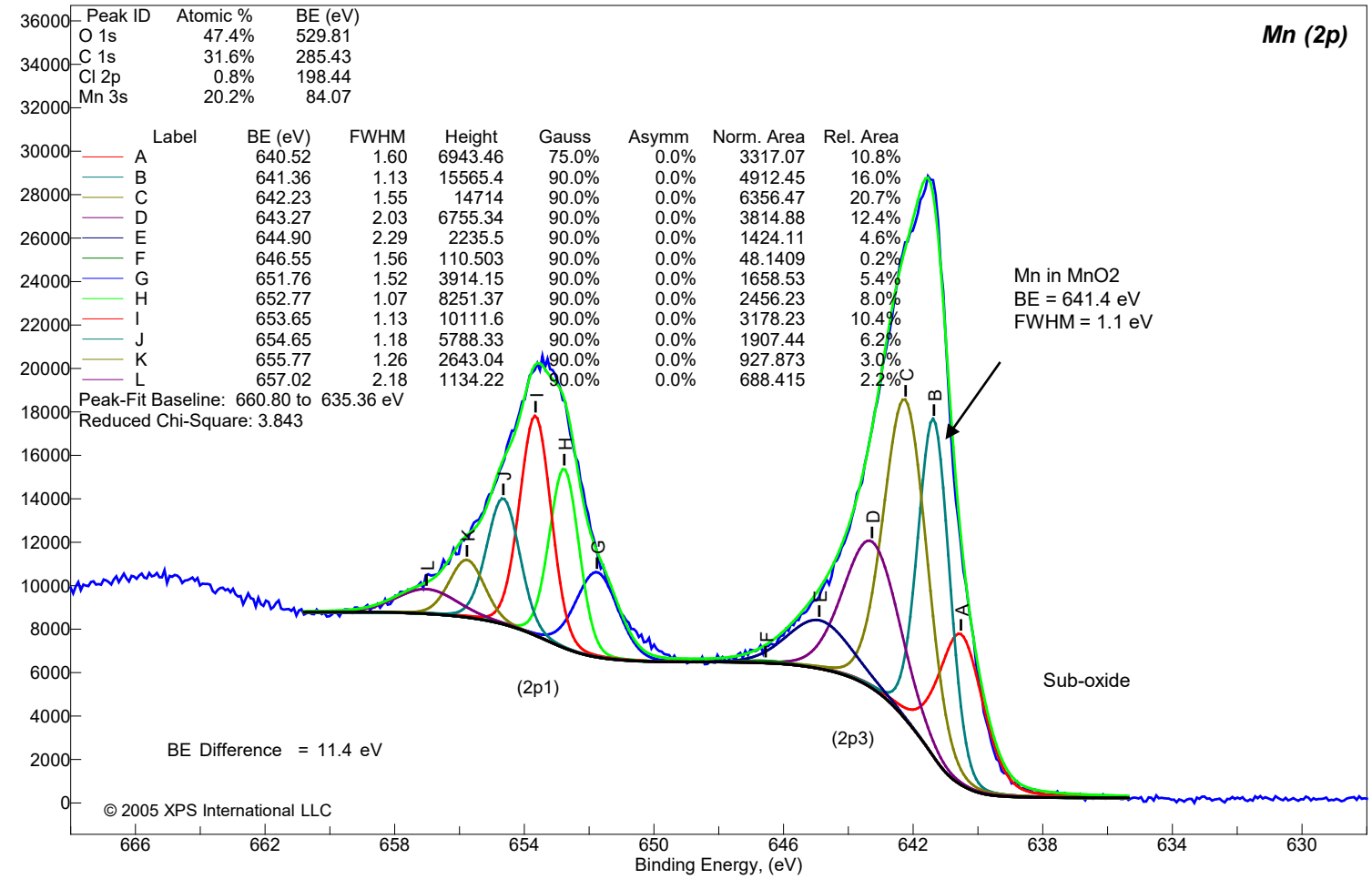
Sample Description: MnO2 (99.99%) (chip) from Aldrich lot# 04728PV, conductive
scraped chip with knife edge, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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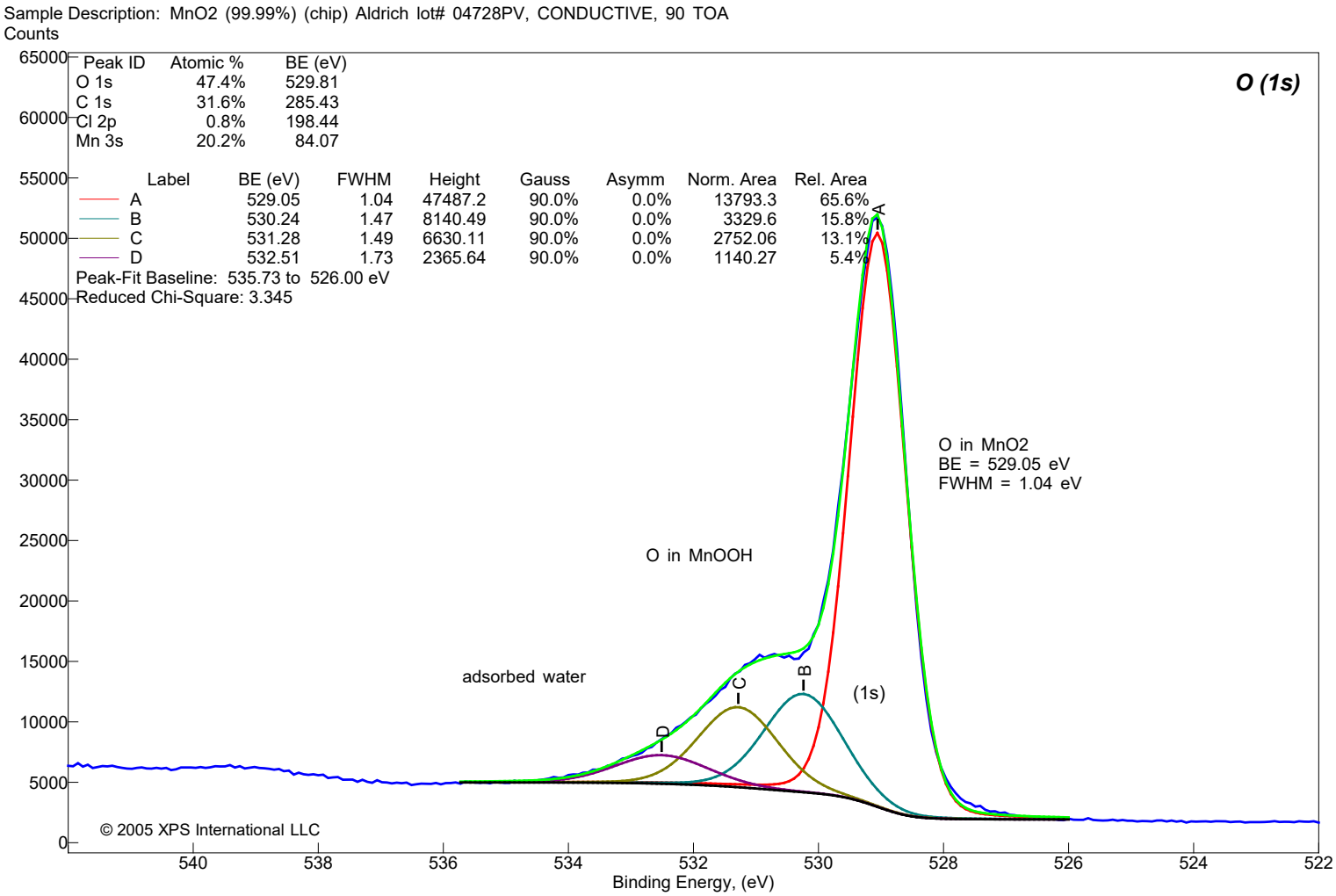
Manganese (IV) Oxide (FW = 86.94)

Sample Description: MnO2 (99.99%) (chip) Aldrich lot# 04728PV, CONDUCTIVE, 90 TOA



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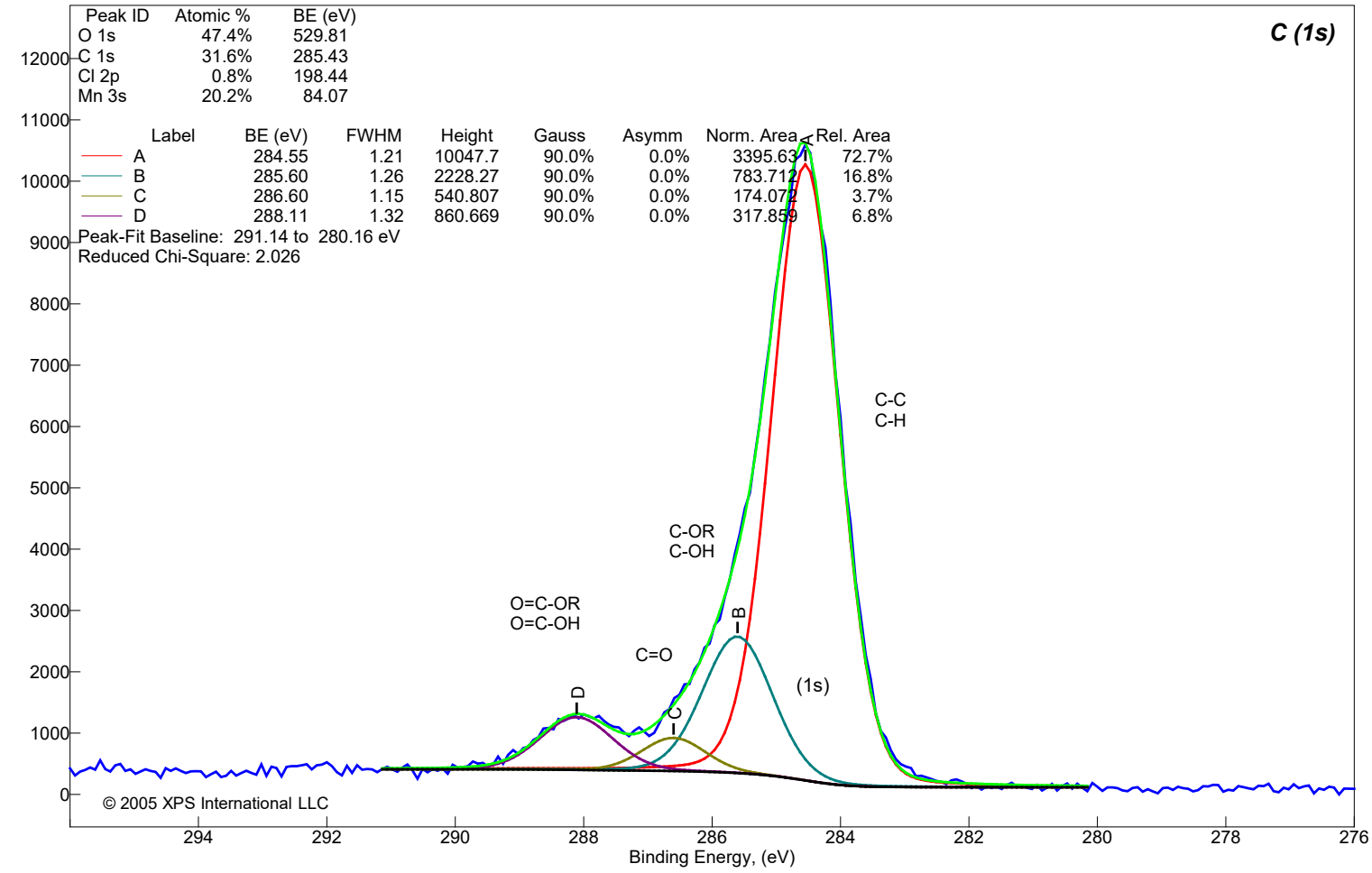
Manganese (IV) Oxide (FW = 86.94)



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Manganese (IV) Oxide (FW = 86.94)

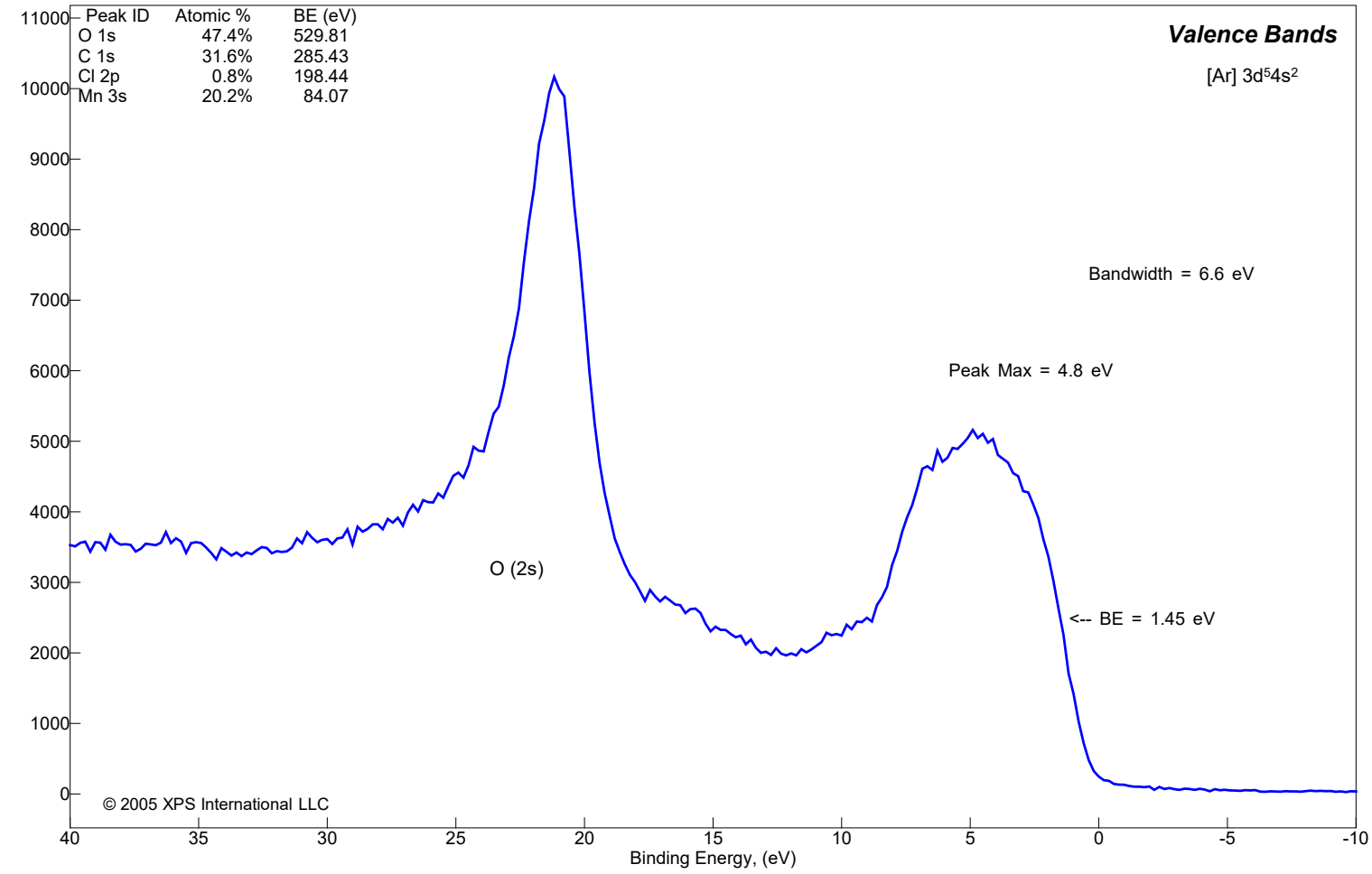
Sample Description: MnO2 (99.99%) (chip) Aldrich lot# 04728PV, CONDUCTIVE, 90 TOA



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Manganese (IV) Oxide (FW = 86.94)

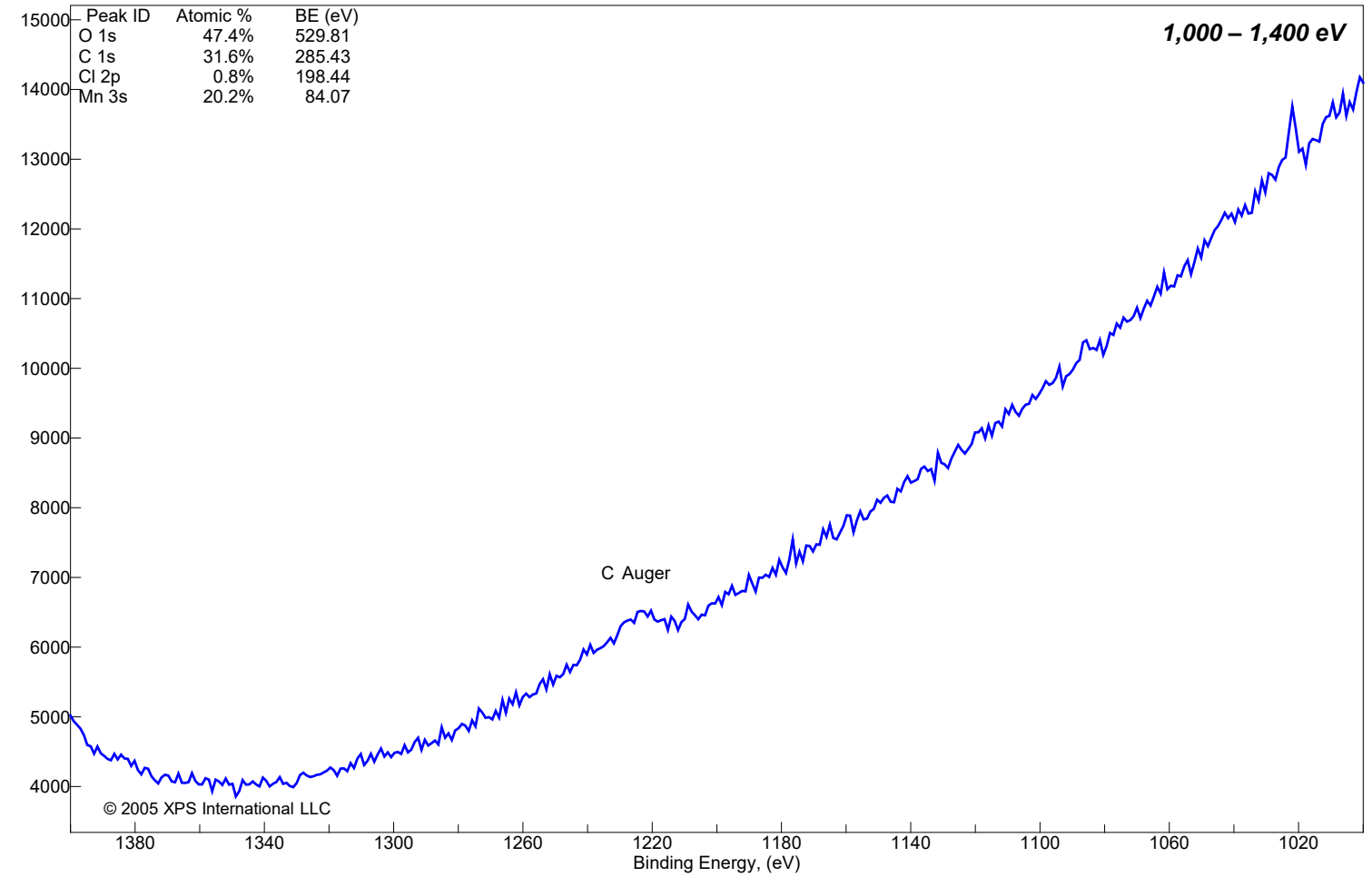
Sample Description: MnO2 (99.99%) (chip) Aldrich lot# 04728PV, CONDUCTIVE, 90 TOA



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Manganese (IV) Oxide (FW = 86.94)

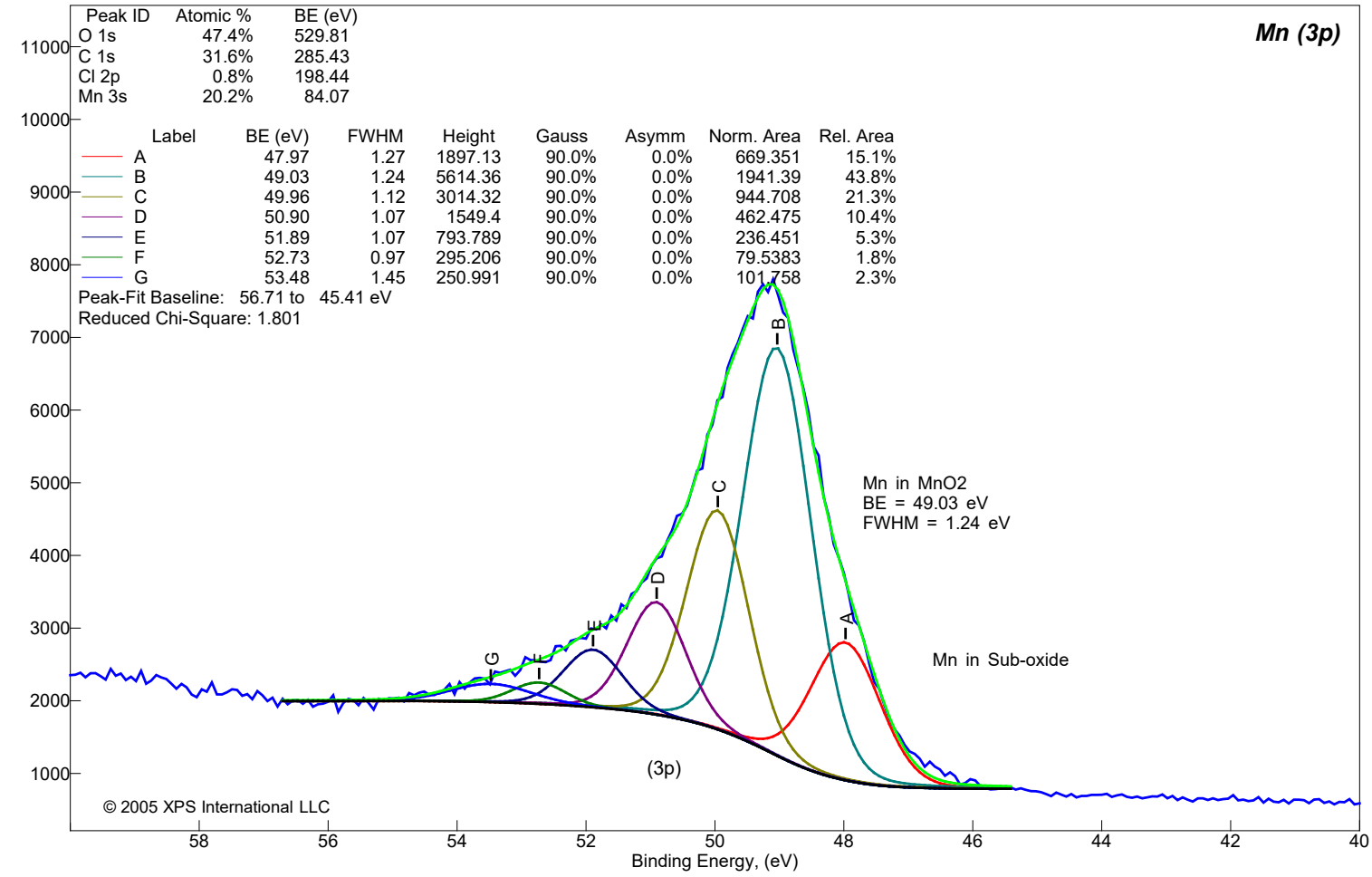
Sample Description: MnO2 (99.99%) (chip) Aldrich lot# 04728PV, CONDUCTIVE, 90 TOA



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Manganese (IV) Oxide (FW = 86.94)

Sample Description: MnO2 (99.99%) (chip) Aldrich lot# 04728PV, CONDUCTIVE, 90 TOA



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Mn_2O_3

Manganese (III) Oxide (FW = 157.86)
Surface Composition Table

Description: Mn_2O_3 from Rare Metallics Co., analyzed at 90 deg TOA, mesh at 1 mm, conductive black powder pressed into 3 mm pellet, mp 1080 C dec, d 4.50, sol in HCl

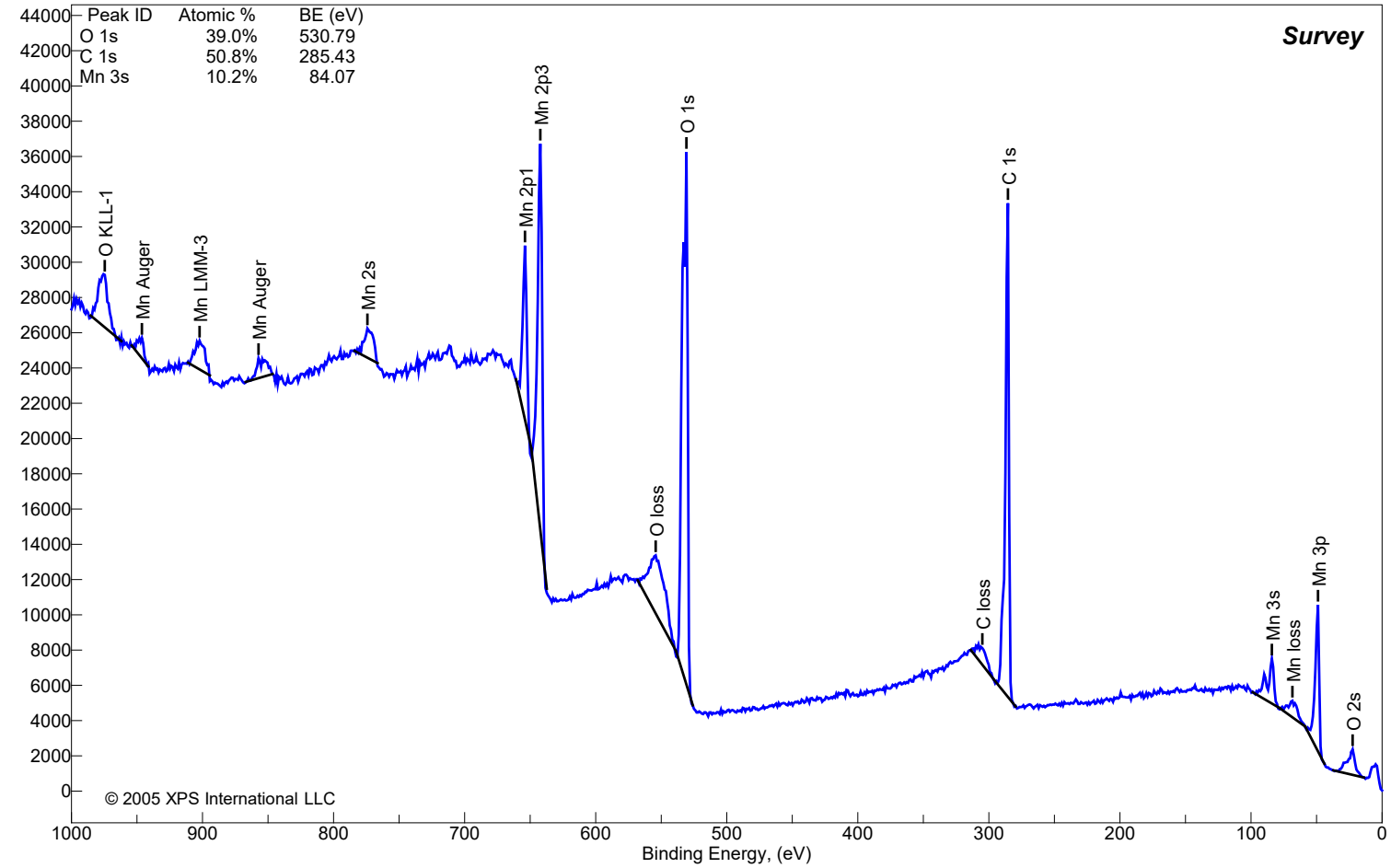
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	22.5	22.5	0.14	1.5	5,034	
Mn 3p	48.9	48.9	1.42	1.5	14,650	
Mn loss	68.4	68.4	0.00	1.5	4,436	
Mn 3s	84.1	84.1	0.67	1.5	7,723	10.2%
C 1s	285.4	285.4	1.00	1.5	45,380	50.8%
C loss	305.0	305.0	0.00	1.5	4,727	
O 1s	530.8	530.8	2.93	1.5	72,462	39.0%
O loss	554.3	554.3	0.00	1.5	25,808	
Mn 2p3	642.2	642.2	9.17	1.5	46,060	
Mn 2p1	654.0	654.0	4.74	1.5	19,368	
Mn 2s	774.2	774.2	4.23	1.5	7,546	
Mn Auger	857.3	857.3	0.00	1.5	5,093	
Mn LMM-3	902.2	902.2	0.48	1.5	8,402	
Mn Auger	946.2	946.2	0.00	1.5	2,649	
O KLL-1	974.6	974.6	0.70	1.5	12,282	

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Mn_2O_3

Manganese (III) Oxide (FW = 157.86)

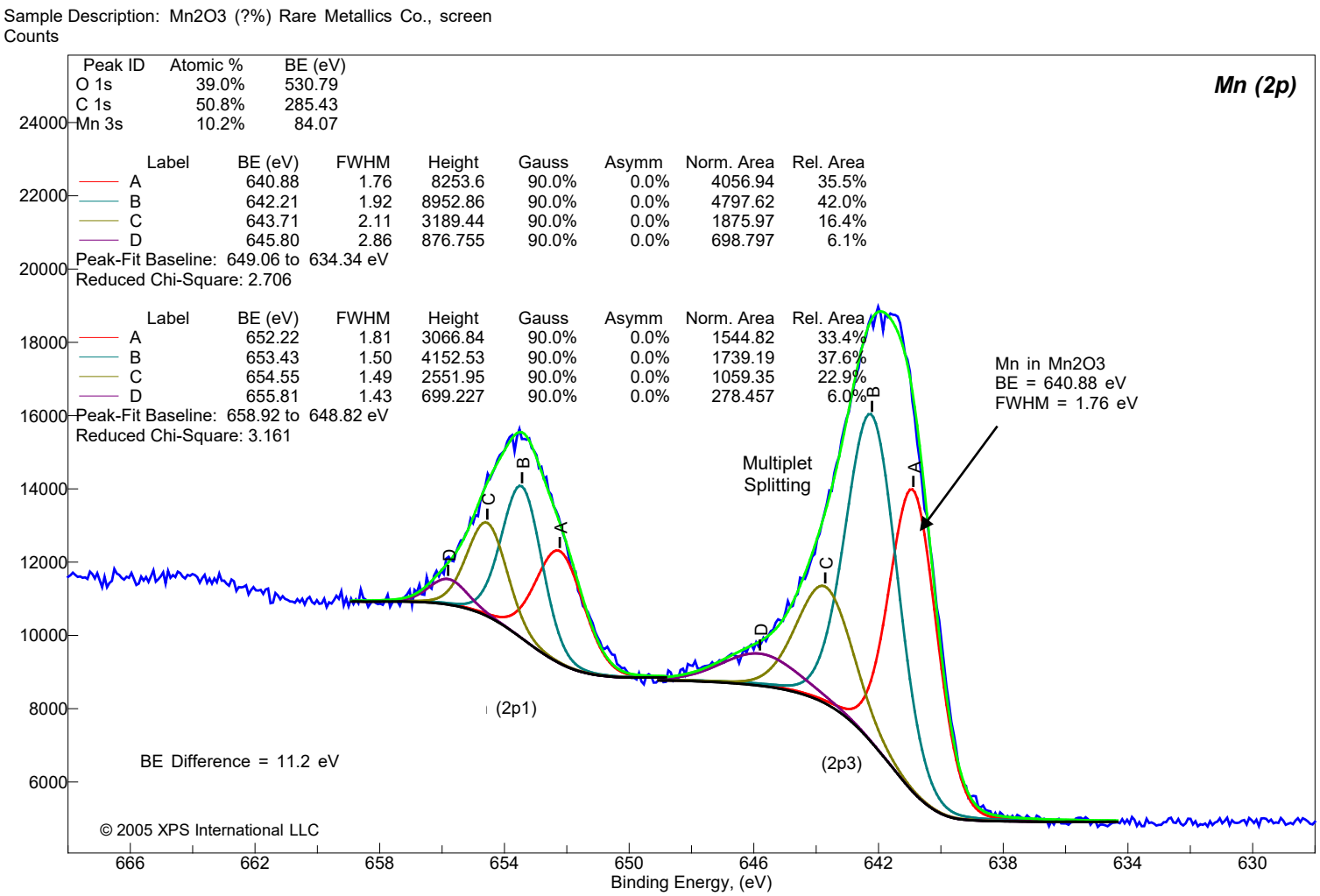
Sample Description: Mn2O3 (?%) from Rare Metallics Co.,
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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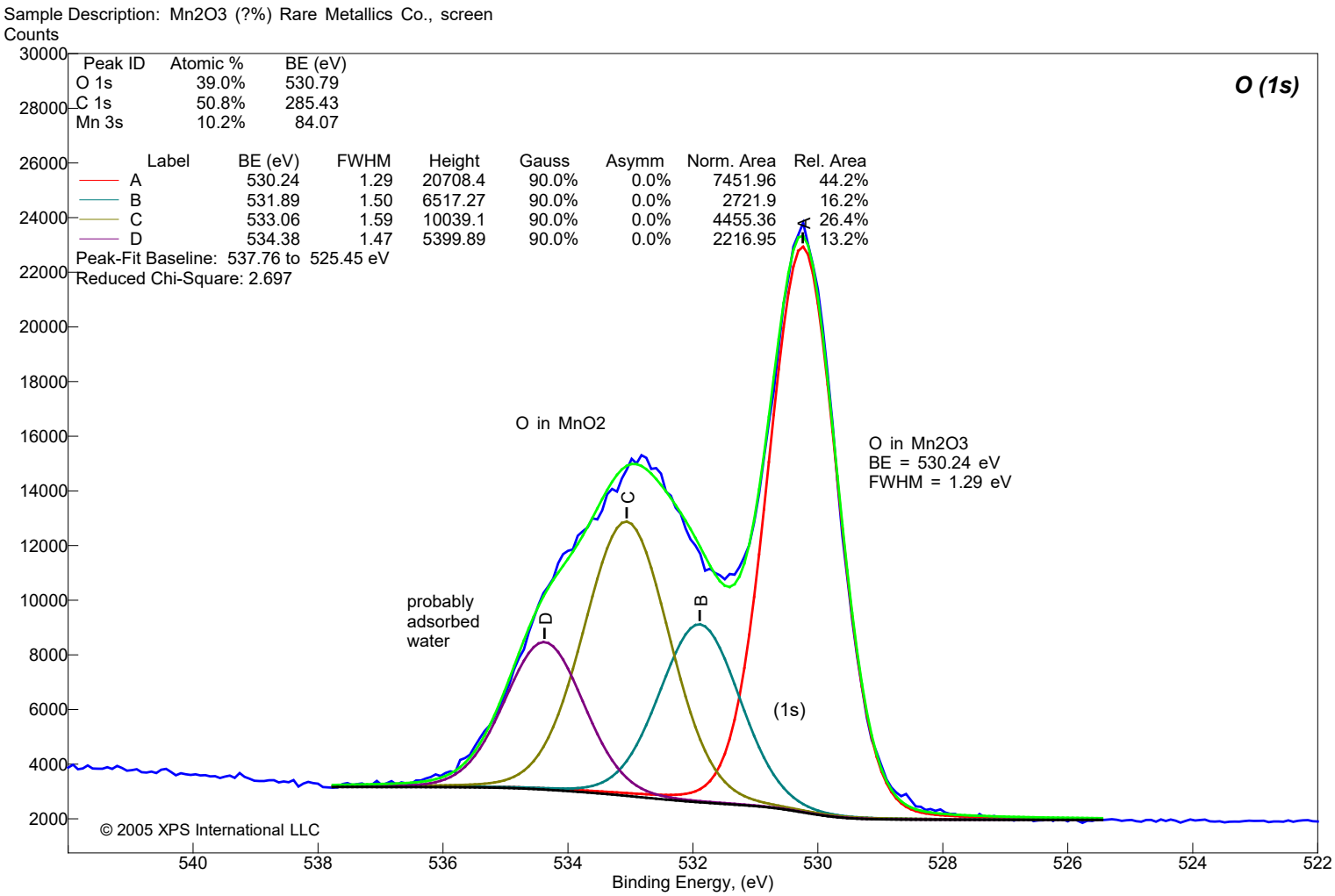
Mn_2O_3

Manganese (III) Oxide (FW = 157.86)



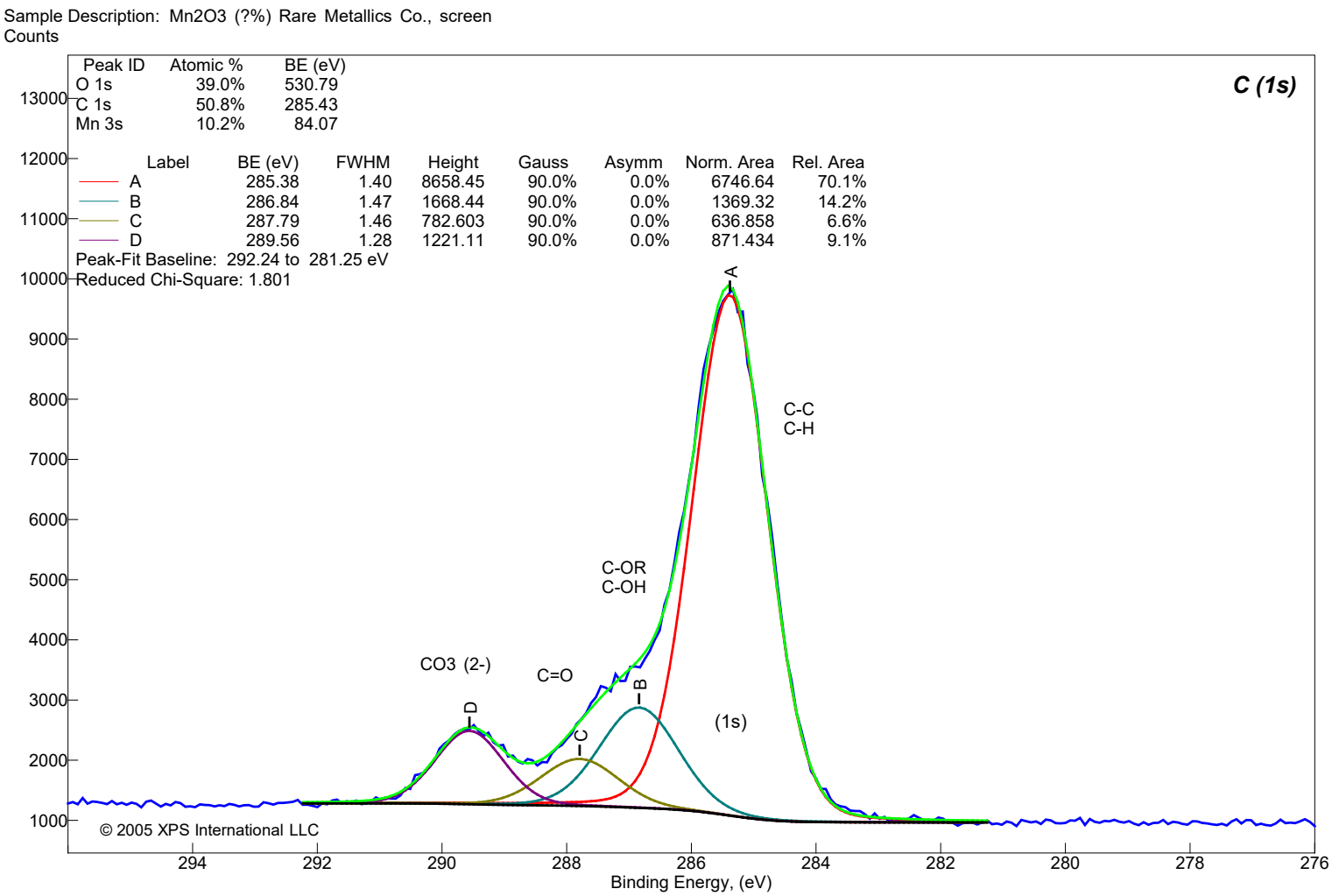
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Manganese (III) Oxide (FW = 157.86)



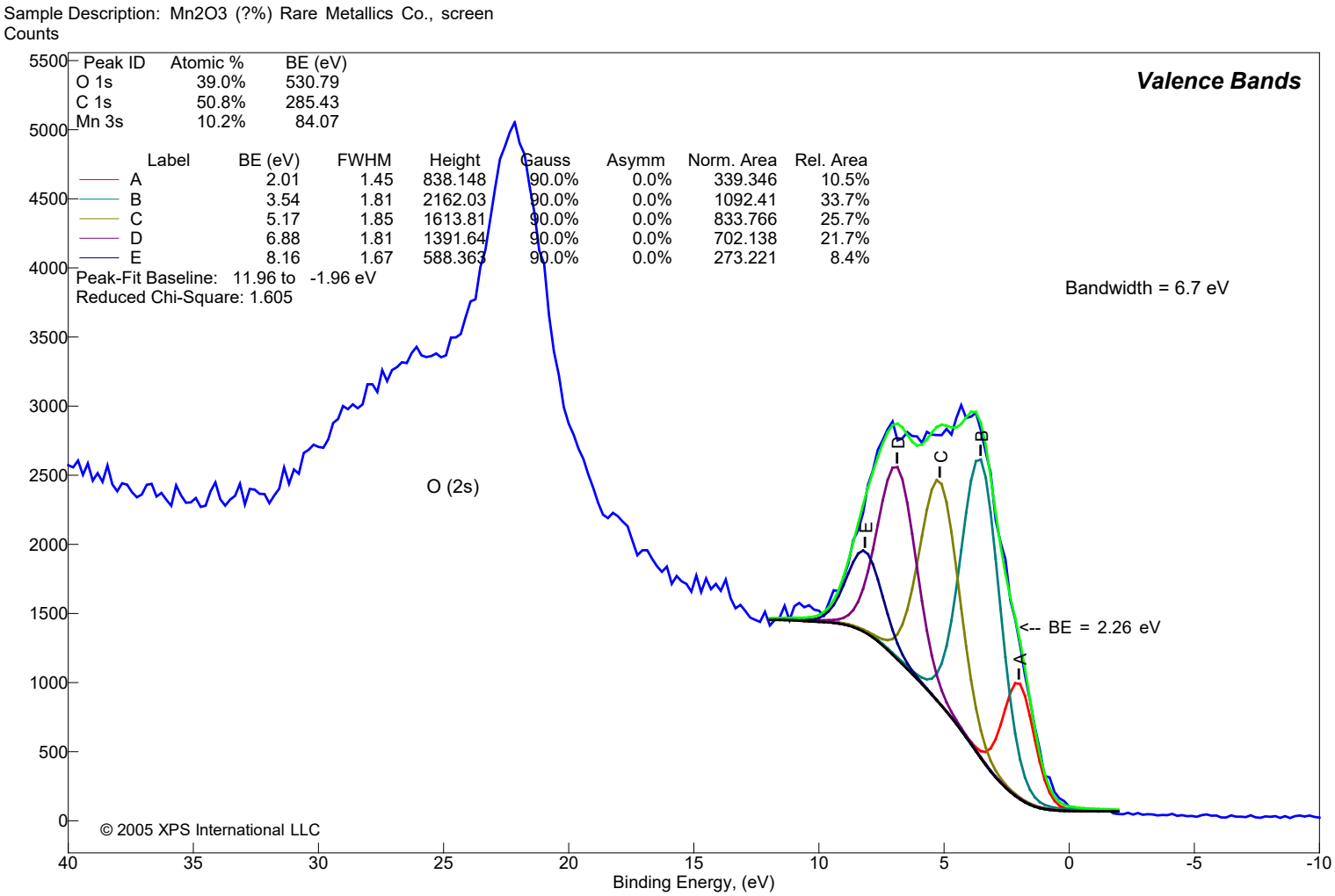
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Manganese (III) Oxide (FW = 157.86)



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Manganese (III) Oxide (FW = 157.86)

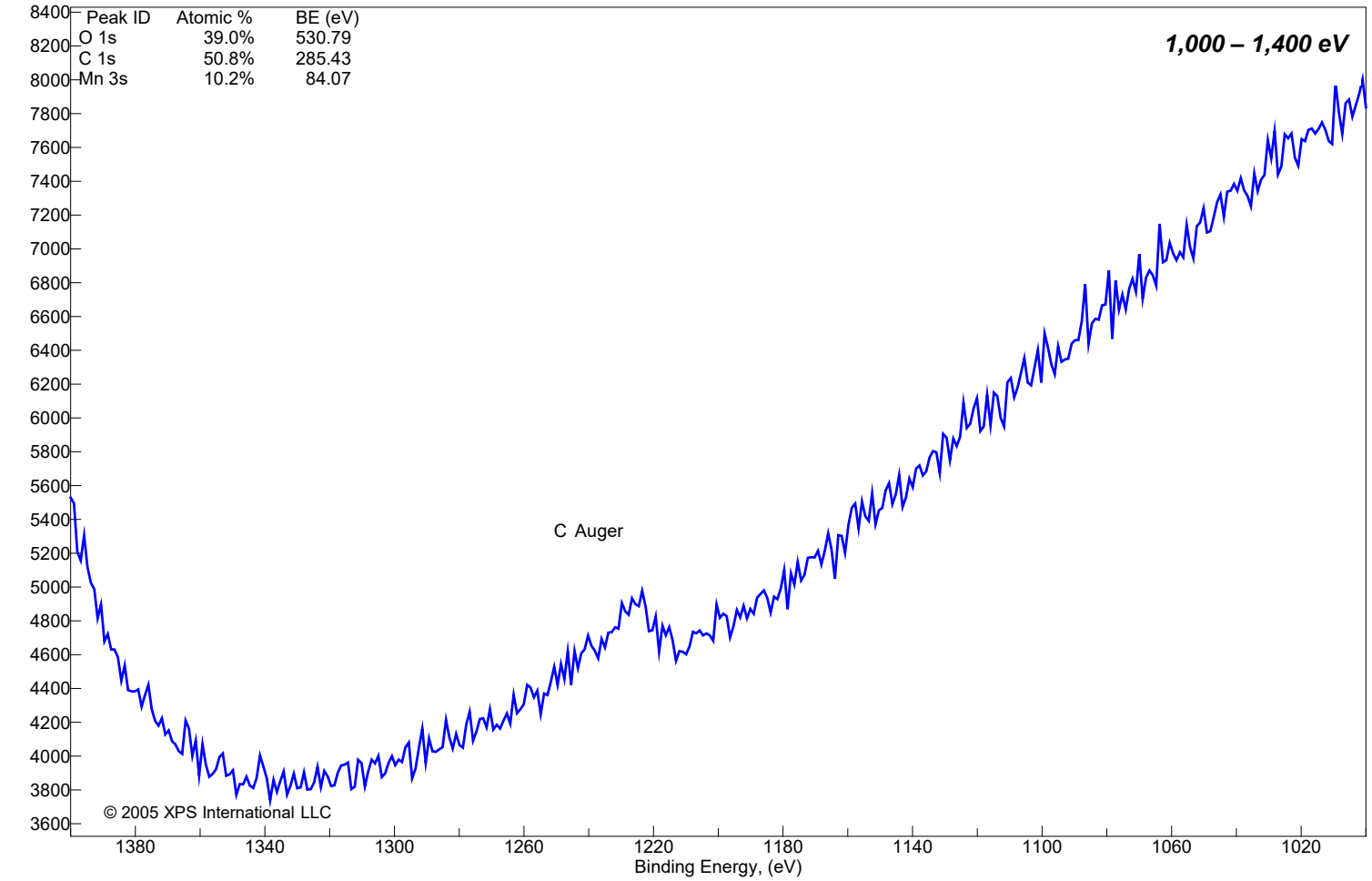


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Mn_2O_3

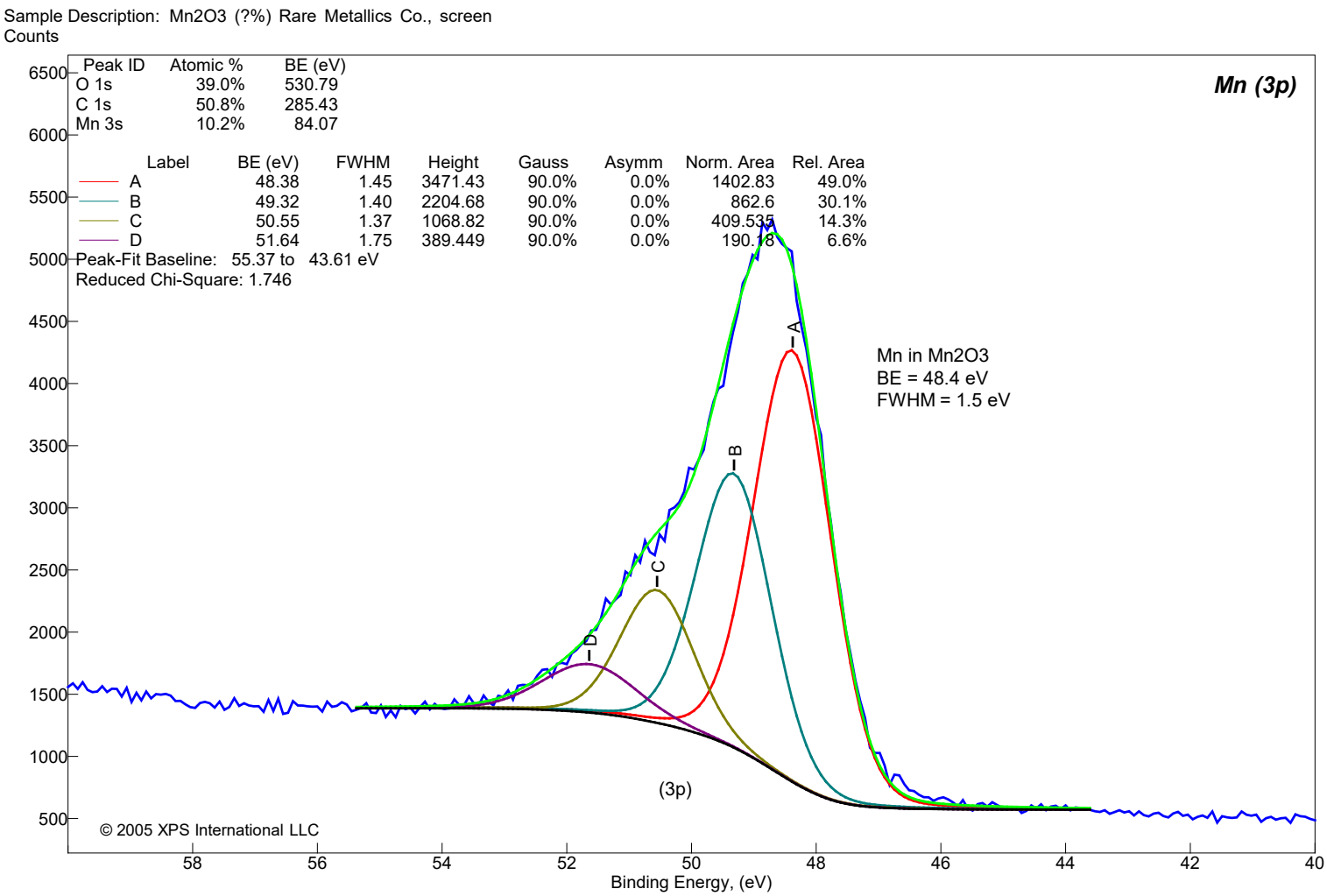
Manganese (III) Oxide (FW = 157.86)

Sample Description: Mn2O3 (?%) Rare Metallics Co., screen



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Manganese (III) Oxide (FW = 157.86)



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MoO_2

Molybdenum (IV) Oxide (FW = 127.94)
Surface Composition Table

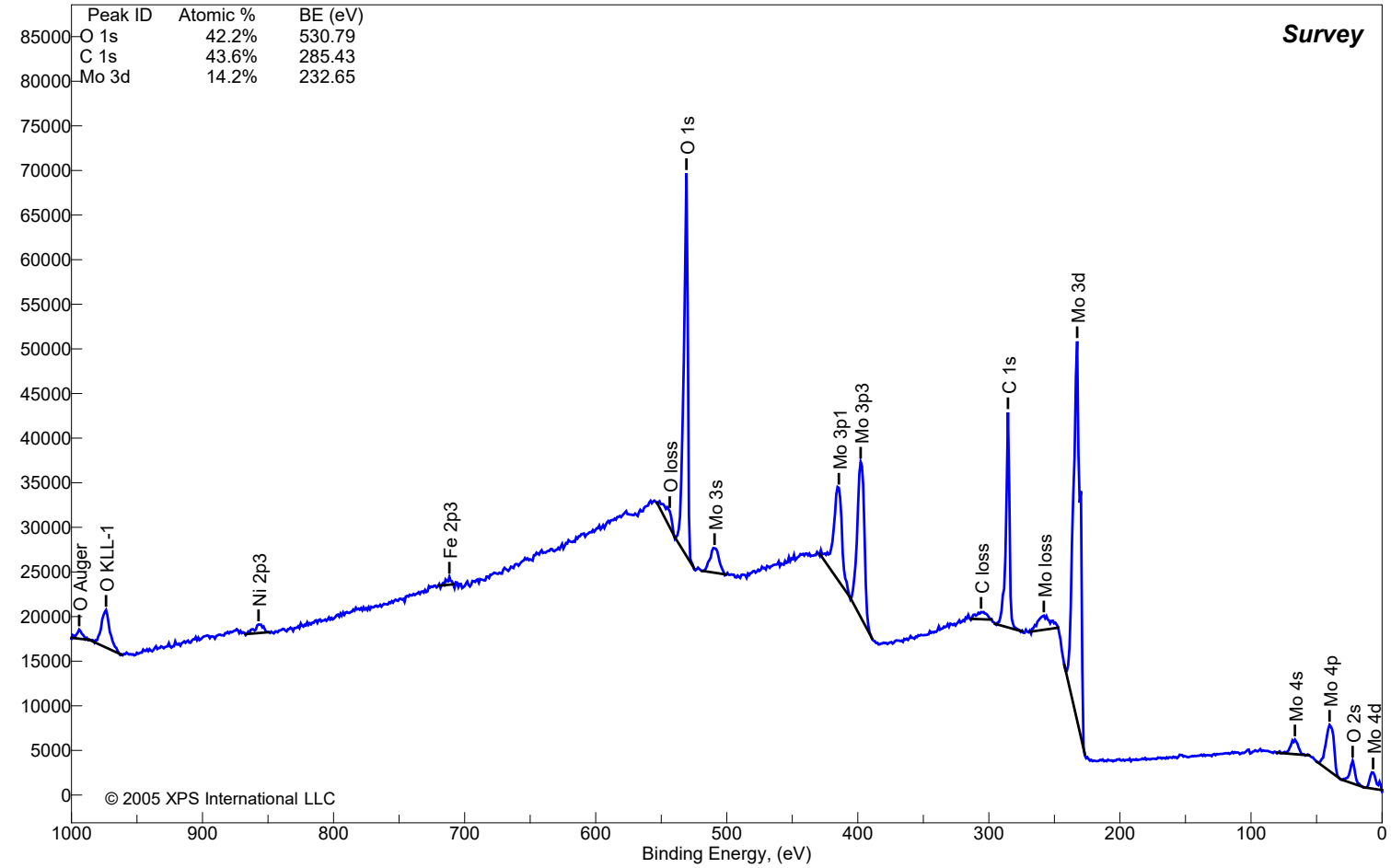
Description: MoO_2 from Cerac Co., analyzed at 90 deg TOA, mesh at 1 mm, conductive black powder pressed into 3 mm pellet, d 6.42

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Mo 4d	6.8	6.8	0.32	1.5	6,141	
O 2s	22.5	22.5	0.14	1.5	5,995	
Mo 4p	40.1	40.1	1.31	1.5	18,877	
Mo 4s	66.5	66.5	0.44	1.5	6,004	
Mo 3d	232.6	232.6	9.50	1.5	127,280	14.2%
Mo loss	258.1	258.1	0.00	1.5	7,722	
C 1s	285.4	285.4	1.00	1.5	38,739	43.6%
C loss	306.0	306.0	0.00	1.5	3,947	
Mo 3p3	397.8	397.8	5.94	1.5	56,086	
Mo 3p1	414.5	414.5	3.04	1.5	42,258	
Mo 3s	509.3	509.3	2.34	1.5	11,419	
O 1s	530.8	530.8	2.93	1.5	78,049	42.2%
O loss	543.5	543.5	0.00	1.5	7,775	
Fe 2p3	711.6	711.6	10.82	1.5	1,033	
Ni 2p3	857.3	857.3	14.61	1.5	4,203	
O KLL-1	973.6	973.6	0.70	1.5	15,416	
O Auger	994.1	994.1	0.00	1.5	2,877	

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Molybdenum (IV) Oxide (FW = 127.94)

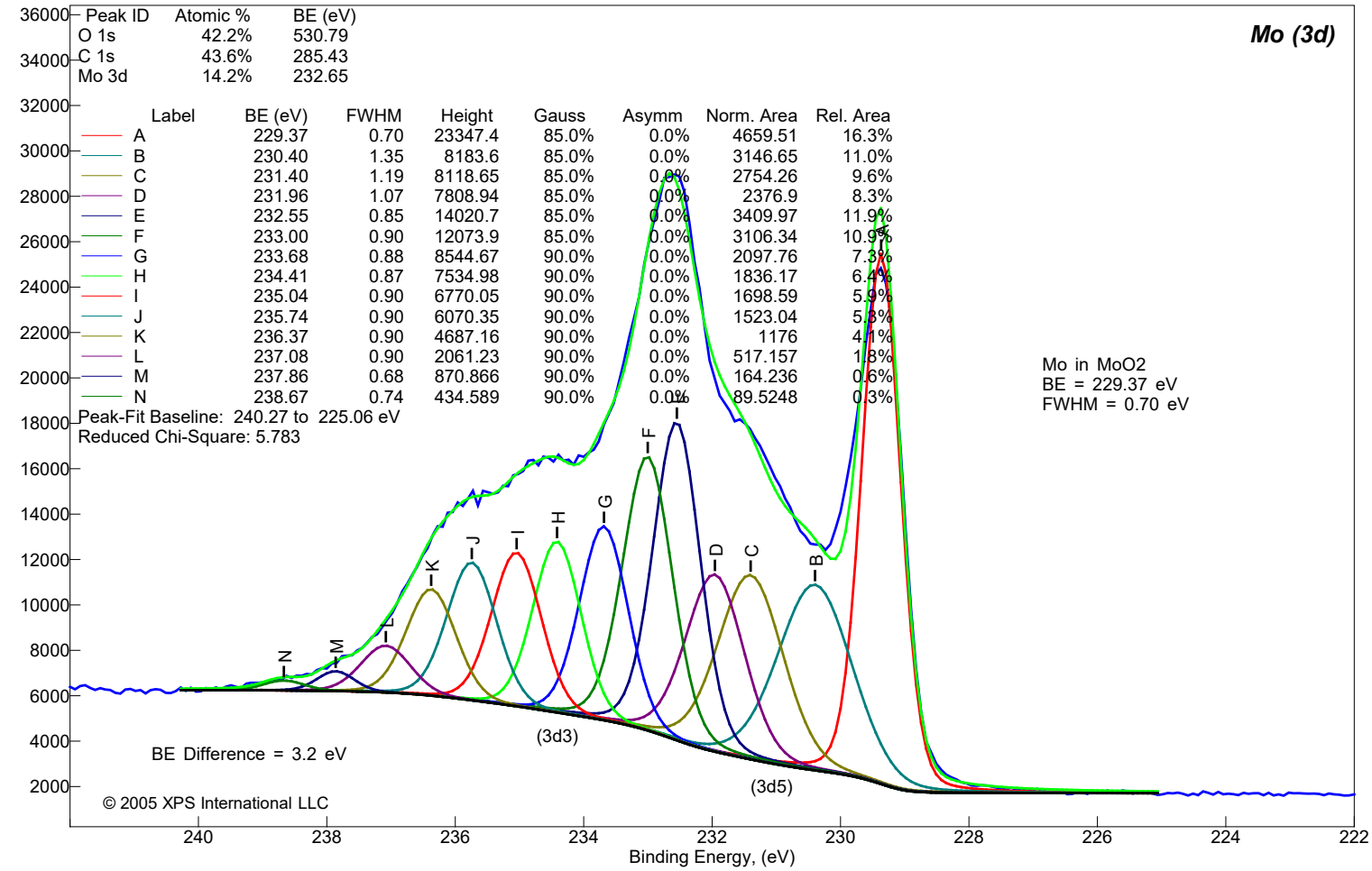
Sample Description: MoO2 (?%) from Cerac, conductive
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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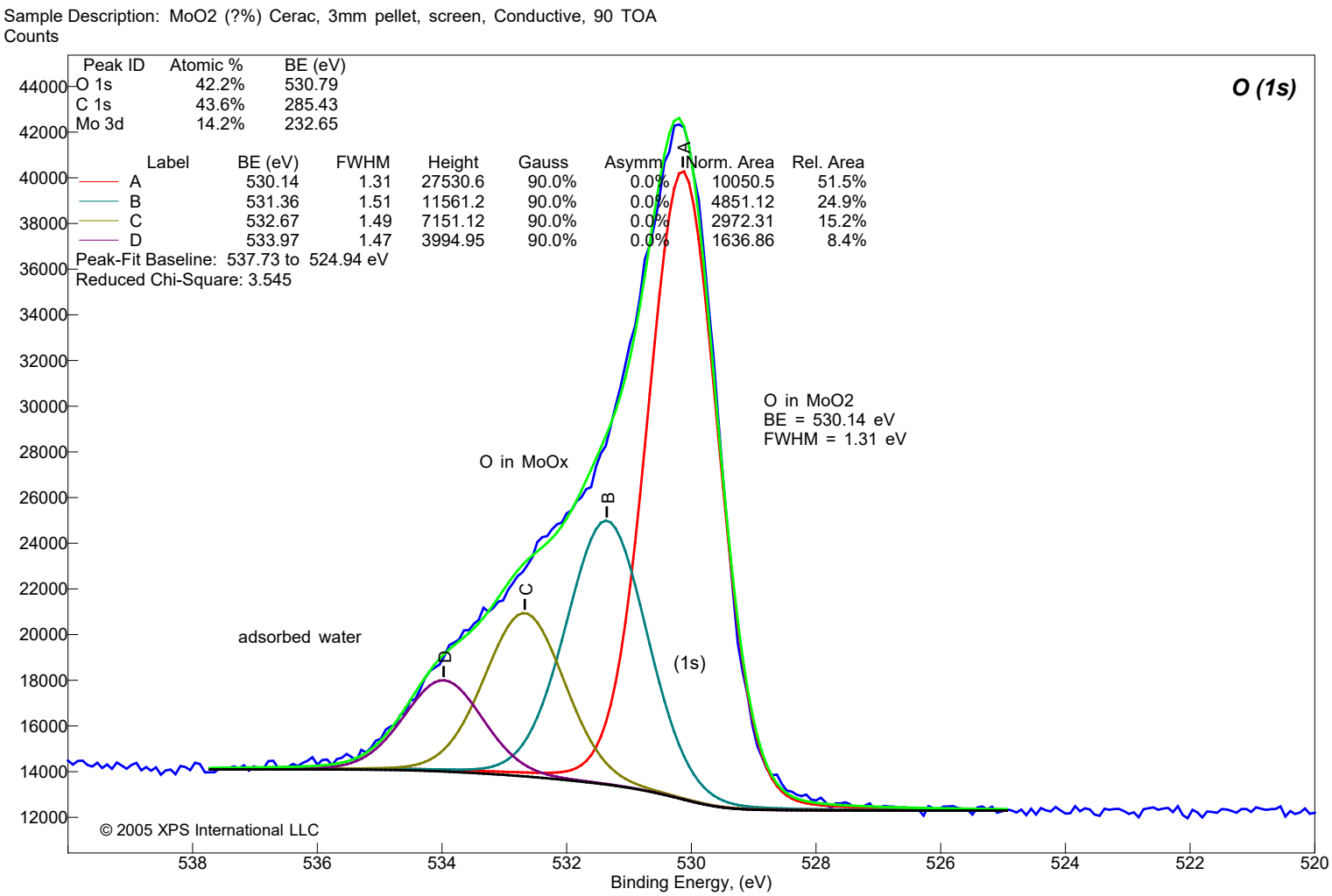
Molybdenum (IV) Oxide (FW = 127.94)

Sample Description: MoO2 (?%) Cerac, 3mm pellet, screen, Conductive, 90 TOA



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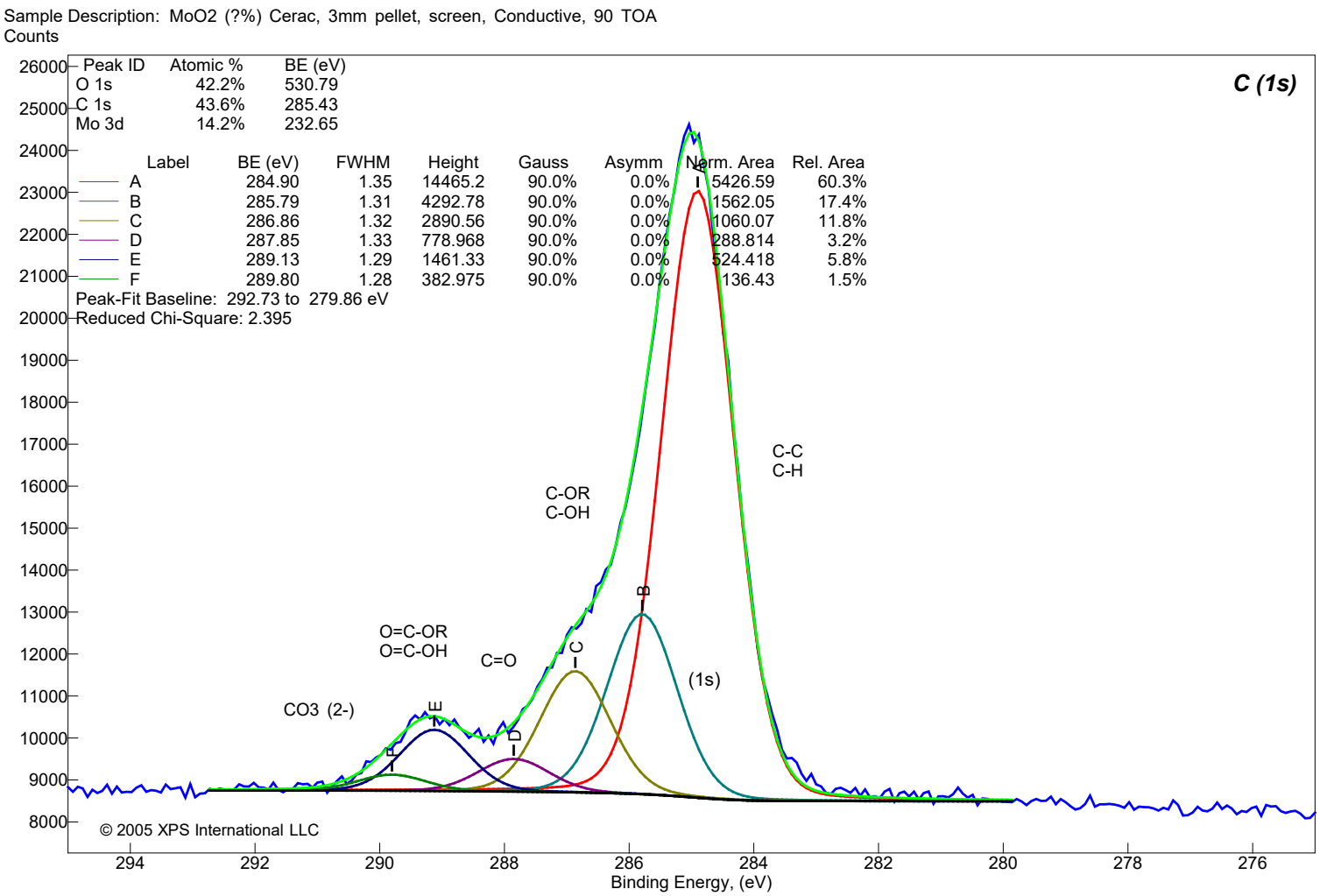
Molybdenum (IV) Oxide (FW = 127.94)



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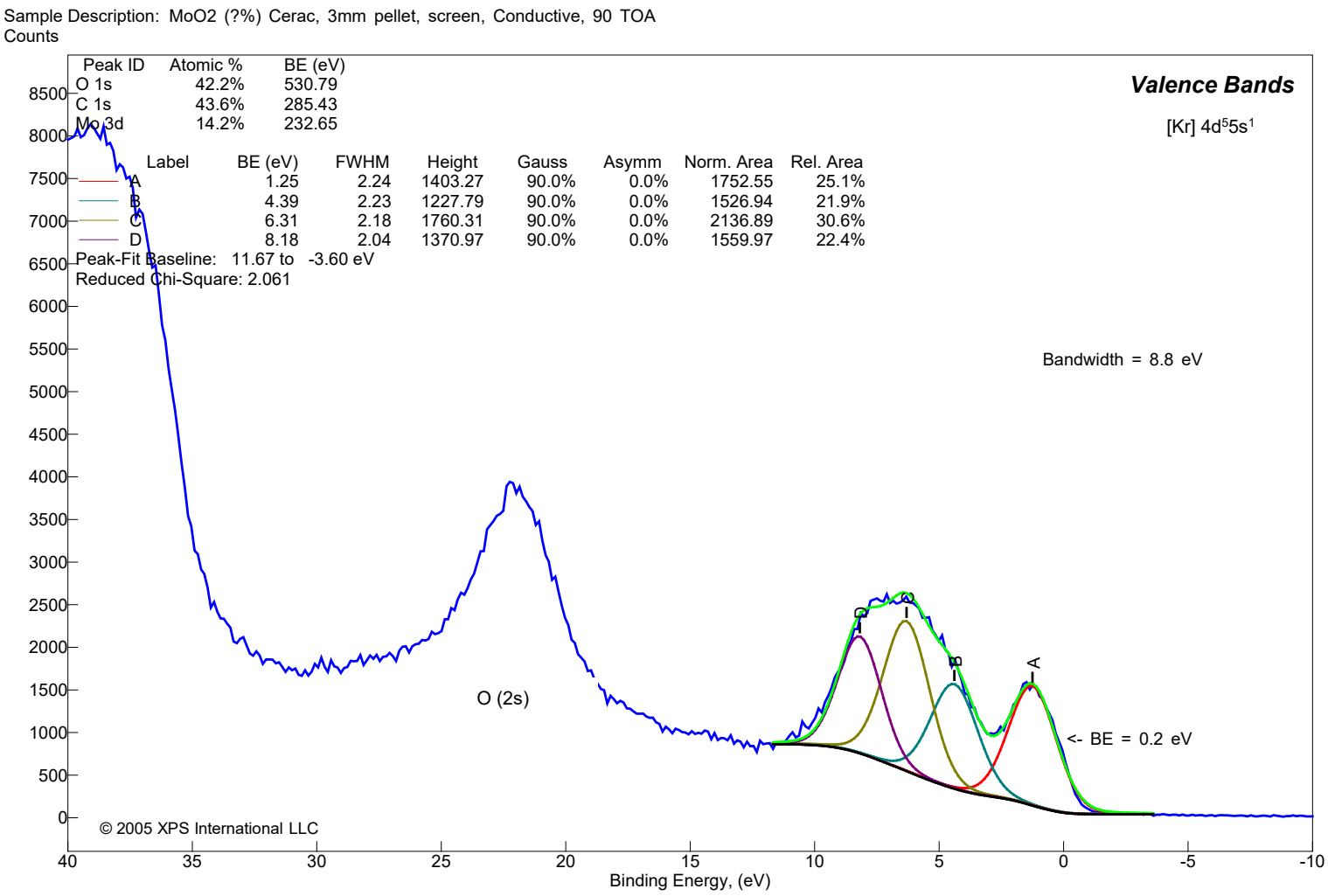
Molybdenum (IV) Oxide (FW = 127.94)

Sample Description: MoO2 (?%) Cerac, 3mm pellet, screen, Conductive, 90 TOA



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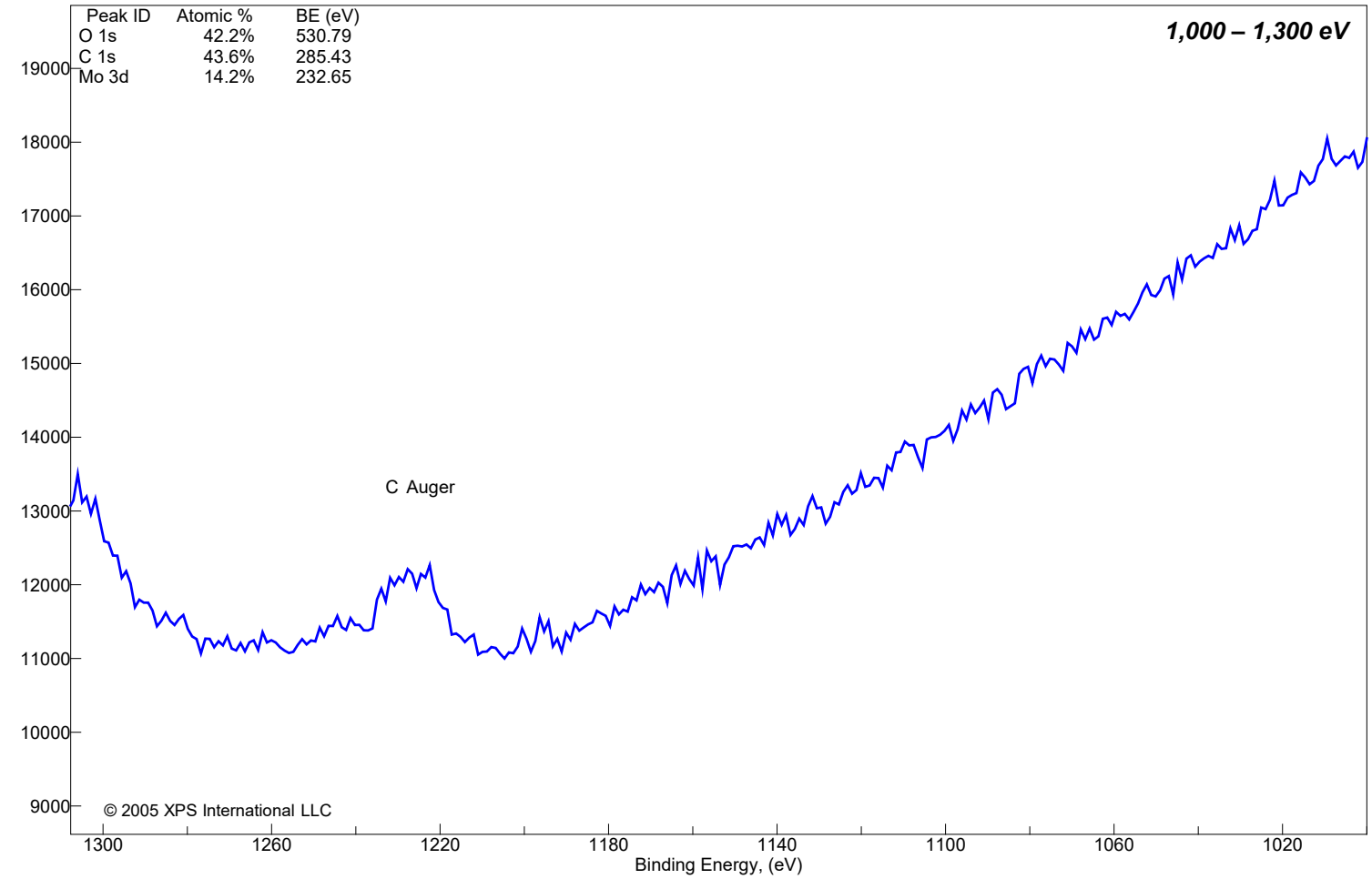
Molybdenum (IV) Oxide (FW = 127.94)



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Molybdenum (IV) Oxide (FW = 127.94)

Sample Description: MoO2 (?%) Cerac, 3mm pellet, screen, Conductive, 90 TOA



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MoO_3

Molybdenum (VI) Oxide (FW = 143.94)
Surface Composition Table

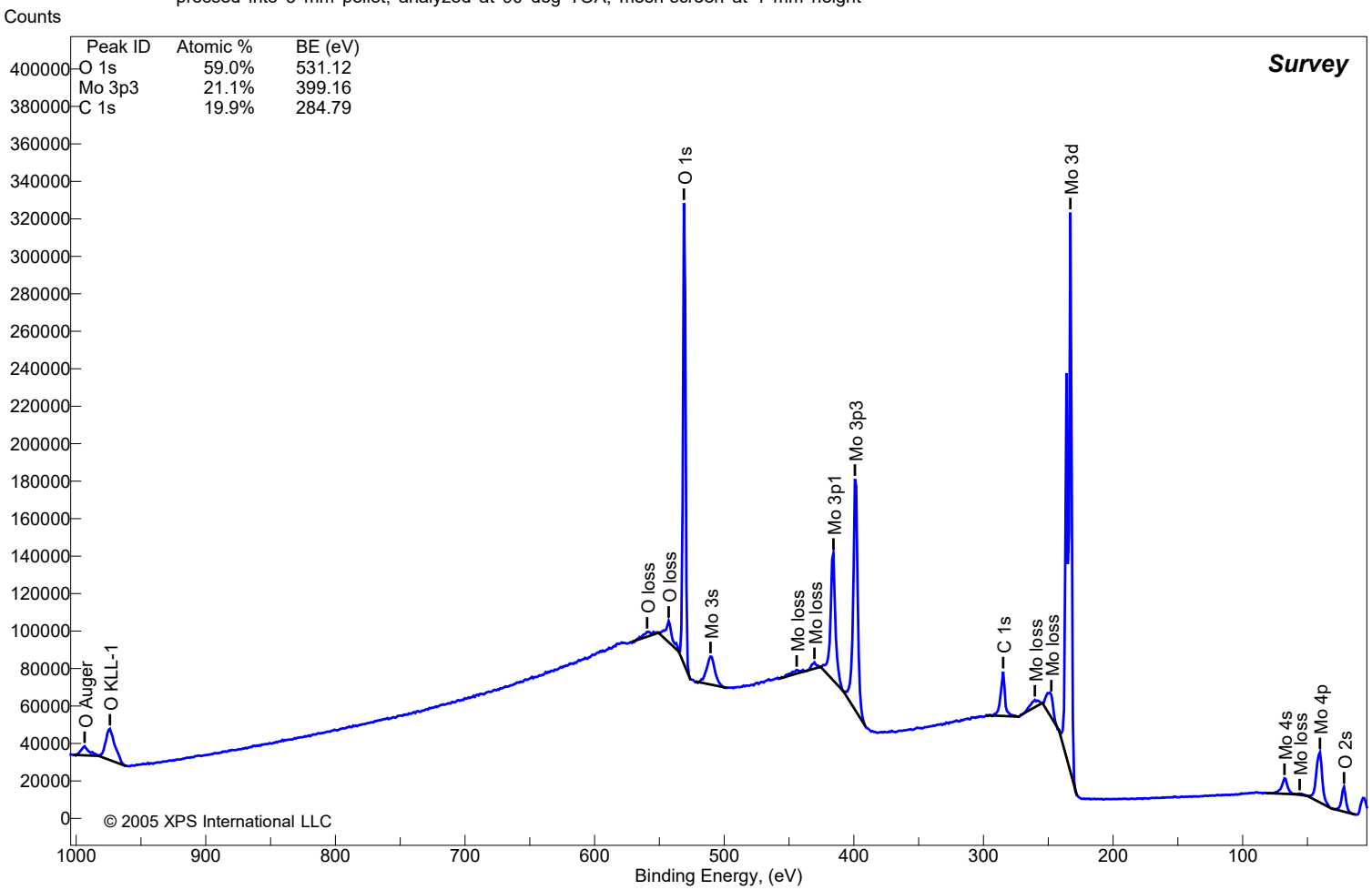
Description: MoO_3 (99.99%) from Aldrich Co. Lot# 02715MAV, analyzed at 90 deg TOA, mesh at 1 mm, conductive pale-blue white powder pressed into 3 mm pellet, mp 795 C, d 4.696, sol in water

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	21.8	21.8	0.14	1.0	8,795	
Mo 4p	40.4	40.4	1.31	1.0	24,337	
Mo loss	56.0	56.0	0.00	1.0	615	
Mo 4s	67.8	67.8	0.44	1.0	7,458	
Mo 3d	233.0	233.0	9.50	1.0	176,537	
Mo loss	247.6	247.6	0.00	1.0	11,834	
Mo loss	260.3	260.3	0.00	1.0	4,681	
C 1s	284.8	284.8	1.00	1.4	15,403	19.9%
Mo 3p3	399.2	399.2	5.94	1.4	84,631	21.1%
Mo 3p1	415.8	415.8	3.04	1.0	50,827	
Mo loss	430.4	430.4	0.00	1.0	2,333	
Mo loss	444.1	444.1	0.00	1.0	2,800	
Mo 3s	510.6	510.6	2.34	1.0	18,781	
O 1s	531.1	531.1	2.93	1.4	97,222	59.0%
O loss	542.9	542.9	0.00	1.0	10,967	
O loss	559.5	559.5	0.00	1.0	3,409	
O KLL-1	973.9	973.9	0.70	1.0	23,056	
O Auger	993.5	993.5	0.00	1.0	5,844	

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Molybdenum (VI) Oxide (FW = 143.94)

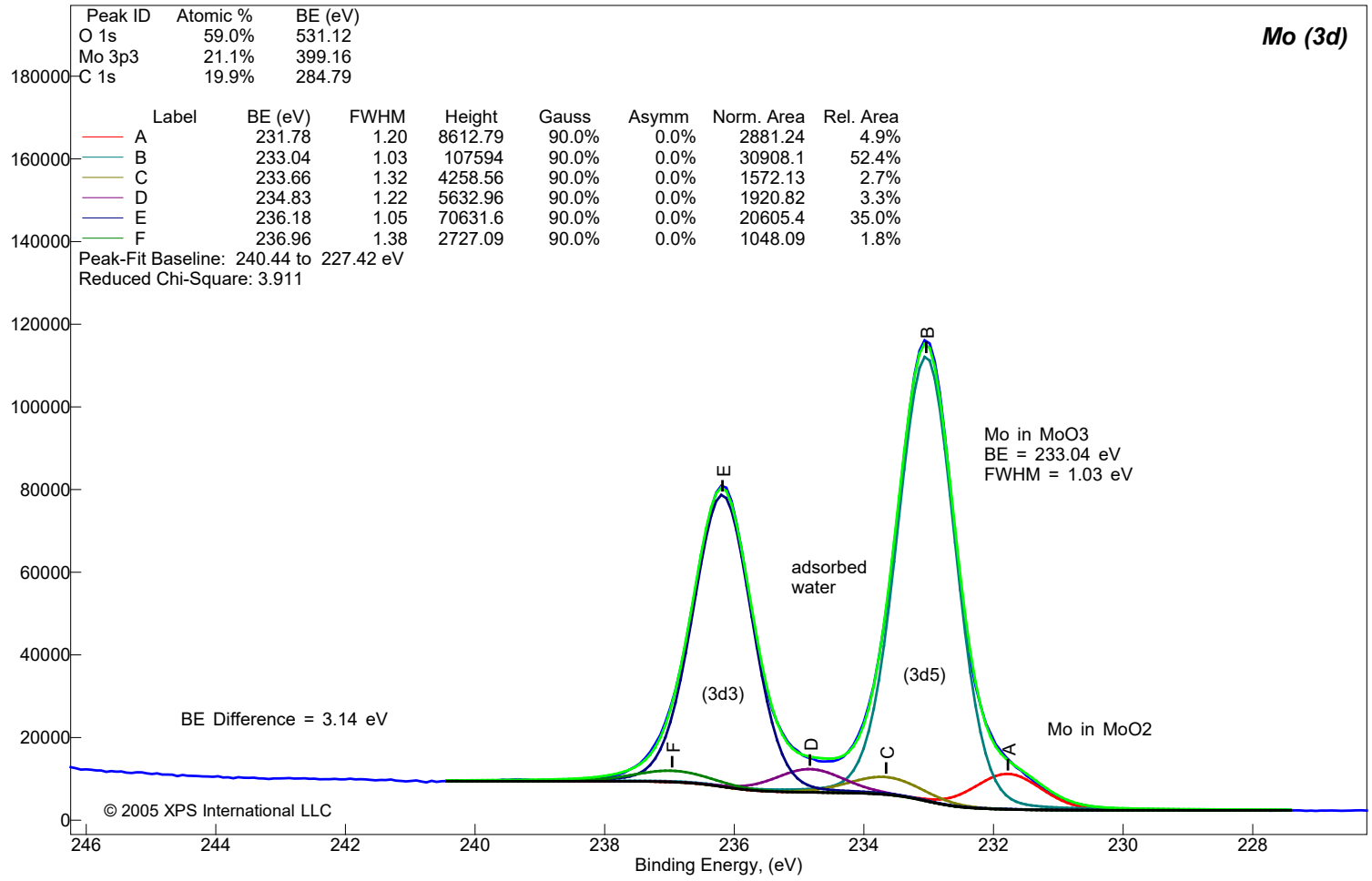
Sample Description: MoO3 (99.99%) from Aldrich lot #02715CM AV
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Molybdenum (VI) Oxide (FW = 143.94)

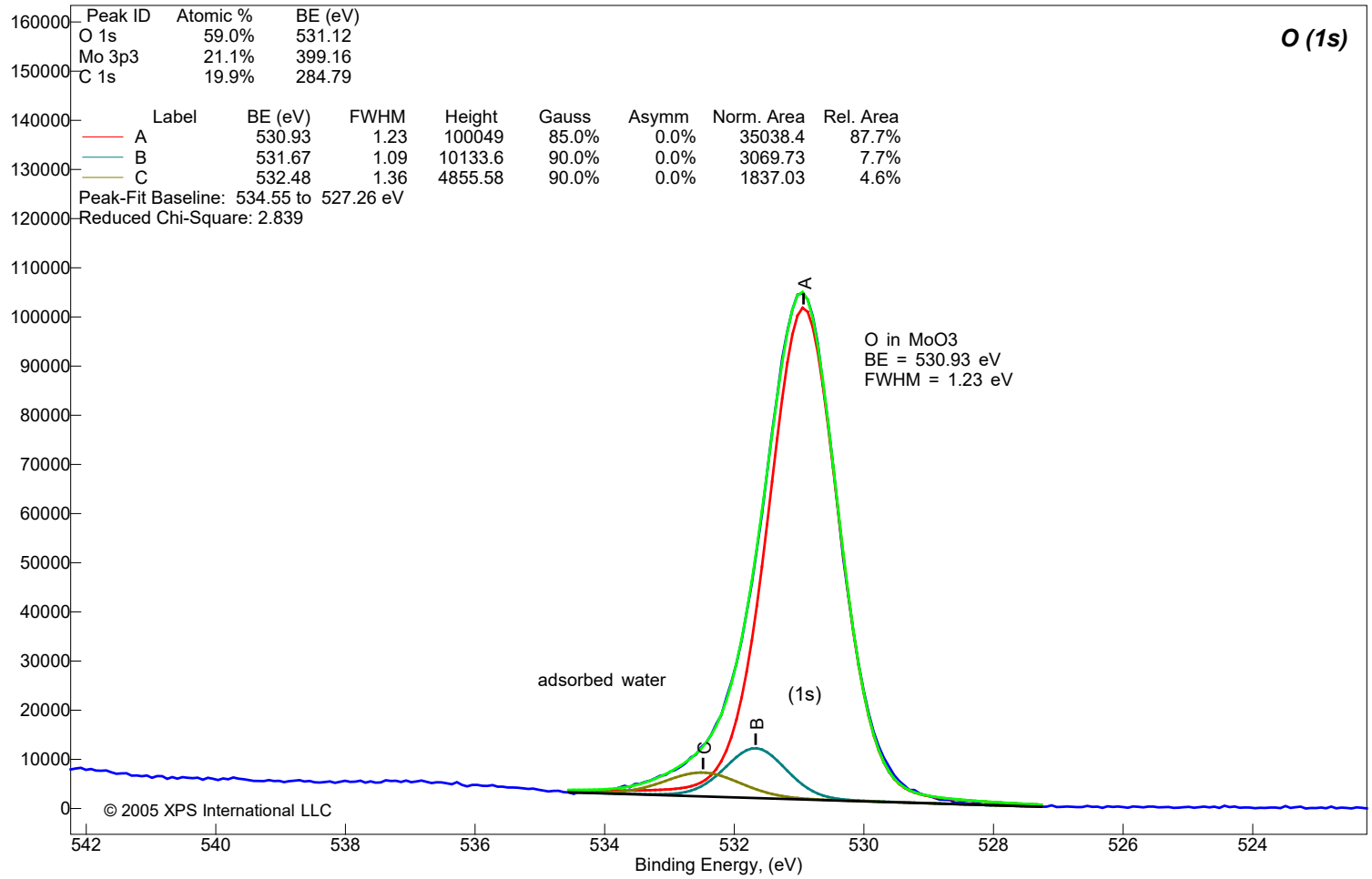
Sample Description: MoO3 (99.99%) Aldrich lot #02715CM AV, 3mm pellet, screen, 90 TOA



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Molybdenum (VI) Oxide (FW = 143.94)

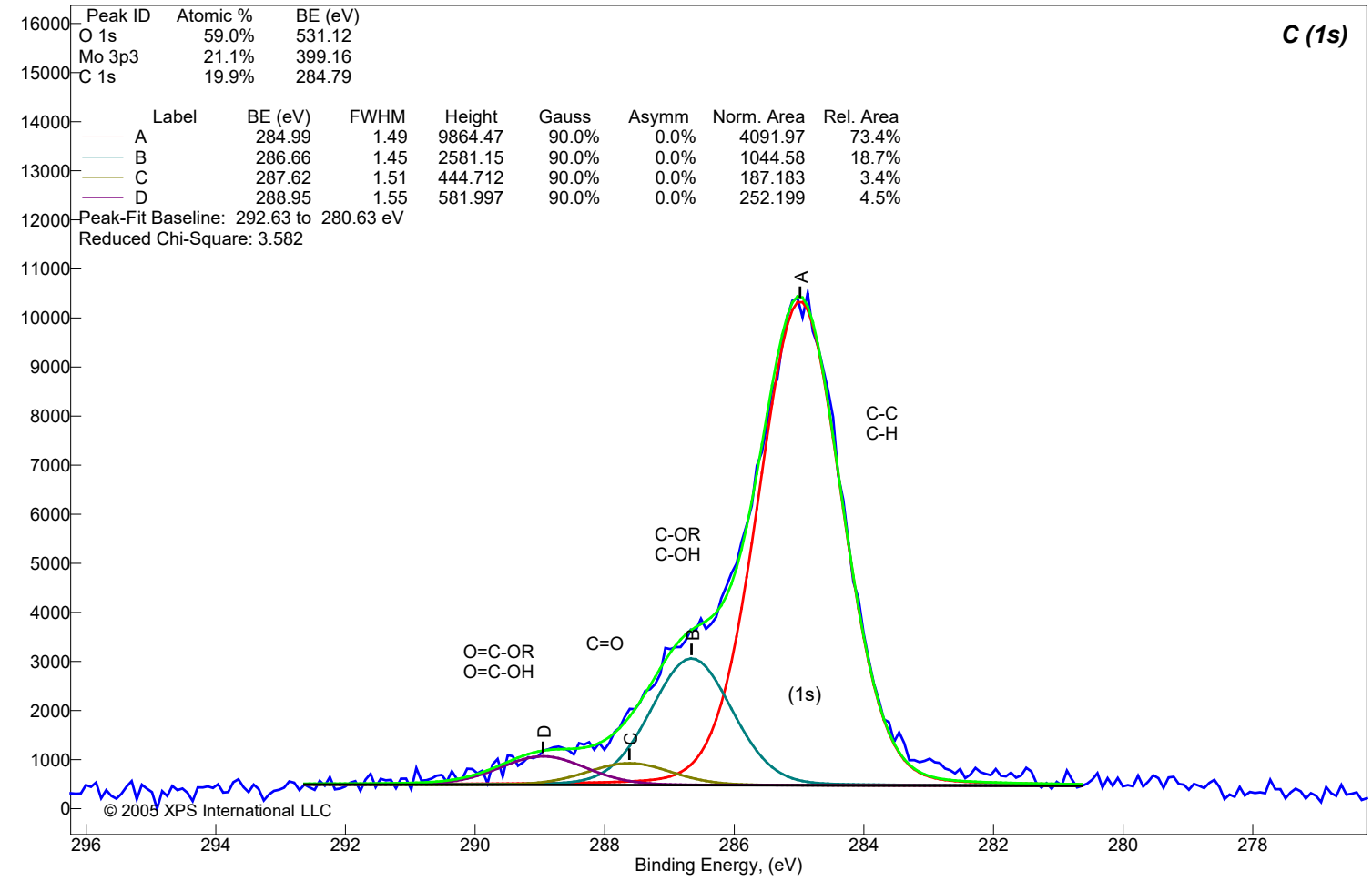
Sample Description: MoO3 (99.99%) Aldrich lot #02715CM AV, 3mm pellet, screen, 90 TOA



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Molybdenum (VI) Oxide (FW = 143.94)

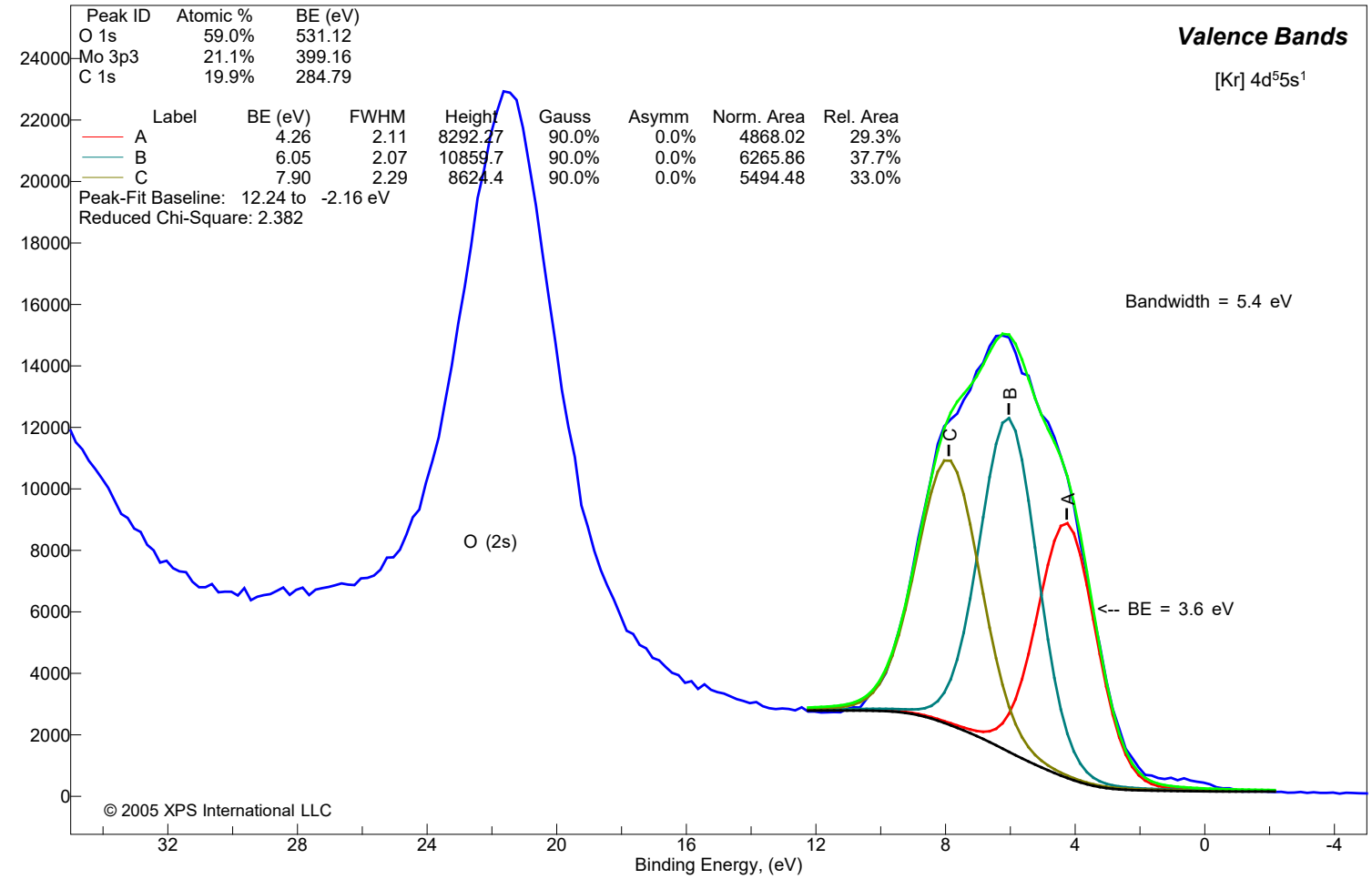
Sample Description: MoO3 (99.99%) Aldrich lot #02715CM AV, 3mm pellet, screen, 90 TOA



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Molybdenum (VI) Oxide (FW = 143.94)

Sample Description: MoO3 (99.99%) Aldrich lot #02715CM AV, 3mm pellet, screen, 90 TOA



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Sodium (I) Oxide (FW = 61.98)
Surface Composition Table

Description: Na_2O in a translucent lump of synthetic Na_2O:SiO_2 (20:80) glass (Okayama Univ, Japan)
bulk freshly exposed before analysis, analyzed at 35 deg TOA, mesh at 1mm, non-conductive

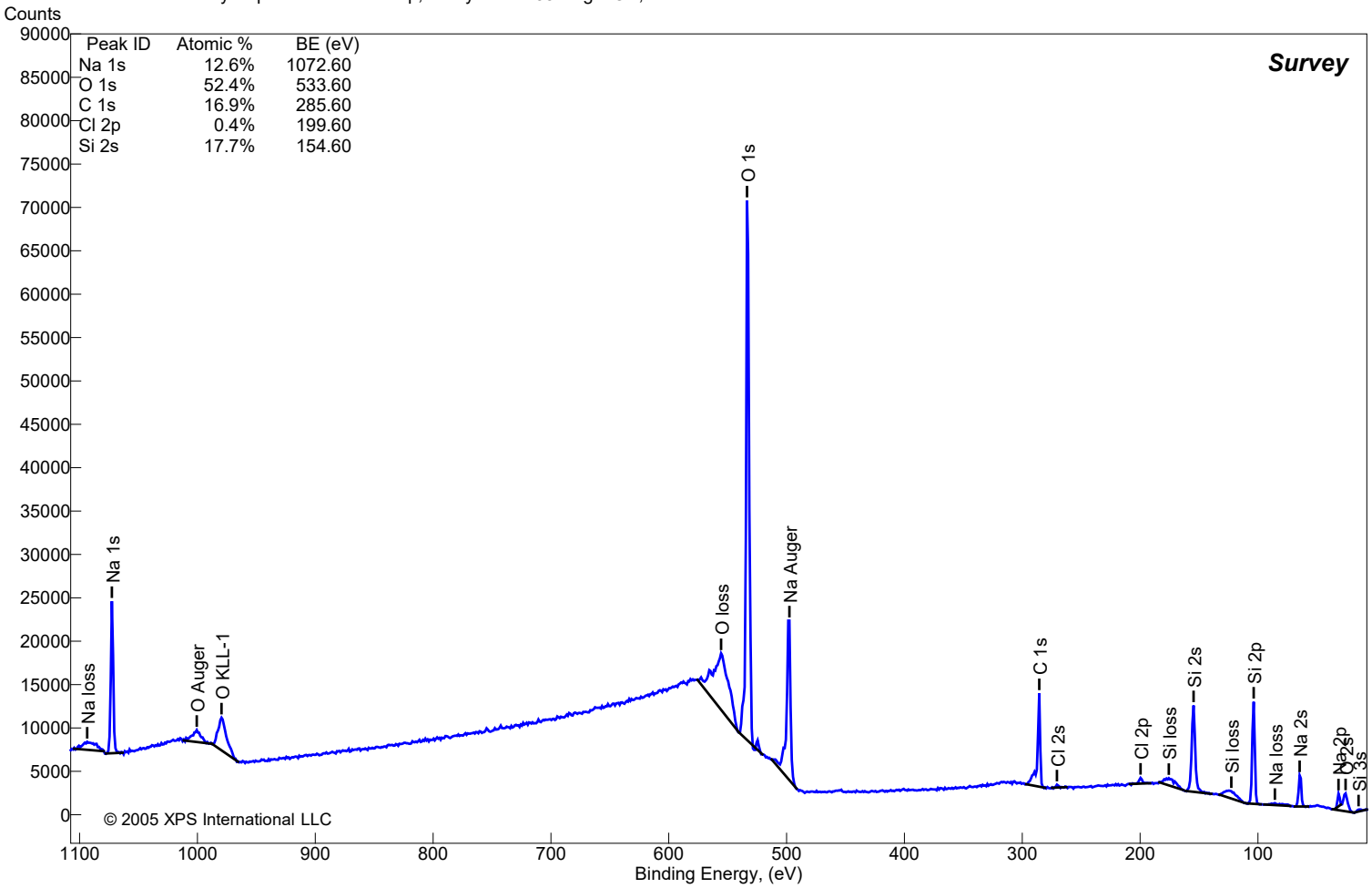
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Si 3s	14.6	11.7	0.08	1.4	658	
O 2s	25.6	22.7	0.14	1.4	9,208	
Na 2p	31.6	28.7	0.19	1.4	1,929	
Na 2s	64.6	61.7	0.42	1.4	6,021	
Na loss	85.6	82.7	0.00	1.4	1,615	
Si 2p	103.6	100.7	0.82	1.4	19,010	
Si loss	122.6	119.7	0.00	1.4	6,708	
Si 2s	154.6	151.7	0.96	1.4	21,869	17.7%
Si loss	175.6	172.7	0.00	1.4	5,328	
Cl 2p	199.6	196.7	2.28	1.4	1,151	0.4%
Cl 2s	270.6	267.7	1.69	1.4	181	
C 1s	285.6	282.7	1.00	1.4	18,842	16.9%
Na Auger	497.6	494.7	0.00	1.4	47,261	
O 1s	533.6	530.7	2.93	1.4	124,136	52.4%
O loss	555.6	552.7	0.00	1.4	62,654	
O KLL-1	979.6	976.7	0.70	1.4	19,940	
O Auger	1000.6	997.7	0.00	1.4	6,928	
Na 1s	1072.6	1069.7	8.52	1.4	26,953	12.6%
Na loss	1093.6	1090.7	0.00	1.4	6,723	

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Na_2O

Sodium (I) Oxide (FW = 61.98)

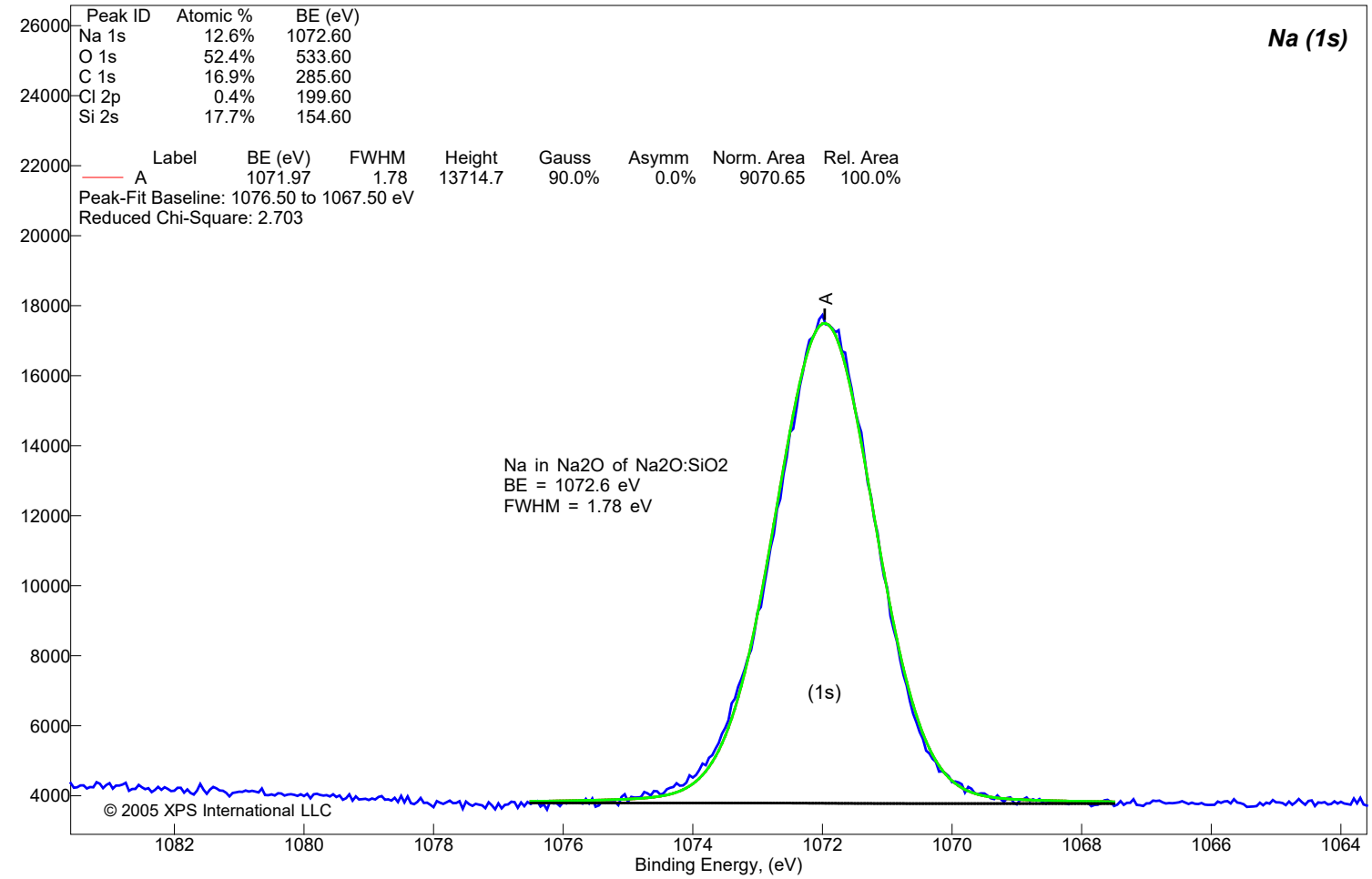
Sample Description: Na2O:SiO2 (20:80) synthesized at Tokuyama University
freshly exposed bulk of lump, analyzed at 35 deg TOA, mesh-screen at 1 mm



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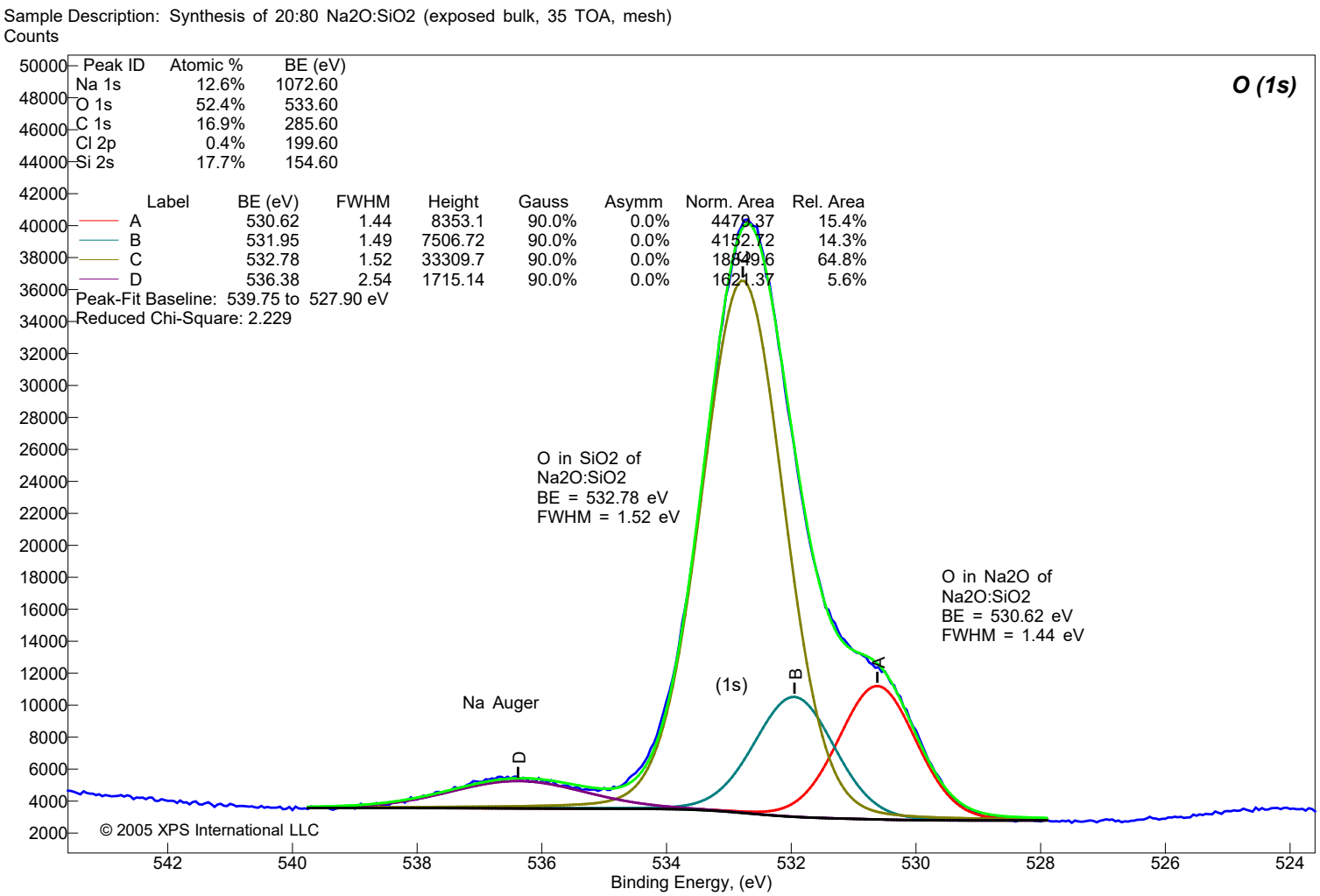
Sodium (I) Oxide (FW = 61.98)

Sample Description: Synthesis of 20:80 Na2O:SiO2 (exposed bulk, 35 TOA, mesh)



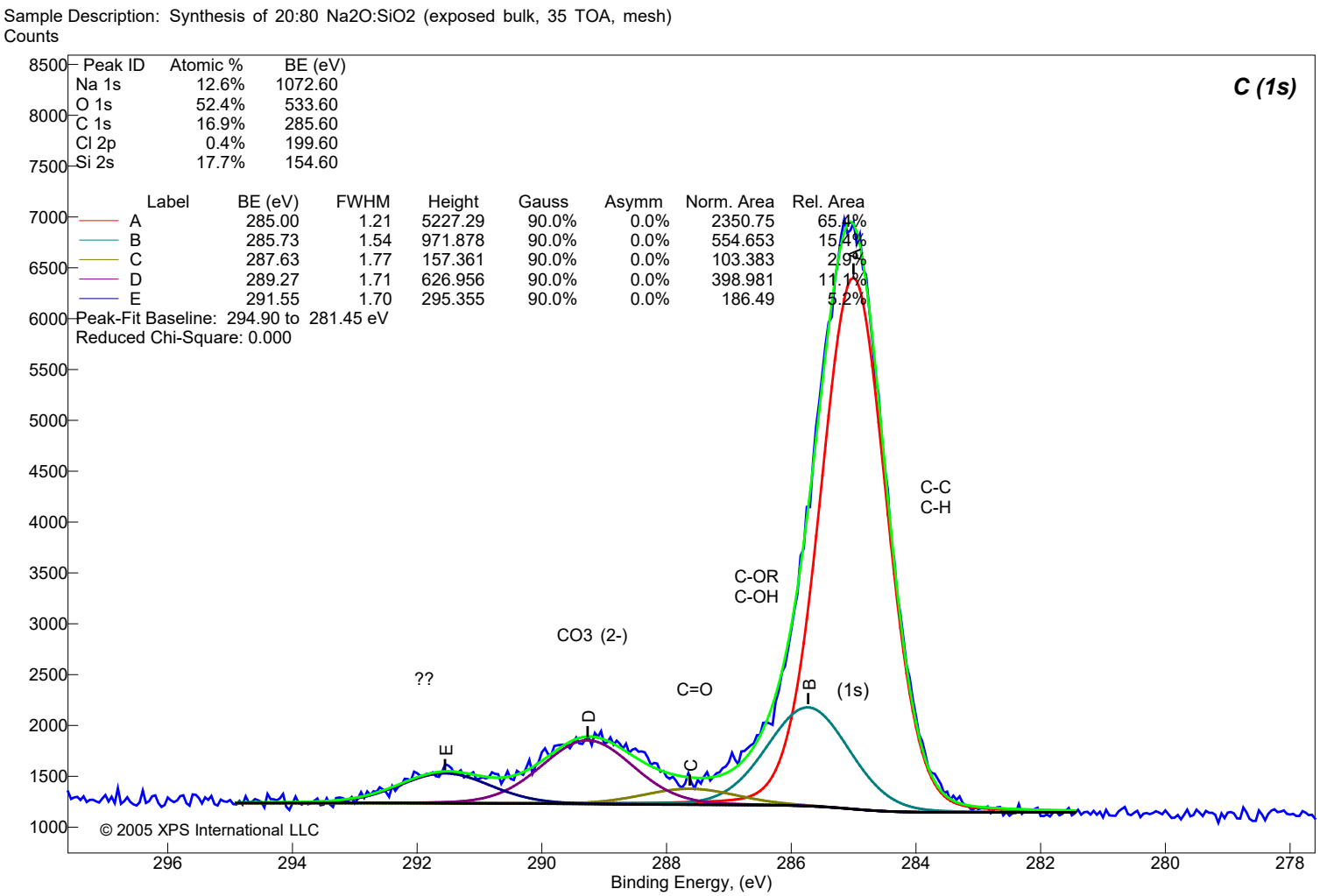
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Sodium (I) Oxide (FW = 61.98)



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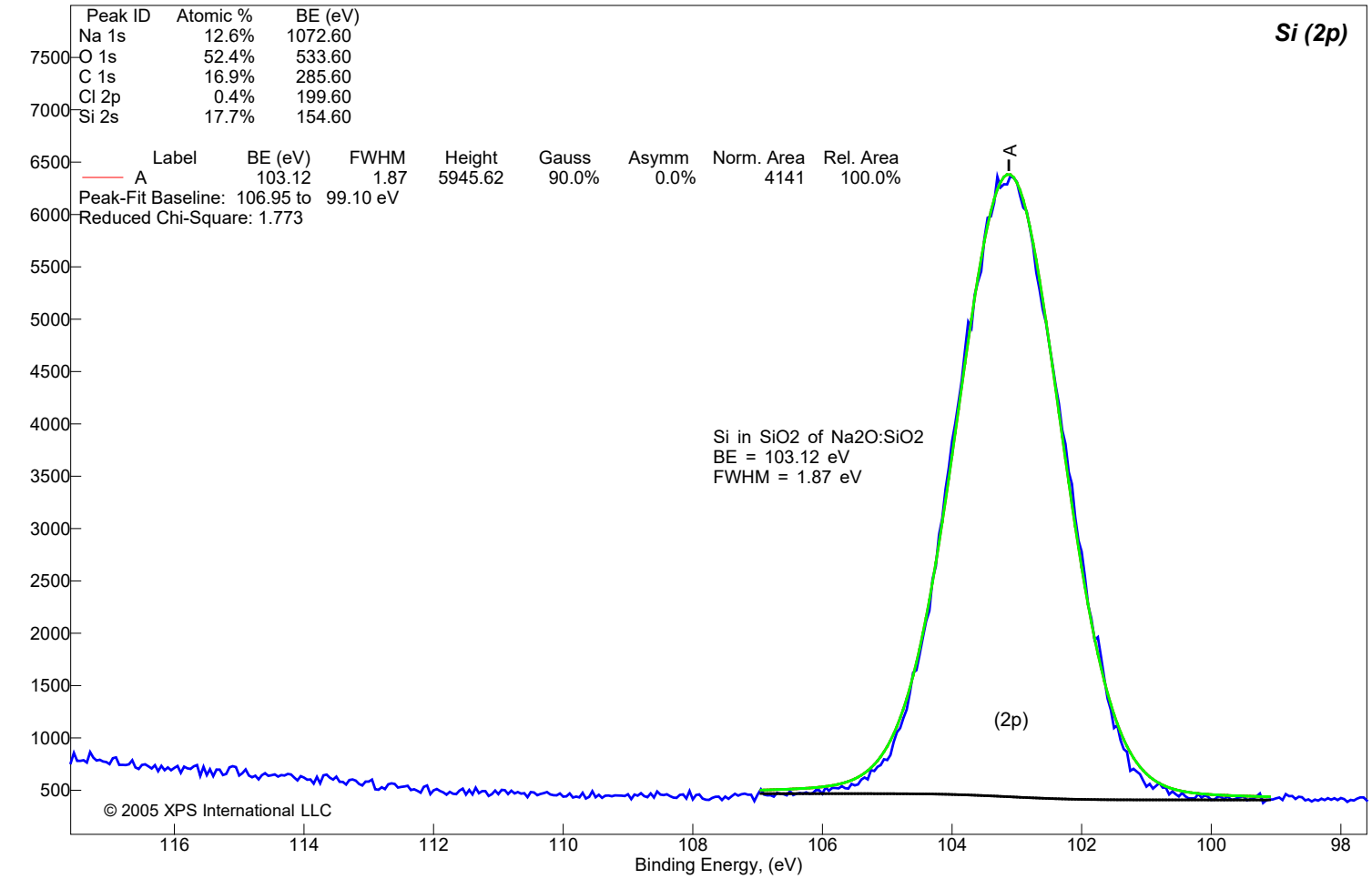
Sodium (I) Oxide (FW = 61.98)



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Sodium (I) Oxide (FW = 61.98)

Sample Description: Synthesis of 20:80 Na2O:SiO2 (exposed bulk, 35 TOA, mesh)



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NbO

Niobium (II) Oxide (FW = 108.91)
Surface Composition Table

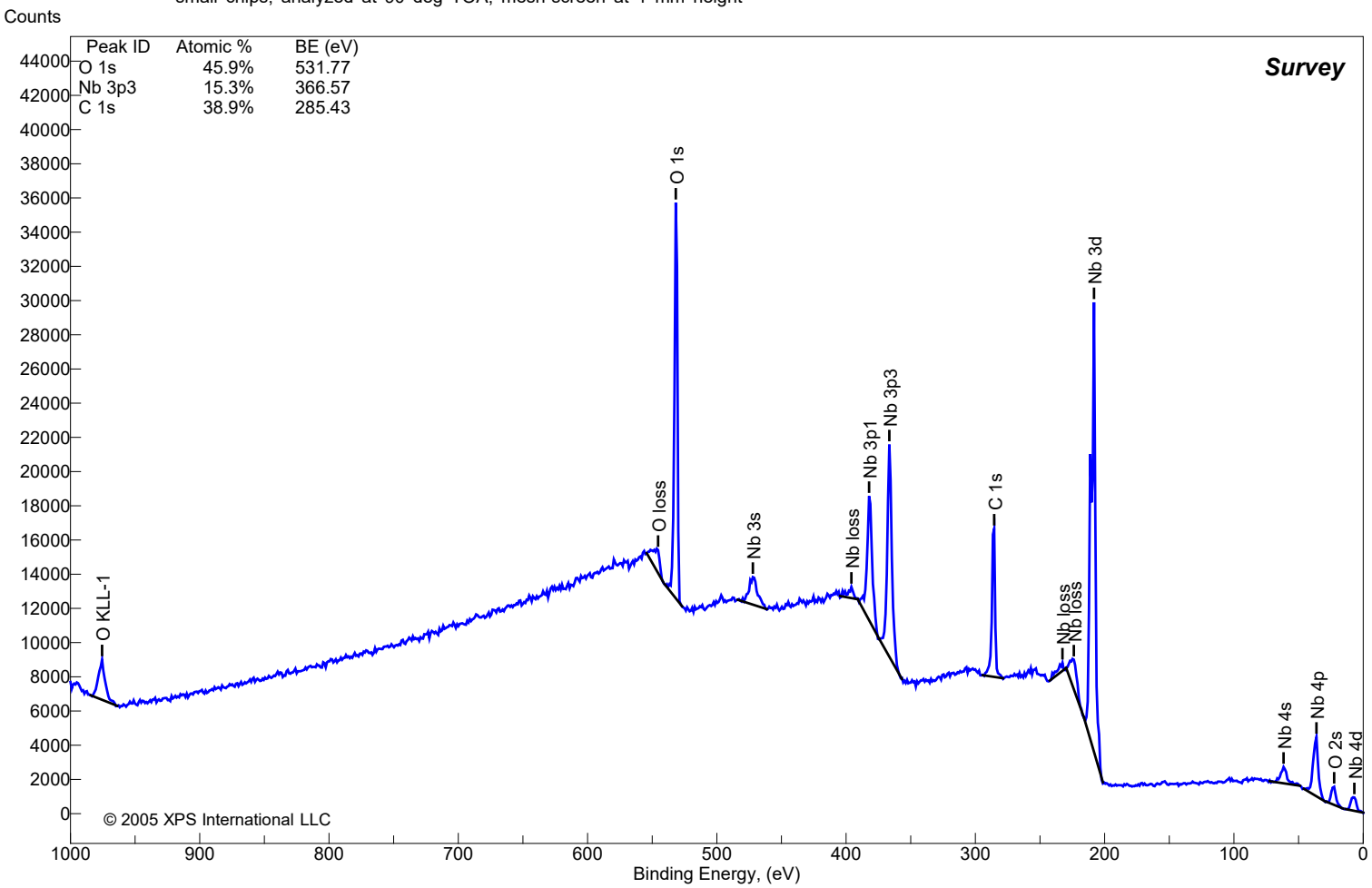
Description: NbO (99.9%) from Cerac Co. Lot# 31668-A-1-5, analyzed at 90 deg TOA, mesh at 1 mm, conductive black chip, exposed bulk before analysis, d 7.3

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Nb 4d	7.8	6.8	0.20	1.5	2,063	
O 2s	23.5	22.5	0.14	1.5	2,148	
Nb 4p	37.2	36.2	1.17	1.5	8,084	
Nb 4s	62.6	61.6	0.40	1.5	2,483	
Nb 3d	209.2	208.2	8.21	1.5	51,874	
Nb loss	224.9	223.9	0.00	1.5	4,943	
Nb loss	233.6	232.6	0.00	1.5	1,283	
C 1s	286.4	285.4	1.00	1.5	13,139	38.9%
Nb 3p3	367.6	366.6	5.53	1.5	25,691	15.3%
Nb 3p1	383.2	382.2	2.84	1.5	17,110	
Nb loss	396.9	395.9	0.00	1.5	1,781	
Nb 3s	473.1	472.1	2.22	1.5	6,485	
O 1s	532.8	531.8	2.93	1.5	32,242	45.9%
O loss	546.5	545.5	0.00	1.5	4,312	
O KLL-1	976.6	975.6	0.70	1.5	7,147	

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Niobium (II) Oxide (FW = 108.91)

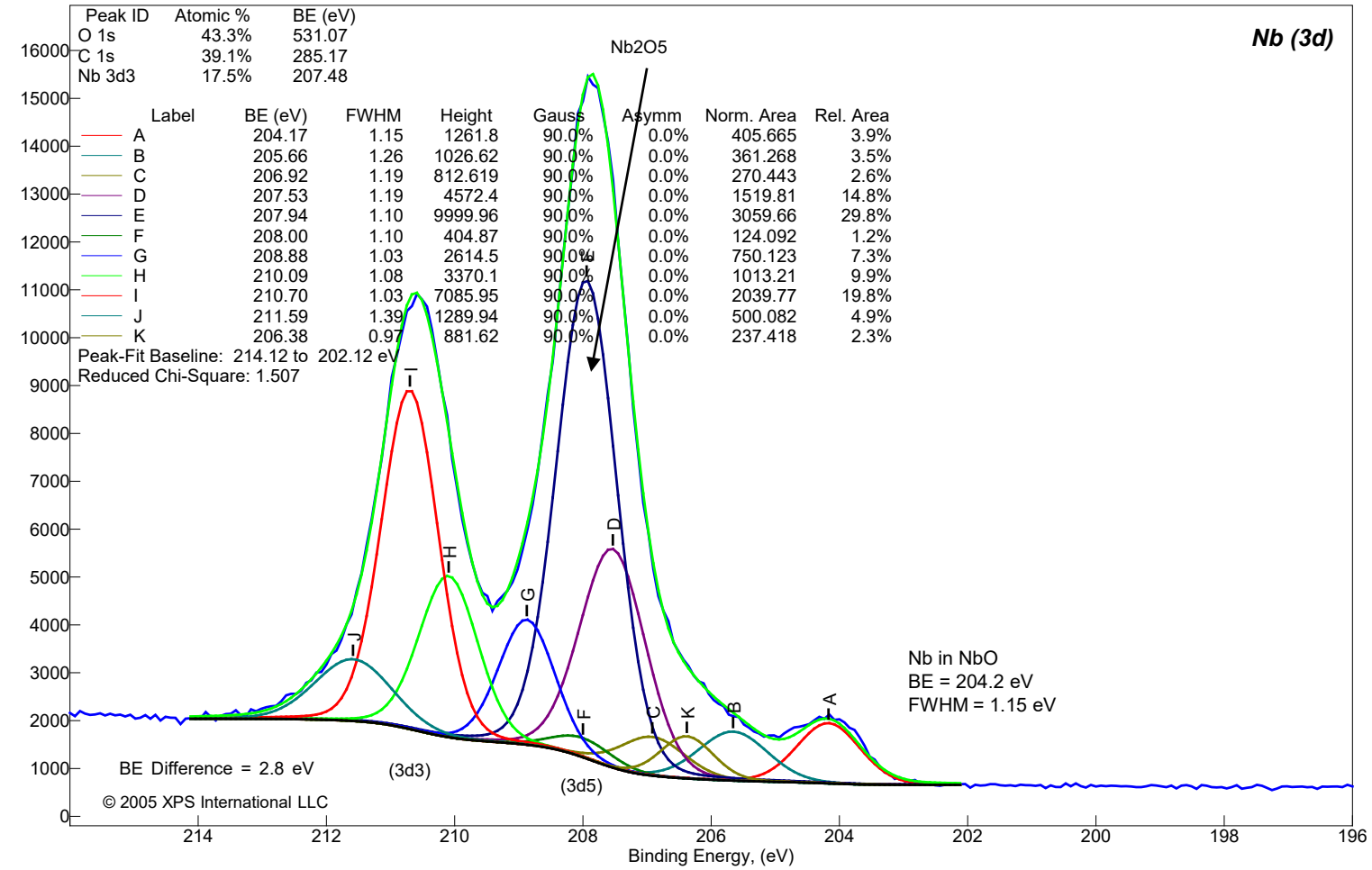
Sample Description: NbO (99.9%) from Cerac lot# 31668-A-1-5, conductive
small chips, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Niobium (II) Oxide (FW = 108.91)

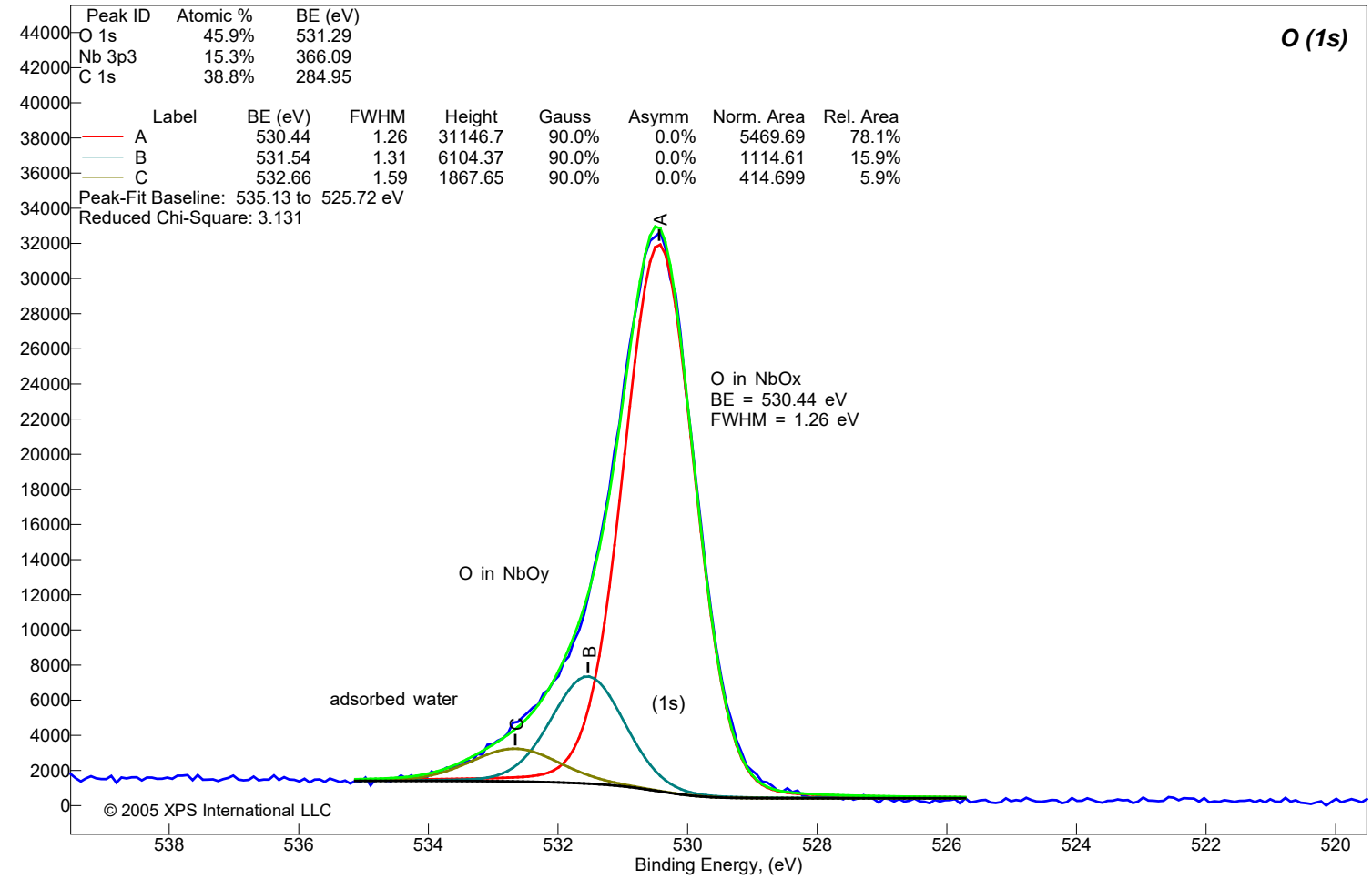
Sample Description: NbO (99.9%) Cerac lot# 31668-A-1-5 Chips/In, Screen, Conductive, 90 TOA



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Niobium (II) Oxide (FW = 108.91)

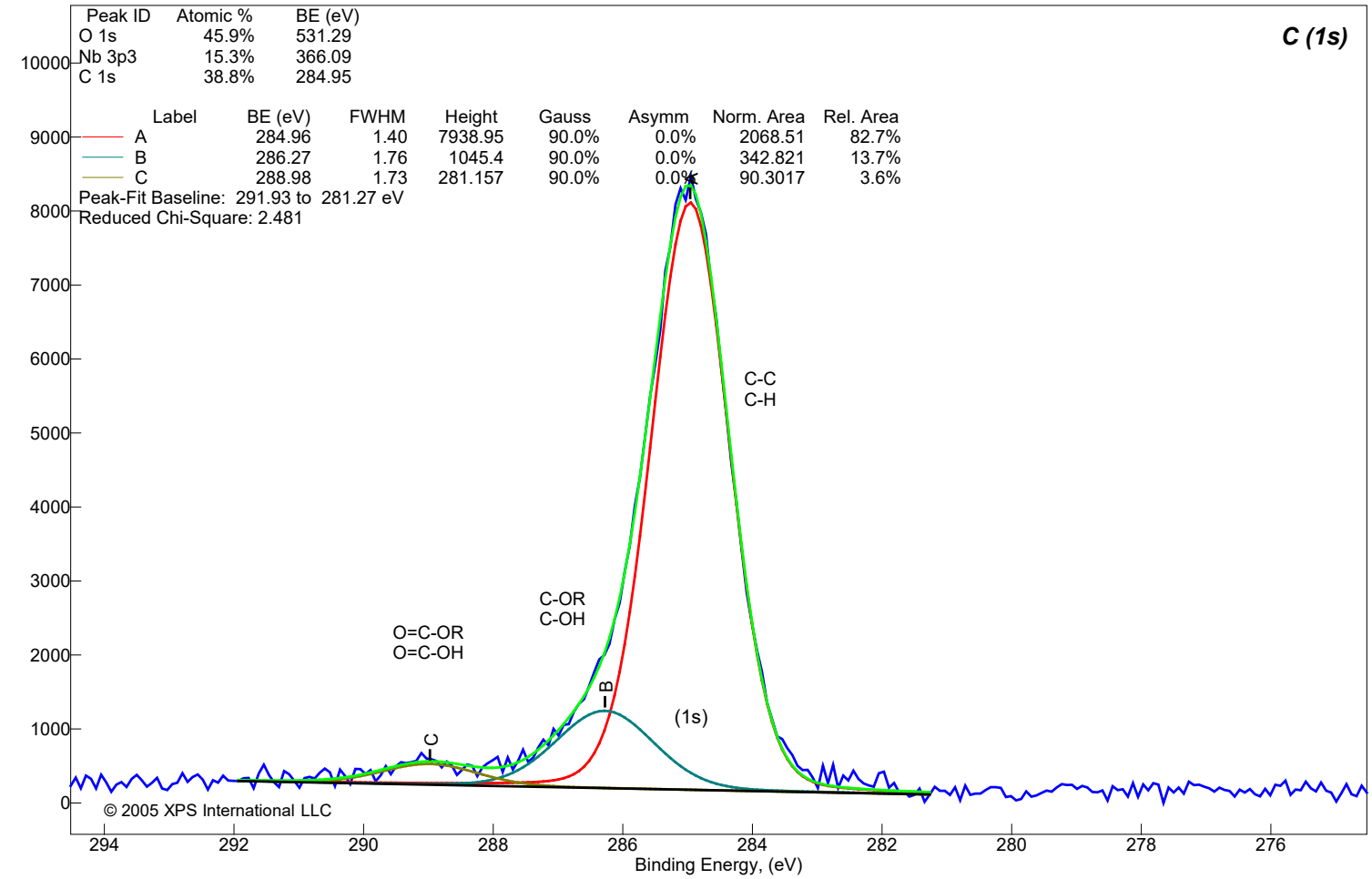
Sample Description: NbO (99.9%) Cerac lot# 31668-A-1-5 Chips/In, Screen, Conductive, 90 TOA



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Niobium (II) Oxide (FW = 108.91)

Sample Description: NbO (99.9%) Cerac lot# 31668-A-1-5 Chips/In, Screen, Conductive, 90 TOA

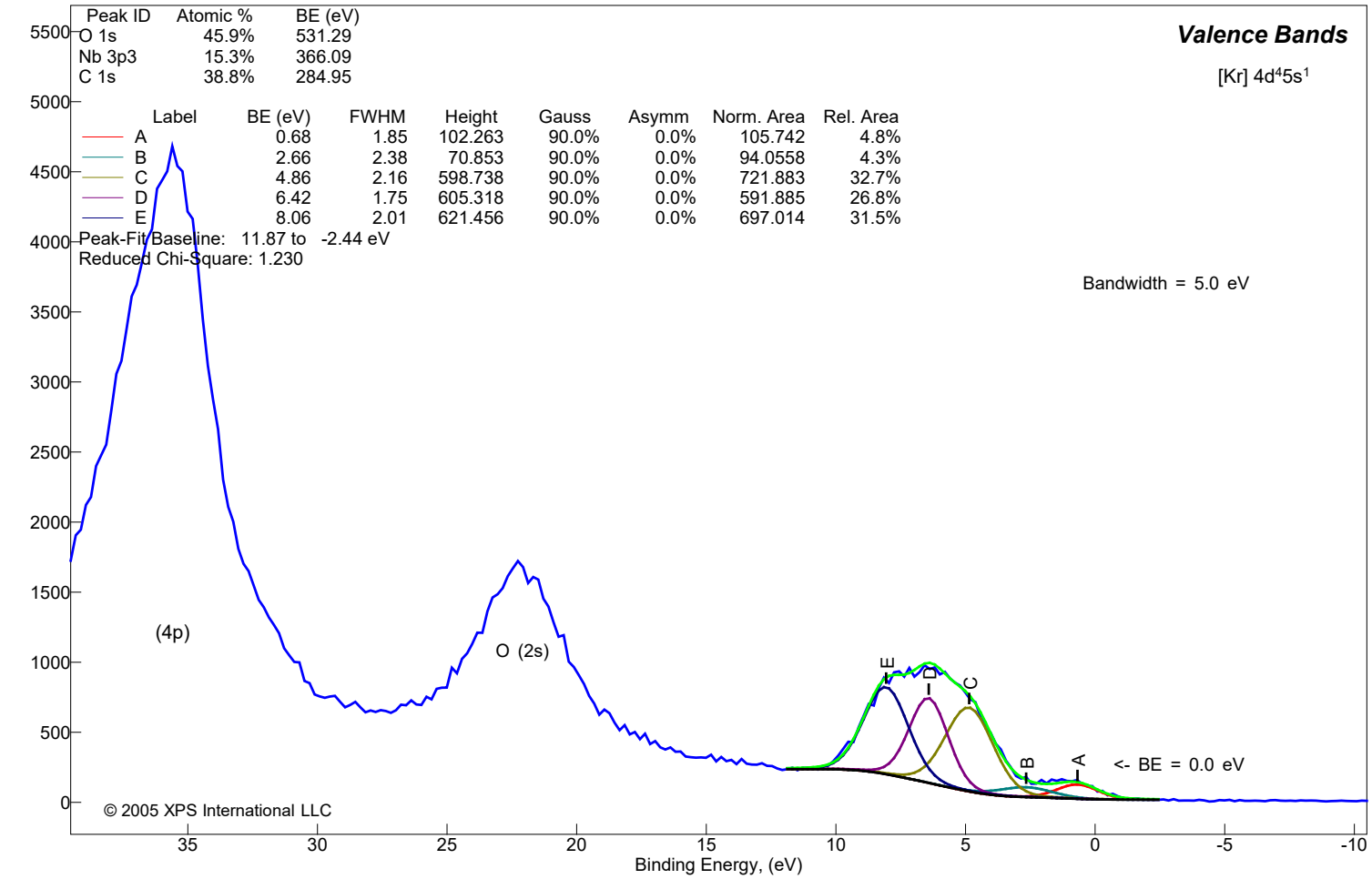


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NbO

Niobium (II) Oxide (FW = 108.91)

Sample Description: NbO (99.9%) Cerac lot# 31668-A-1-5 Chips/In, Screen, Conductive, 90 TOA

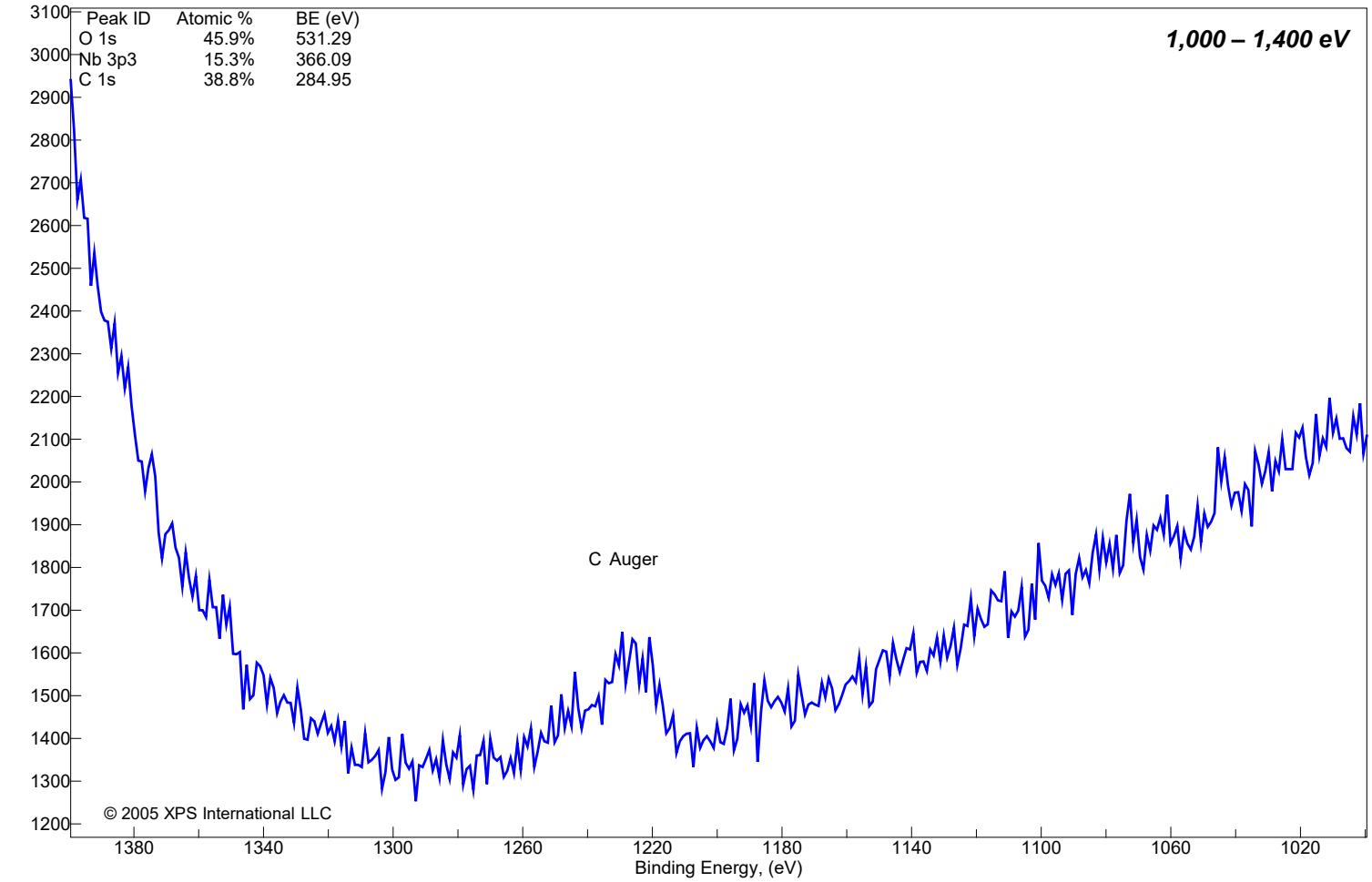


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NbO

Niobium (II) Oxide (FW = 108.91)

Sample Description: NbO (99.9%) Cerac lot# 31668-A-1-5 Chips/In, Screen, Conductive, 90 TOA



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NbO_2

Niobium (IV) Oxide (FW = 124.91)
Surface Composition Table

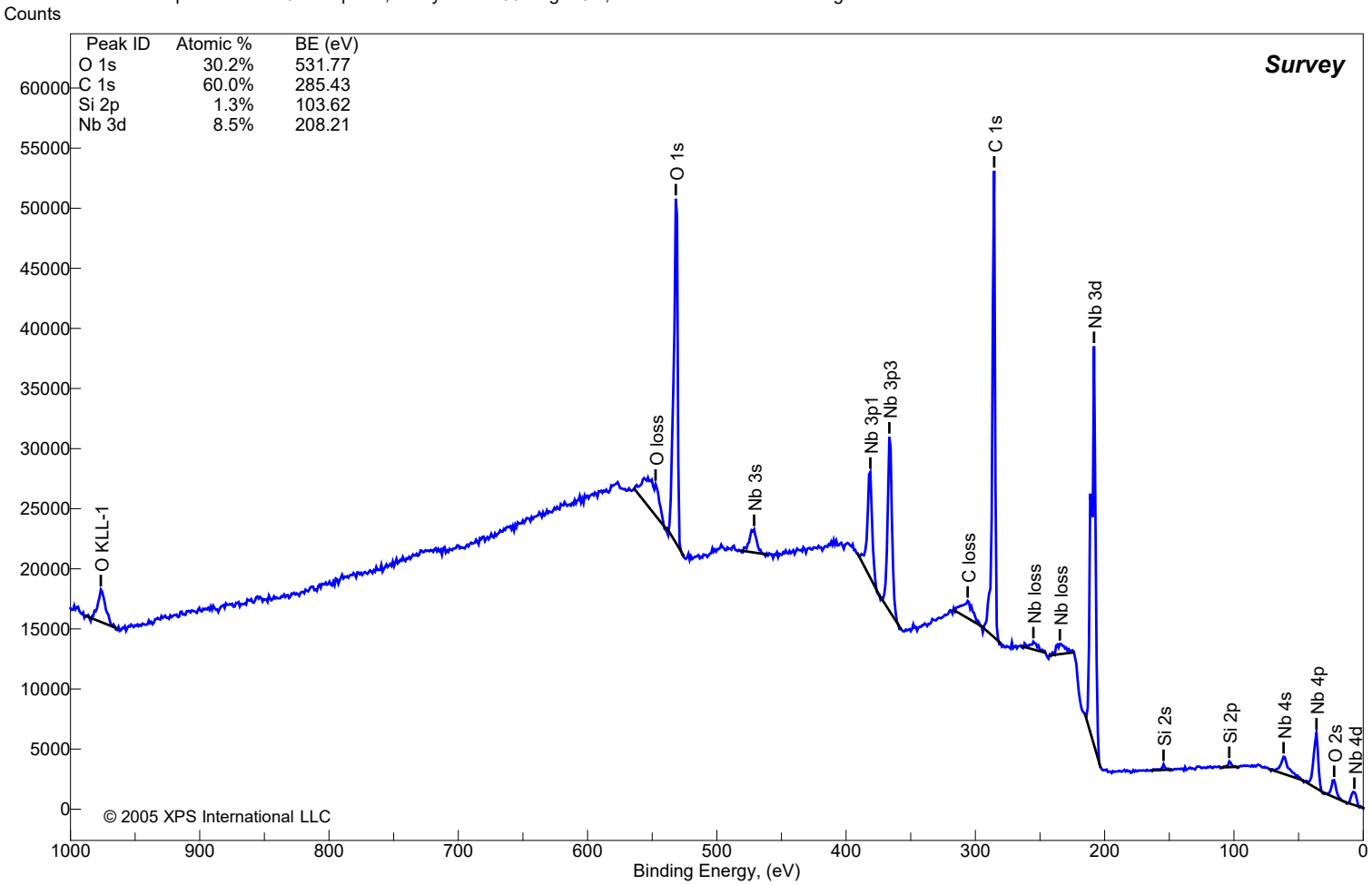
Description: NbO_2 (99.9%) from Cerac Co. Lot# 59352-A-1+2, analyzed at 90 deg TOA, mesh at 1 mm, semi-conductive powder pressed into 3 mm pellet, d 5.9

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Nb 4d	6.8	6.8	0.20	1.5	2,540	
O 2s	22.5	22.5	0.14	1.5	3,300	
Nb 4p	36.2	36.2	1.17	1.5	9,761	
Nb 4s	61.6	61.6	0.40	1.5	5,392	
Si 2p	103.6	103.6	0.82	1.5	1,094	1.3%
Si 2s	154.4	154.4	0.96	1.5	881	
Nb 3d	208.2	208.2	8.21	1.5	63,592	8.5%
Nb loss	234.6	234.6	0.00	1.5	2,476	
Nb loss	255.1	255.1	0.00	1.5	2,200	
C 1s	285.4	285.4	1.00	1.5	49,716	60.0%
C loss	306.0	306.0	0.00	1.5	6,030	
Nb 3p3	366.6	366.6	5.53	1.5	28,886	
Nb 3p1	381.2	381.2	2.84	1.5	19,496	
Nb 3s	471.2	471.2	2.22	1.5	6,357	
O 1s	531.8	531.8	2.93	1.5	51,994	30.2%
O loss	547.4	547.4	0.00	1.5	19,229	
O KLL-1	976.5	976.5	0.70	1.5	10,533	

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Niobium (IV) Oxide (FW = 124.91)

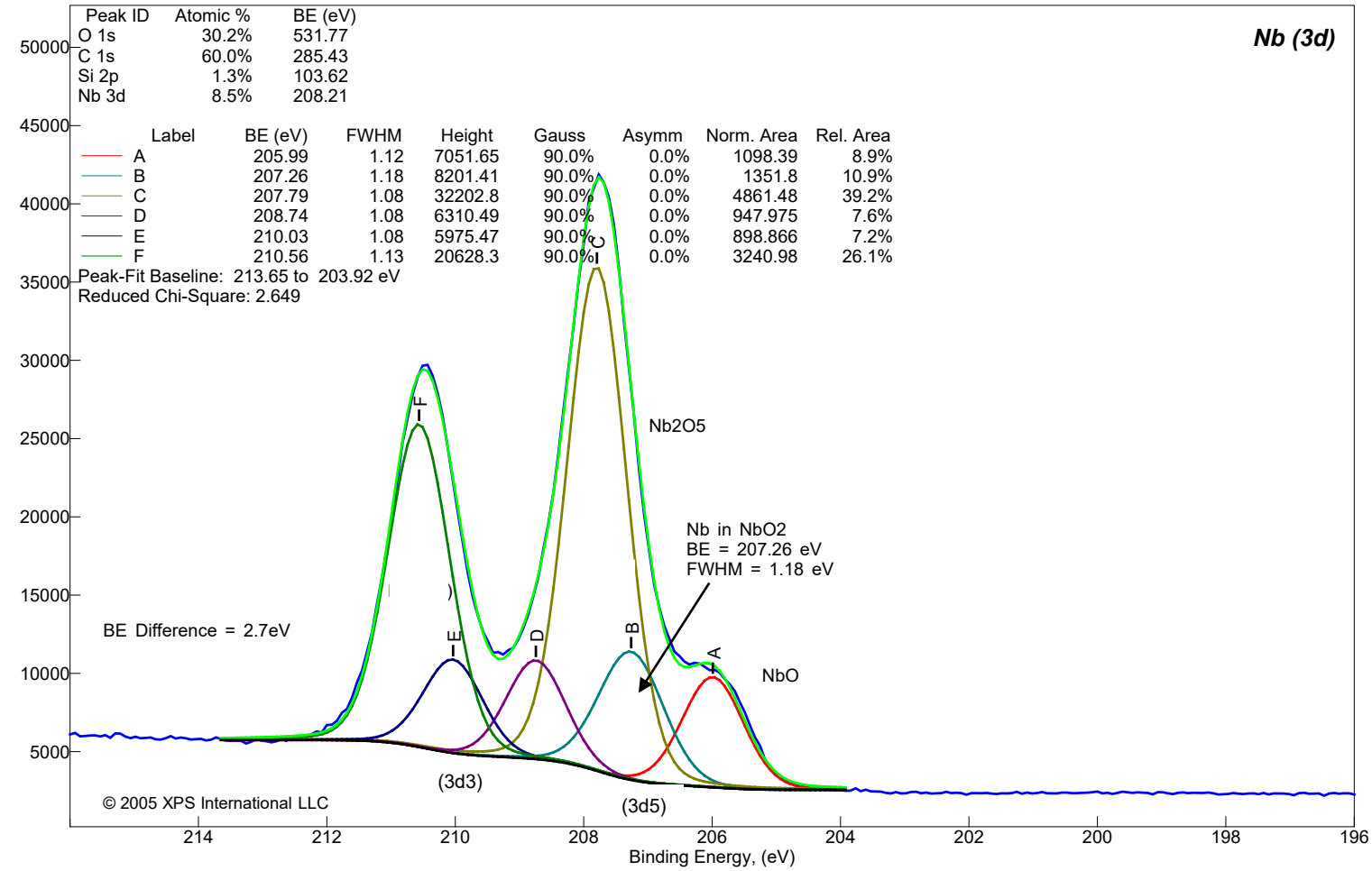
Sample Description: NbO2 (99.9%) from Cerac lot# 59352-A-1+2, Semi-Conductive
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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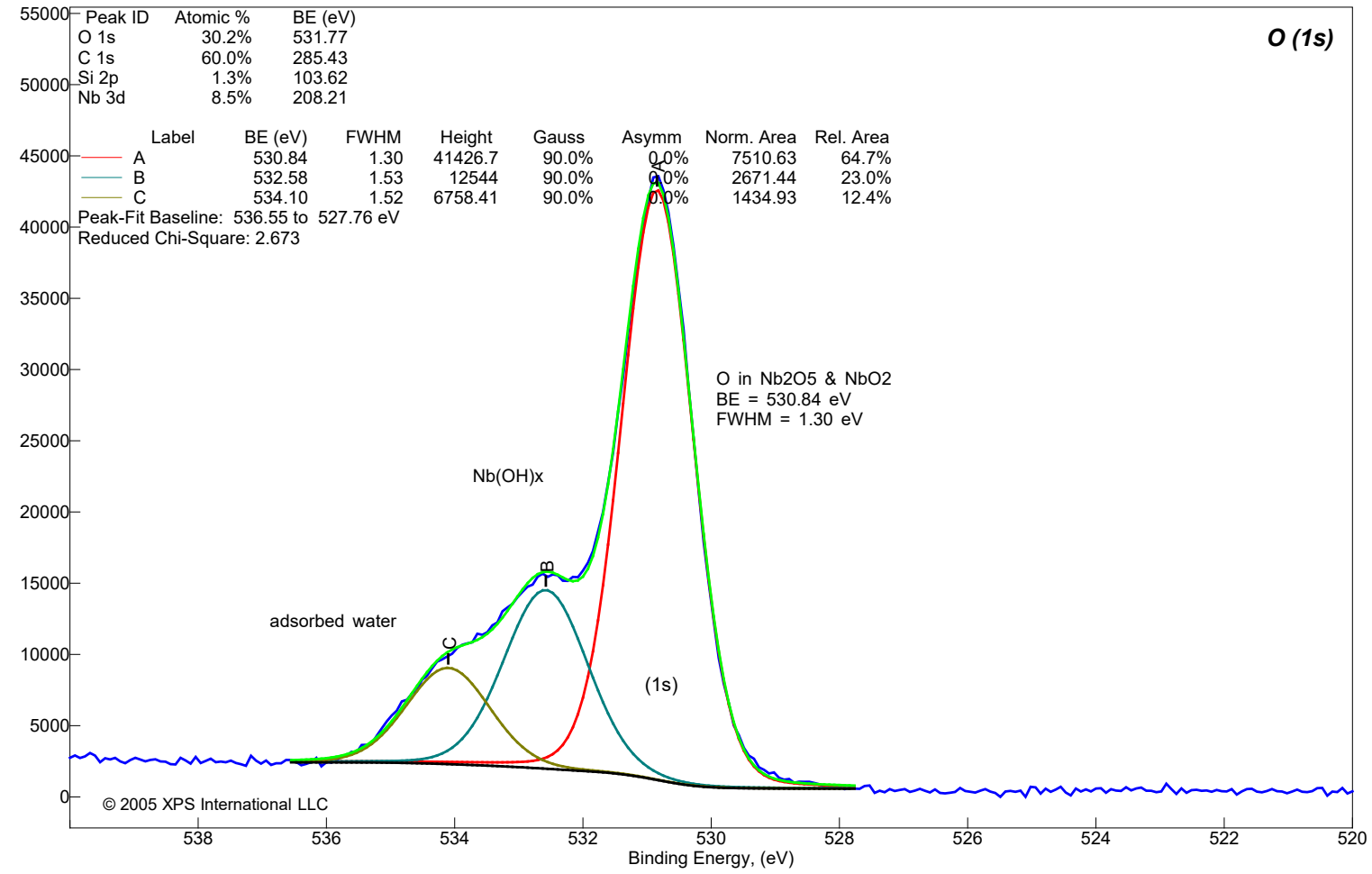
Niobium (IV) Oxide (FW = 124.91)

Sample Description: NbO2 (99.9%) Cerac lot# 59352-A-1+2, 3mm pellet, Semi-Conductive, 90 TOA



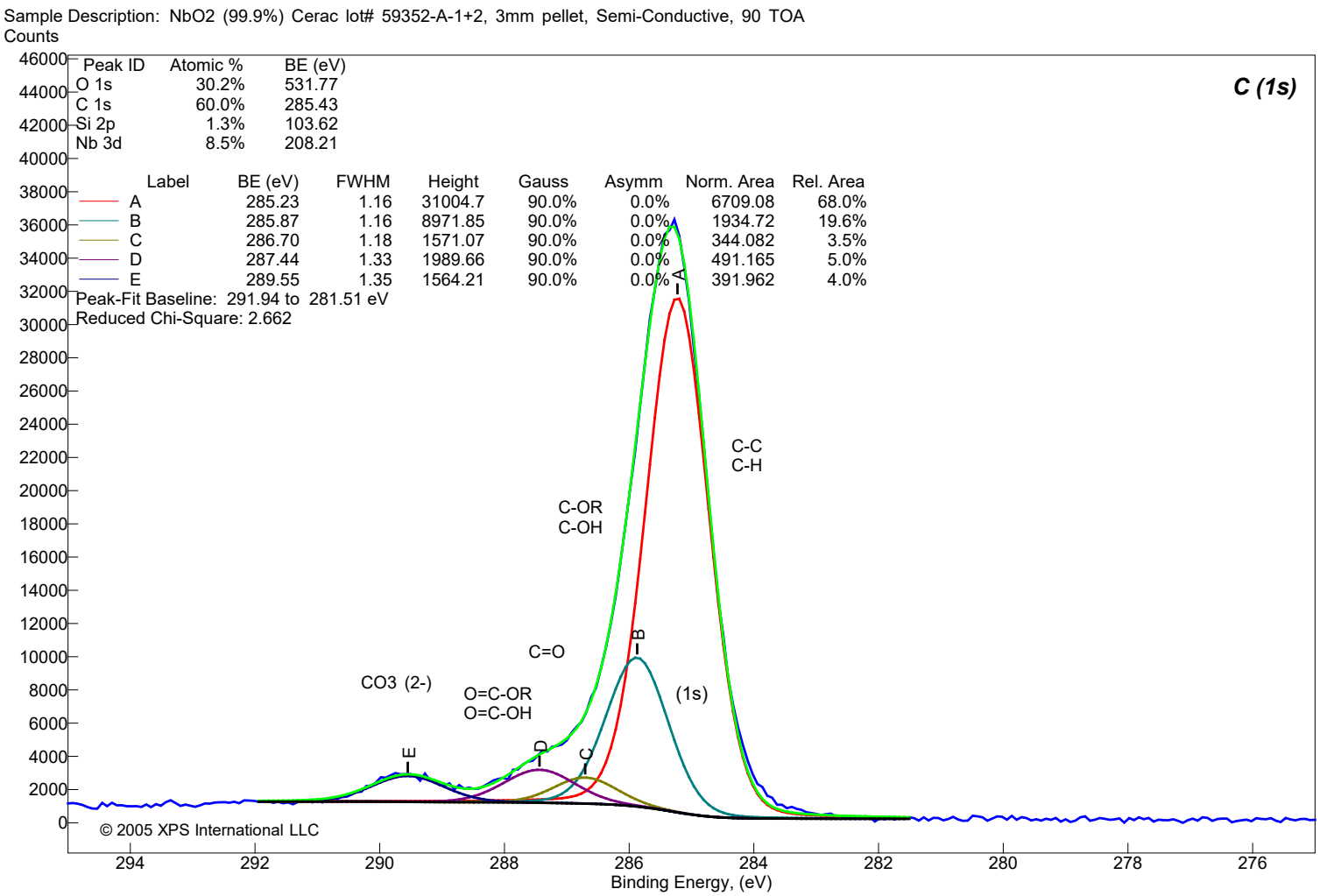
Niobium (IV) Oxide (FW = 124.91)

Sample Description: NbO2 (99.9%) Cerac lot# 59352-A-1+2, 3mm pellet, Semi-Conductive, 90 TOA



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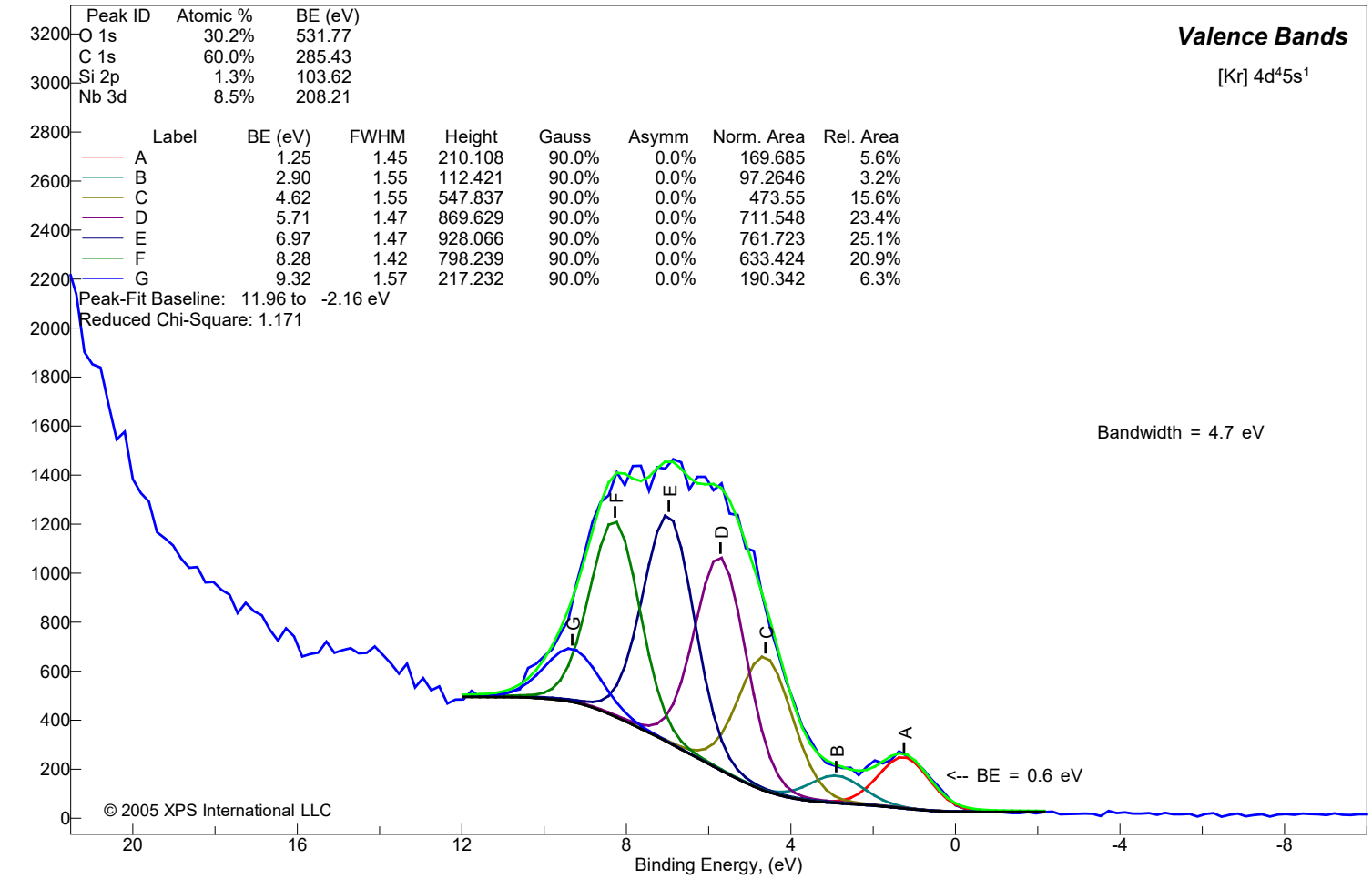
Niobium (IV) Oxide (FW = 124.91)



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Niobium (IV) Oxide (FW = 124.91)

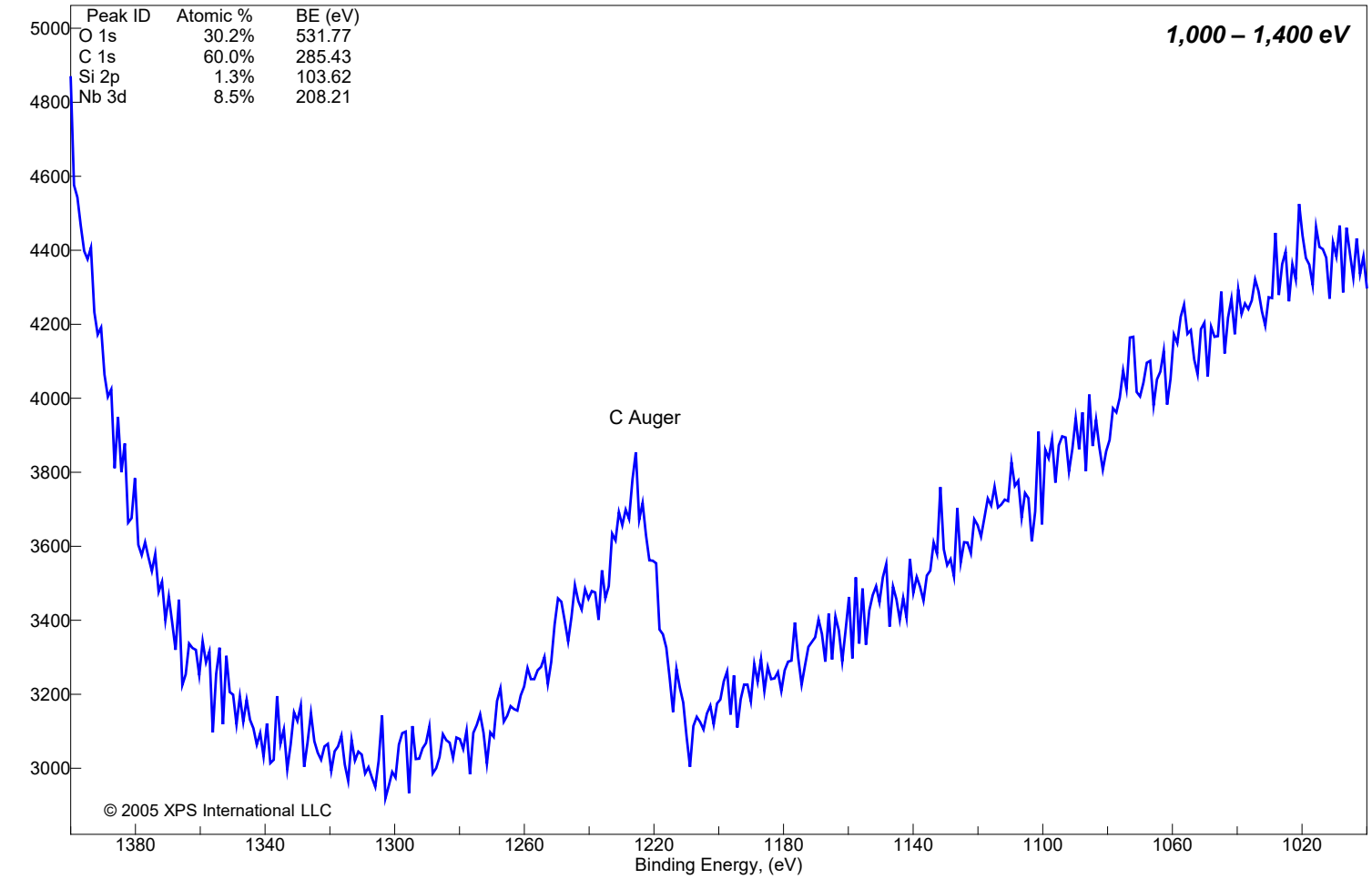
Sample Description: NbO2 (99.9%) Cerac lot# 59352-A-1+2, 3mm pellet, Semi-Conductive, 90 TOA



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Niobium (IV) Oxide (FW = 124.91)

Sample Description: NbO2 (99.9%) Cerac lot# 59352-A-1+2, 3mm pellet, Semi-Conductive, 90 TOA



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Nb_2O_5

Niobium (V) Oxide (FW = 265.82)
Surface Composition Table

Description: Nb_2O_5 (99.99%) from Aldrich Co. Lot# 90701KW, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white powder pressed into 3 mm pellet, mp 1520 C, d 4.6, sol in hot H2SO4, HF

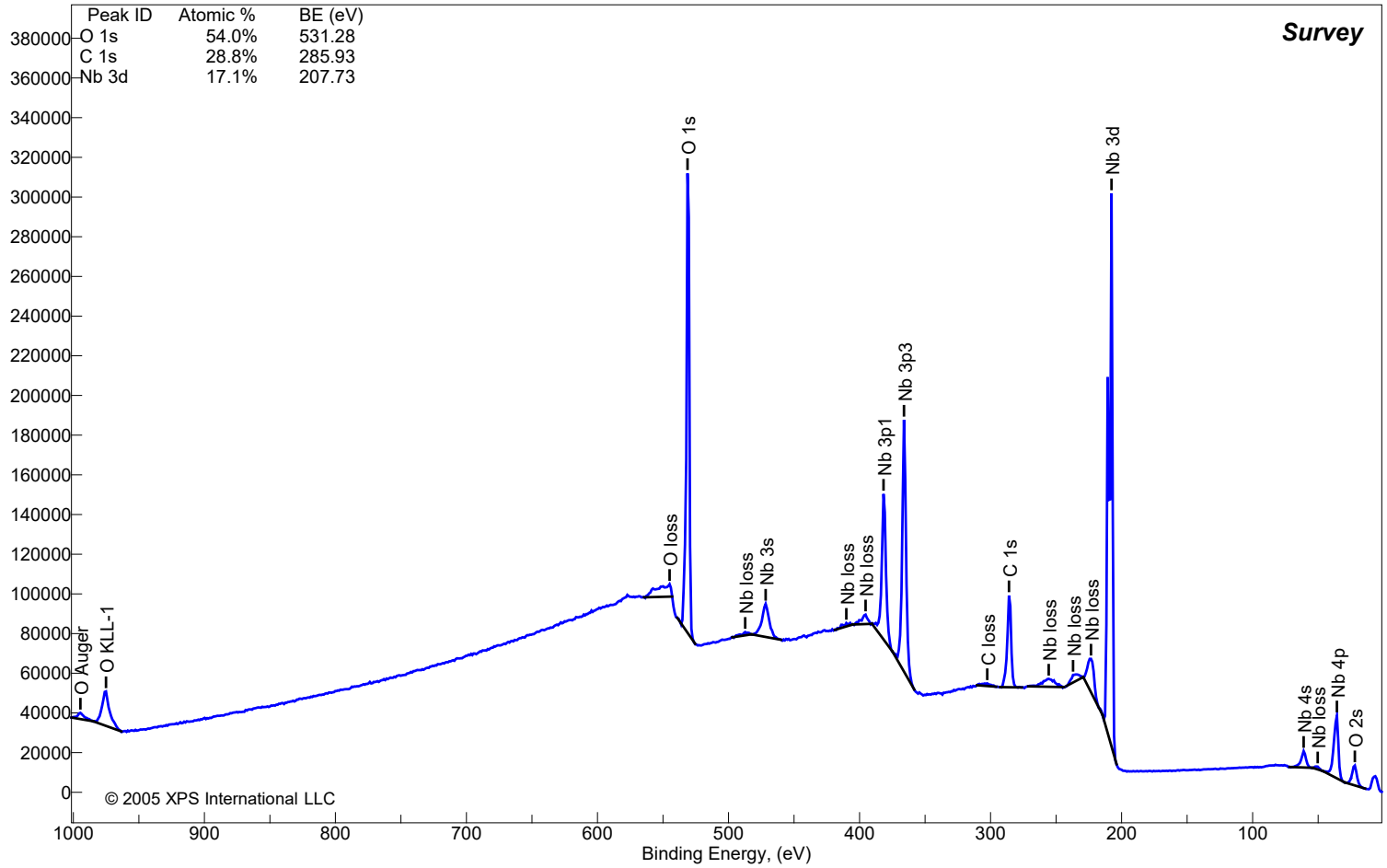
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	22.0	17.8	0.14	1.5	7,408	
Nb 4p	35.7	31.5	1.17	1.5	21,940	
Nb loss	50.3	46.1	0.00	1.5	978	
Nb 4s	61.1	56.9	0.40	1.5	6,095	
Nb 3d	207.7	203.5	8.21	1.5	144,491	17.1%
Nb loss	223.4	219.2	0.00	1.5	16,797	
Nb loss	237.1	232.9	0.00	1.5	4,606	
Nb loss	255.6	251.4	0.00	1.5	7,279	
C 1s	285.9	281.7	1.00	1.5	27,000	28.8%
C loss	302.5	298.3	0.00	1.5	1,748	
Nb 3p3	366.1	361.9	5.53	1.5	73,769	
Nb 3p1	381.7	377.5	2.84	1.5	46,774	
Nb loss	395.4	391.2	0.00	1.5	3,822	
Nb loss	410.1	405.9	0.00	1.5	1,245	
Nb 3s	471.7	467.5	2.22	1.5	18,289	
Nb loss	487.3	483.1	0.00	1.5	1,492	
O 1s	531.3	527.1	2.93	1.5	105,204	54.0%
O loss	545.0	540.8	0.00	1.5	12,393	
O KLL-1	975.1	970.9	0.70	1.5	20,627	
O Auger	994.6	990.4	0.00	1.5	3,556	

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Nb_2O_5

Niobium (V) Oxide (FW = 265.82)

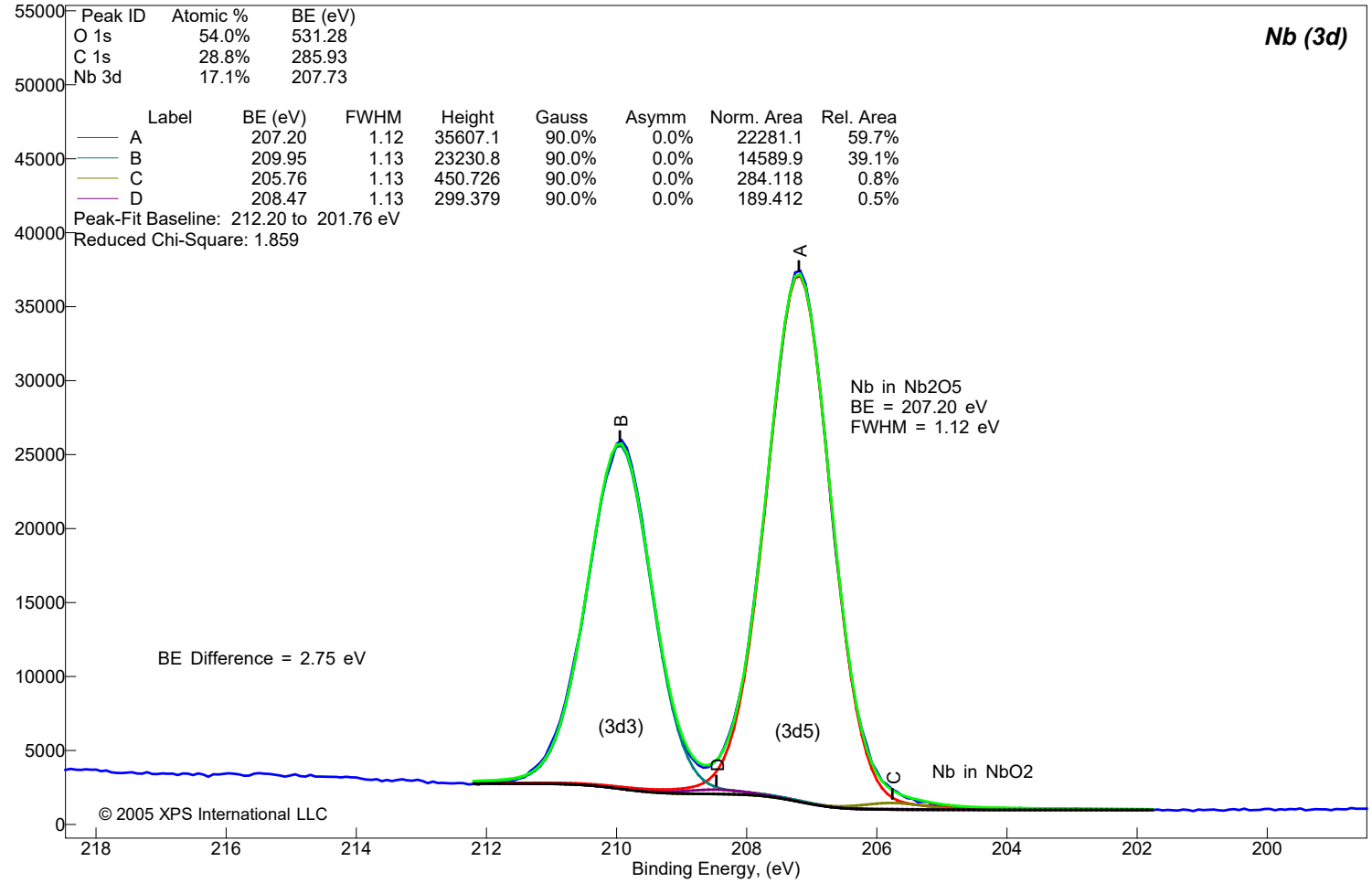
Sample Description: Nb2O5 (99.99%) from Aldrich lot# KW 09701KW
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Niobium (V) Oxide (FW = 265.82)

Sample Description: Nb2O5 (99.99%) Aldrich Lot# KW 09701KW, 3mm pellet, screen, 90 TOA

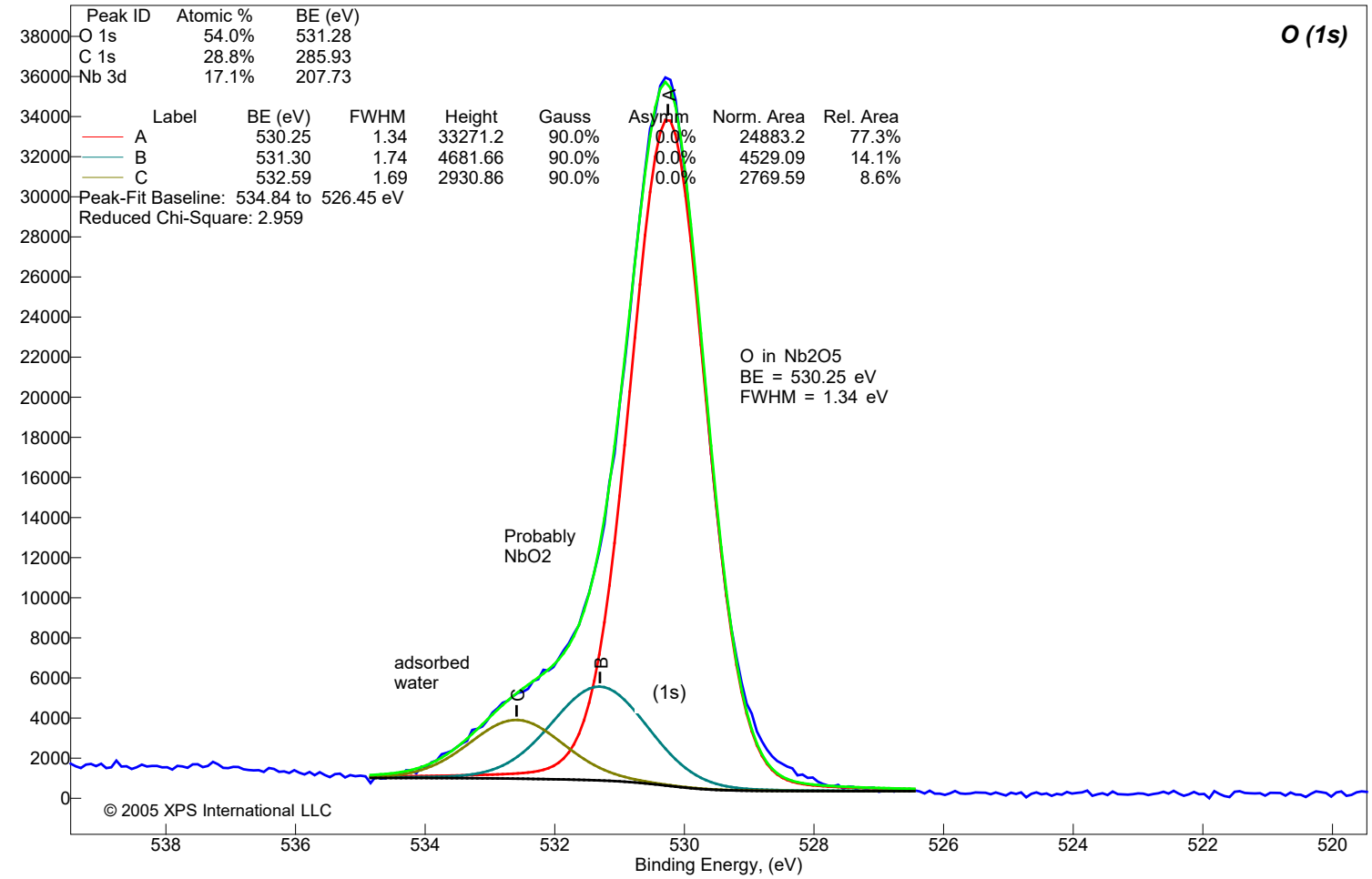


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Nb_2O_5

Niobium (V) Oxide (FW = 265.82)

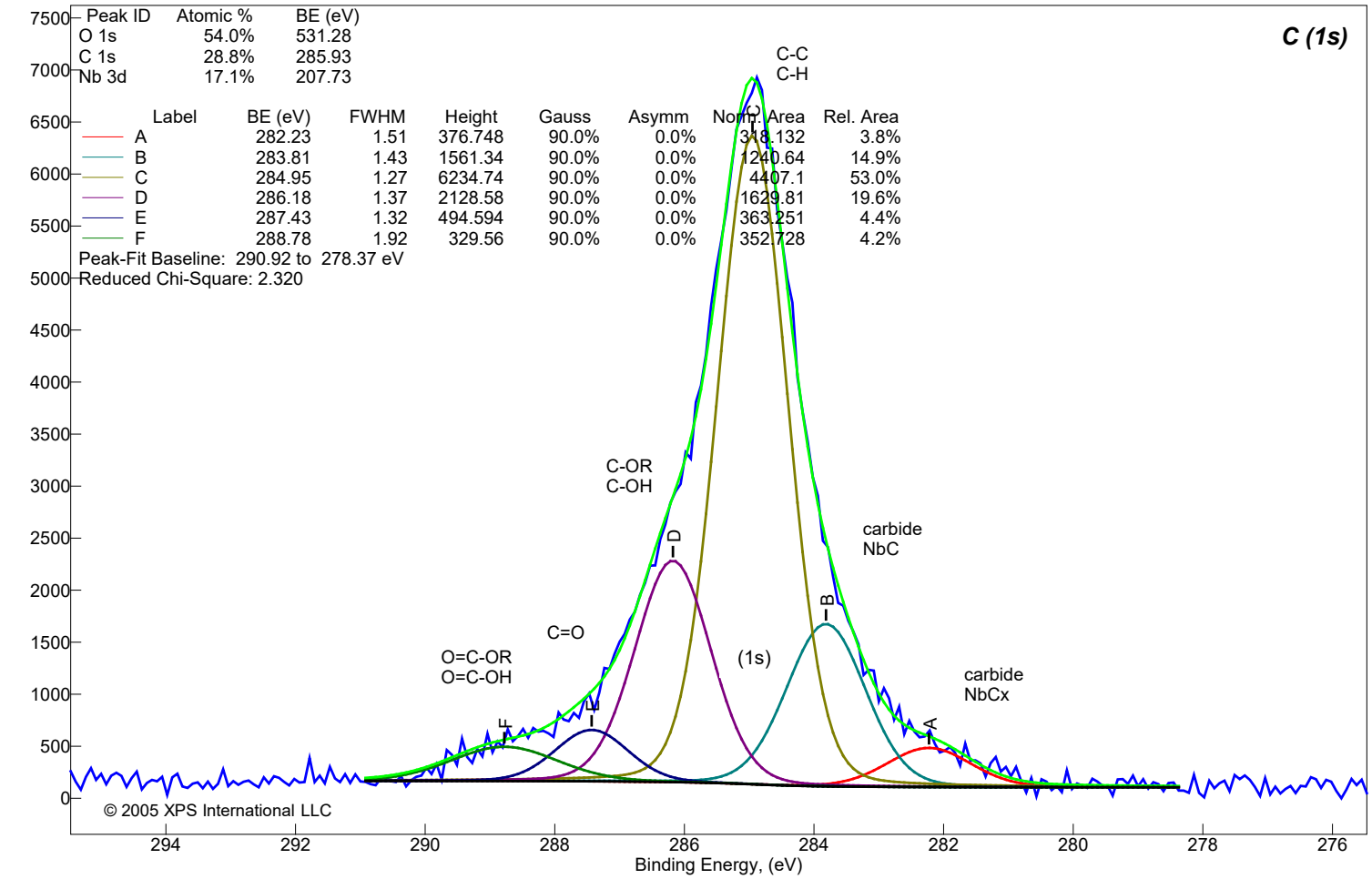
Sample Description: Nb2O5 (99.99%) Aldrich Lot# KW 09701KW, 3mm pellet, screen, 90 TOA



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Niobium (V) Oxide (FW = 265.82)

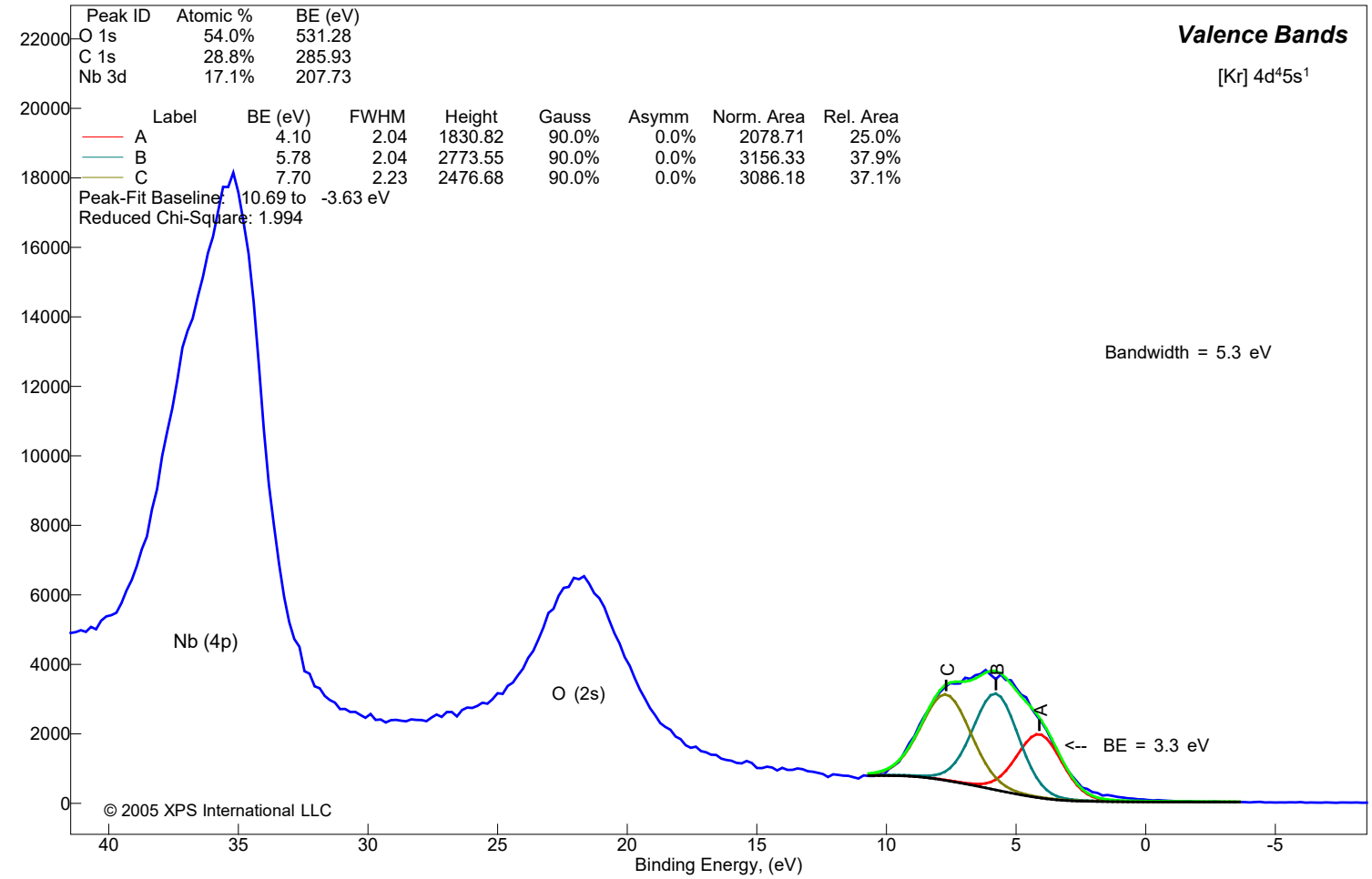
Sample Description: Nb2O5 (99.99%) Aldrich Lot# KW 09701KW, 3mm pellet, screen, 90 TOA



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Niobium (V) Oxide (FW = 265.82)

Sample Description: Nb2O5 (99.99%) Aldrich Lot# KW 09701KW, 3mm pellet, screen, 90 TOA

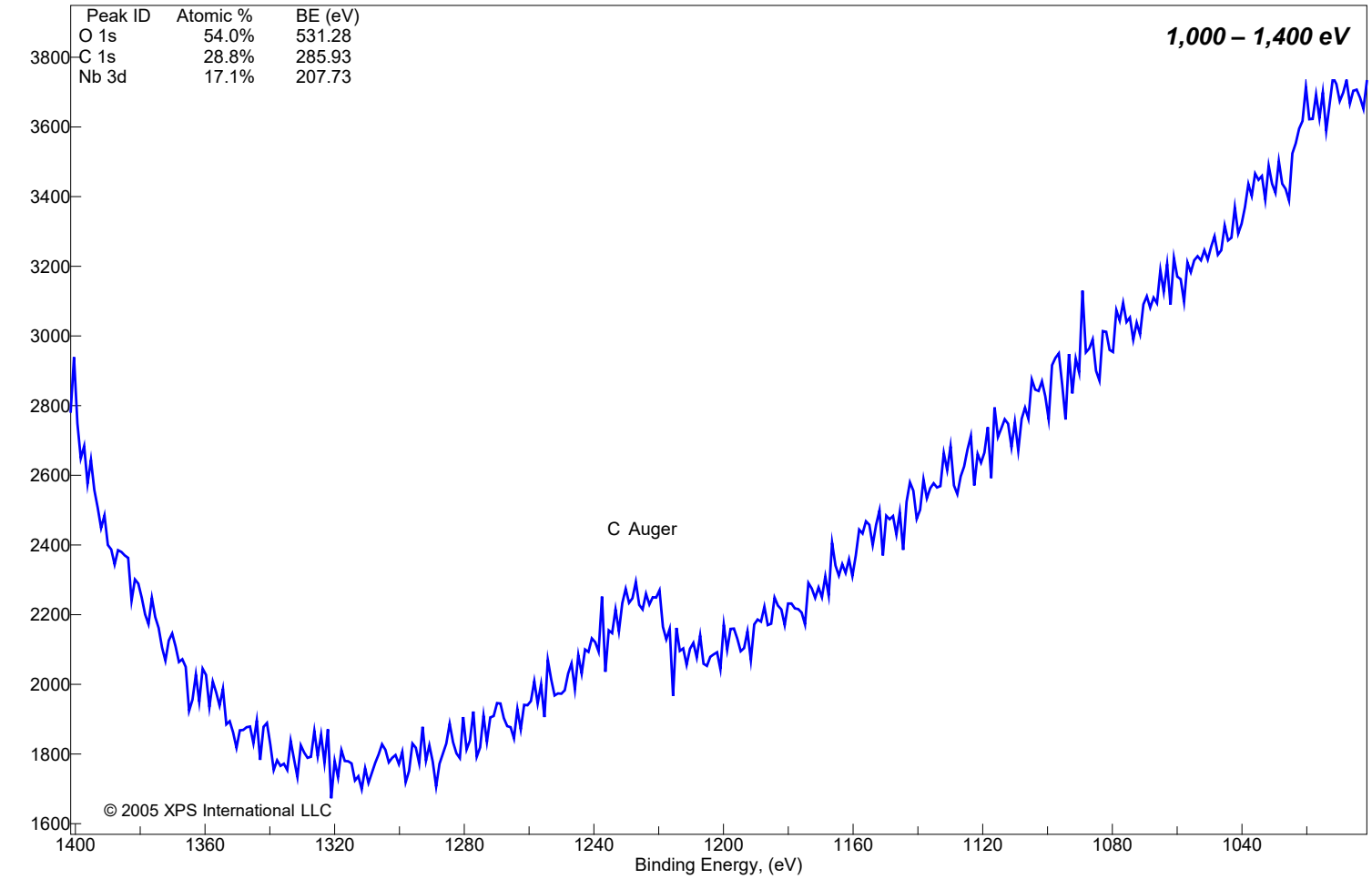


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Nb_2O_5

Niobium (V) Oxide (FW = 265.82)

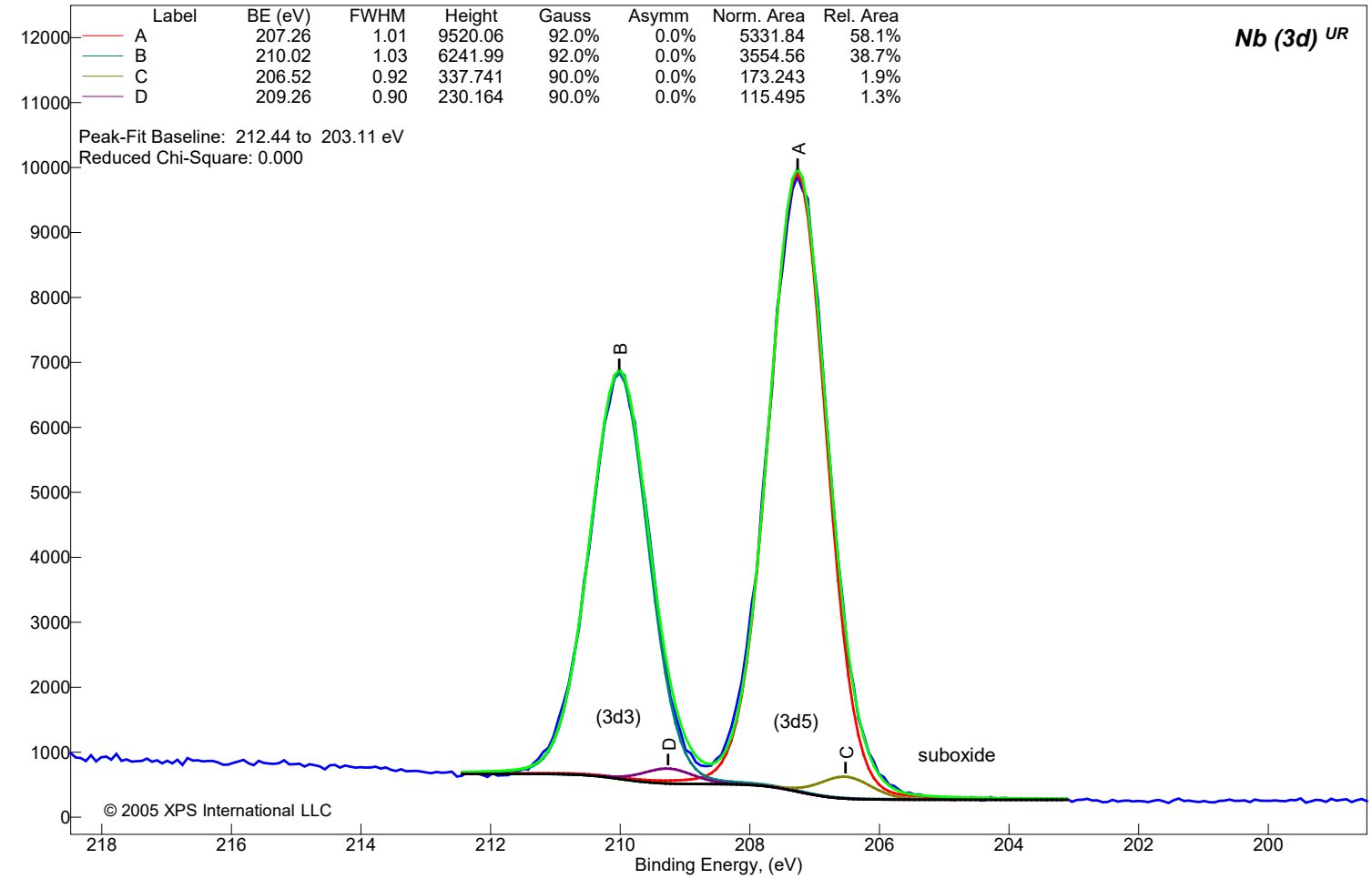
Sample Description: Nb2O5 (99.99%) Aldrich Lot# KW 09701KW, 3mm pellet, screen, 90 TOA



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Niobium (V) Oxide (FW = 265.82)

Sample Description: Nb2O5 (99.99%) Aldrich Lot# KW 09701KW, 3 mm pellet, screen, 90 TOA



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NiO

Nickel (II) Oxide (FW = 74.70)
Surface Composition Table

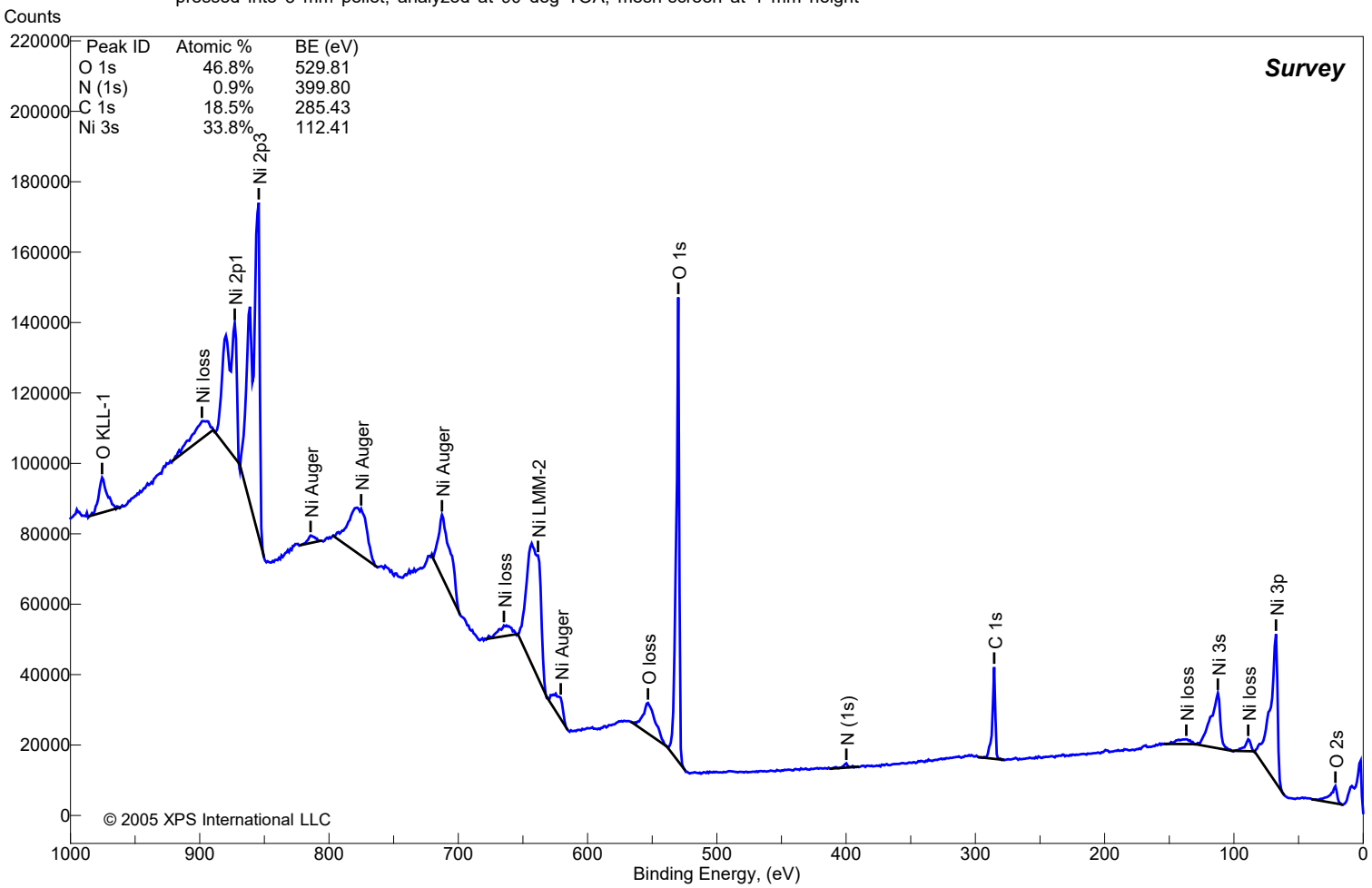
Description: NiO (99.99%) from Aldrich Co. Lot# 00503CW, analyzed at 90 deg TOA, mesh at 1 mm, conductive green powder pressed into 3 mm pellet, mp 1984 C, d 6.67, sol in acid

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	21.5	21.5	0.14	1.5	8,117	
Ni 3p	67.4	67.4	2.22	1.5	71,792	
Ni loss	89.0	89.0	0.00	1.5	4,943	
Ni 3s	112.4	112.4	0.89	1.5	34,599	33.8%
Ni loss	136.9	136.9	0.00	1.5	4,406	
C 1s	285.4	285.4	1.00	1.5	17,345	18.5%
N (1s)	399.8	399.8	1.80	1.5	1,234	0.9%
O 1s	529.8	529.8	2.93	1.5	91,273	46.8%
O loss	553.3	553.3	0.00	1.5	24,117	
Ni Auger	620.7	620.7	0.00	1.5	12,680	
Ni LMM-2	638.3	638.3	0.64	1.5	109,735	
Ni loss	664.7	664.7	0.00	1.5	9,172	
Ni Auger	712.6	712.6	0.00	1.5	48,080	
Ni Auger	775.2	775.2	0.00	1.5	53,190	
Ni Auger	814.3	814.3	0.00	1.5	3,424	
Ni 2p3	854.4	854.4	14.61	1.5	179,930	
Ni 2p1	872.9	872.9	7.57	1.5	98,578	
Ni loss	898.3	898.3	0.00	1.5	19,917	
O KLL-1	975.6	975.6	0.70	1.5	19,396	

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Nickel (II) Oxide (FW = 74.70)

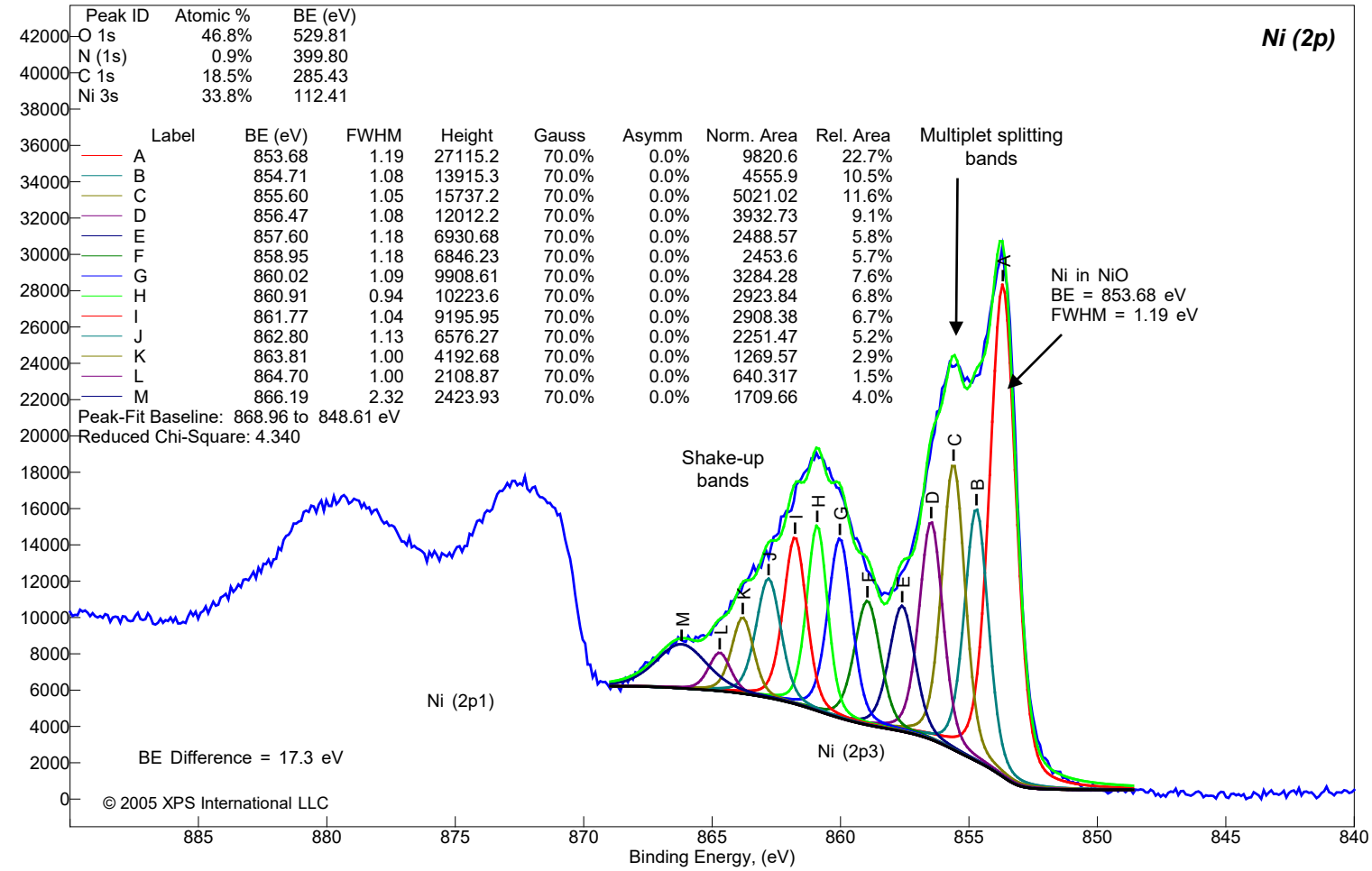
Sample Description: NiO (99.99%) from Aldr lot# 00503CW, conductive
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Nickel (II) Oxide (FW = 74.70)

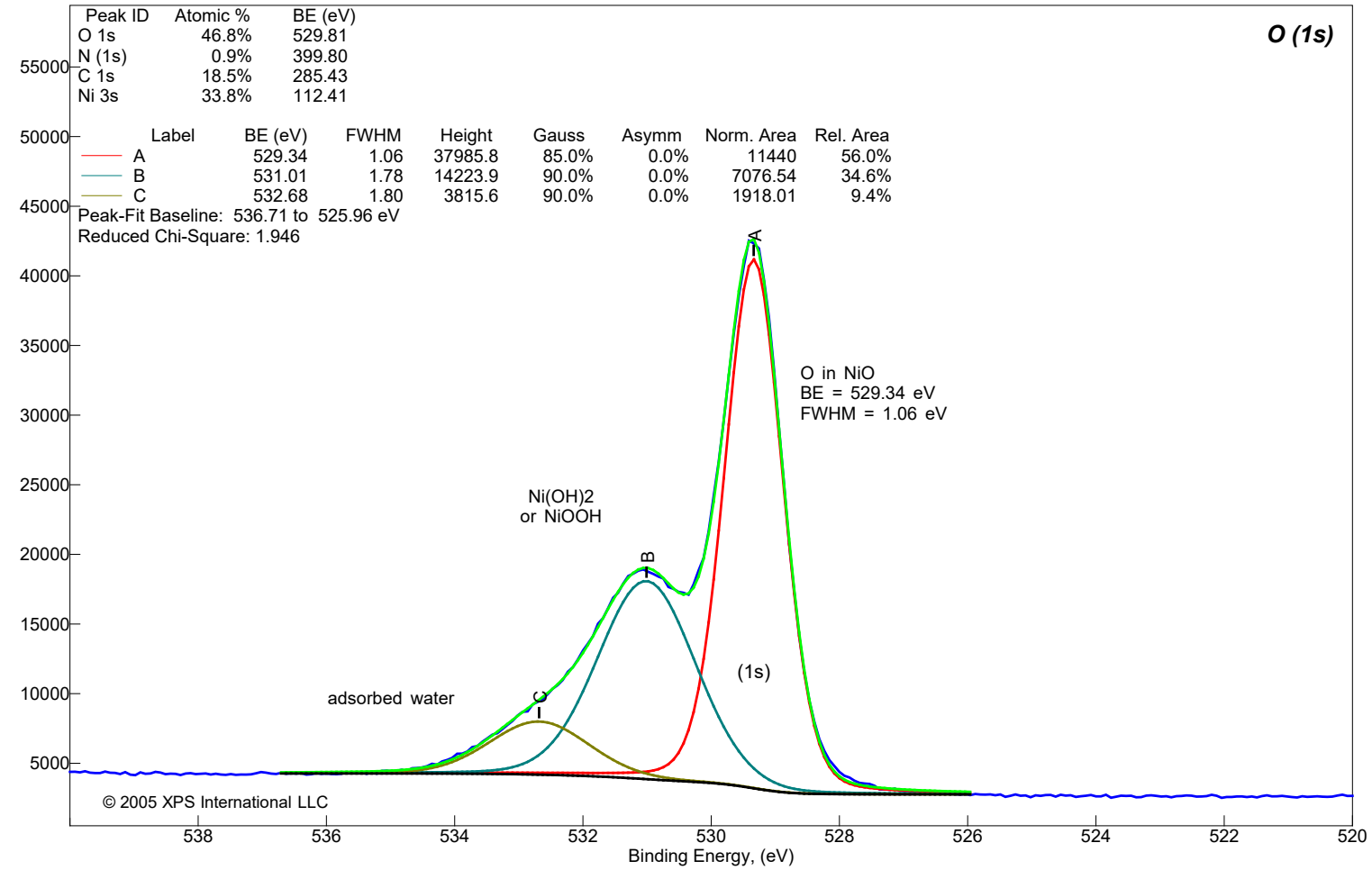
Sample Description: NiO (99.99%) Aldr lot# 00503CW, 3mm pellet, CONDUCTIVE, 90 TOA



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Nickel (II) Oxide (FW = 74.70)

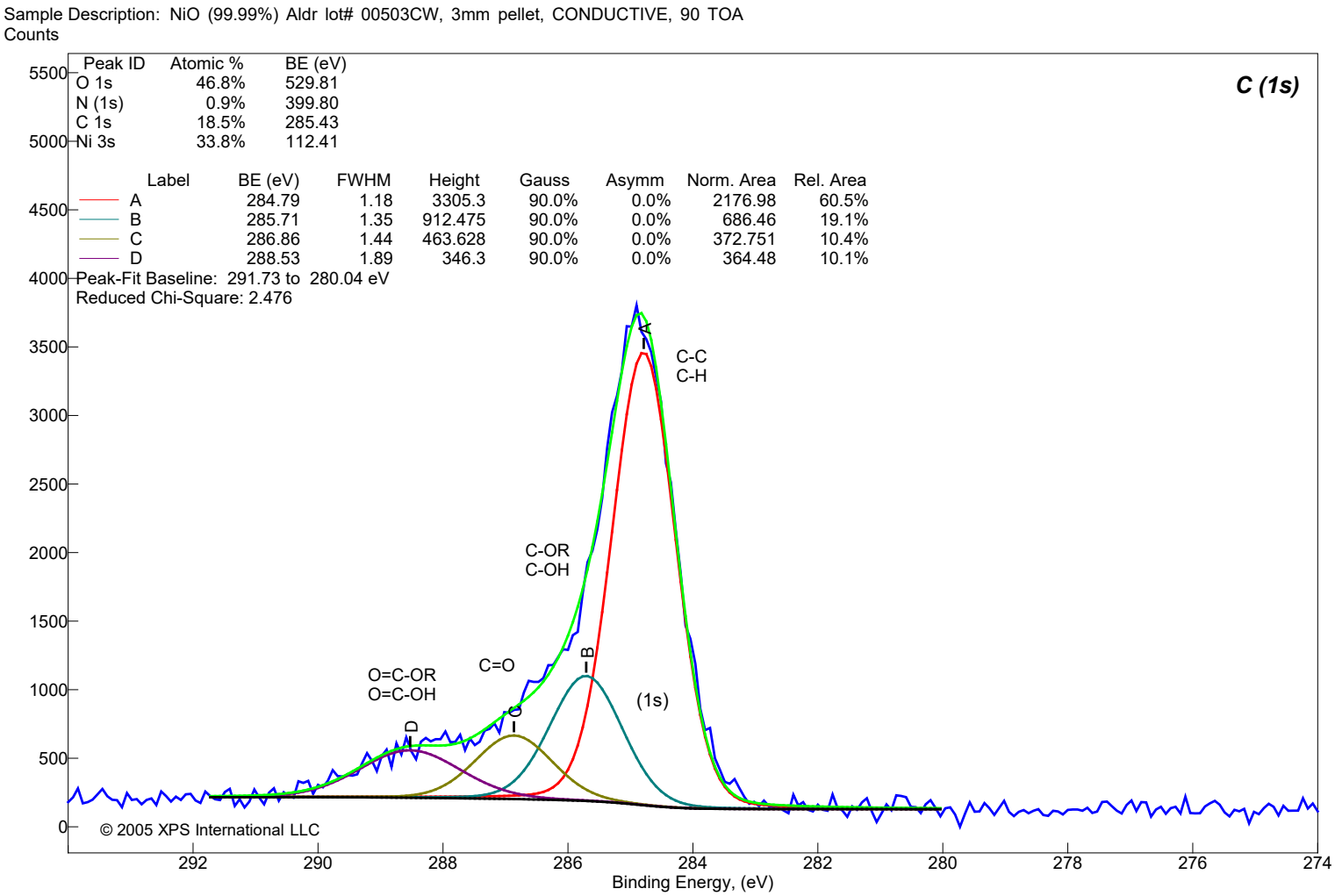
Sample Description: NiO (99.99%) Aldr lot# 00503CW, 3mm pellet, CONDUCTIVE, 90 TOA



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Nickel (II) Oxide (FW = 74.70)

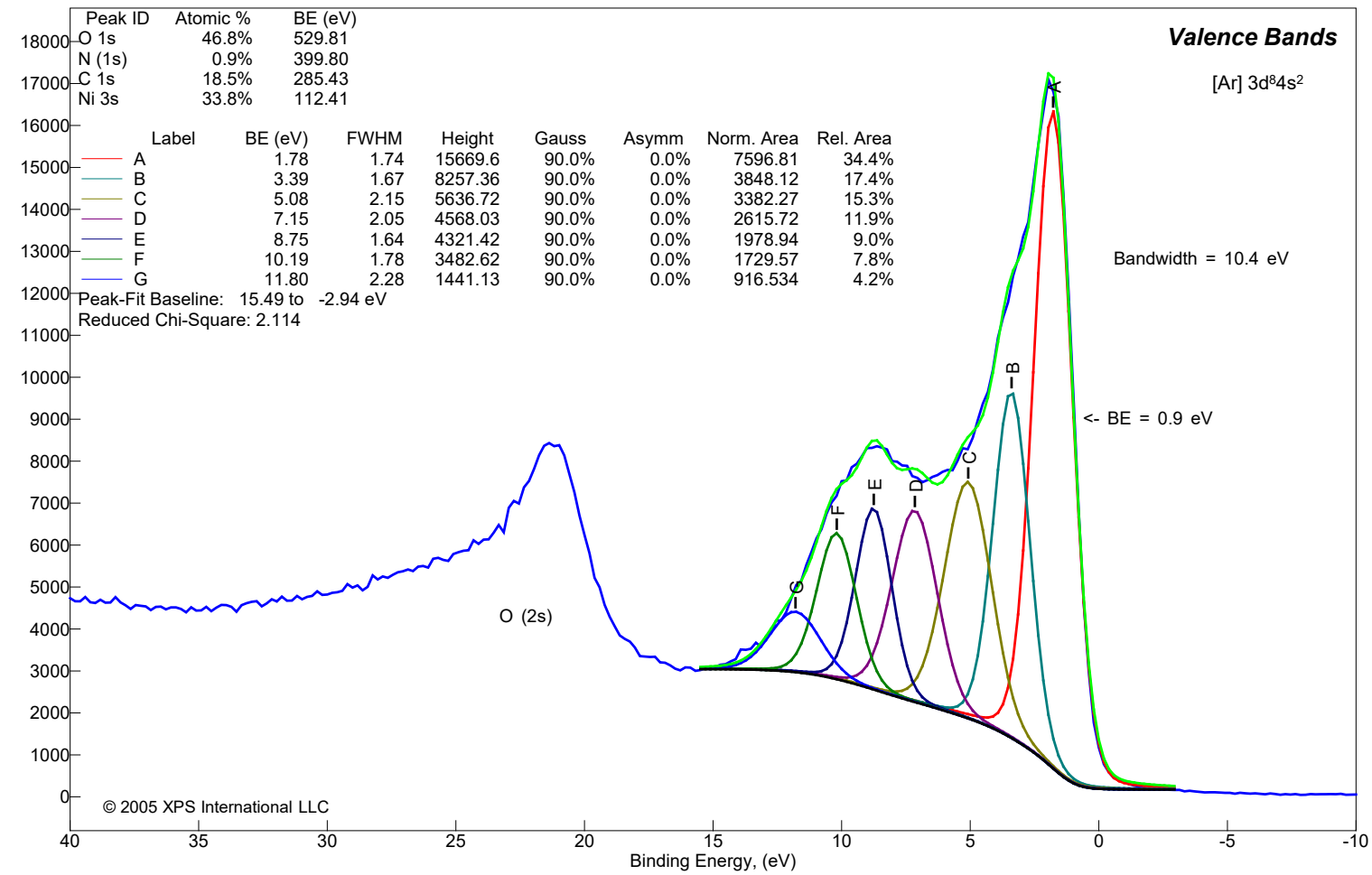
Sample Description: NiO (99.99%) Aldr lot# 00503CW, 3mm pellet, CONDUCTIVE, 90 TOA



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Nickel (II) Oxide (FW = 74.70)

Sample Description: NiO (99.99%) Aldr lot# 00503CW, 3mm pellet, CONDUCTIVE, 90 TOA

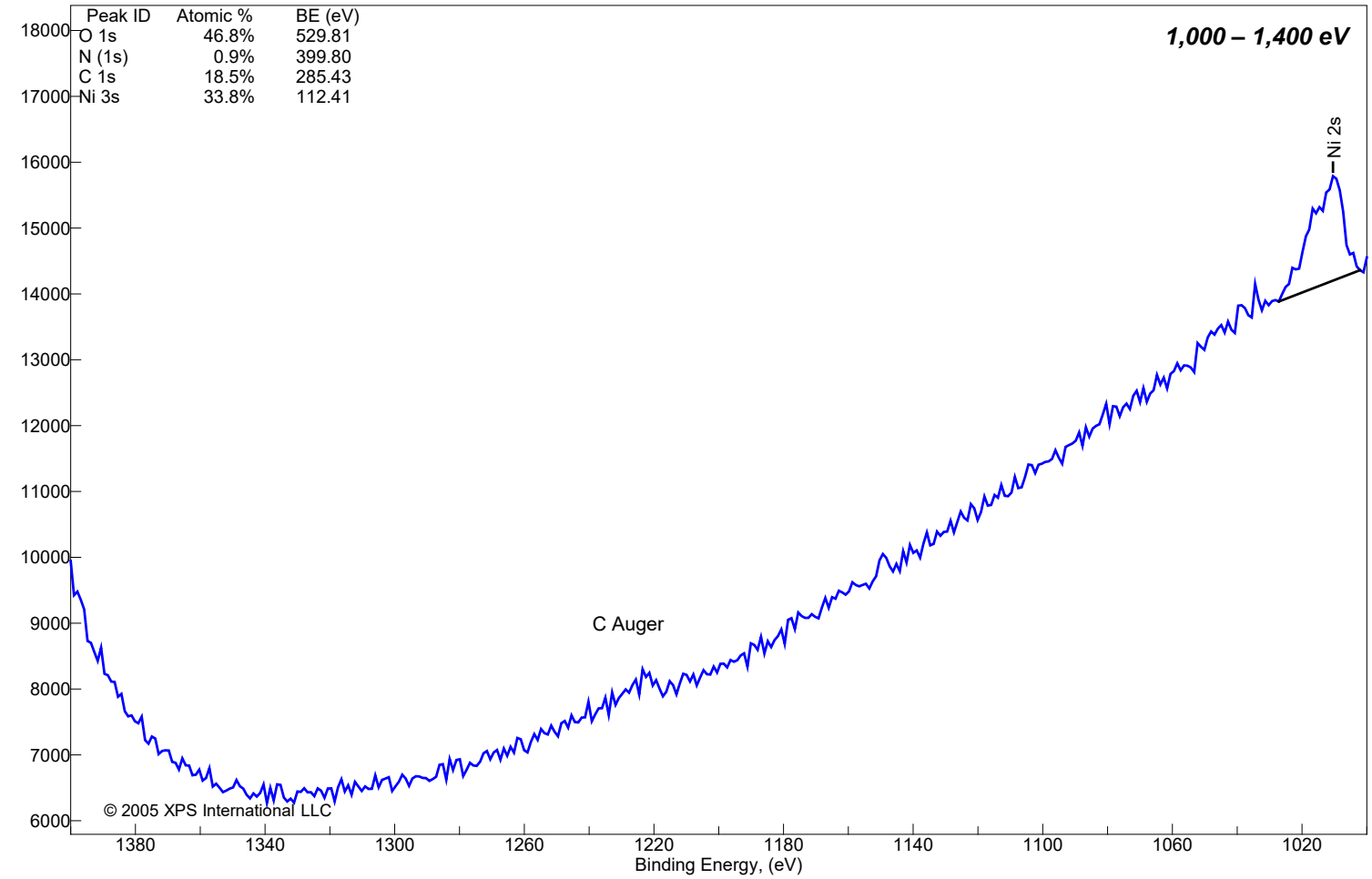


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NiO

Nickel (II) Oxide (FW = 74.70)

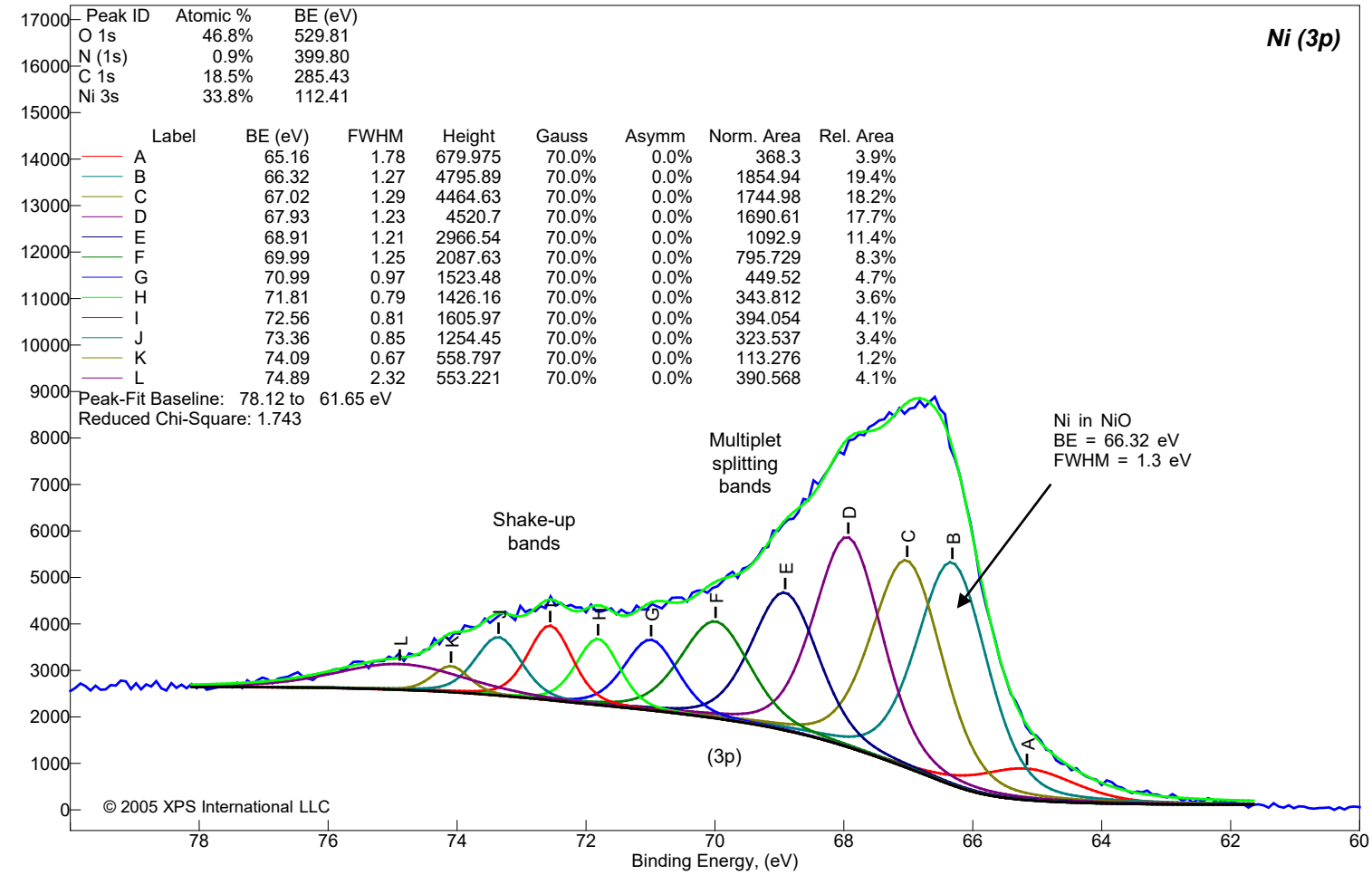
Sample Description: NiO (99.99%) Aldr lot# 00503CW, 3mm pellet, CONDUCTIVE, 90 TOA



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Nickel (II) Oxide (FW = 74.70)

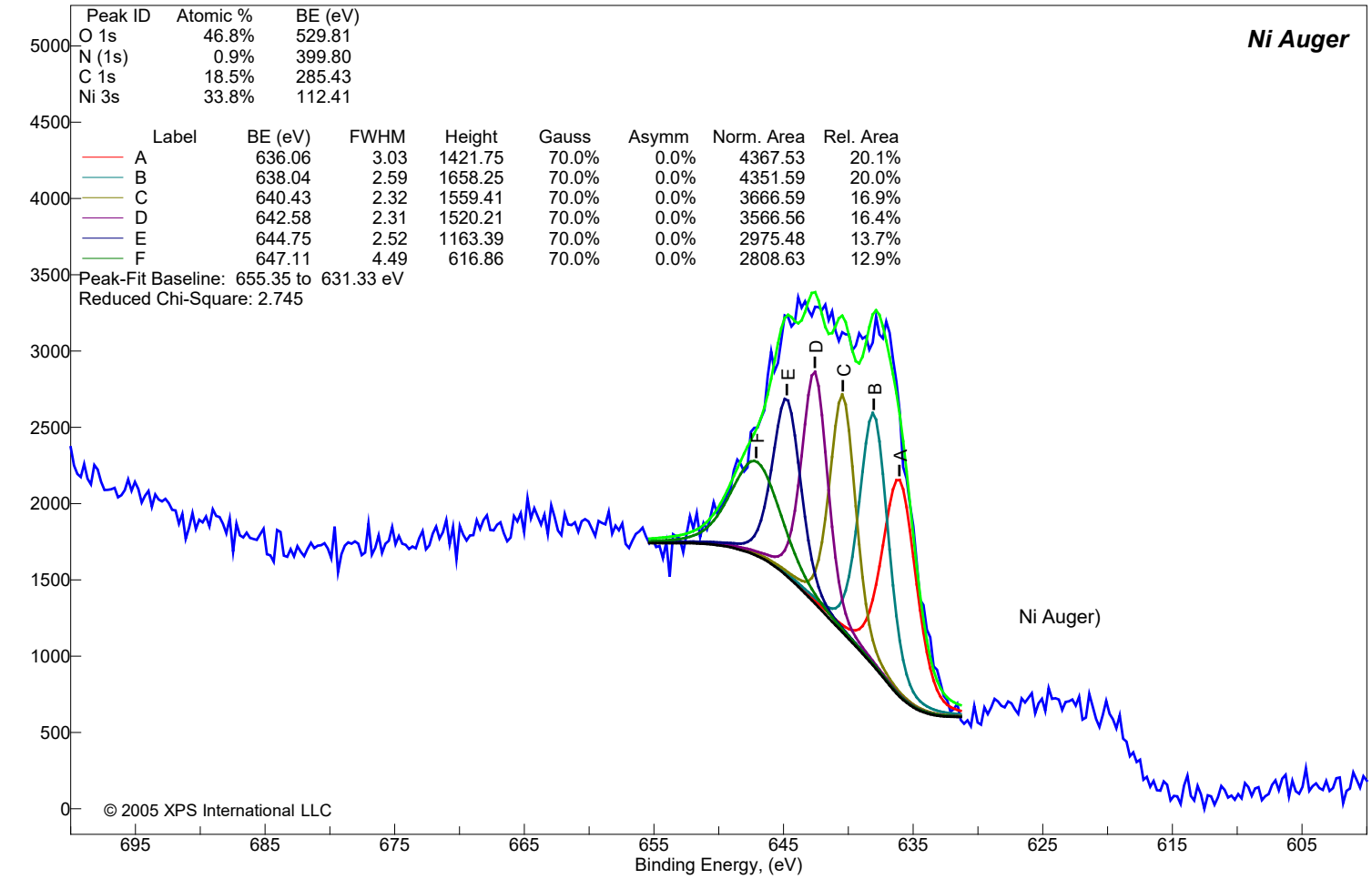
Sample Description: NiO (99.99%) Aldr lot# 00503CW, 3mm pellet, CONDUCTIVE, 90 TOA



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Nickel (II) Oxide (FW = 74.70)

Sample Description: NiO (99.99%) Aldr lot# 00503CW, 3mm pellet, CONDUCTIVE, 90 TOA



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$Ni(OH)_2$

Nickel (II) Hydroxide (FW = 92.72)
Surface Composition Table

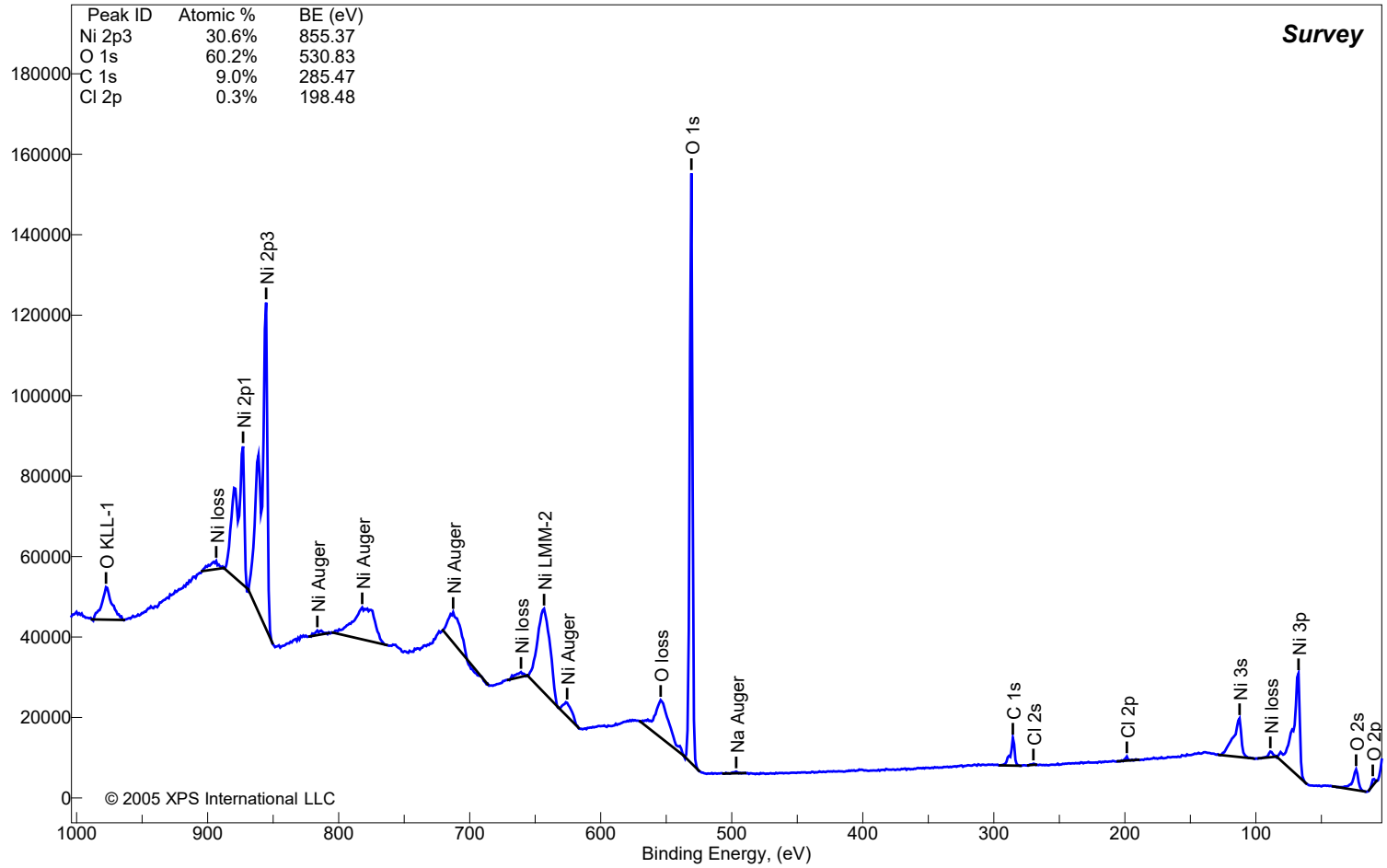
Description: $Ni(OH)_2$ (99%) from Aldrich Co., analyzed at 90 deg TOA, mesh at 1 mm, non-conductive light-green powder pressed into 3 mm pellet, mp 200 dec C, sol in dil acid

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2p	10.8	6.9	0.02	1.5	2,162	
O 2s	23.5	19.6	0.14	1.5	13,656	
Ni 3p	67.5	63.6	2.22	1.5	78,868	
Ni loss	89.0	85.1	0.00	1.5	3,377	
Ni 3s	112.5	108.6	0.89	1.5	35,500	
Cl 2p	198.5	194.6	2.28	1.5	946	0.3%
Cl 2s	269.8	265.9	1.69	1.5	678	
C 1s	285.5	281.6	1.00	1.5	13,052	9.0%
Na Auger	496.6	492.7	0.00	1.5	723	
O 1s	530.8	526.9	2.93	1.5	181,974	60.2%
O loss	554.3	550.4	0.00	1.5	61,761	
Ni Auger	625.7	621.8	0.00	1.5	13,917	
Ni LMM-2	643.2	639.3	0.64	1.5	115,860	
Ni loss	660.8	656.9	0.00	1.5	3,993	
Ni Auger	712.7	708.8	0.00	1.5	35,781	
Ni Auger	782.1	778.2	0.00	1.5	77,633	
Ni Auger	816.3	812.4	0.00	1.5	2,607	
Ni 2p3	855.4	851.5	14.61	1.5	247,179	30.6%
Ni 2p1	873.0	869.1	7.57	1.5	131,368	
Ni loss	893.5	889.6	0.00	1.5	8,992	
O KLL-1	977.6	973.7	0.70	1.5	37,943	

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Nickel (II) Hydroxide (FW = 92.72)

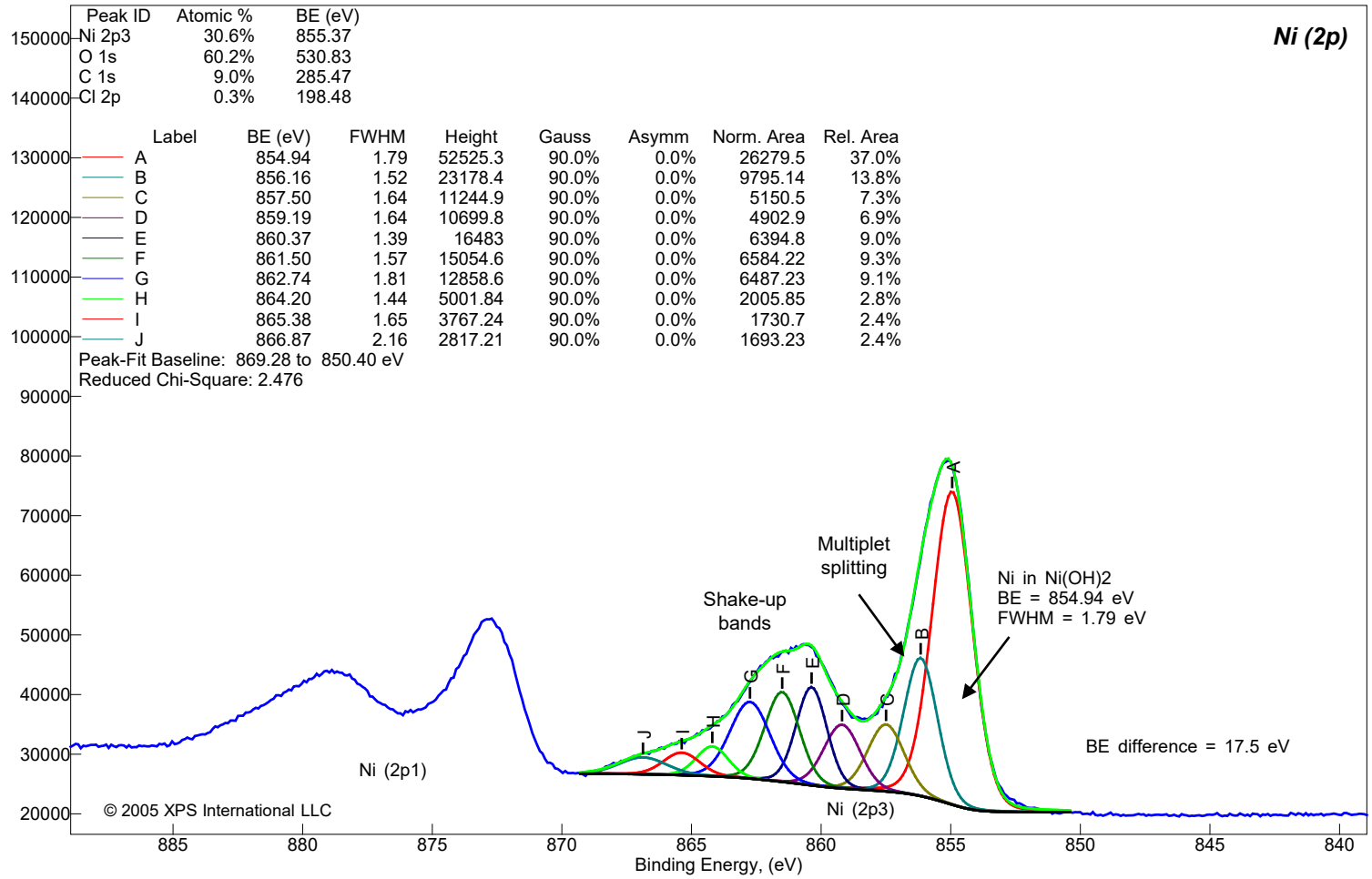
Sample Description: Ni(OH)2 (99%) from Aldrich
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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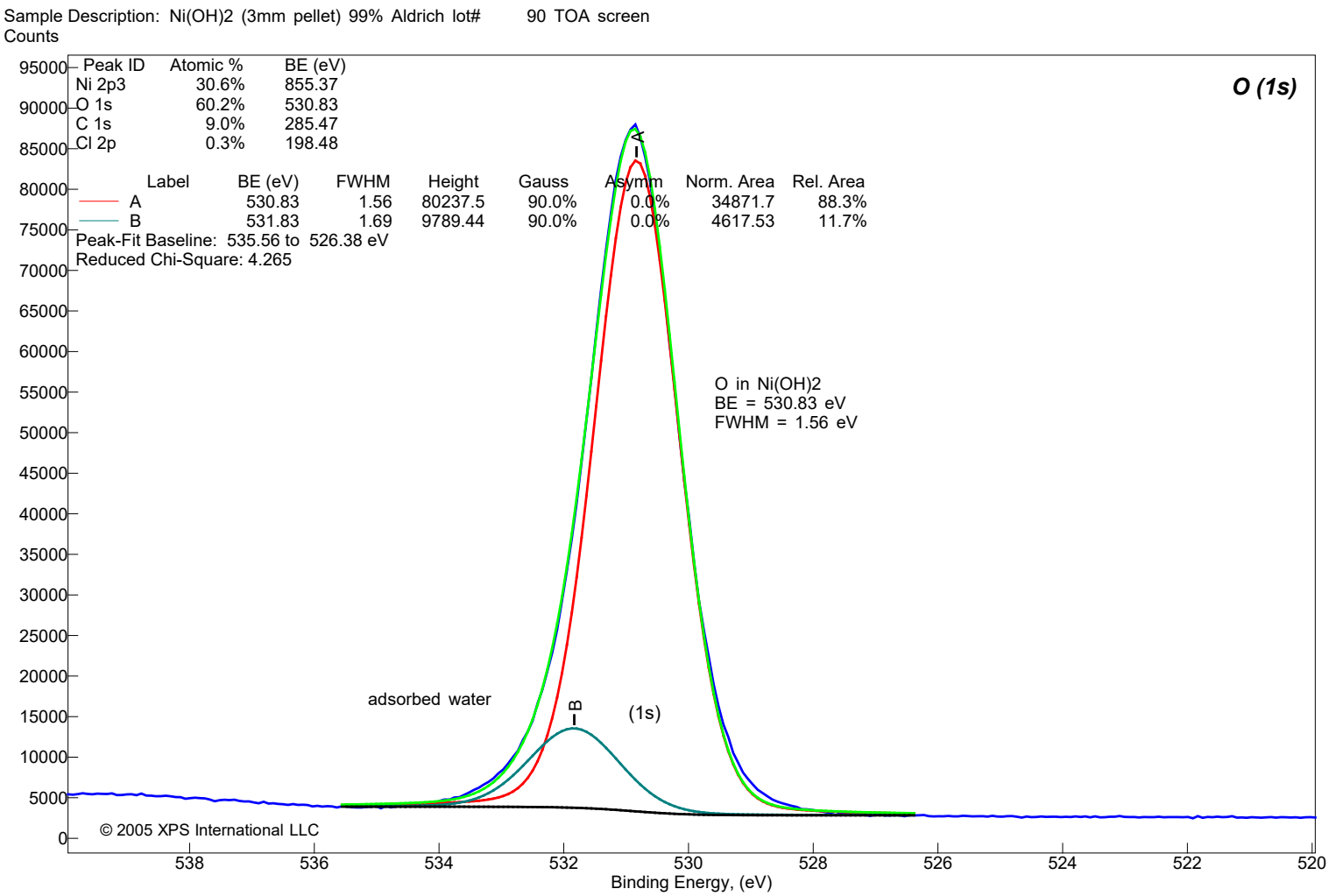
Nickel (II) Hydroxide (FW = 92.72)

Sample Description: Ni(OH)2 (3mm pellet) 99% Aldrich lot# 90 TOA screen



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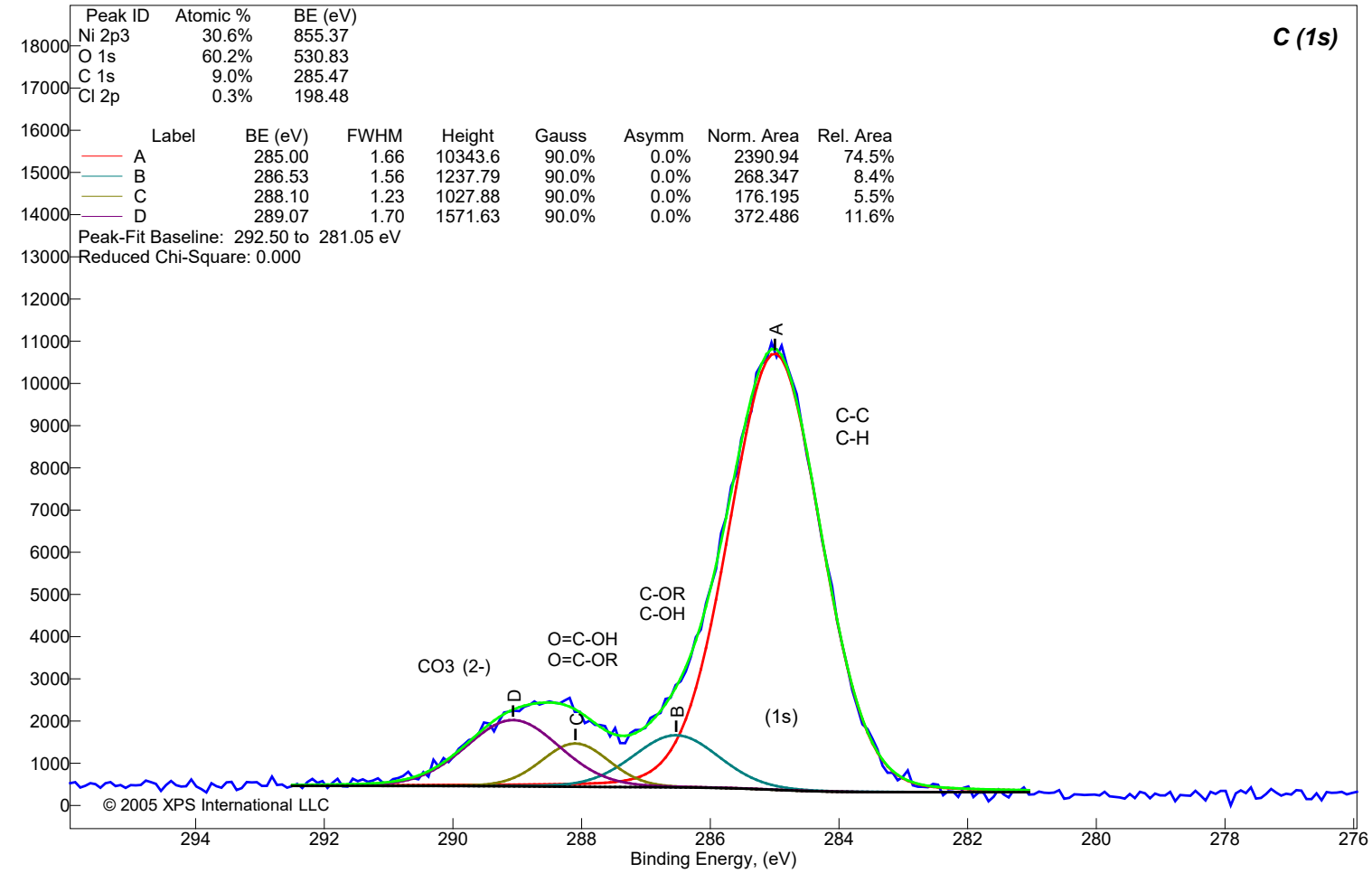
Nickel (II) Hydroxide (FW = 92.72)



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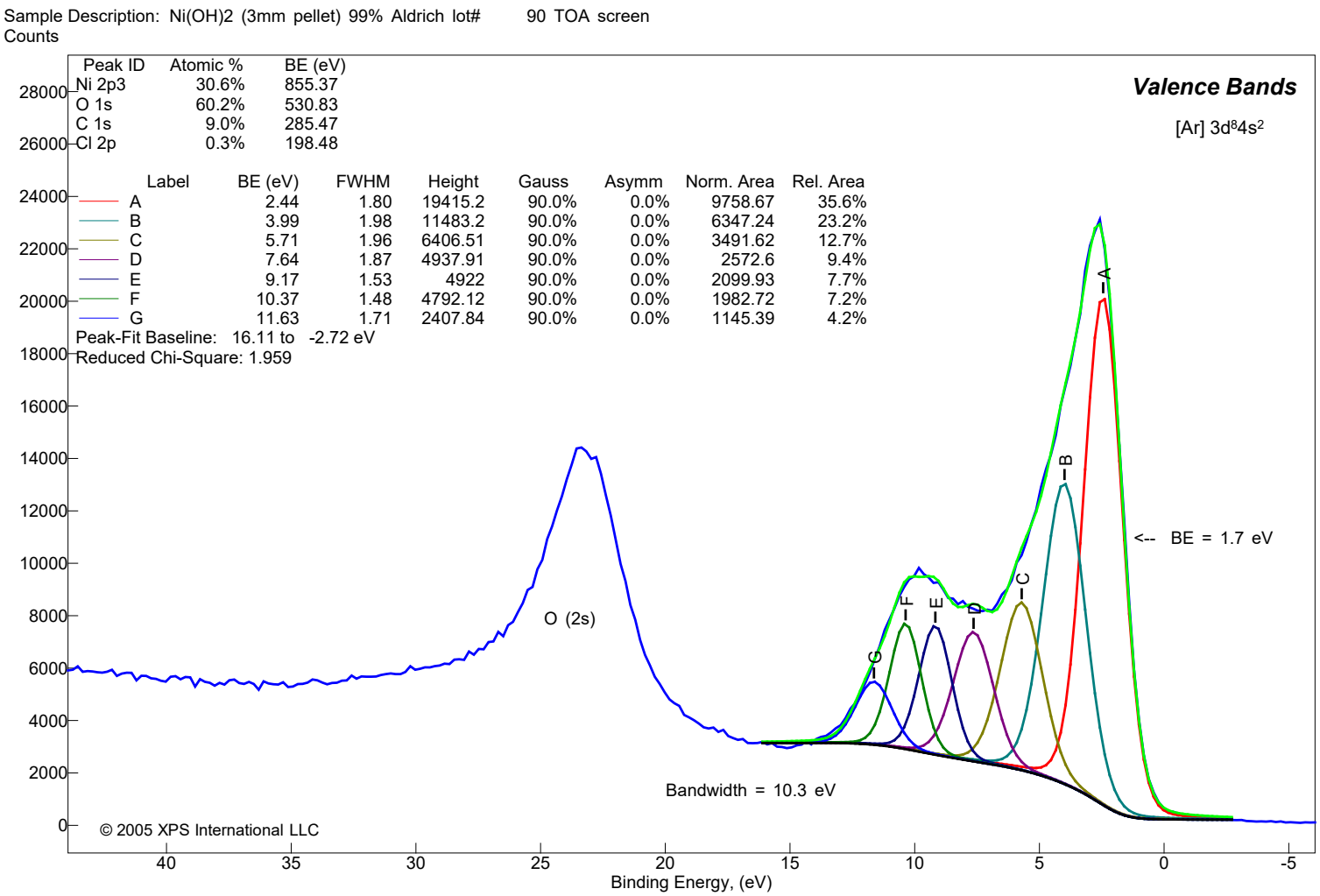
Nickel (II) Hydroxide (FW = 92.72)

Sample Description: Ni(OH)2 (3mm pellet) 99% Aldrich lot# 90 TOA screen



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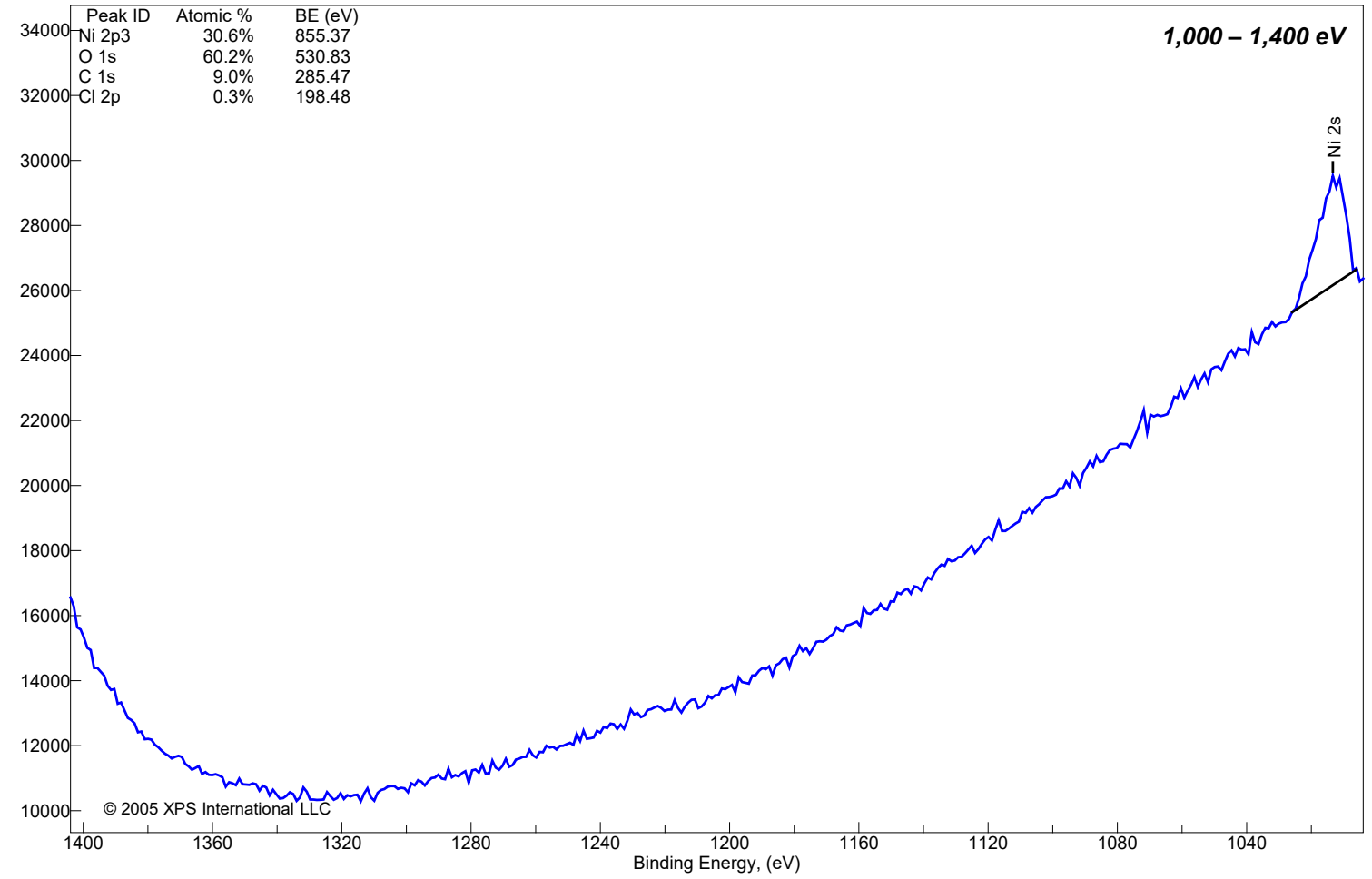
Nickel (II) Hydroxide (FW = 92.72)



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Nickel (II) Hydroxide (FW = 92.72)

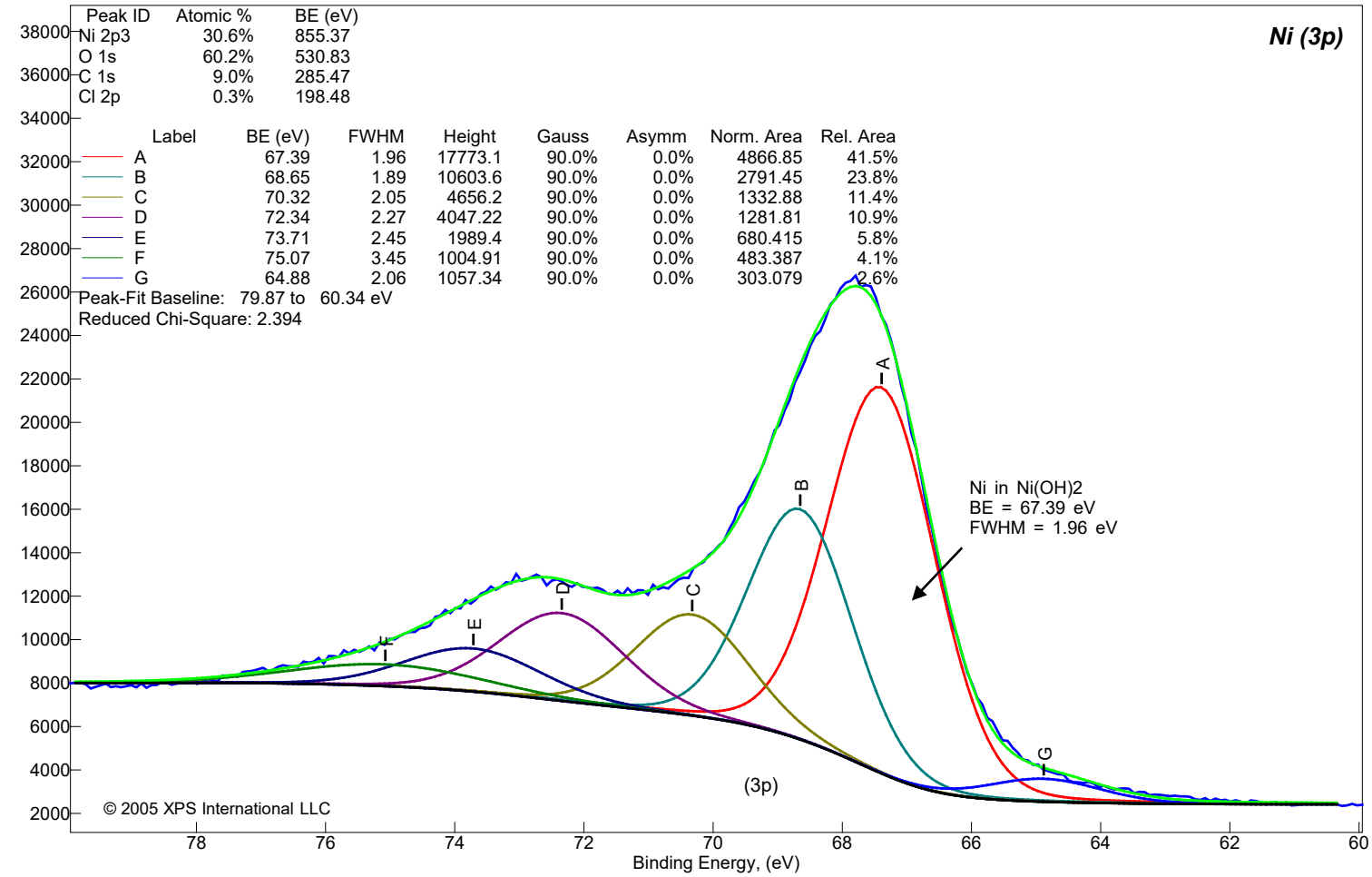
Sample Description: Ni(OH)2 (3mm pellet) 99% Aldrich lot# 90 TOA screen



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Nickel (II) Hydroxide (FW = 92.72)

Sample Description: Ni(OH)2 (3mm pellet) 99% Aldrich lot# 90 TOA screen



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PbO

Lead (II) Oxide (FW = 223.20)
Surface Composition Table

Description: PbO (99.999%) from Aldrich Co. Lot# 04911PV, analyzed at 90 deg TOA, mesh at 1 mm, semi-conductive yellow powder pressed into 3 mm pellet, mp 888 C, d 9.53, sol in acetic acid

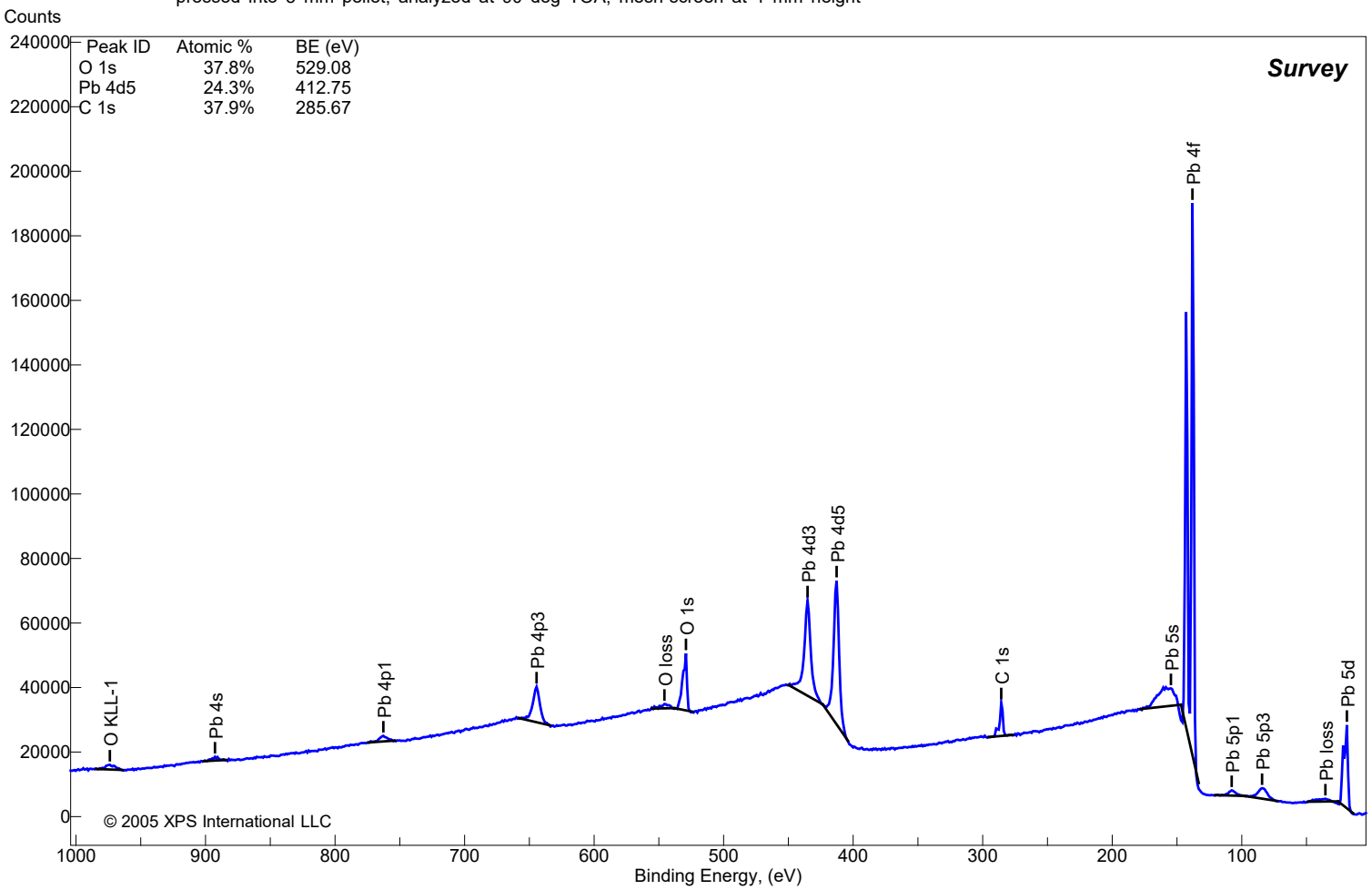
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Pb 5d	18.8	18.8	2.69	1.5	84,967	
Pb loss	35.4	35.4	0.00	1.5	15,114	
Pb 5p3	84.3	84.3	1.33	1.5	23,757	
Pb 5p1	107.8	107.8	0.53	1.5	9,936	
Pb 4f	138.1	138.1	22.74	1.5	566,285	
Pb 5s	154.7	154.7	0.54	1.5	129,173	
C 1s	285.7	285.7	1.00	1.5	27,164	37.9%
Pb 4d5	412.8	412.8	13.02	1.5	191,420	24.3%
Pb 4d3	435.2	435.2	8.87	1.5	152,979	
O 1s	529.1	529.1	2.93	1.5	56,566	37.8%
O loss	545.7	545.7	0.00	1.5	8,016	
Pb 4p3	644.4	644.4	6.33	1.5	63,248	
Pb 4p1	762.7	762.7	2.12	1.5	10,321	
Pb 4s	892.7	892.7	1.96	1.5	6,104	
O KLL-1	973.8	973.8	0.70	1.5	10,333	

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PbO

Lead (II) Oxide (FW = 223.20)

Sample Description: PbO (99.999%) from Aldrich Lot# 04911PV, semi-conductive
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height

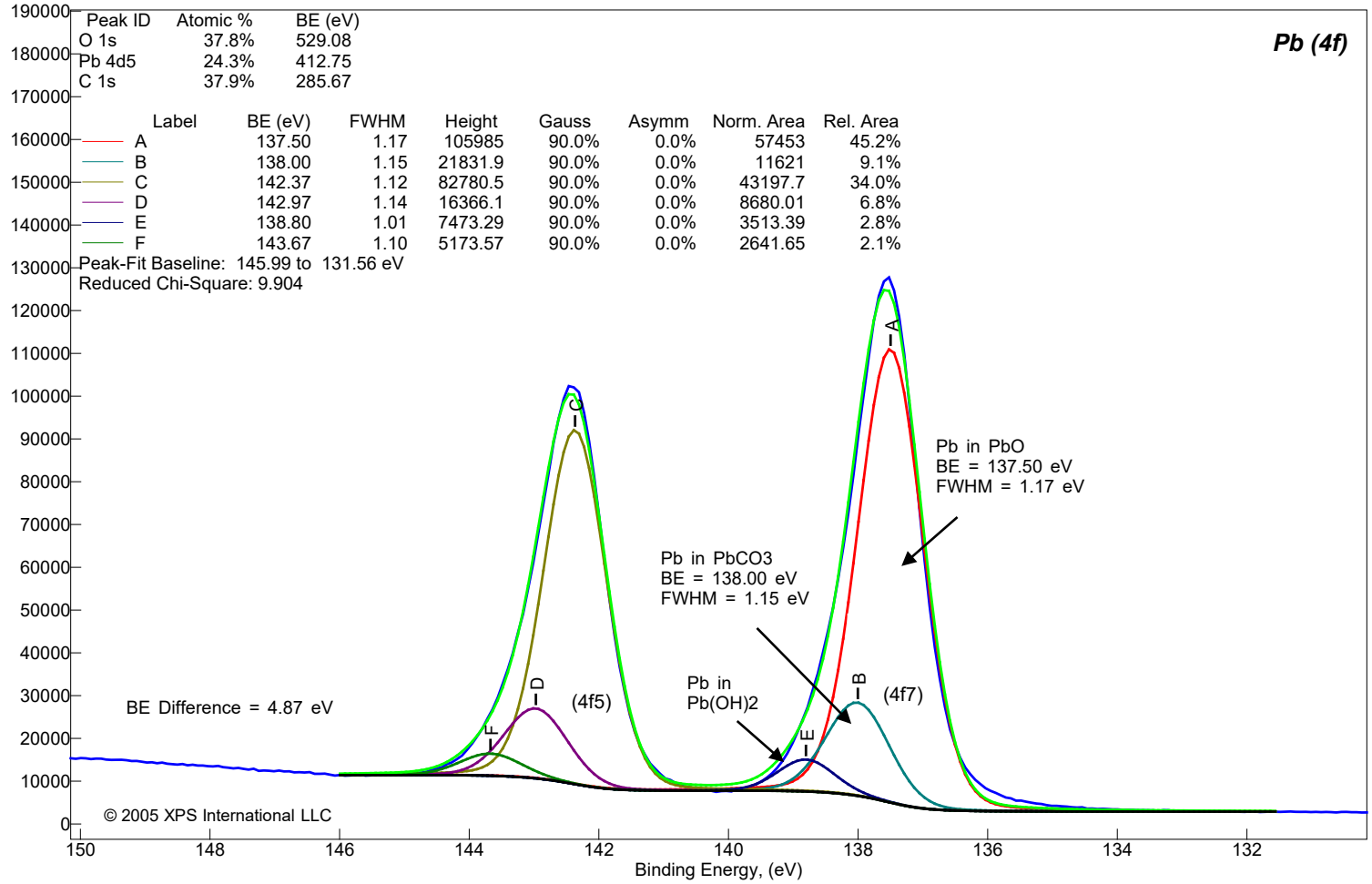


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PbO

Lead (II) Oxide (FW = 223.20)

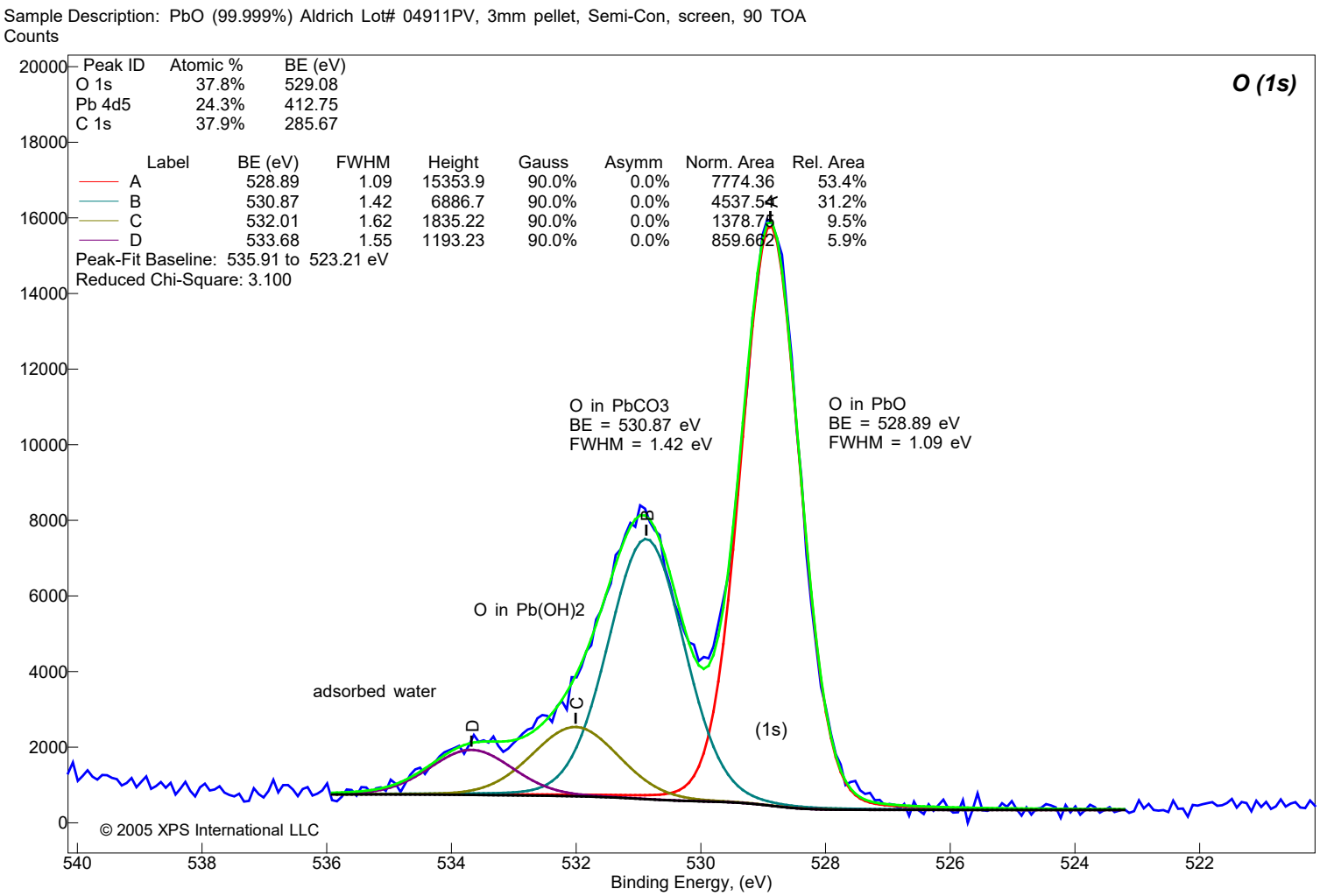
Sample Description: PbO (99.999%) Aldrich Lot# 04911PV, 3mm pellet, Semi-Con, screen, 90 TOA



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PbO

Lead (II) Oxide (FW = 223.20)

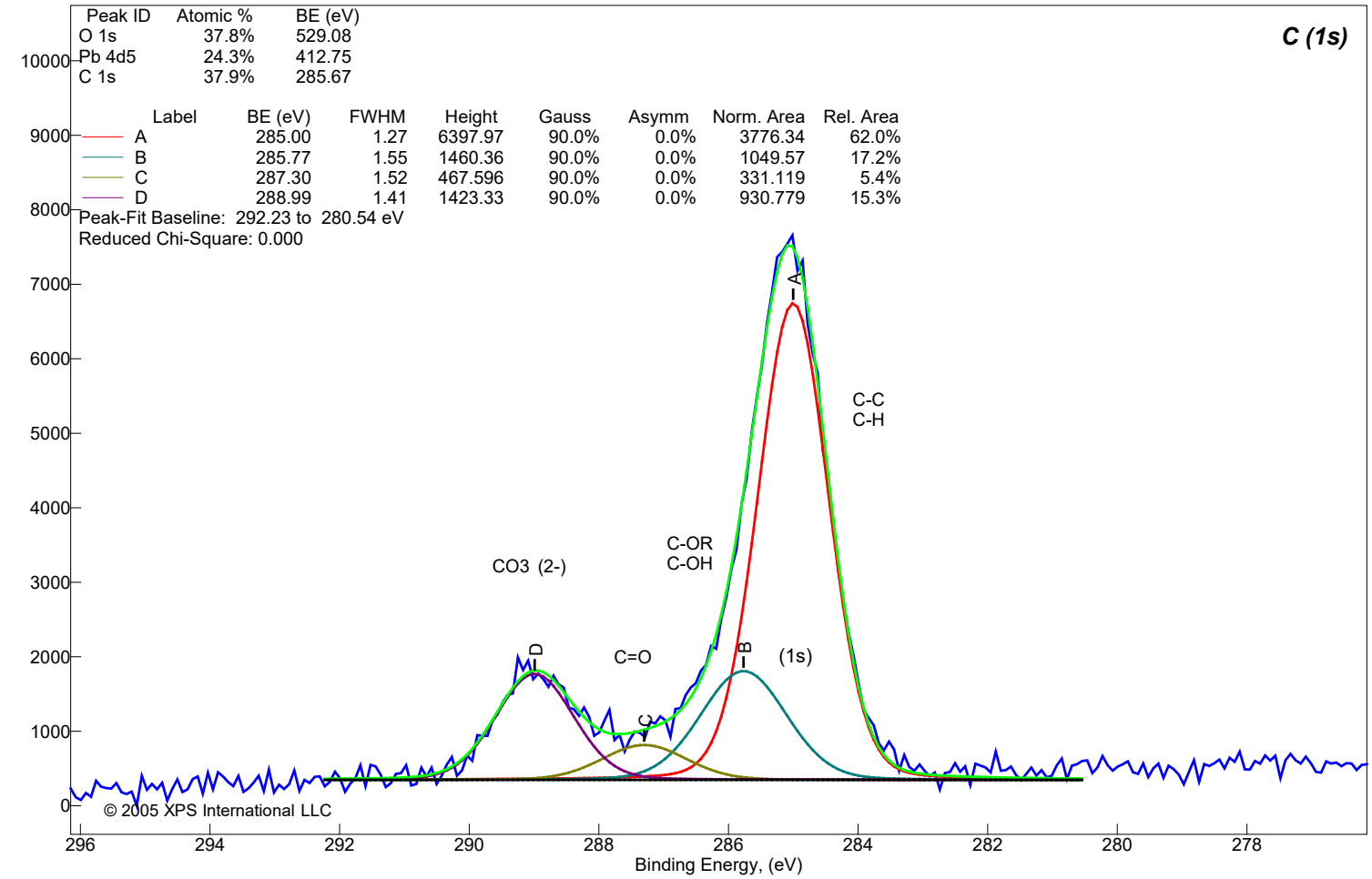


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PbO

Lead (II) Oxide (FW = 223.20)

Sample Description: PbO (99.999%) Aldrich Lot# 04911PV, 3mm pellet, Semi-Con, screen, 90 TOA

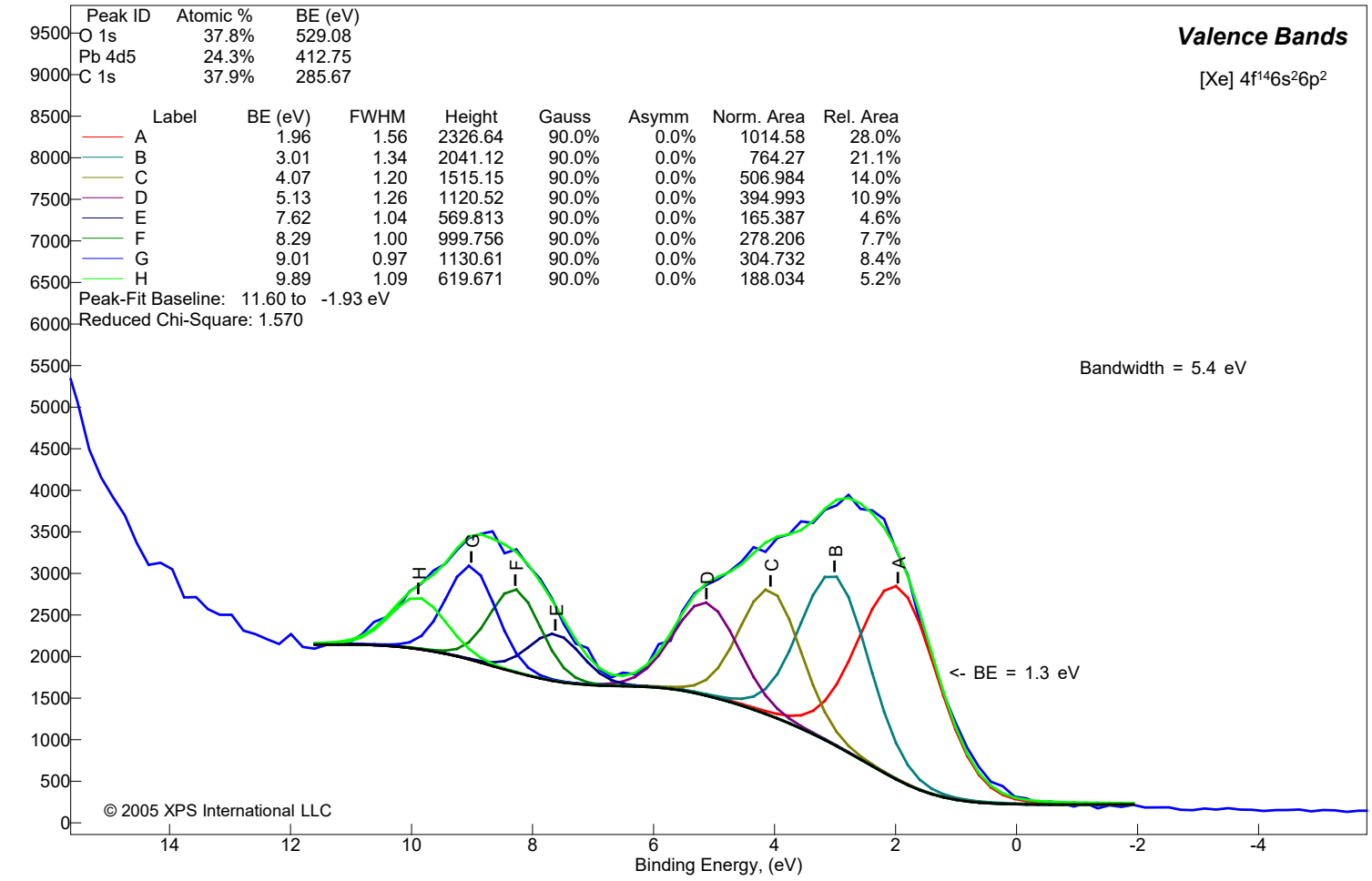


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PbO

Lead (II) Oxide (FW = 223.20)

Sample Description: PbO (99.999%) Aldrich Lot# 04911PV, 3mm pellet, Semi-Con, screen, 90 TOA

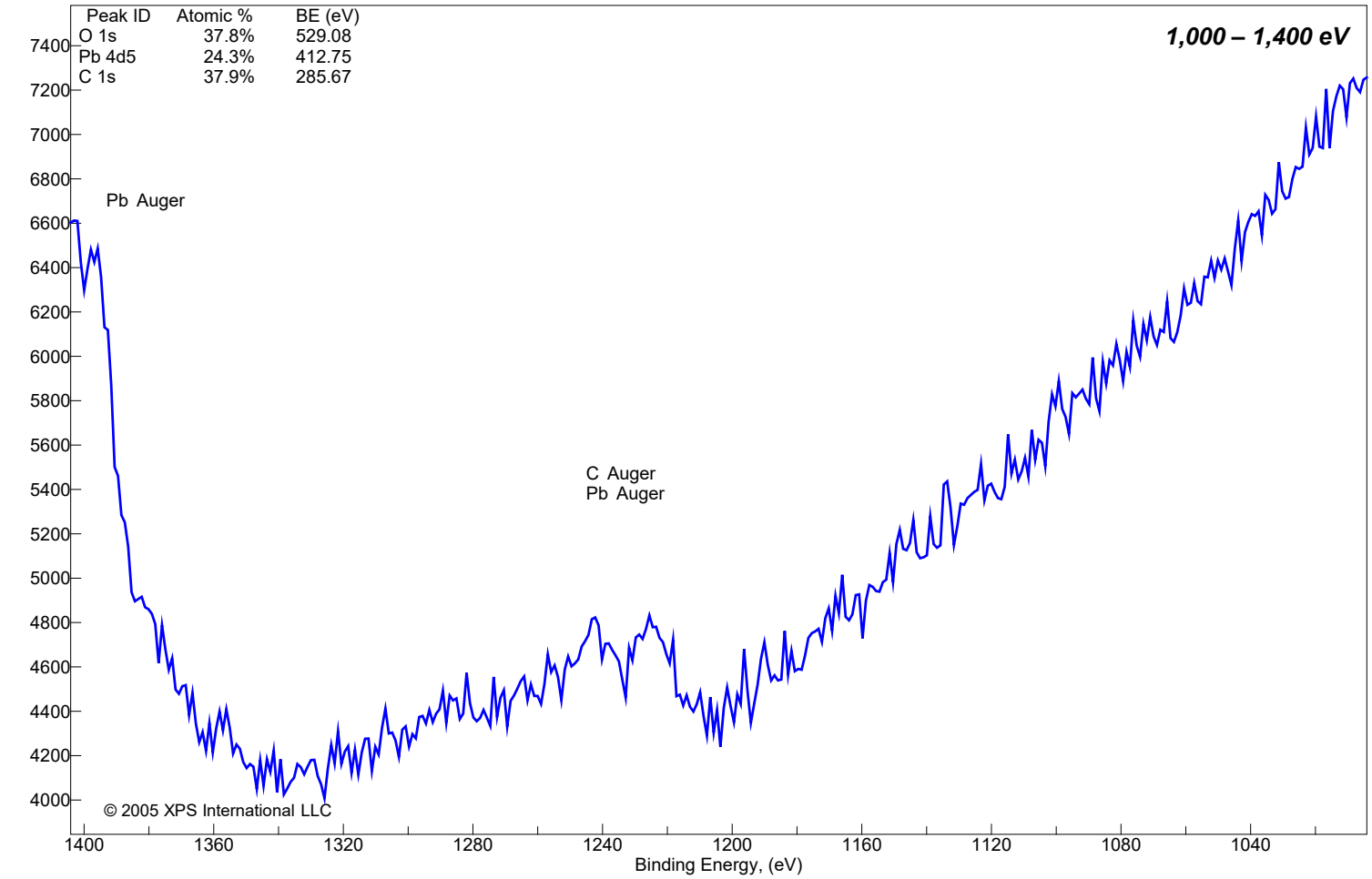


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PbO

Lead (II) Oxide (FW = 223.20)

Sample Description: PbO (99.999%) Aldrich Lot# 04911PV, 3mm pellet, Semi-Con, screen, 90 TOA

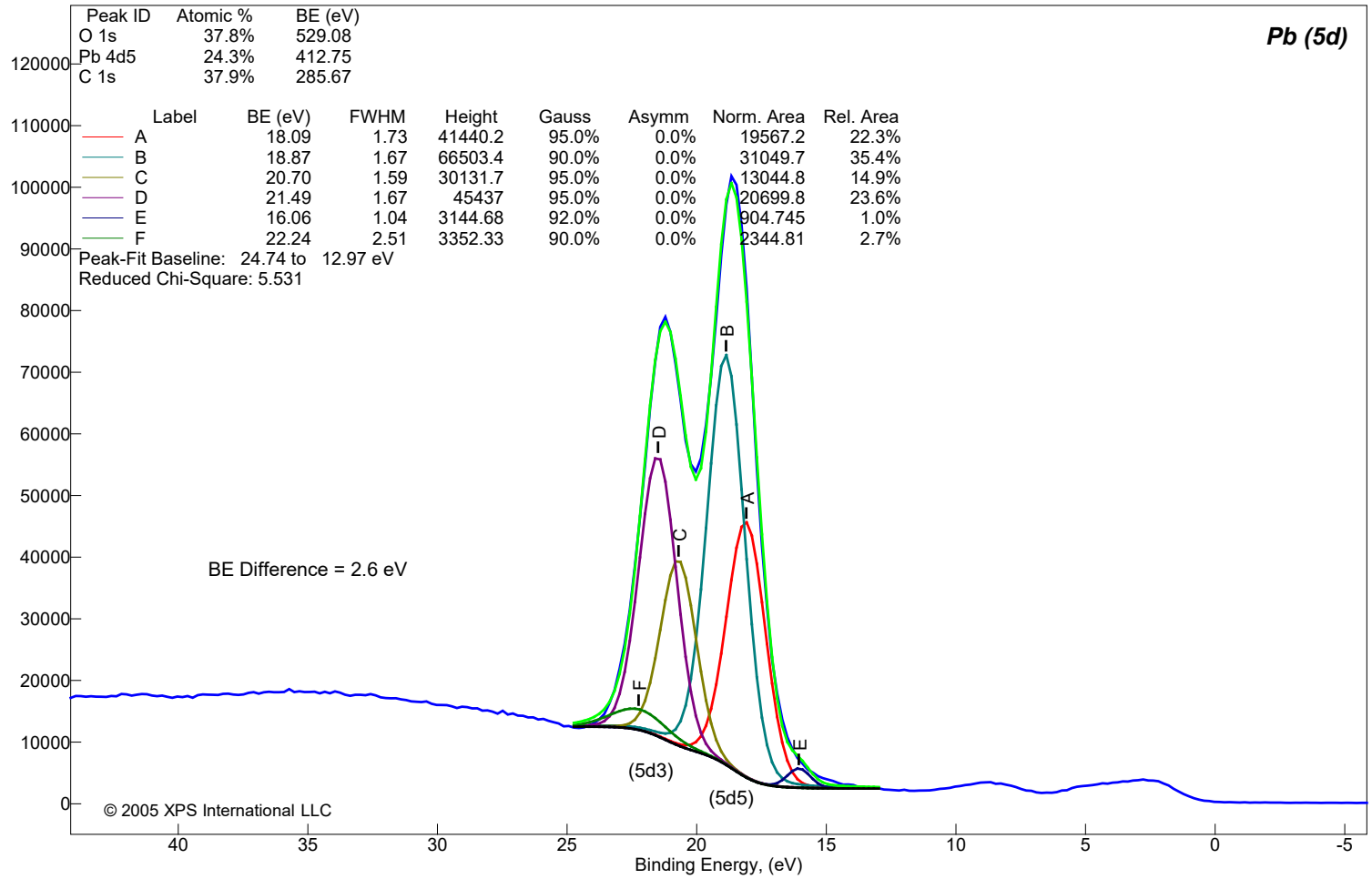


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PbO

Lead (II) Oxide (FW = 223.20)

Sample Description: PbO (99.999%) Aldrich Lot# 04911PV, 3mm pellet, Semi-Con, screen, 90 TOA



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PbO_2

Lead (IV) Oxide (FW = 239.19)
Surface Composition Table

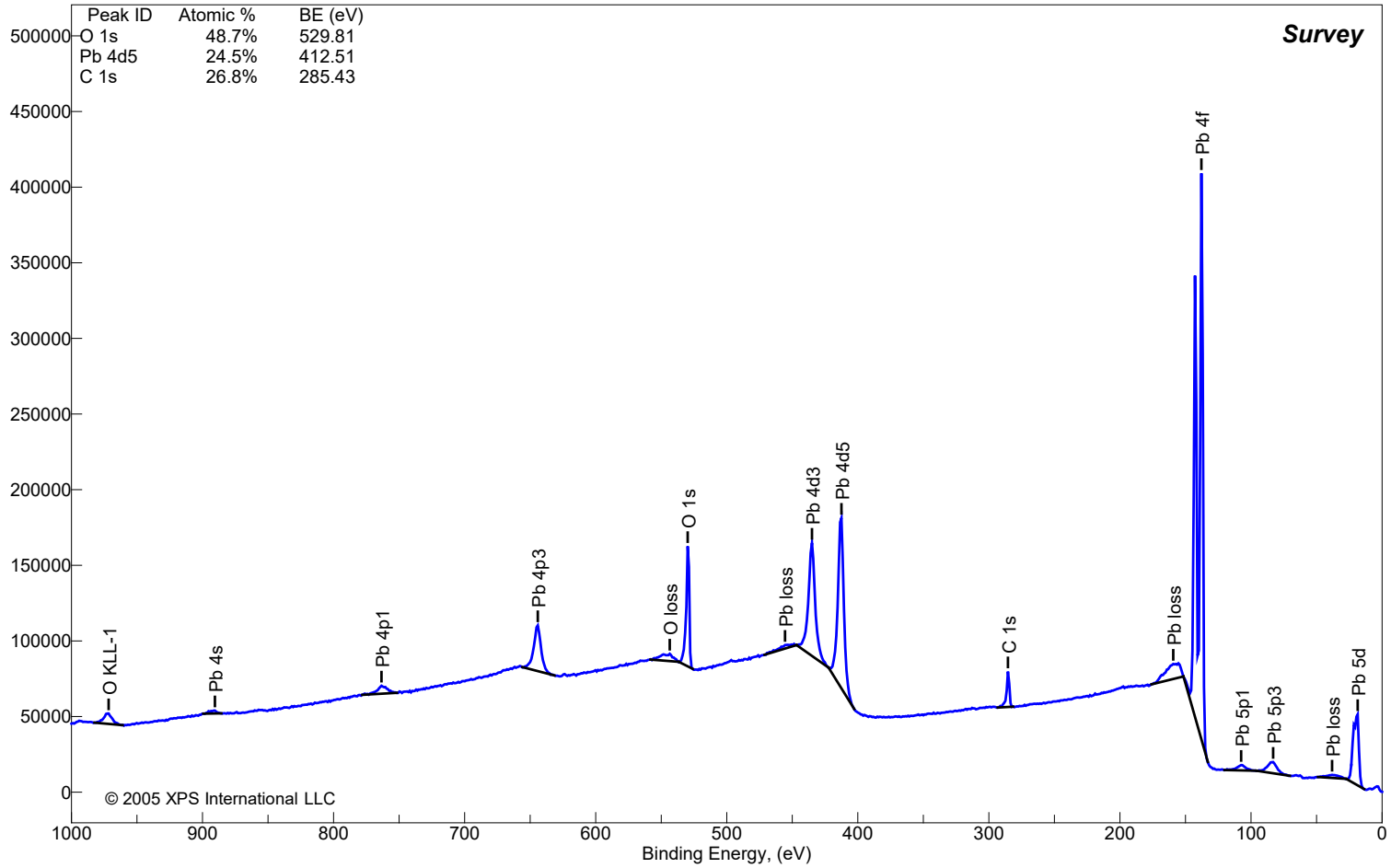
Description: PbO_2 (95+%) from Aldrich Co. Lot# 06811JW, analyzed at 90 deg TOA, mesh at 1 mm, conductive dark brown powder pressed into 3 mm pellet, mp 290 C dec, d 9.38, sol in HCl, HNO3

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Pb 5d	18.6	18.6	2.69	1.5	59,595	
Pb loss	38.1	38.1	0.00	1.5	6,378	
Pb 5p3	83.1	83.1	1.33	1.5	16,358	
Pb 5p1	107.5	107.5	0.53	1.5	8,006	
Pb 4f	137.8	137.8	22.74	1.5	410,503	
Pb 4f	139.8	139.8	22.74	1.1	83,039	
Pb loss	159.3	159.3	0.00	1.5	33,839	
C 1s	285.4	285.4	1.00	1.5	15,246	26.8%
Pb 4d5	412.5	412.5	13.02	1.5	153,016	24.5%
Pb 4d3	435.0	435.0	8.87	1.5	116,111	
Pb loss	455.5	455.5	0.00	1.5	6,539	
O 1s	529.8	529.8	2.93	1.5	57,677	48.7%
O loss	543.5	543.5	0.00	1.5	13,094	
Pb 4p3	644.2	644.2	6.33	1.5	50,934	
Pb 4p1	763.4	763.4	2.12	1.5	12,236	
Pb 4s	890.5	890.5	1.96	1.5	3,113	
O KLL-1	971.7	971.7	0.70	1.5	12,700	

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Lead (IV) Oxide (FW = 239.19)

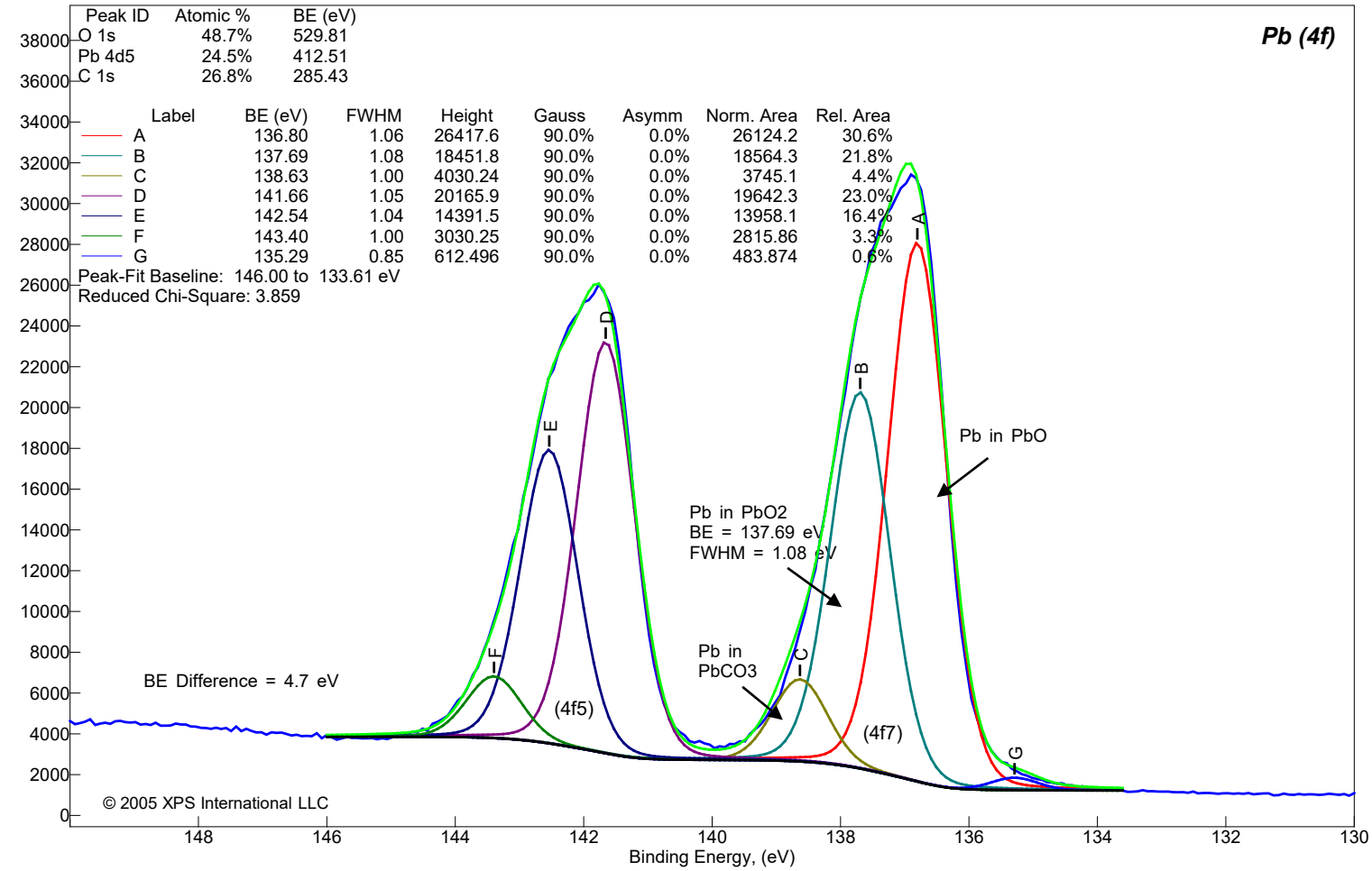
Sample Description: PbO2 (95+%) from Aldrich Lot# 06811JW, conductive
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Lead (IV) Oxide (FW = 239.19)

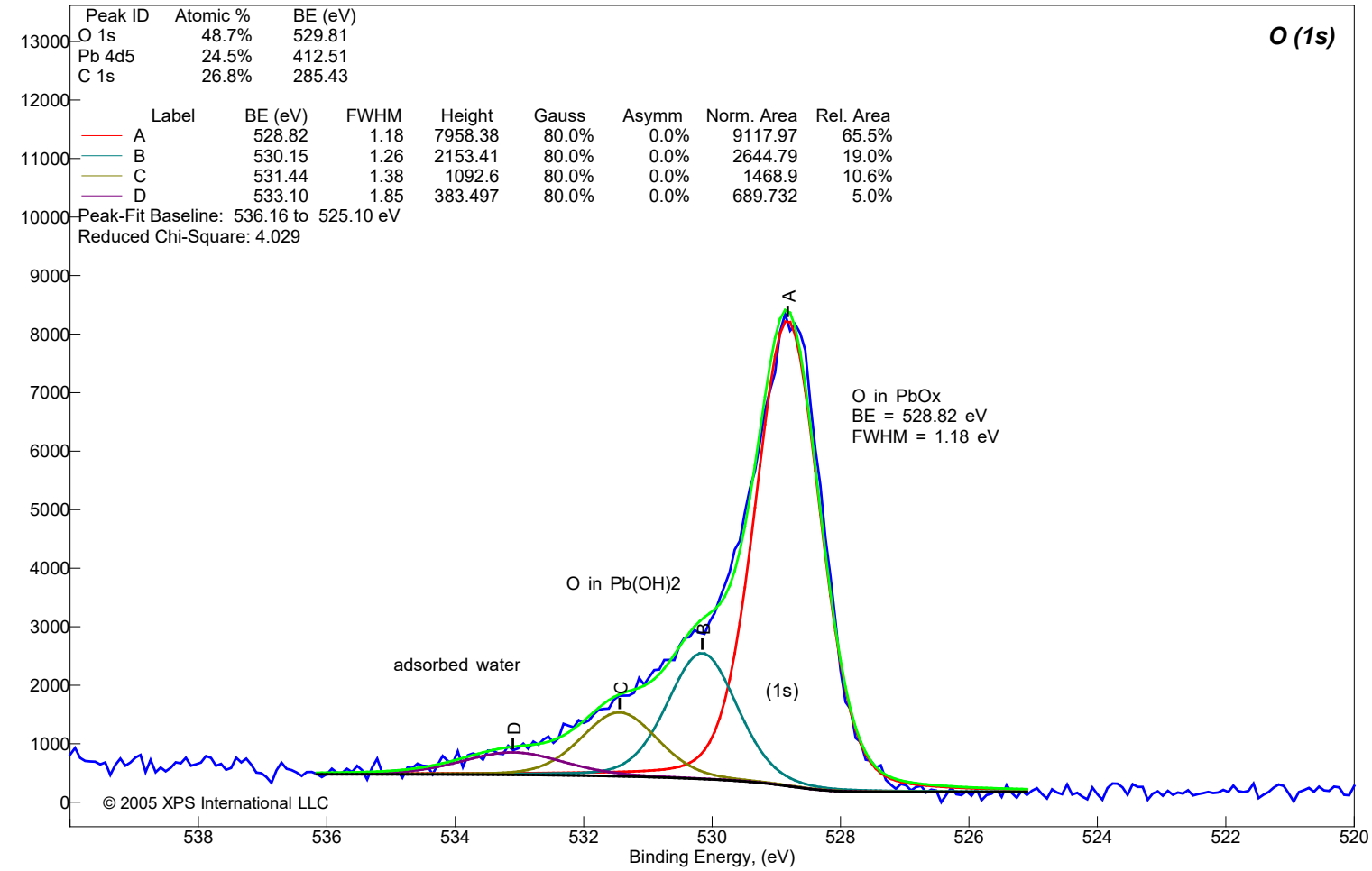
Sample Description: PbO2 (95+%) Aldrich Lot# 06811JW, 3mm pellet, CONDUCTIVE, 90 TOA



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Lead (IV) Oxide (FW = 239.19)

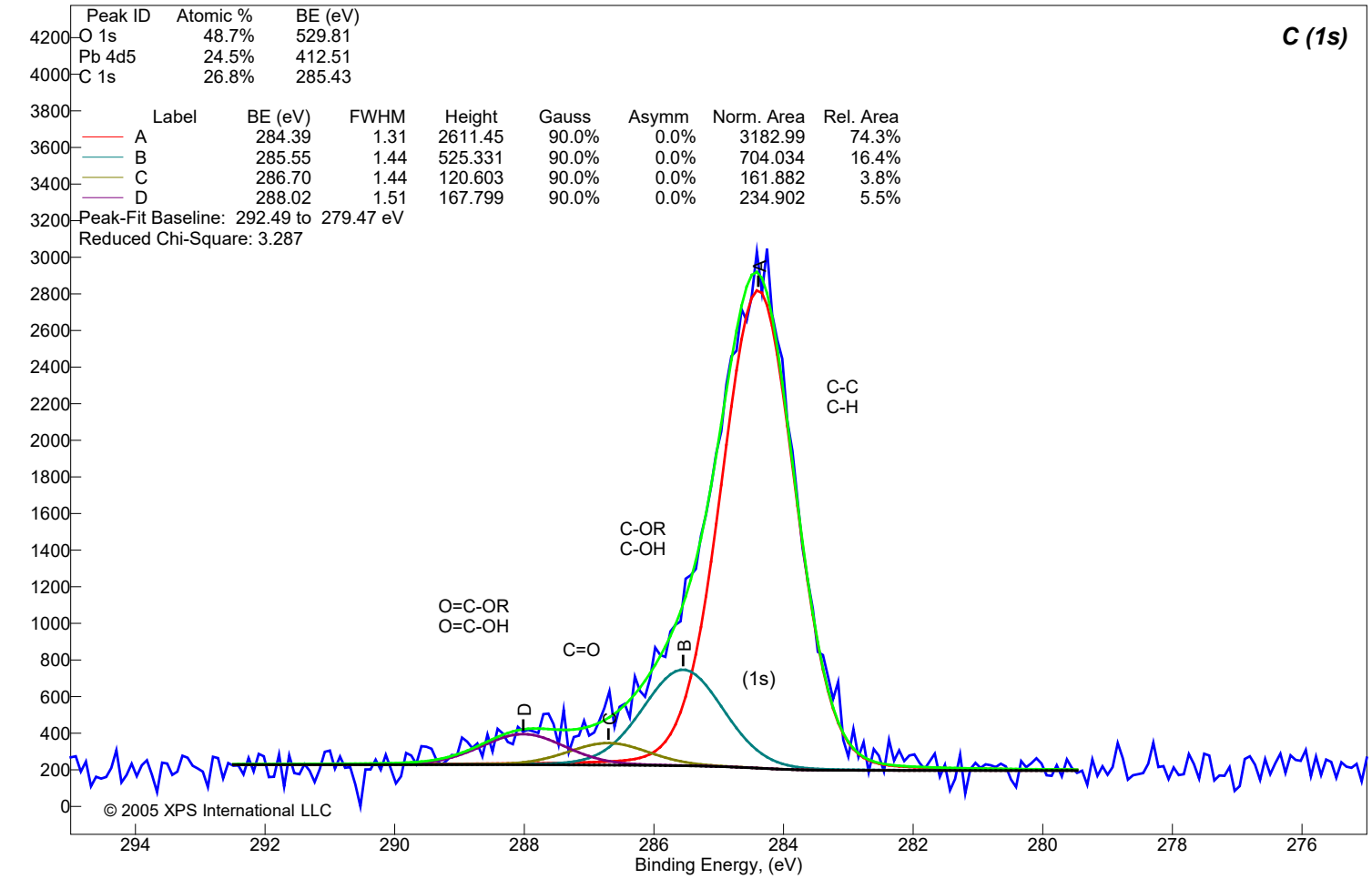
Sample Description: PbO2 (95+%) Aldrich Lot# 06811JW, 3mm pellet, CONDUCTIVE, 90 TOA



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Lead (IV) Oxide (FW = 239.19)

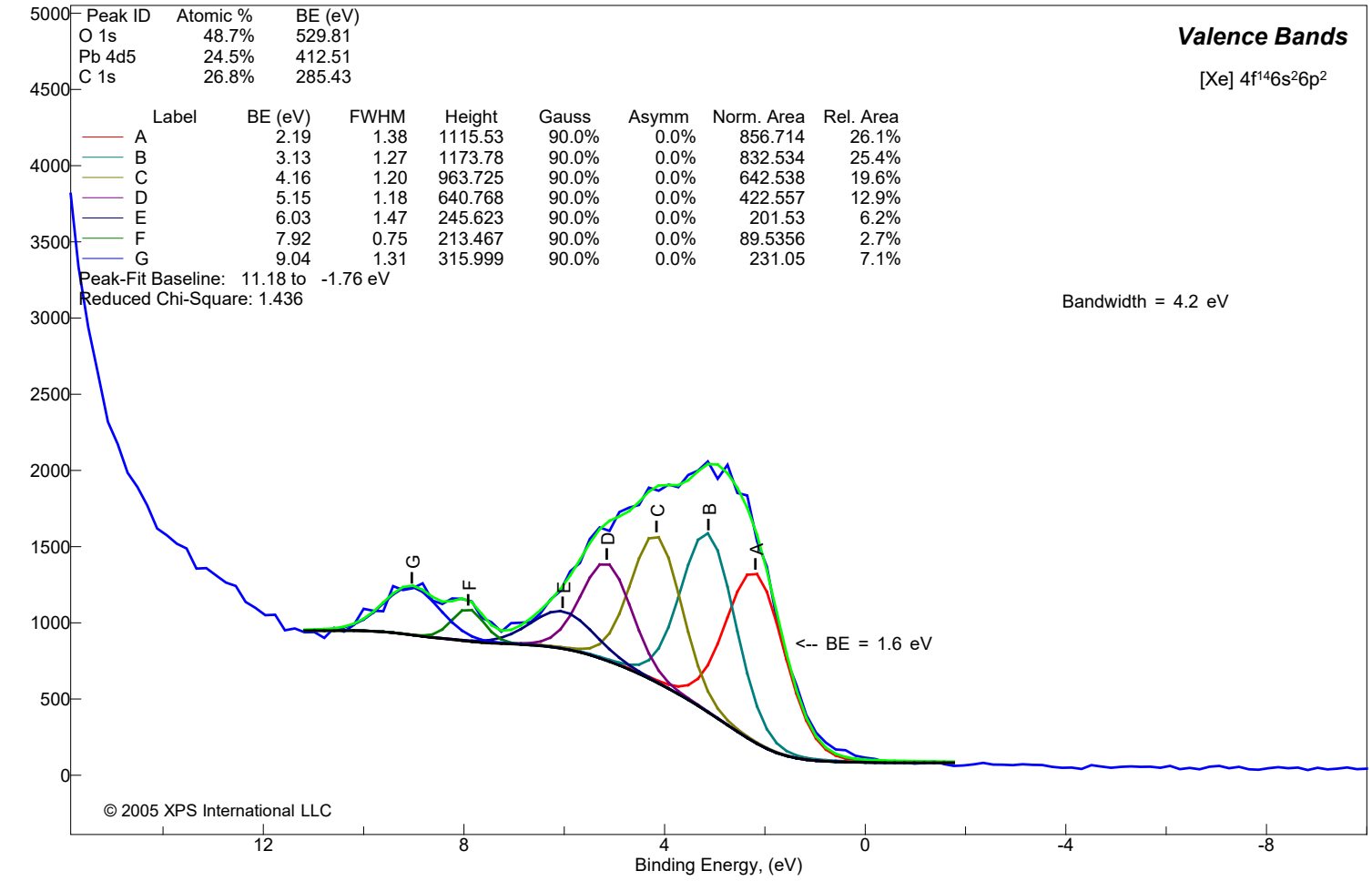
Sample Description: PbO2 (95+%) Aldrich Lot# 06811JW, 3mm pellet, CONDUCTIVE, 90 TOA



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Lead (IV) Oxide (FW = 239.19)

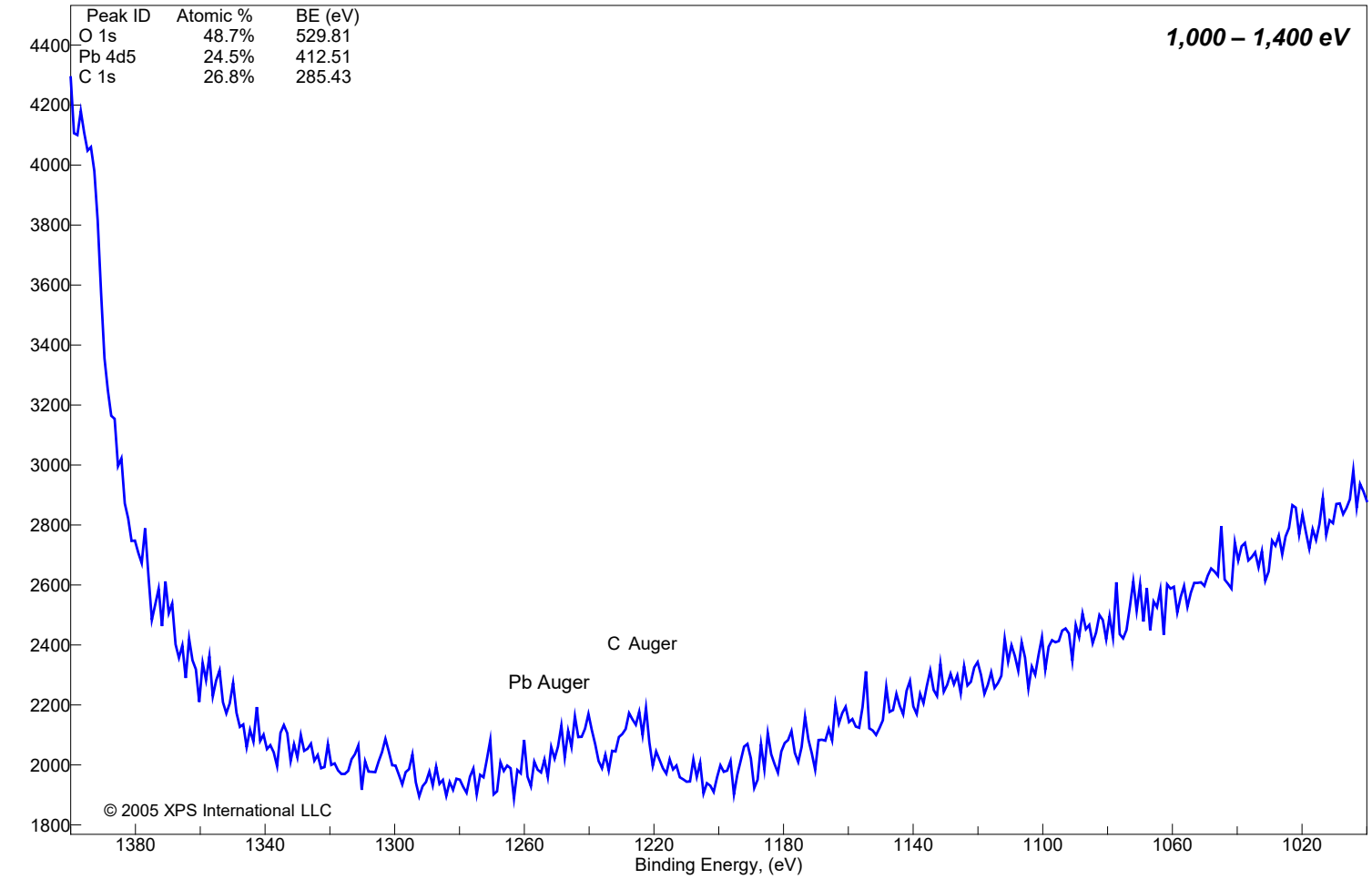
Sample Description: PbO2 (95+%) Aldrich Lot# 06811JW, 3mm pellet, CONDUCTIVE, 90 TOA



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Lead (IV) Oxide (FW = 239.19)

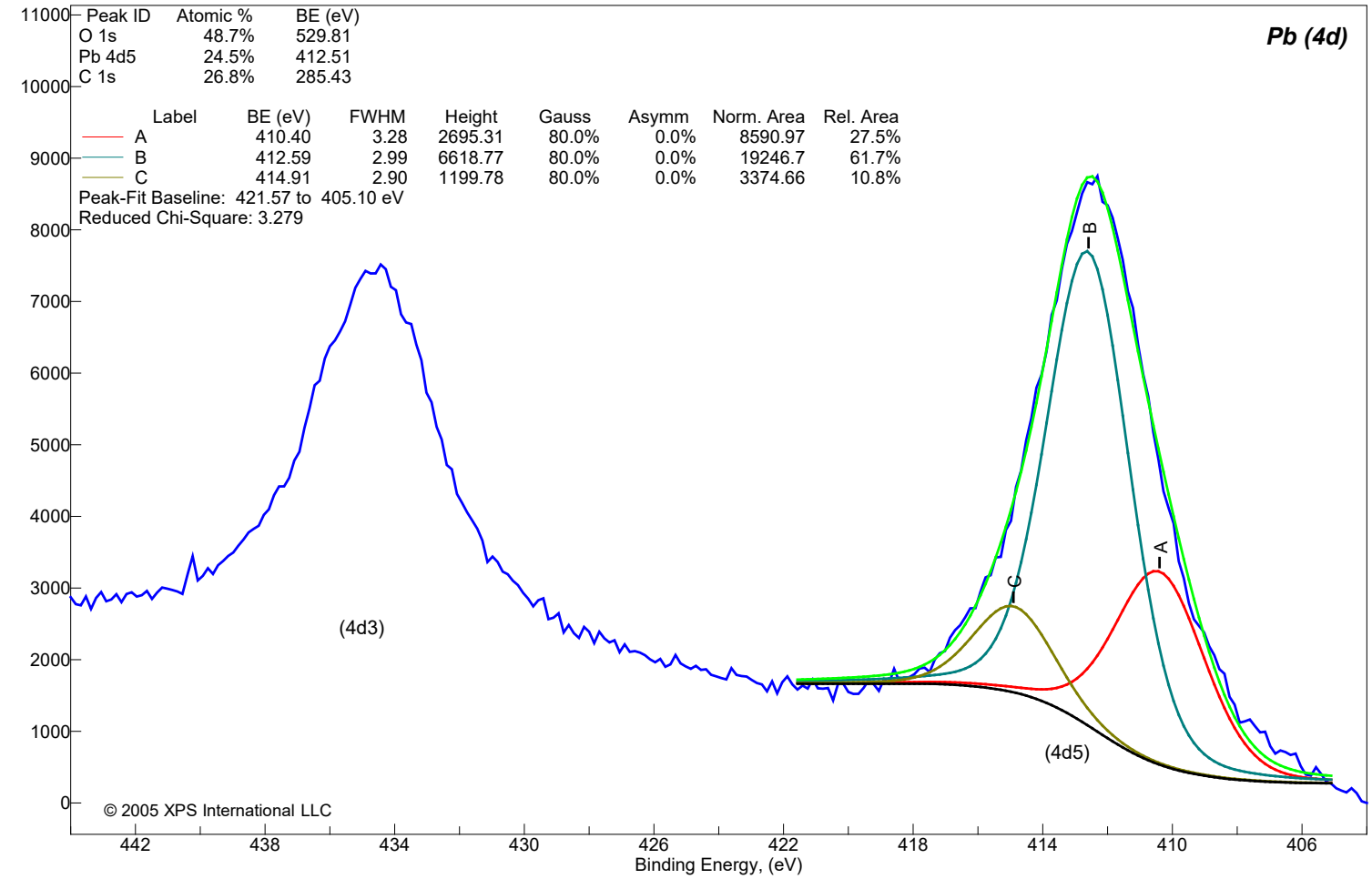
Sample Description: PbO2 (95+%) Aldrich Lot# 06811JW, 3mm pellet, CONDUCTIVE, 90 TOA



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Lead (IV) Oxide (FW = 239.19)

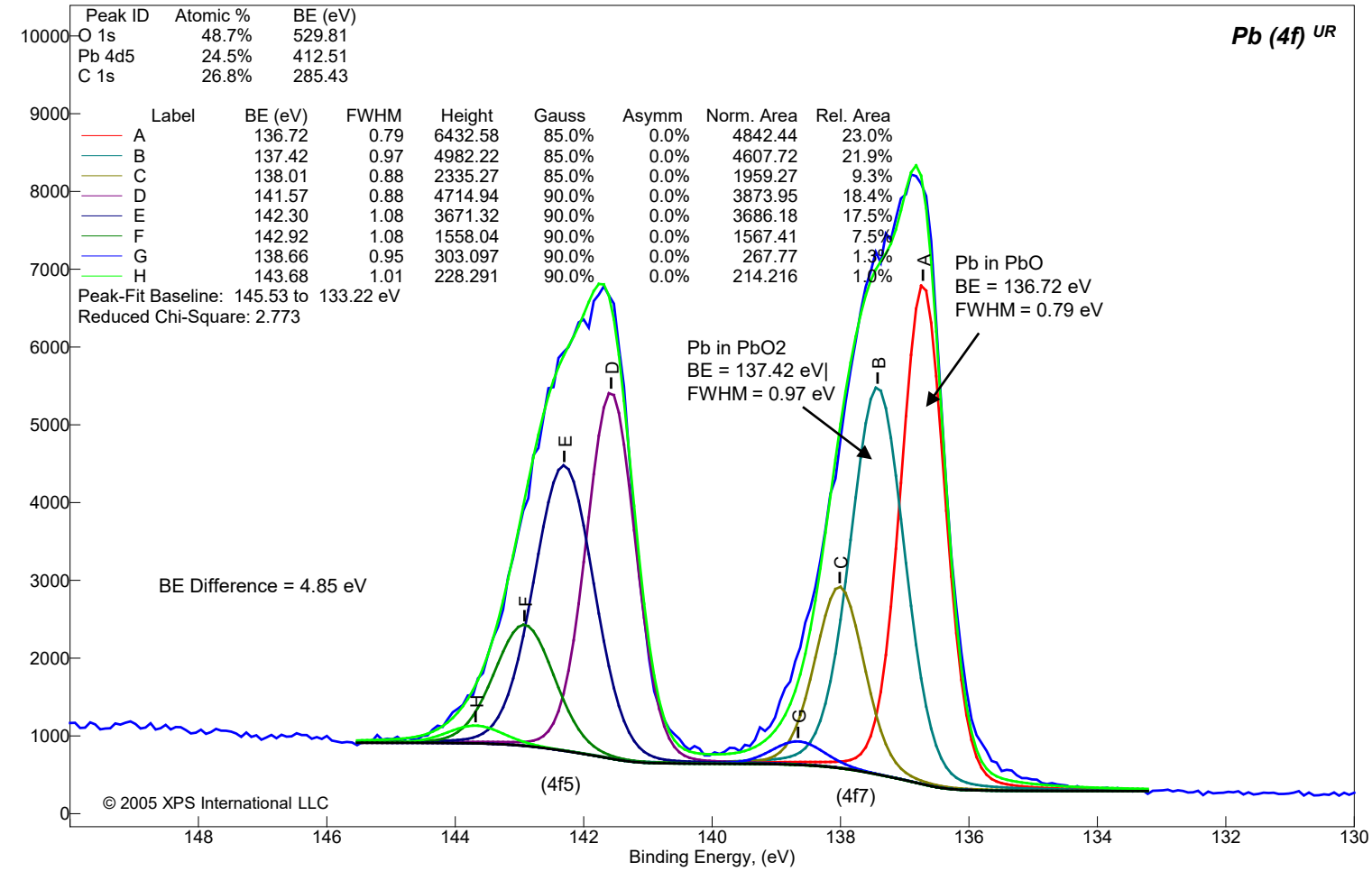
Sample Description: PbO2 (95+%) Aldrich Lot# 06811JW, 3mm pellet, CONDUCTIVE, 90 TOA



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Lead (IV) Oxide (FW = 239.19)

Sample Description: PbO2 (95+%) Aldrich Lot# 06811JW, 3mm pellet, CONDUCTIVE, 90 TOA



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Pb_2O_3

Lead (III) Oxide (FW = 462.40)
Surface Composition Table

Description: Pb_2O_3 (99.9%) from Rare Metallics Co. Lot# 80310-04, analyzed at 90 deg TOA, mesh at 1 mm, conductive red powder pressed into 3 mm pellet, mp 370 C dec

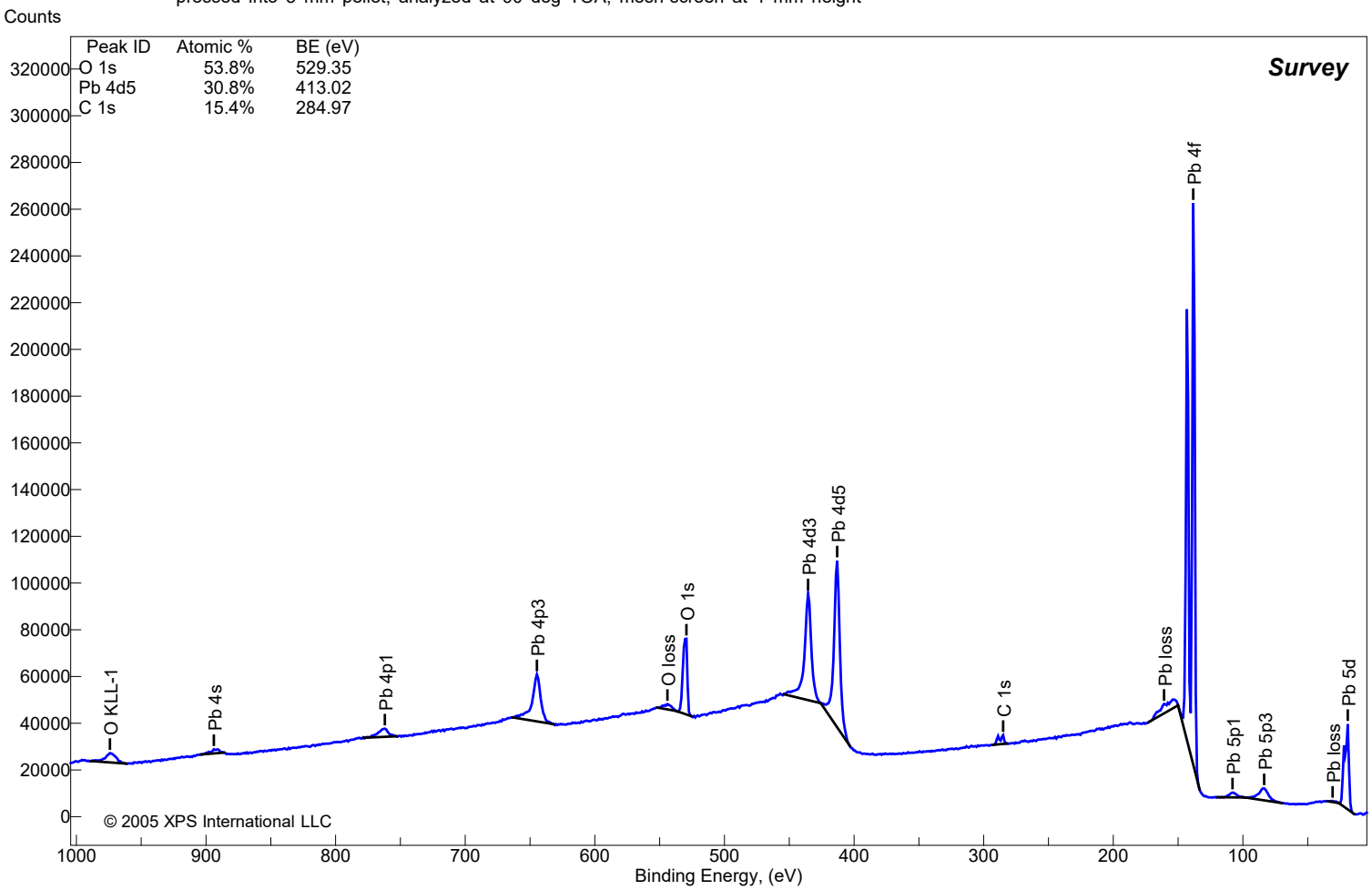
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Pb 5d	19.1	19.1	2.69	1.5	121,063	
Pb loss	30.8	30.8	0.00	1.5	1,549	
Pb 5p3	83.6	83.6	1.33	1.5	39,063	
Pb 5p1	108.0	108.0	0.53	1.5	11,191	
Pb 4f	138.3	138.3	22.74	1.5	834,457	
Pb loss	160.8	160.8	0.00	1.5	43,340	
C 1s	285.0	285.0	1.00	1.5	14,816	15.4%
Pb 4d5	413.0	413.0	13.02	1.5	326,935	30.8%
Pb 4d3	435.5	435.5	8.87	1.5	243,139	
O 1s	529.3	529.3	2.93	1.5	107,959	53.8%
O loss	544.0	544.0	0.00	1.5	13,636	
Pb 4p3	644.7	644.7	6.33	1.5	131,470	
Pb 4p1	762.0	762.0	2.12	1.5	23,977	
Pb 4s	894.0	894.0	1.96	1.5	10,919	
O KLL-1	974.1	974.1	0.70	1.5	33,713	

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Pb_2O_3

Lead (III) Oxide (FW = 462.40)

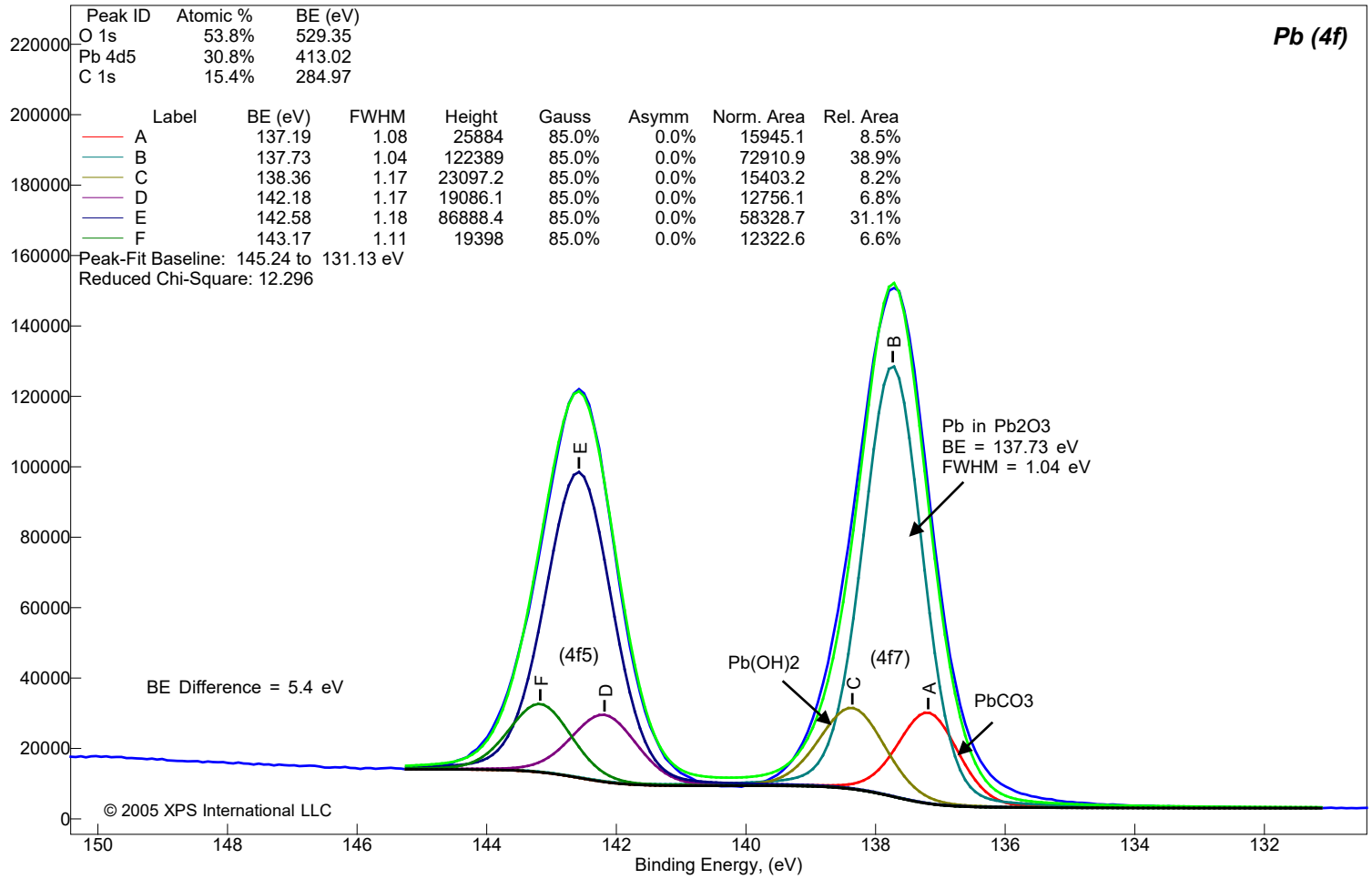
Sample Description: Pb2O3 (99.9%) from Rare Metallics Corp. lot# 80310-04
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Lead (III) Oxide (FW = 462.40)

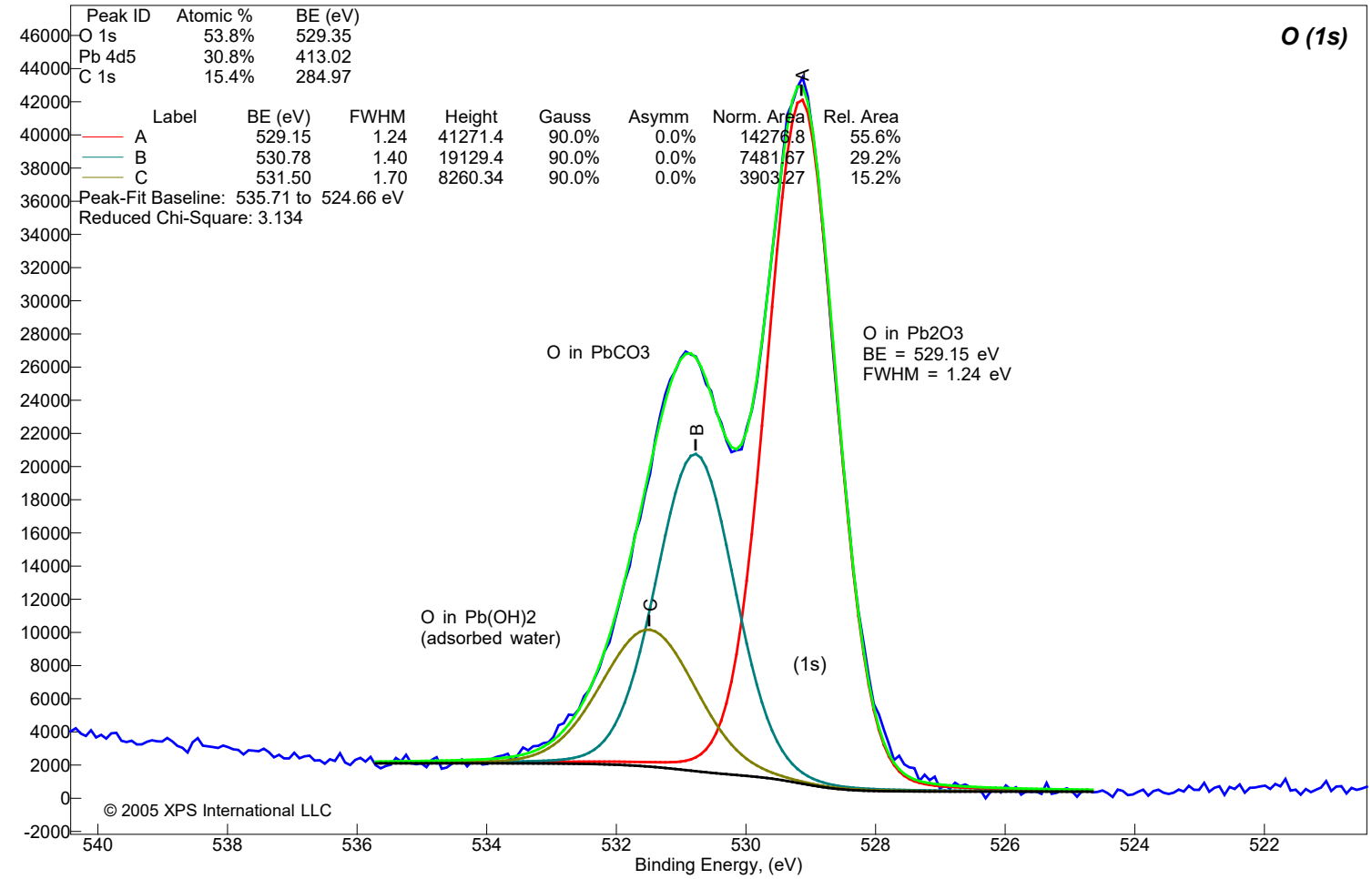
Sample Description: Pb2O3 (99.9%) RMC lot# 80310-04, 3mm pellet, screen, 90 TOA



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Lead (III) Oxide (FW = 462.40)

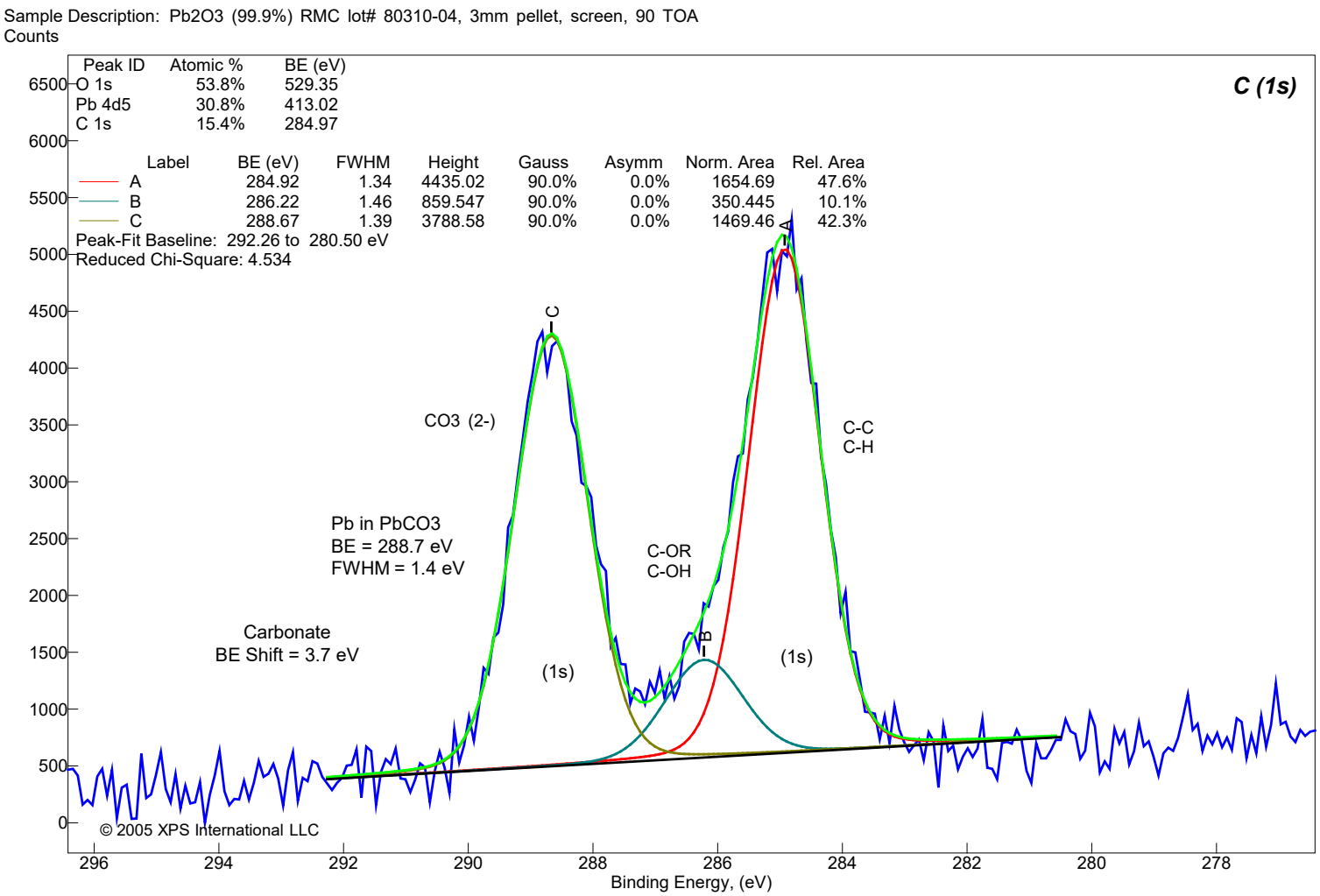
Sample Description: Pb2O3 (99.9%) RMC lot# 80310-04, 3mm pellet, screen, 90 TOA



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Pb_2O_3

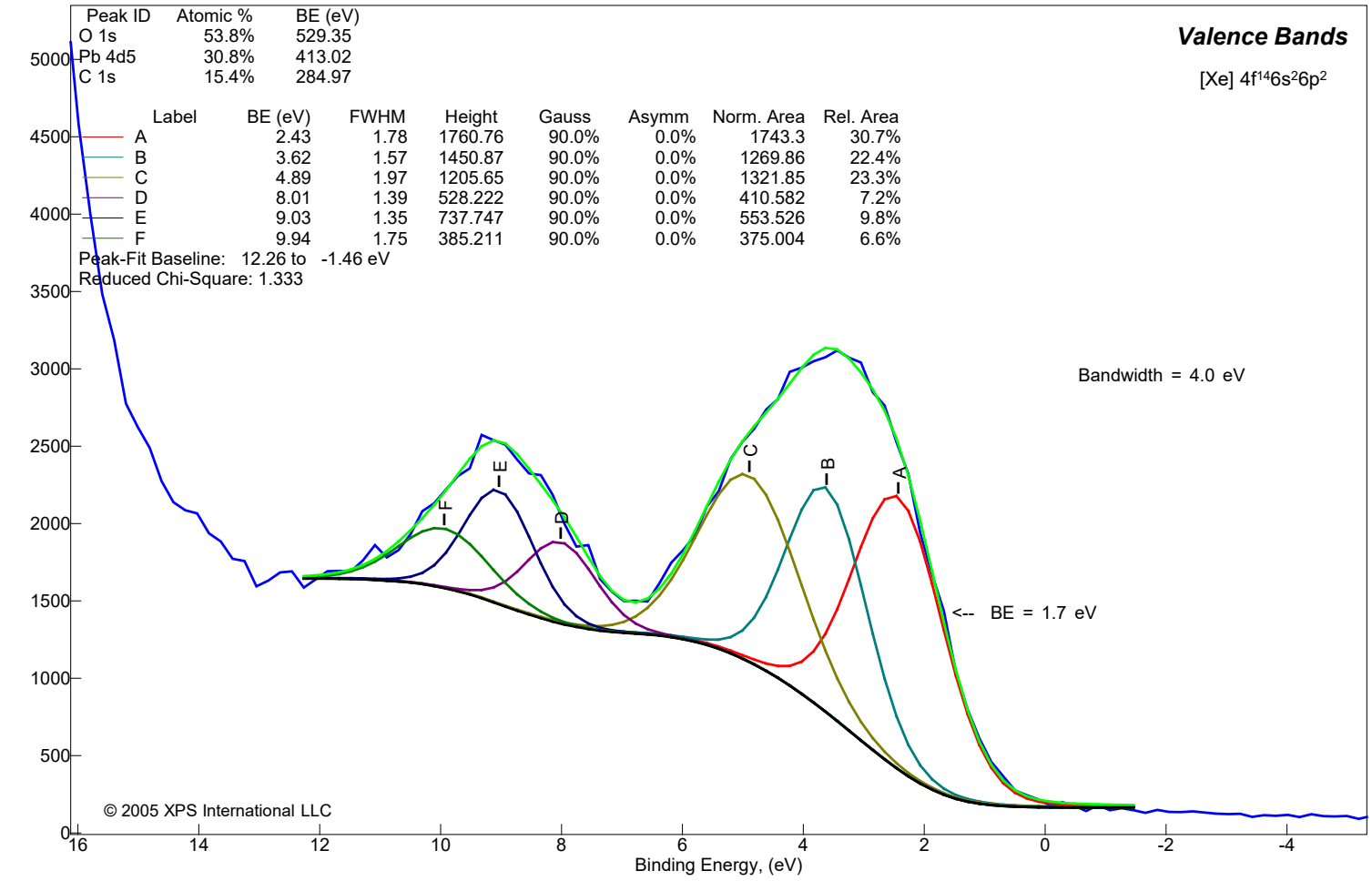
Lead (III) Oxide (FW = 462.40)



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Lead (III) Oxide (FW = 462.40)

Sample Description: Pb2O3 (99.9%) RMC lot# 80310-04, 3mm pellet, screen, 90 TOA

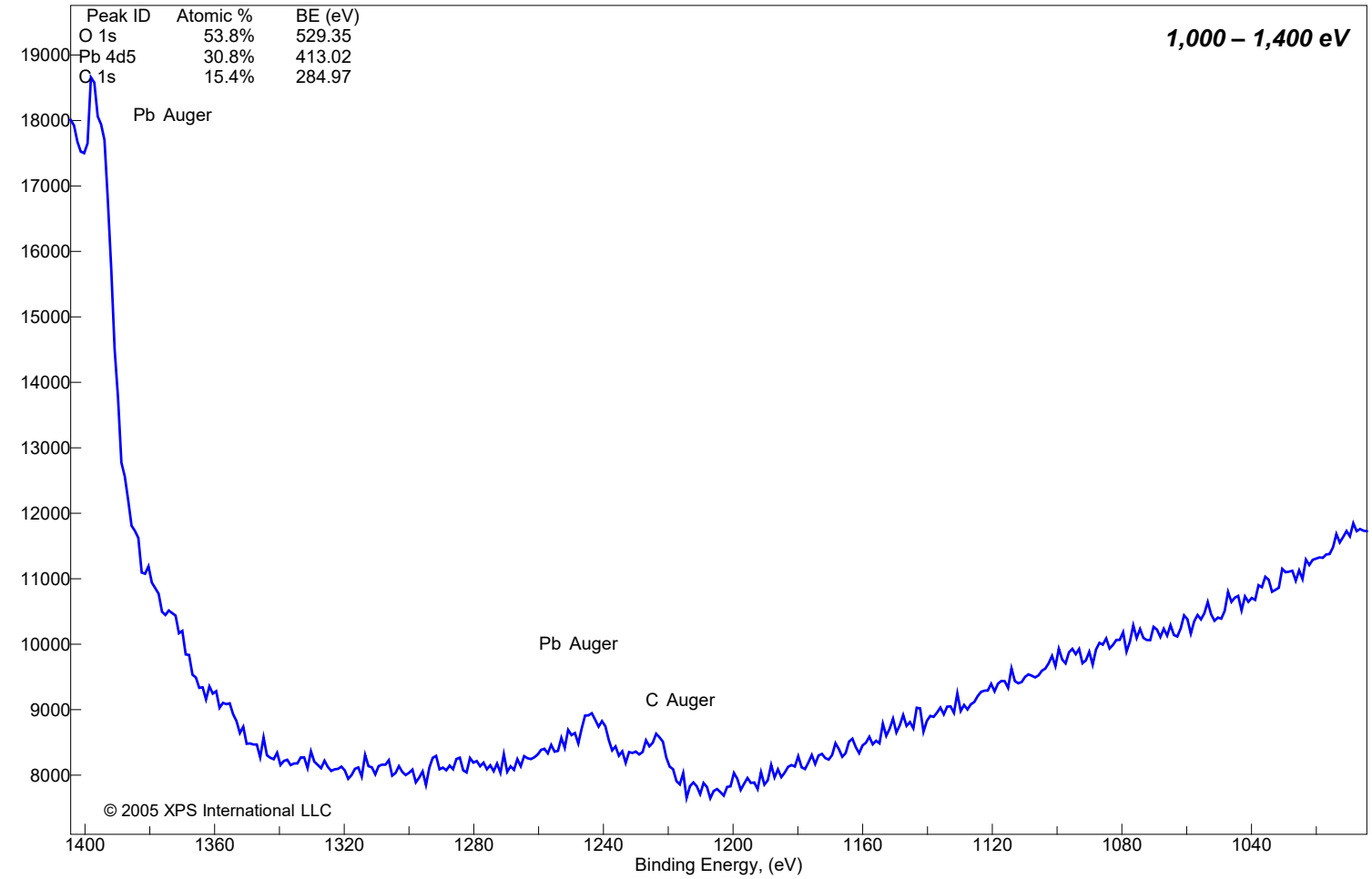


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Pb_2O_3

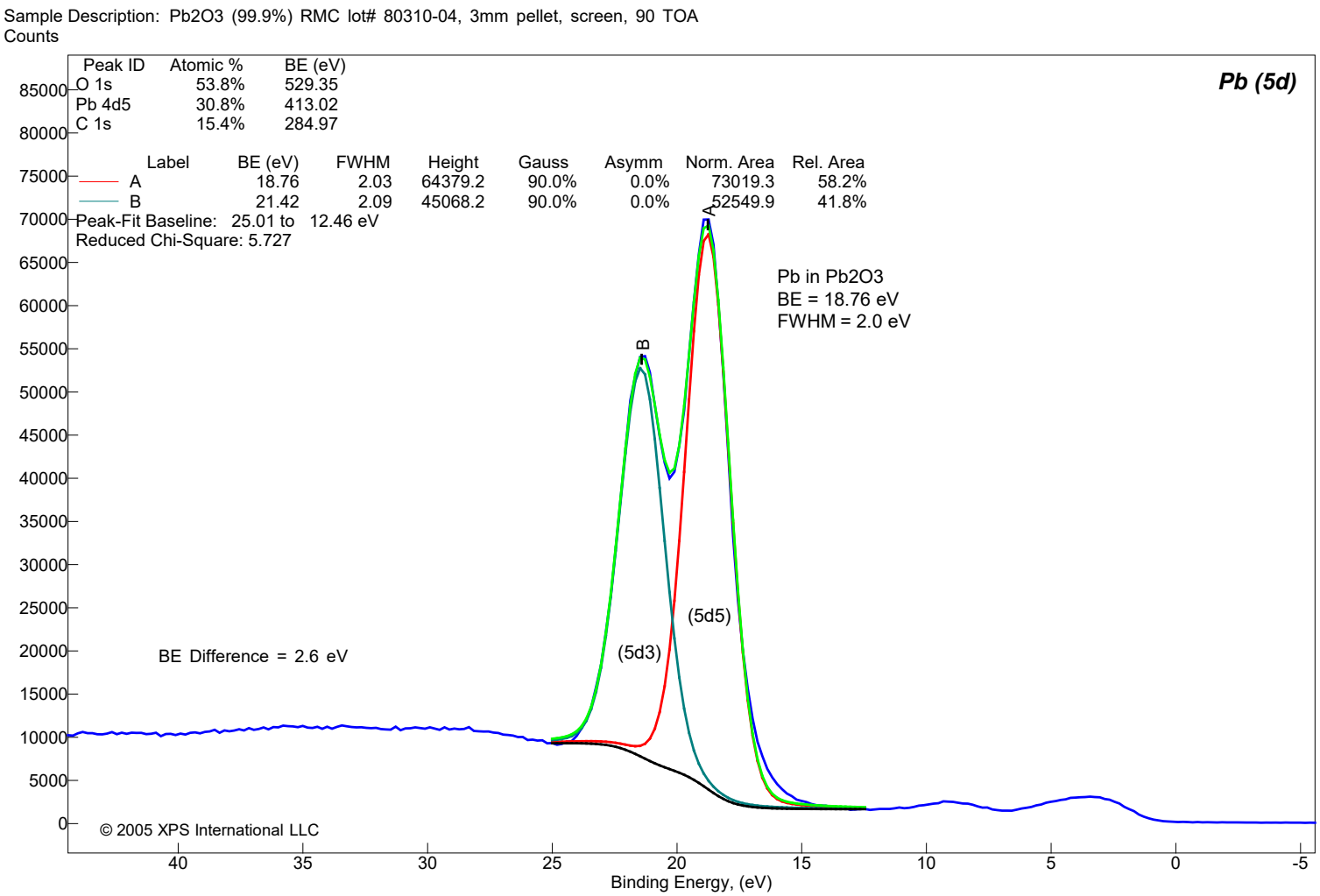
Lead (III) Oxide (FW = 462.40)

Sample Description: Pb2O3 (99.9%) RMC lot# 80310-04, 3mm pellet, screen, 90 TOA



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Lead (III) Oxide (FW = 462.40)



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$PbCO_3$
Cerrusite

Lead (II) Carbonate (FW = 267.21)
Surface Composition Table

Description: $PbCO_3$ (99+%) from Cerrusite (natural crystal), analyzed at 90 deg TOA, non-conductive white crystal, analyzed as received, mp 400 C dec., d 6.14

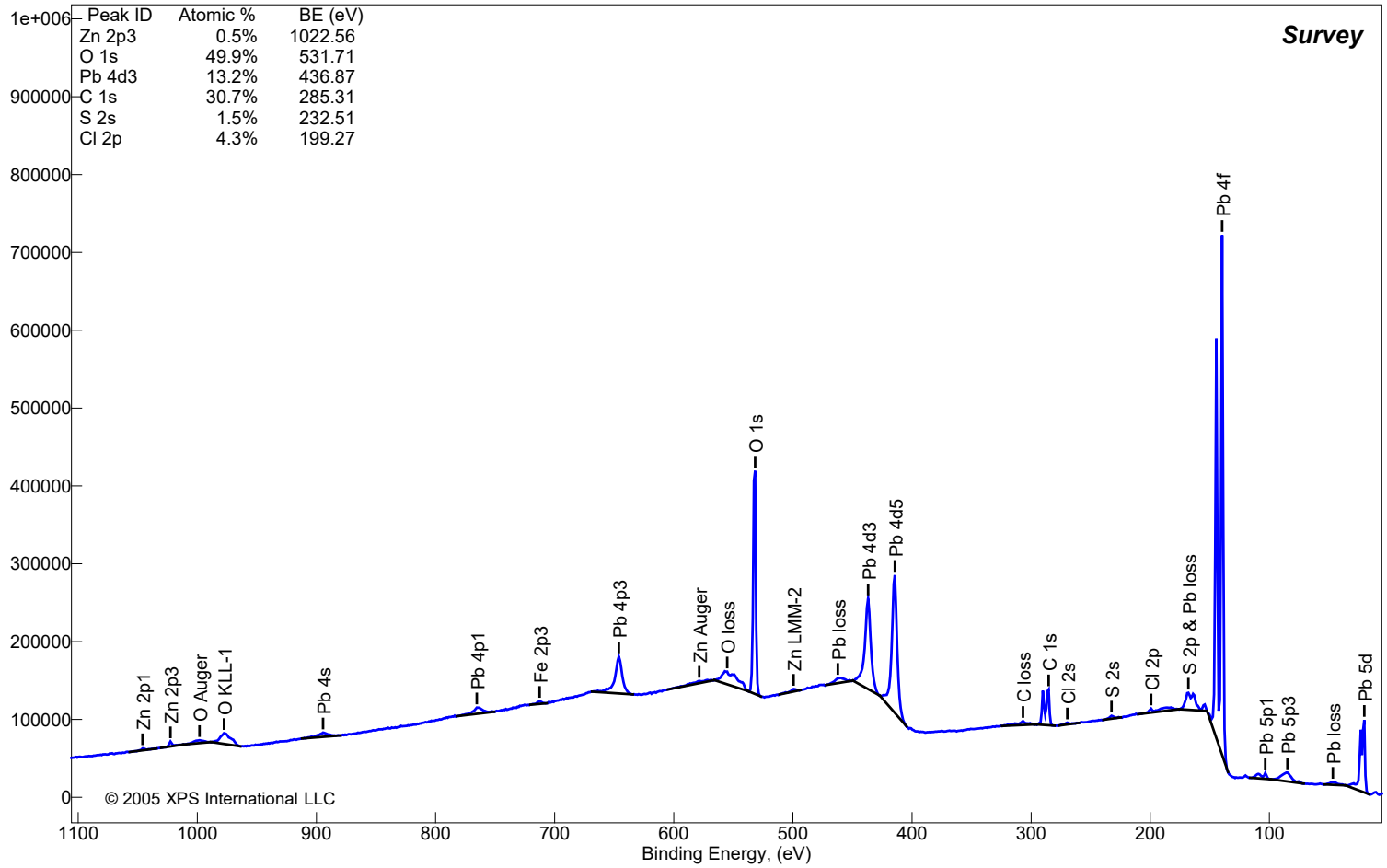
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Pb 5d	21.3	20.3	2.69	1.4	82,716	
Pb loss	47.7	46.7	0.00	1.4	5,730	
Pb 5p3	85.9	84.9	1.33	1.4	23,180	
Pb 5p1	104.4	103.4	0.53	1.4	10,184	
Pb 4f	140.6	139.6	22.74	1.4	488,875	
S 2p & Pb loss	169.0	168.0	1.68	1.4	46,228	
Cl 2p	200.3	199.3	2.28	1.4	15,651	4.3%
S 2s	233.5	232.5	1.43	1.4	3,229	1.5%
Cl 2s	270.7	269.7	1.69	1.4	2,544	
C 1s	286.3	285.3	1.00	1.4	44,616	30.7%
C loss	307.8	306.8	0.00	1.4	8,426	
Pb 4d5	415.4	414.4	13.02	1.4	191,368	
Pb 4d3	437.9	436.9	8.87	1.4	140,819	13.2%
Pb loss	463.3	462.3	0.00	1.4	11,313	
Zn LMM-2	500.4	499.4	0.29	1.4	3,623	
O 1s	532.7	531.7	2.93	1.4	153,930	49.9%
O loss	556.2	555.2	0.00	1.4	50,797	
Zn Auger	579.6	578.6	0.00	1.4	6,459	
Pb 4p3	647.1	646.1	6.33	1.4	70,875	
Fe 2p3	713.6	712.6	10.82	1.4	3,143	
Pb 4p1	766.4	765.4	2.12	1.4	16,015	
Pb 4s	895.5	894.5	1.96	1.4	10,679	
O KLL-1	978.6	977.6	0.70	1.4	30,459	
O Auger	999.1	998.1	0.00	1.4	7,397	
Zn 2p3	1023.6	1022.6	18.92	1.4	3,442	0.5%
Zn 2p1	1047.0	1046.0	9.80	1.4	2,571	

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$PbCO_3$
Cerrusite

Lead (II) Carbonate (FW = 267.21)

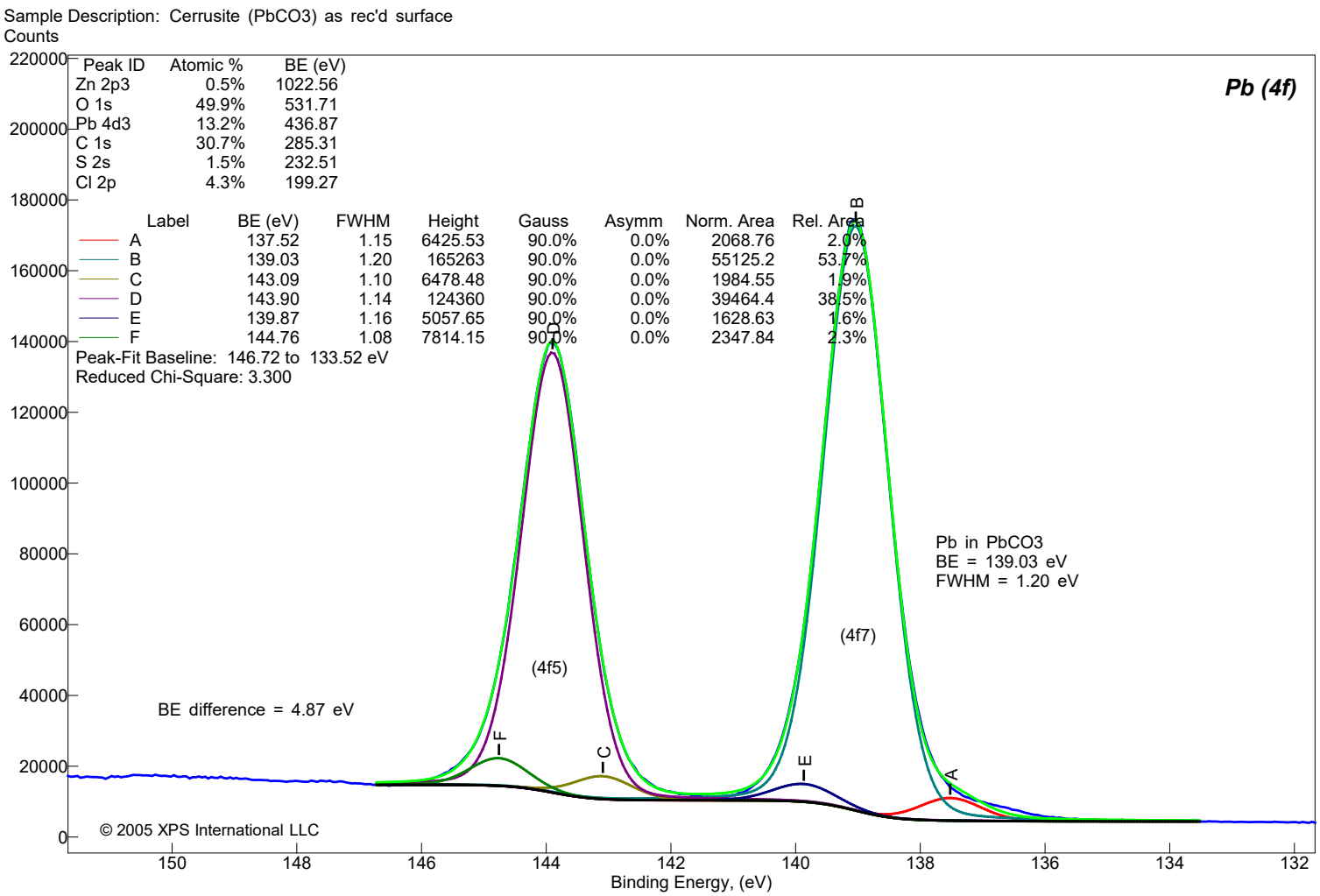
Sample Description: PbCO3 (99%, Cerrusite) natural crystal
analyzed as received at 90 deg TOA



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$PbCO_3$
Cerrusite

Lead (II) Carbonate (FW = 267.21)

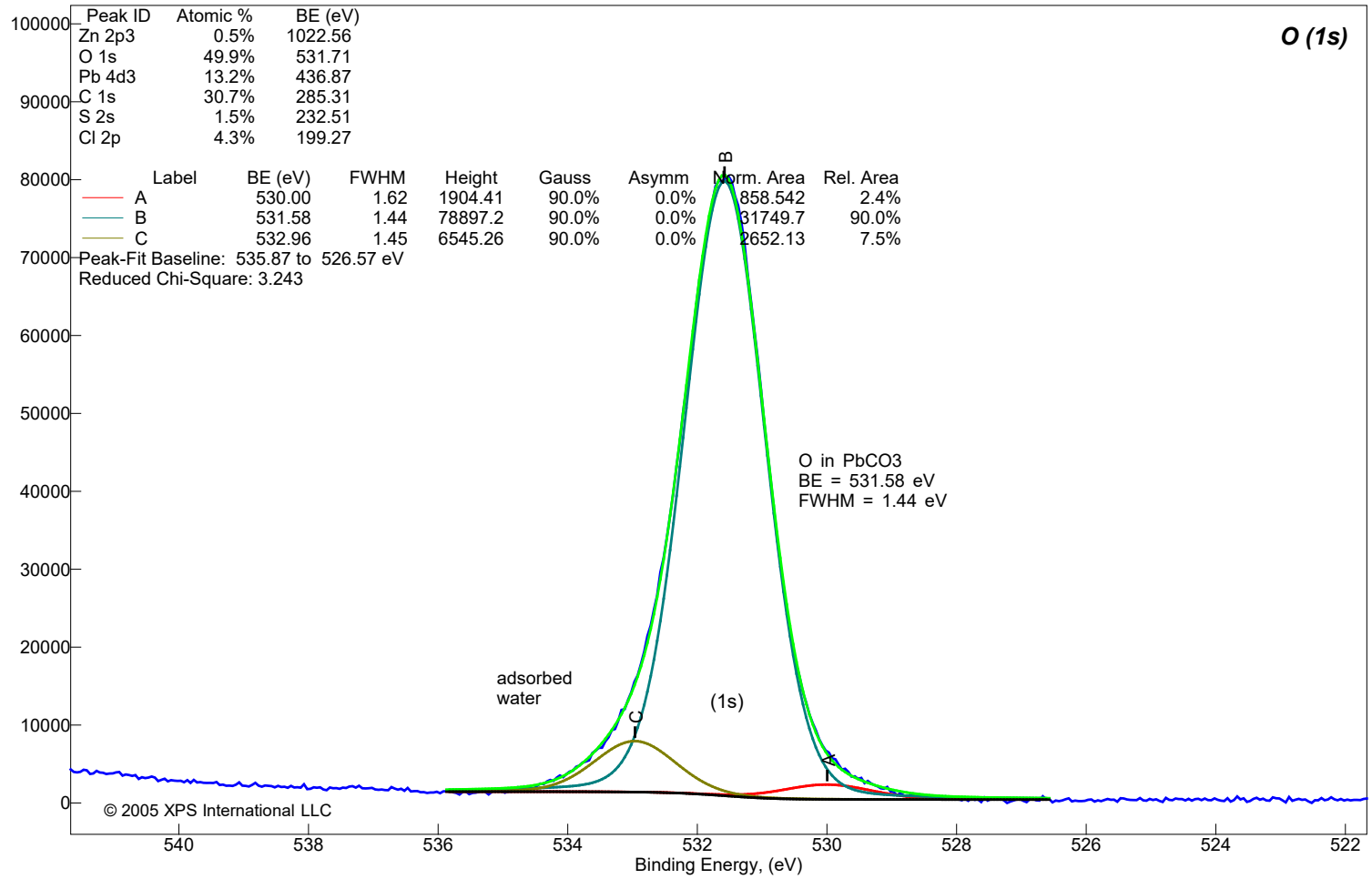


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$PbCO_3$
Cerrusite

Lead (II) Carbonate (FW = 267.21)

Sample Description: Cerrusite (PbCO3) as rec'd surface

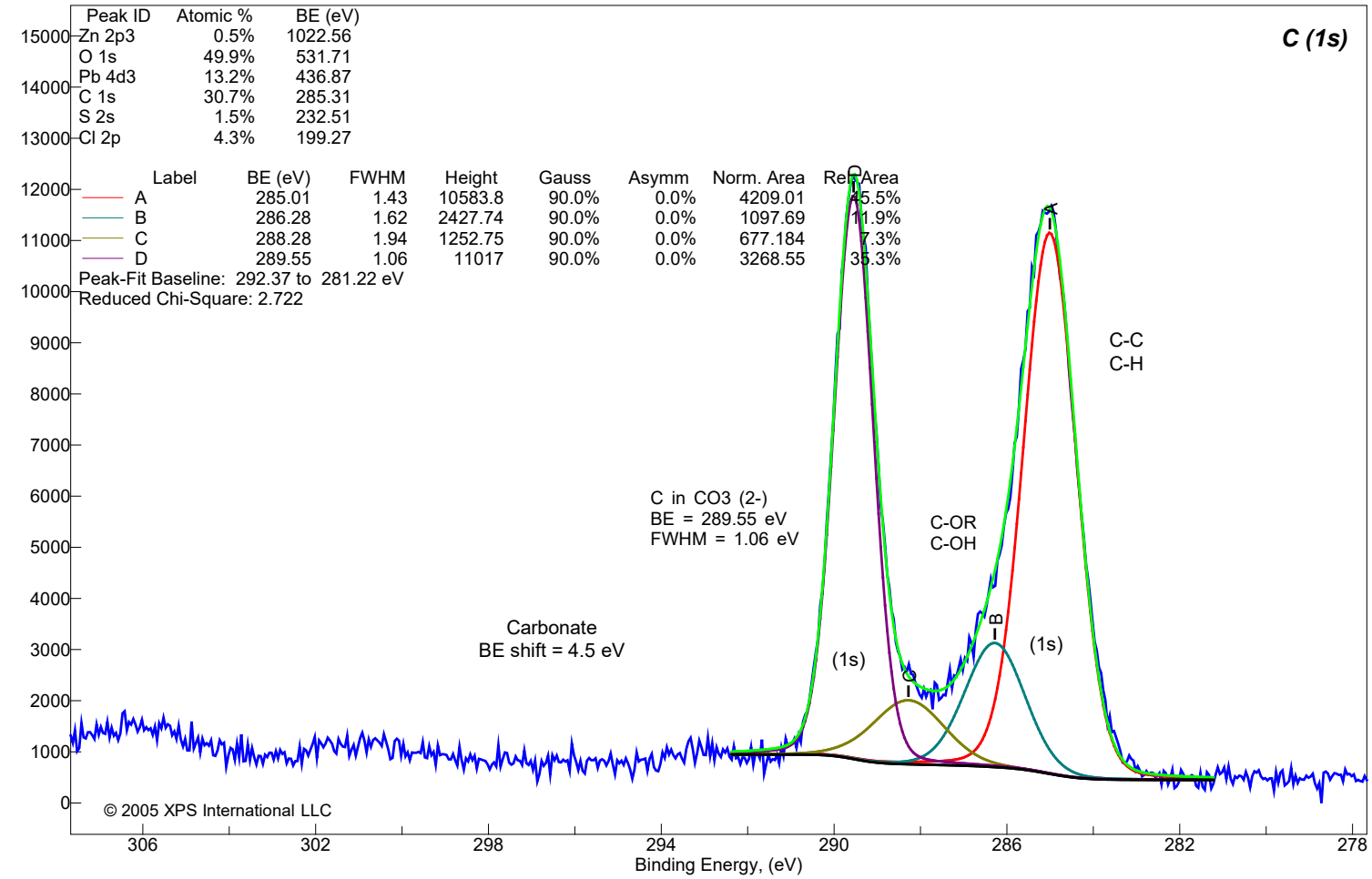


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$PbCO_3$
Cerrusite

Lead (II) Carbonate (FW = 267.21)

Sample Description: Cerrusite (PbCO3) as rec'd surface

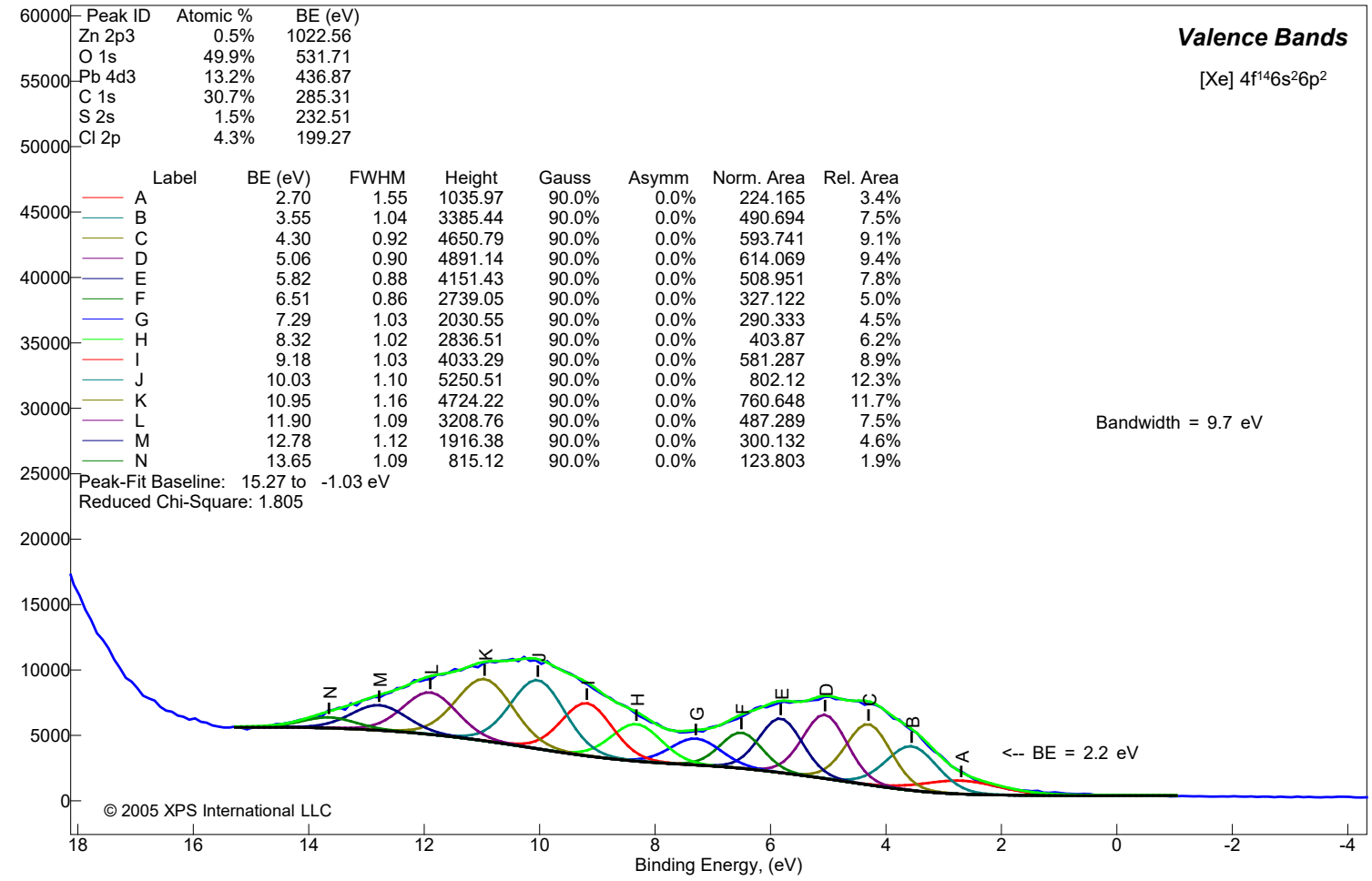


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$PbCO_3$
Cerrusite

Lead (II) Carbonate (FW = 267.21)

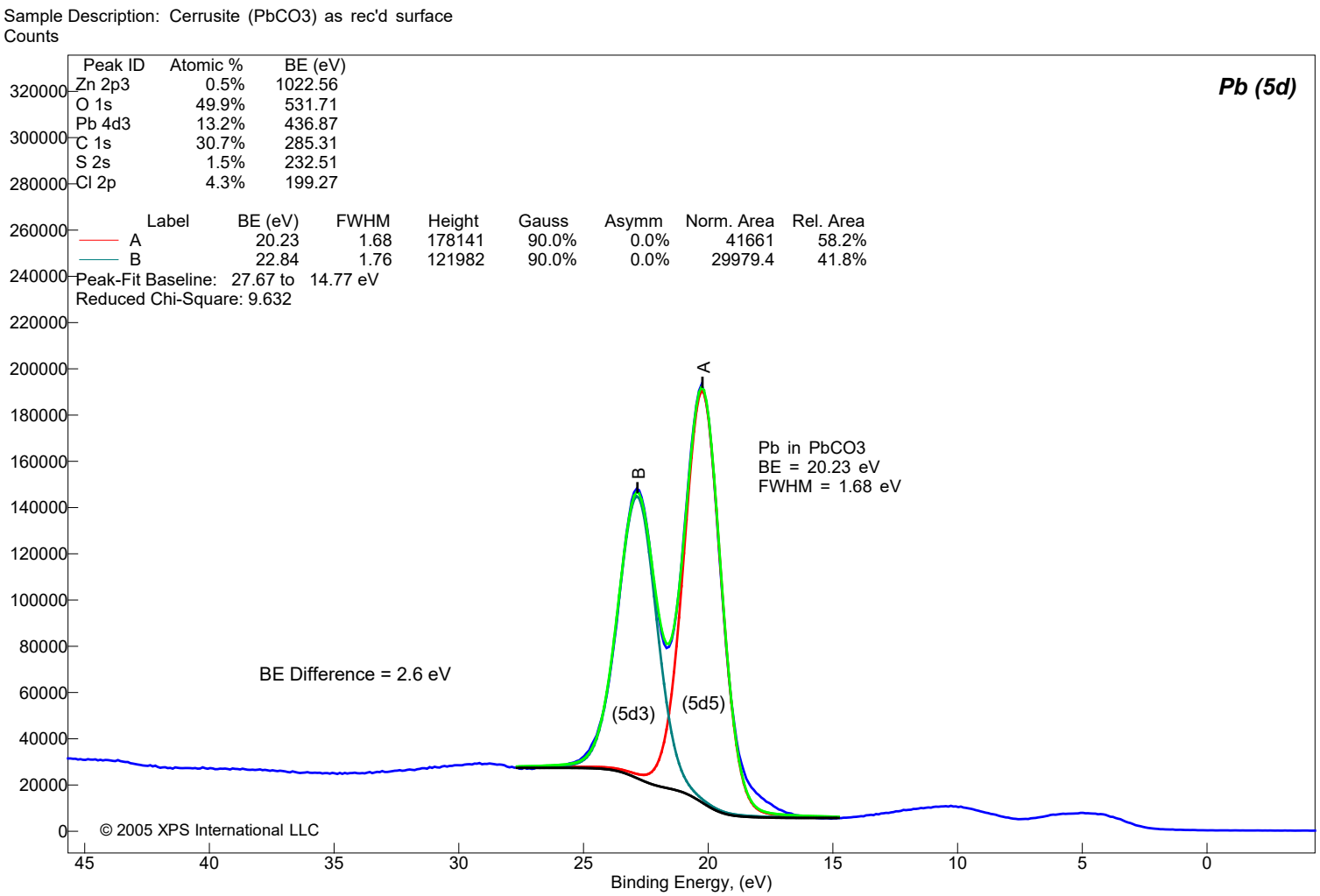
Sample Description: Cerrusite (PbCO3) as rec'd surface



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$PbCO_3$
Cerrusite

Lead (II) Carbonate (FW = 267.21)

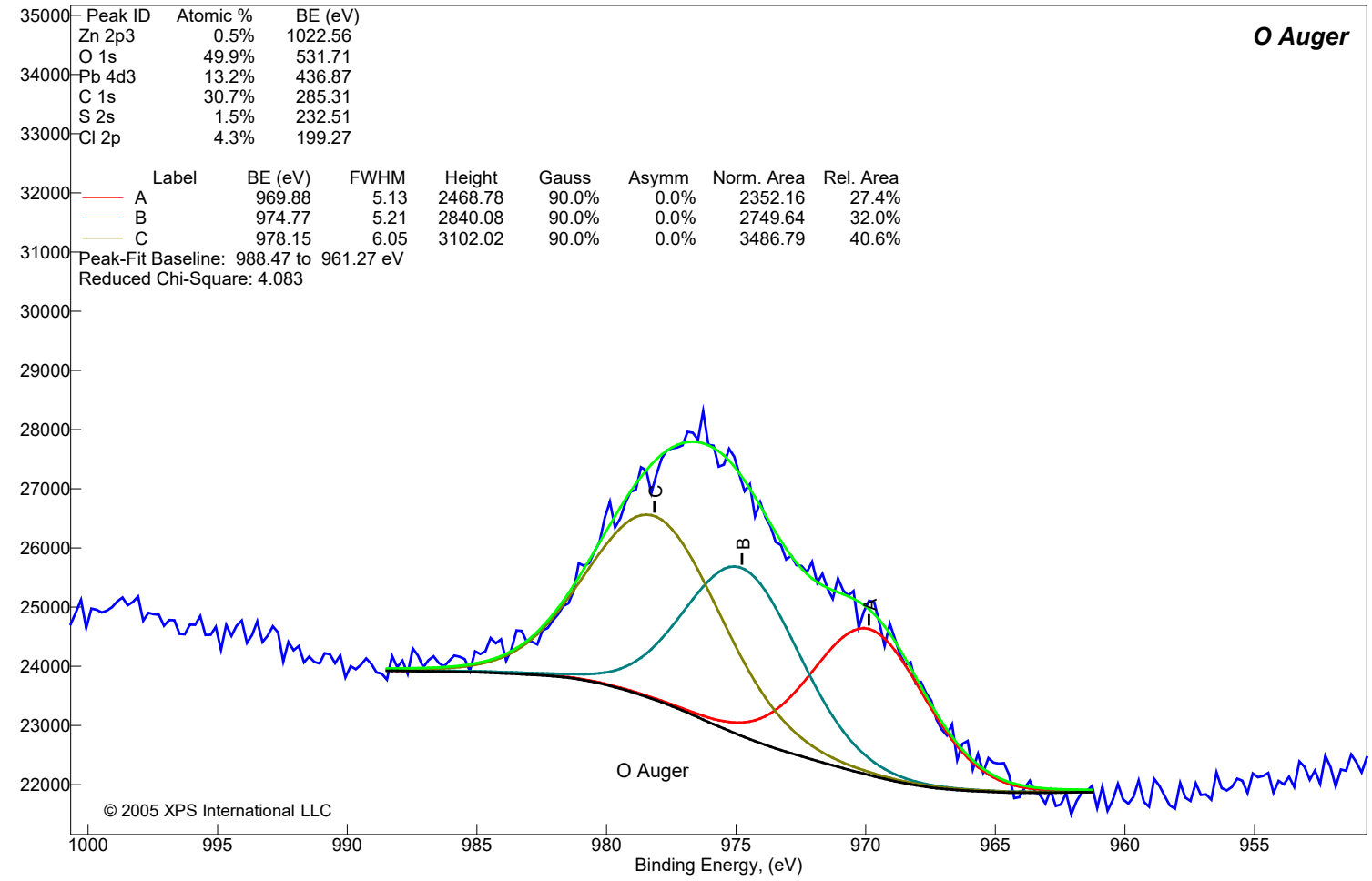


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$PbCO_3$
Cerrusite

Lead (II) Carbonate (FW = 267.21)

Sample Description: Cerrusite (PbCO3) as rec'd surface

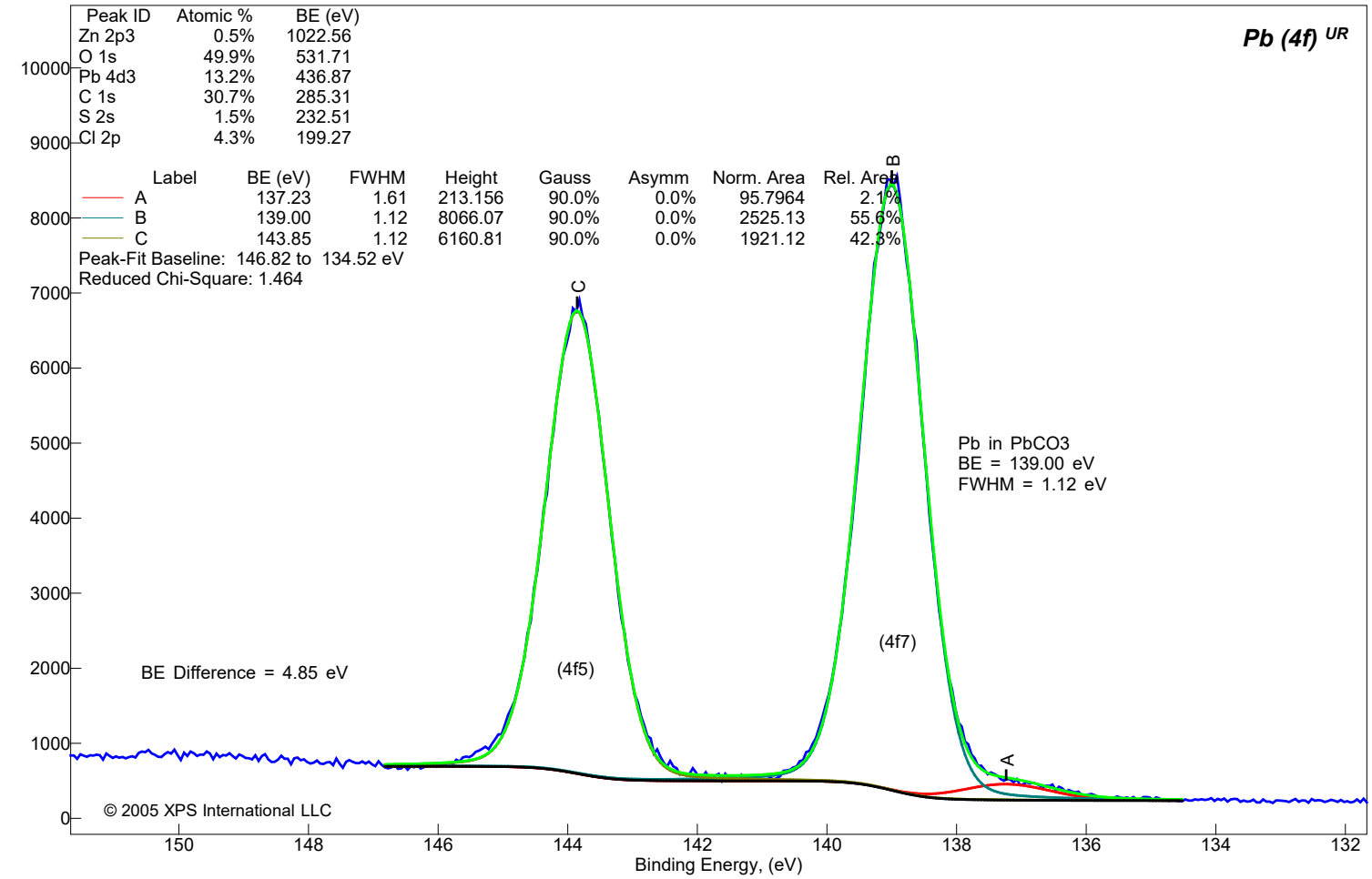


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$PbCO_3$
Cerrusite

Lead (II) Carbonate (FW = 267.21)

Sample Description: Cerrusite (PbCO3) as rec'd surface



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PdO

Palladium (II) Oxide (FW = 122.40)
Surface Composition Table

Description: PdO (99.999%) from Aldrich Co. Lot# 03219JV, analyzed at 90 deg TOA, mesh at 1 mm, semi-conductive black powder pressed into 3 mm pellet, mp 750 C, d 8.3, slightly sol in aqua regia

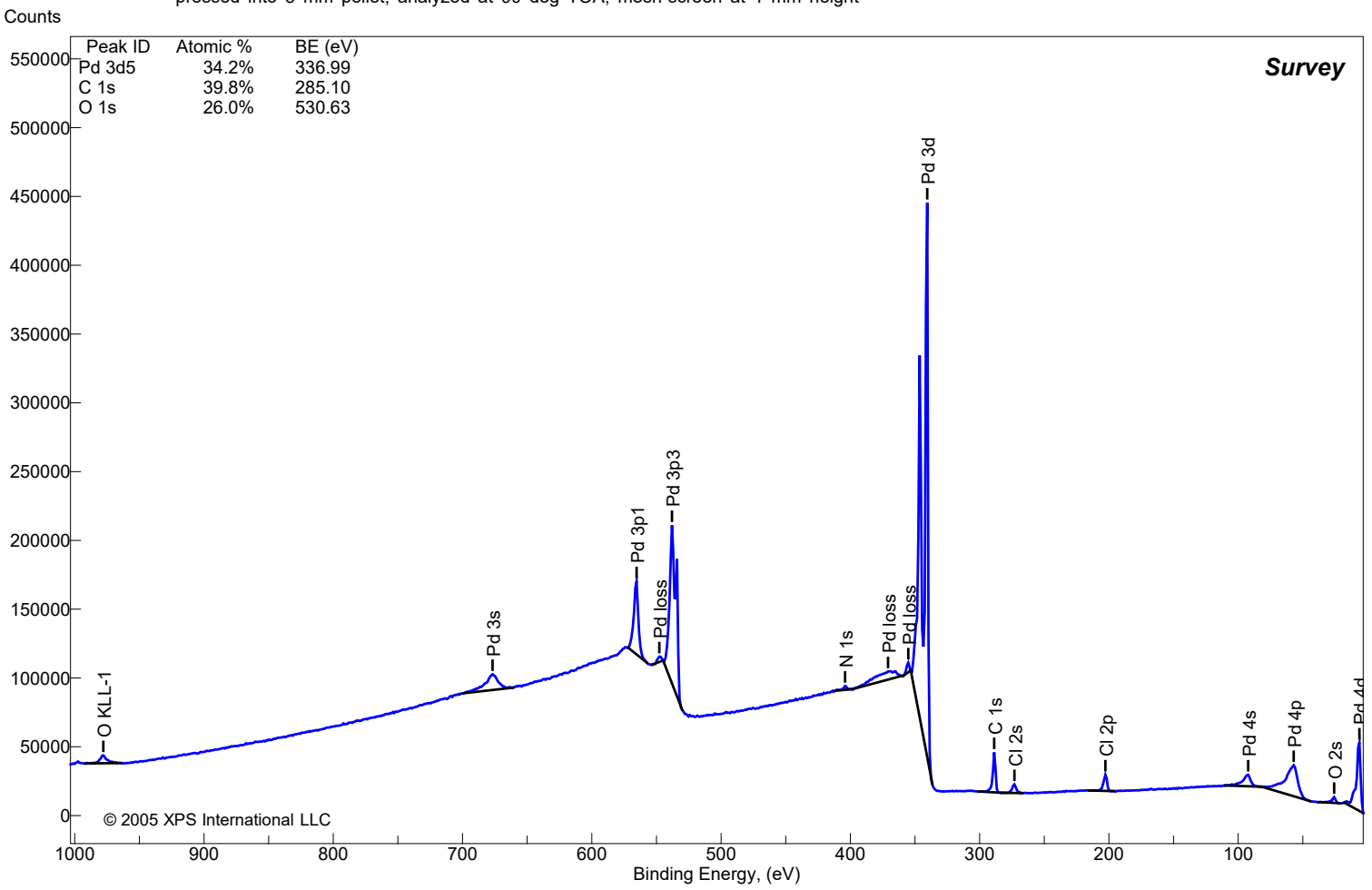
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Pd 4d	6.2	6.2	1.24	1.5	33,470	
O 2s	25.8	25.8	0.14	1.5	2,513	
Pd 4p	57.1	57.1	1.88	1.5	44,567	
Pd 4s	92.3	92.3	0.60	1.5	9,751	
Cl 2p	202.7	202.7	2.28	1.5	6,266	
Cl 2s	273.1	273.1	1.69	1.5	3,867	
C 1s	285.1	285.1	1.00	1.1	5,575	39.8%
Pd 3d5	337.0	337.0	9.48	1.1	43,171	34.2%
Pd 3d3	342.3	342.3	6.56	1.1	25,423	
Pd loss	355.2	355.2	0.00	1.5	3,524	
Pd loss	370.8	370.8	0.00	1.5	19,502	
N 1s	404.1	404.1	1.80	1.5	1,307	
O 1s	530.6	530.6	2.93	1.1	8,298	26.0%
Pd 3p3	538.0	538.0	7.63	1.5	112,408	
Pd loss	547.8	547.8	0.00	1.5	2,321	
Pd 3p1	565.4	565.4	3.83	1.5	37,624	
Pd 3s	676.8	676.8	2.81	1.5	24,286	
O KLL-1	977.9	977.9	0.70	1.5	7,073	

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PdO

Palladium (II) Oxide (FW = 122.40)

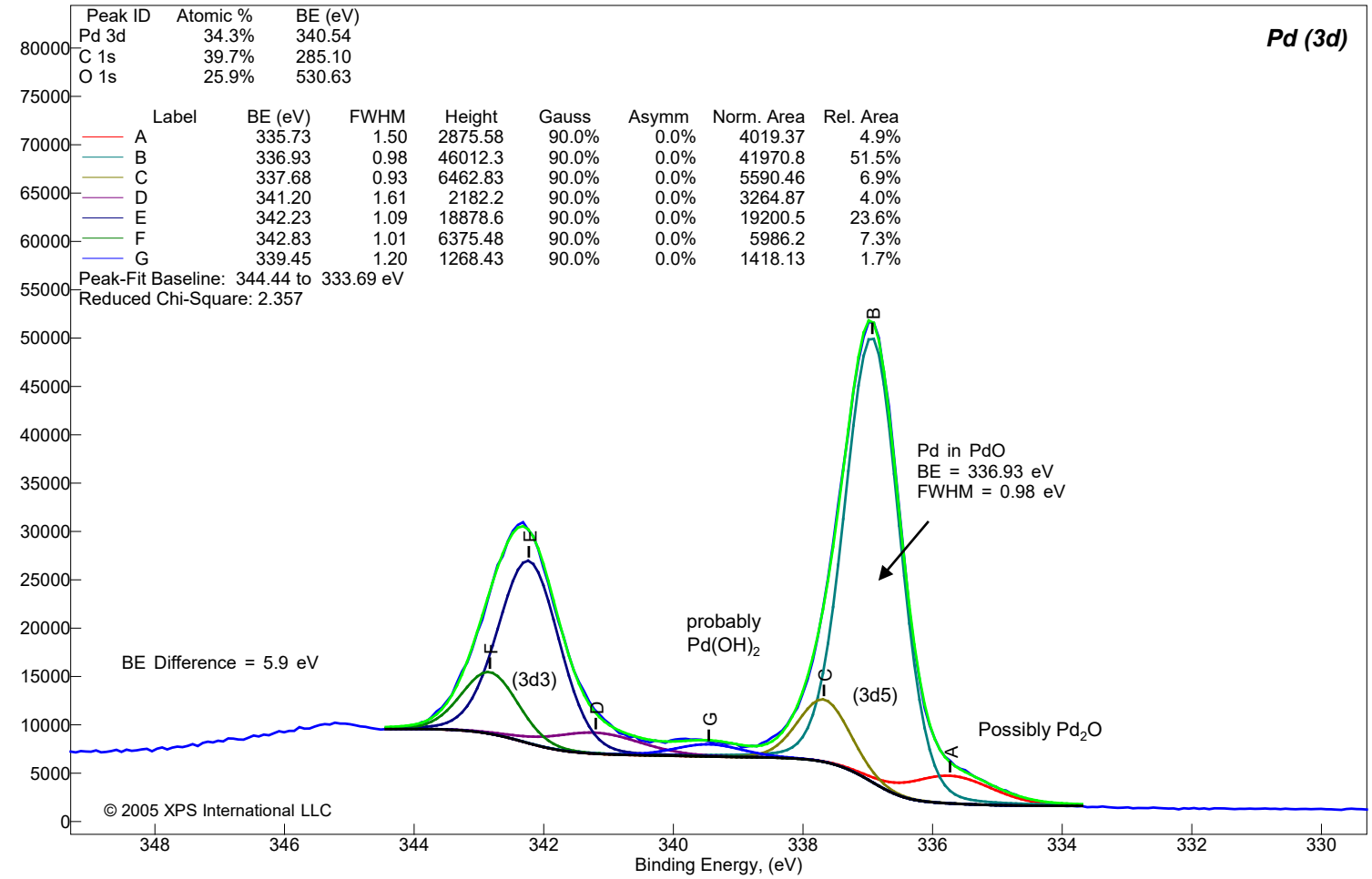
Sample Description: PdO (99.999%) from Aldrich Lot# 03219JV, semi-conductive
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Palladium (II) Oxide (FW = 122.40)

Sample Description: PdO (99.999%) Aldrich Lot# 03219JV, 3mm pellet, Semi-Con, screen, 90 TOA

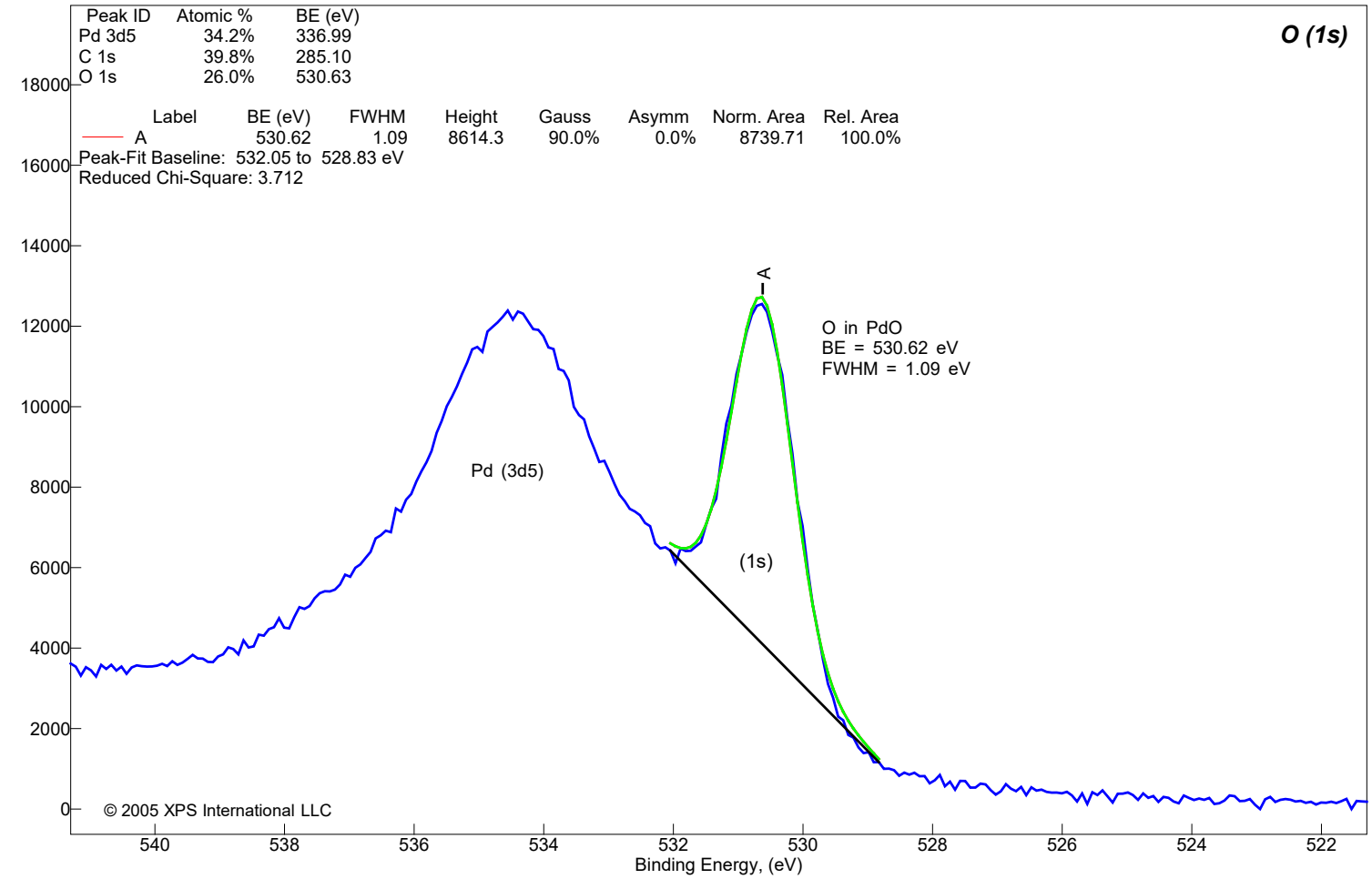


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PdO

Palladium (II) Oxide (FW = 122.40)

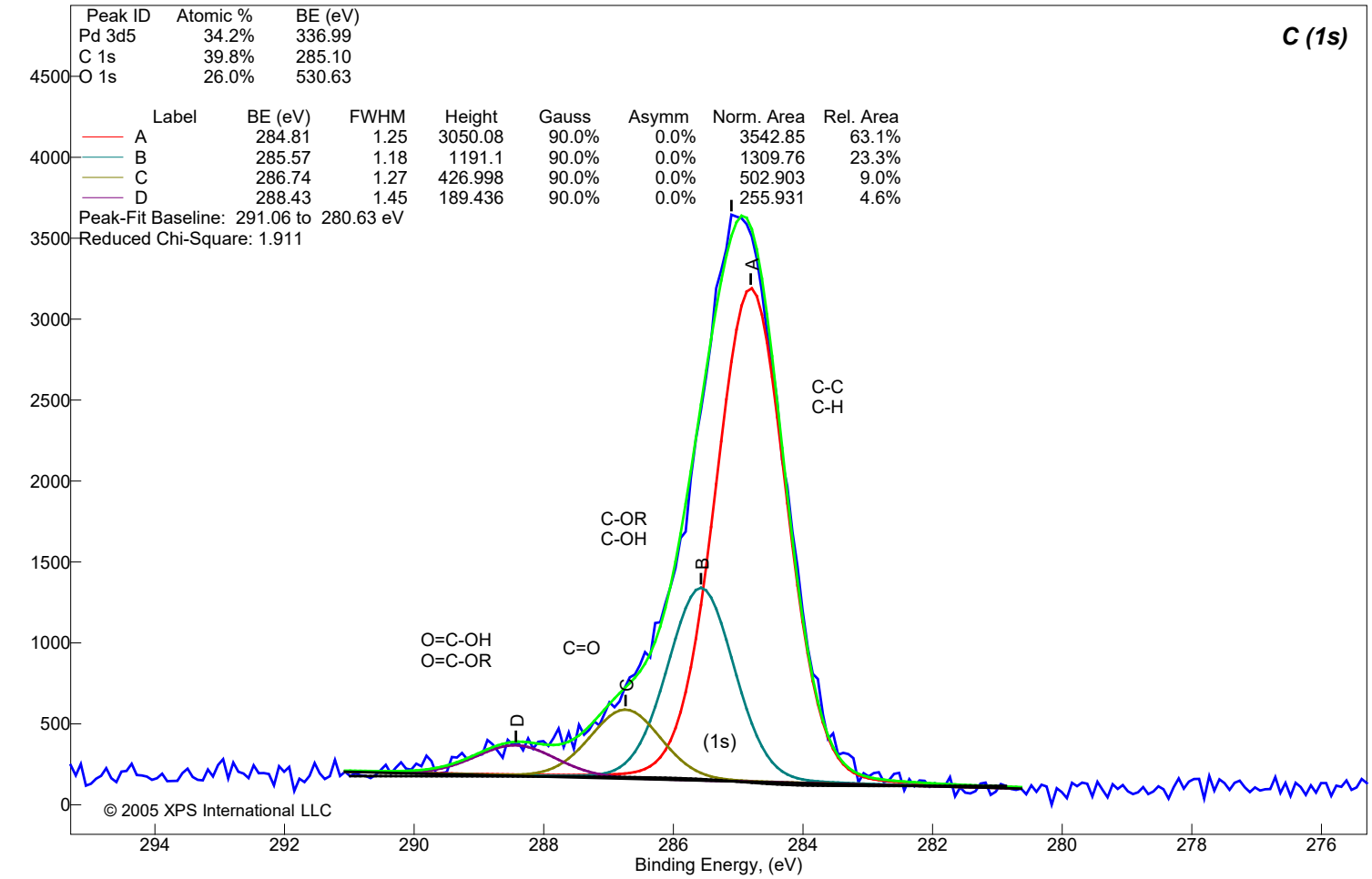
Sample Description: PdO (99.999%) Aldrich Lot# 03219JV, 3mm pellet, Semi-Con, screen, 90 TOA



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Palladium (II) Oxide (FW = 122.40)

Sample Description: PdO (99.999%) Aldrich Lot# 03219JV, 3mm pellet, Semi-Con, screen, 90 TOA

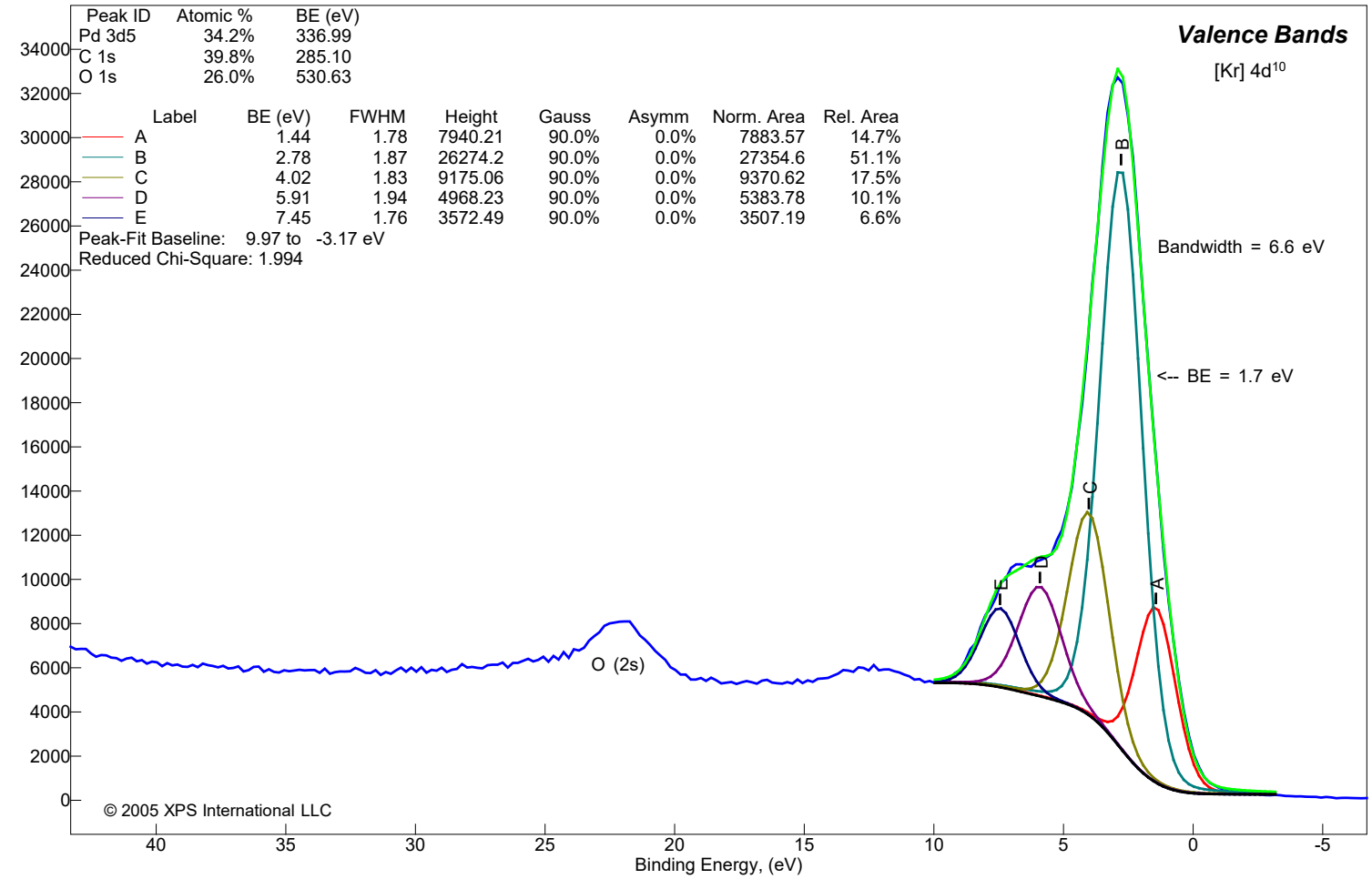


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PdO

Palladium (II) Oxide (FW = 122.40)

Sample Description: PdO (99.999%) Aldrich Lot# 03219JV, 3mm pellet, Semi-Con, screen, 90 TOA

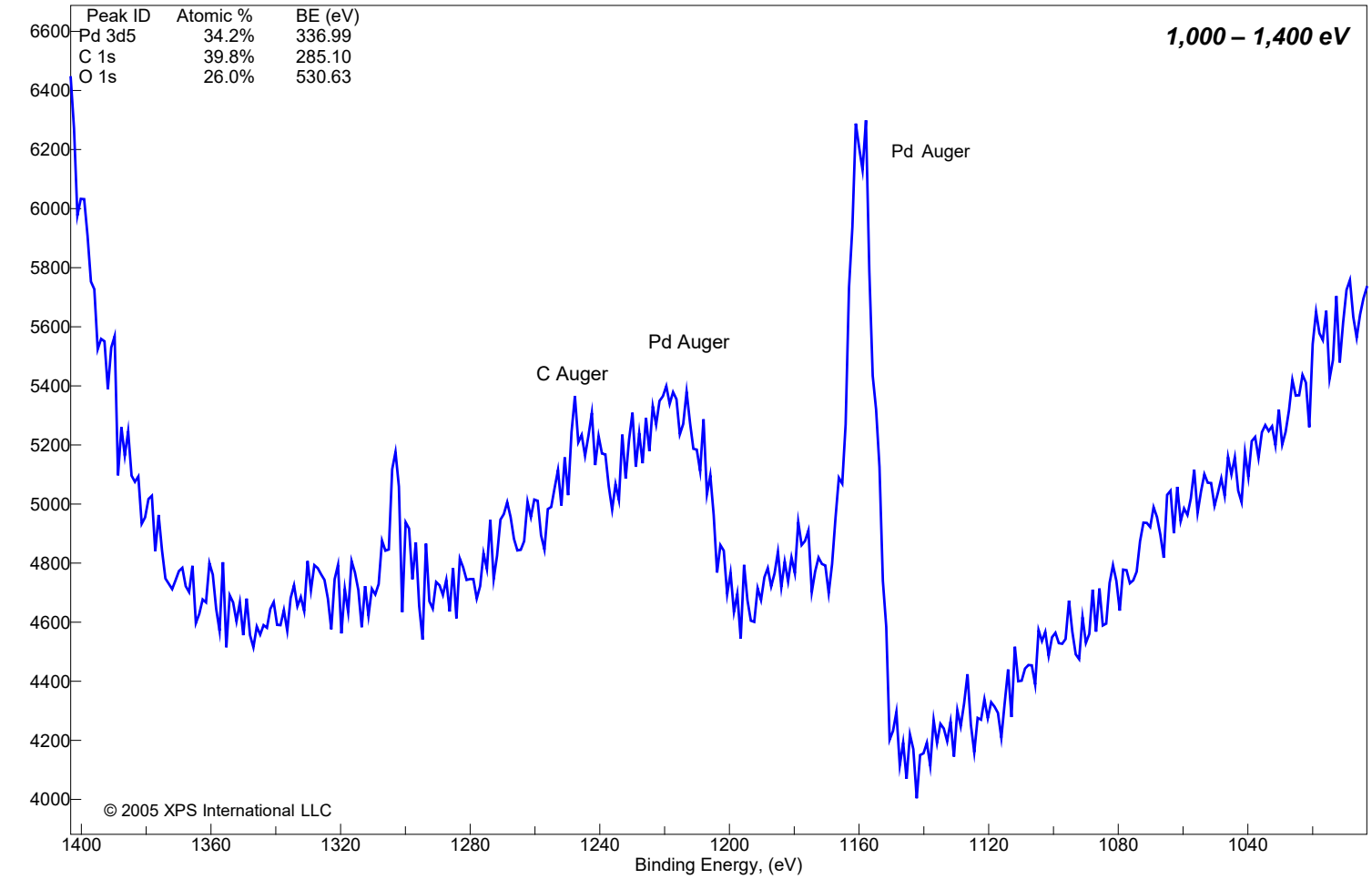


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PdO

Palladium (II) Oxide (FW = 122.40)

Sample Description: PdO (99.999%) Aldrich Lot# 03219JV, 3mm pellet, Semi-Con, screen, 90 TOA



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Pr_6O_{11}

Praseodymium (III, IV) Oxide (FW = 329.82)
Surface Composition Table

Description: Pr_6O_{11} (99.999%) from Aldrich Co. Lot# 09826LX, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white powder pressed into 3 mm pellet, mp 2500 C, very hygroscopic

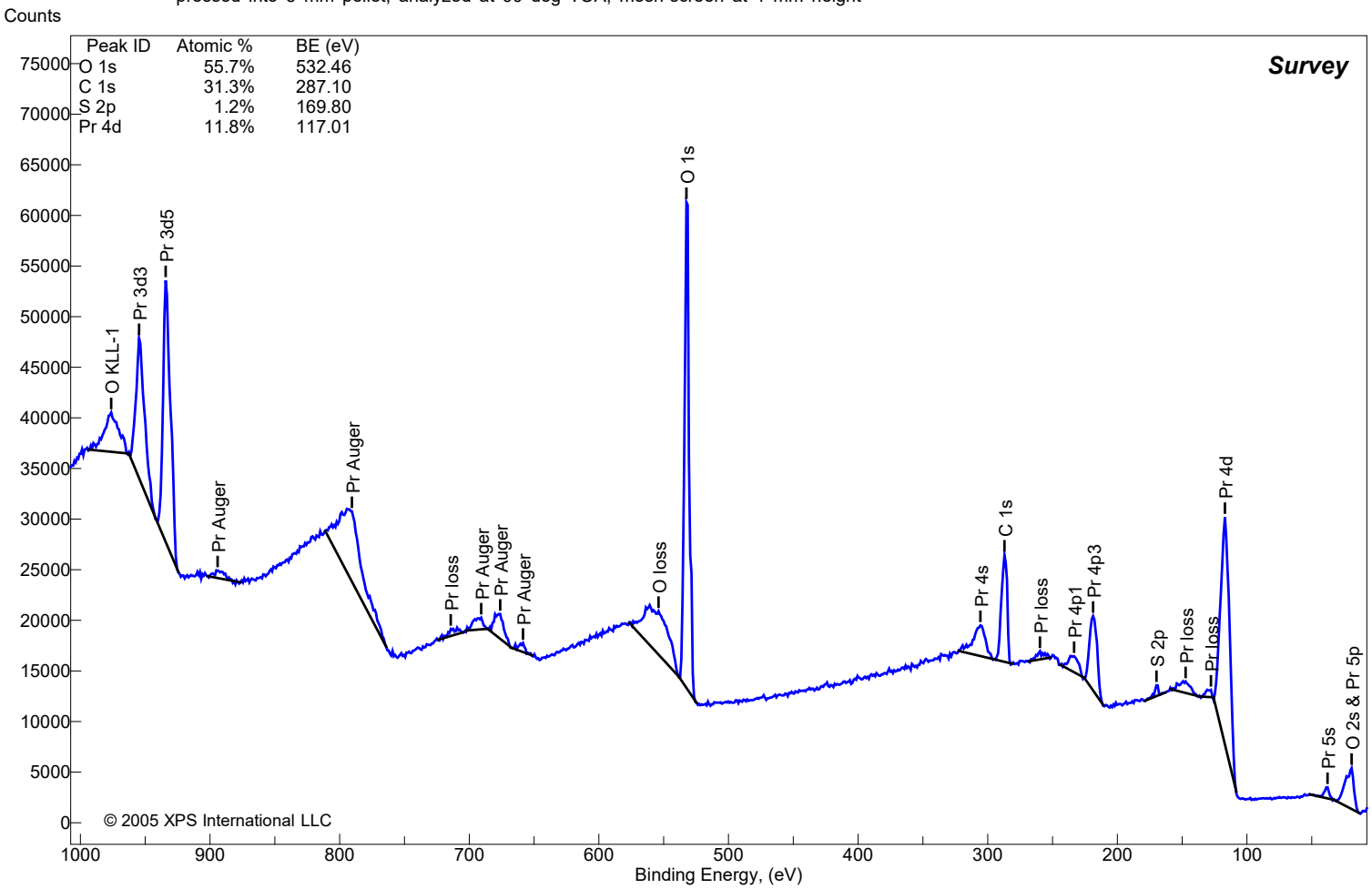
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2p	3.5	0.6	0.02	1.4	5,145	
O 2s & Pr 5p	19.3	16.4	0.14	1.4	15,342	
Pr 5s	37.8	34.9	0.24	1.4	2,103	
Pr 4d	117.0	114.1	7.48	1.4	92,155	11.8%
Pr loss	127.8	124.9	0.00	1.4	2,231	
Pr loss	147.3	144.4	0.00	1.4	5,270	
S 2p	169.8	166.9	1.68	1.4	2,004	1.2%
Pr 4p3	218.7	215.8	3.17	1.4	25,384	
Pr 4p1	233.3	230.4	1.53	1.4	7,027	
Pr loss	259.7	256.8	0.00	1.4	2,997	
C 1s	287.1	284.2	1.00	1.4	27,165	31.3%
Pr 4s	305.7	302.8	1.28	1.4	16,153	
O 1s	532.5	529.6	2.93	1.4	102,960	55.7%
O loss	554.0	551.1	0.00	1.4	46,372	
Pr Auger	658.6	655.7	0.00	1.4	2,548	
Pr Auger	676.2	673.3	0.00	1.4	10,406	
Pr Auger	690.8	687.9	0.00	1.4	5,763	
Pr loss	714.3	711.4	0.00	1.4	2,988	
Pr Auger	790.5	787.6	0.00	1.4	68,247	
Pr Auger	894.1	891.2	0.00	1.4	3,332	
Pr 3d5	934.2	931.3	32.85	1.4	86,109	
Pr 3d3	954.7	951.8	22.72	1.4	54,094	
O KLL-1	976.2	973.3	0.70	1.4	25,167	

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Pr_6O_{11}

Praseodymium (III, IV) Oxide (FW = 329.82)

Sample Description: Pr2O3 and Pr3O4 mixture (99.999%) from Aldrich#09826LX
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height

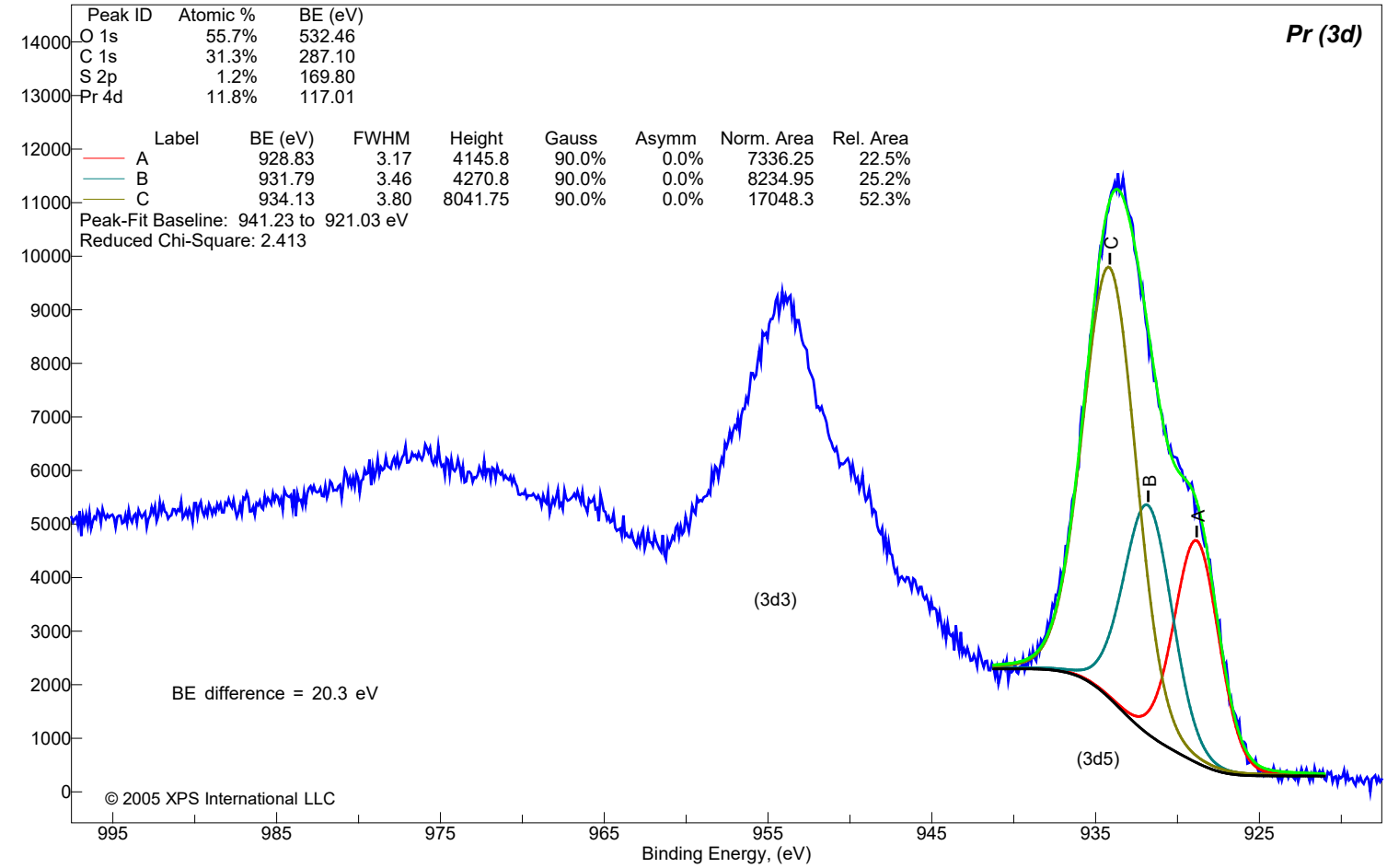


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Pr_6O_{11}

Praseodymium (III, IV) Oxide (FW = 329.82)

Sample Description: Pr(III,IV)oxide 99.999% Aldrich#09826LX 90TOA plt mesh at <1mm

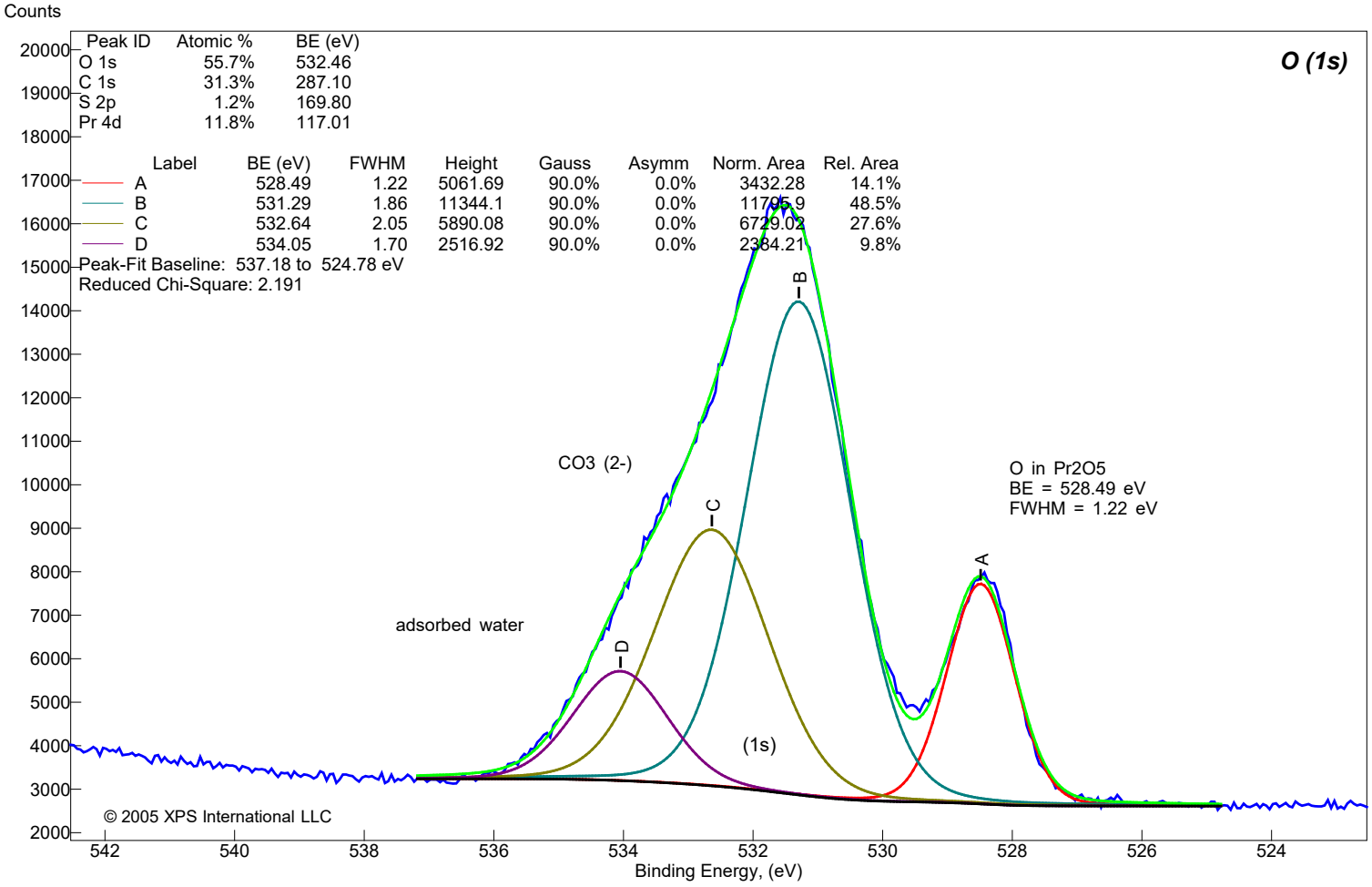


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Pr_6O_{11}

Praseodymium (III, IV) Oxide (FW = 329.82)

Sample Description: Pr(III,IV)oxide 99.999% Aldrich#09826LX 90TOA plt mesh at <1mm

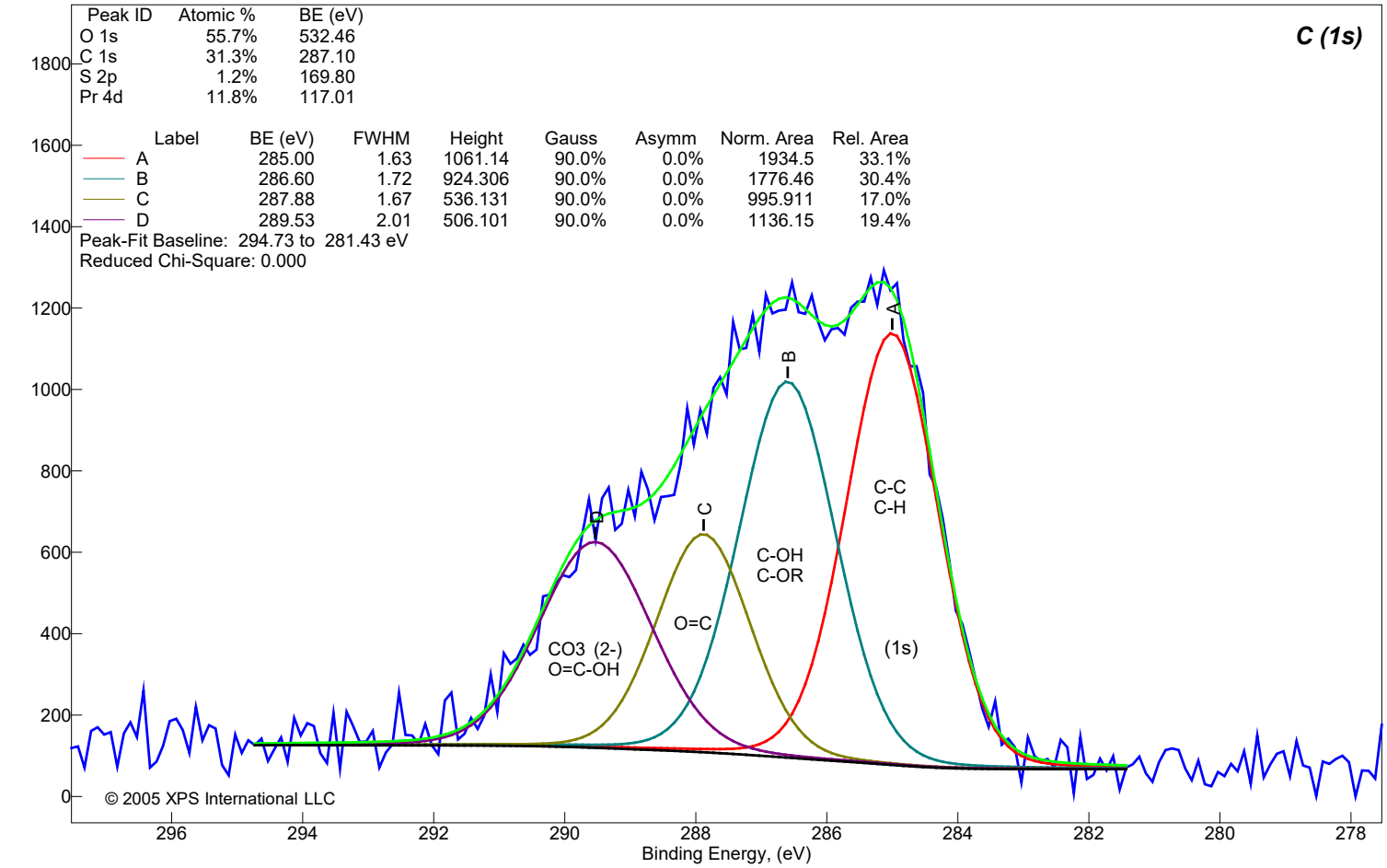


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Pr_6O_{11}

Praseodymium (III, IV) Oxide (FW = 329.82)

Sample Description: Pr(III,IV)oxide 99.999% Aldrich#09826LX 90TOA plt mesh at <1mm

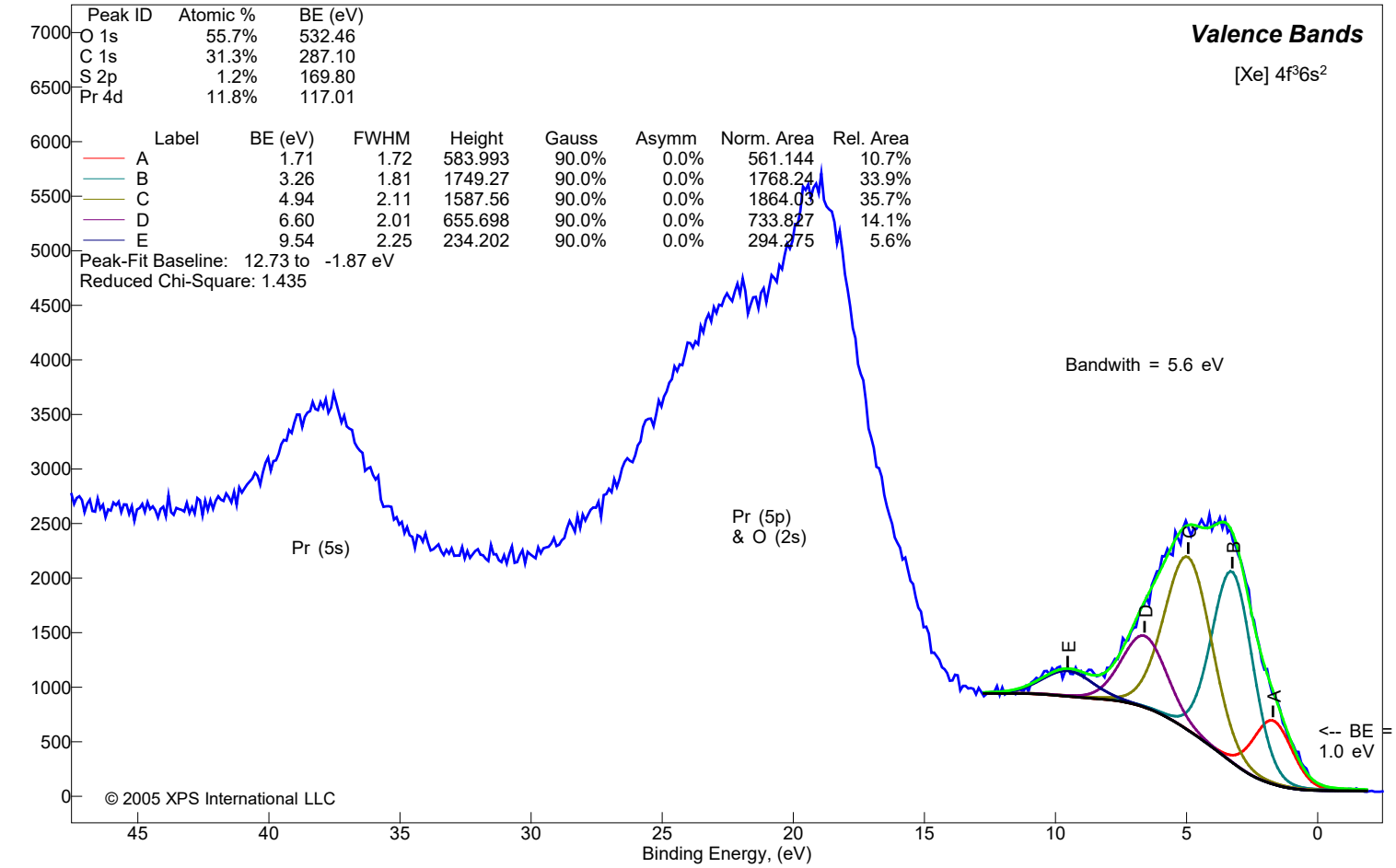


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Pr_6O_{11}

Praseodymium (III, IV) Oxide (FW = 329.82)

Sample Description: Pr(III,IV)oxide 99.999% Aldrich#09826LX 90TOA plt mesh at <1mm

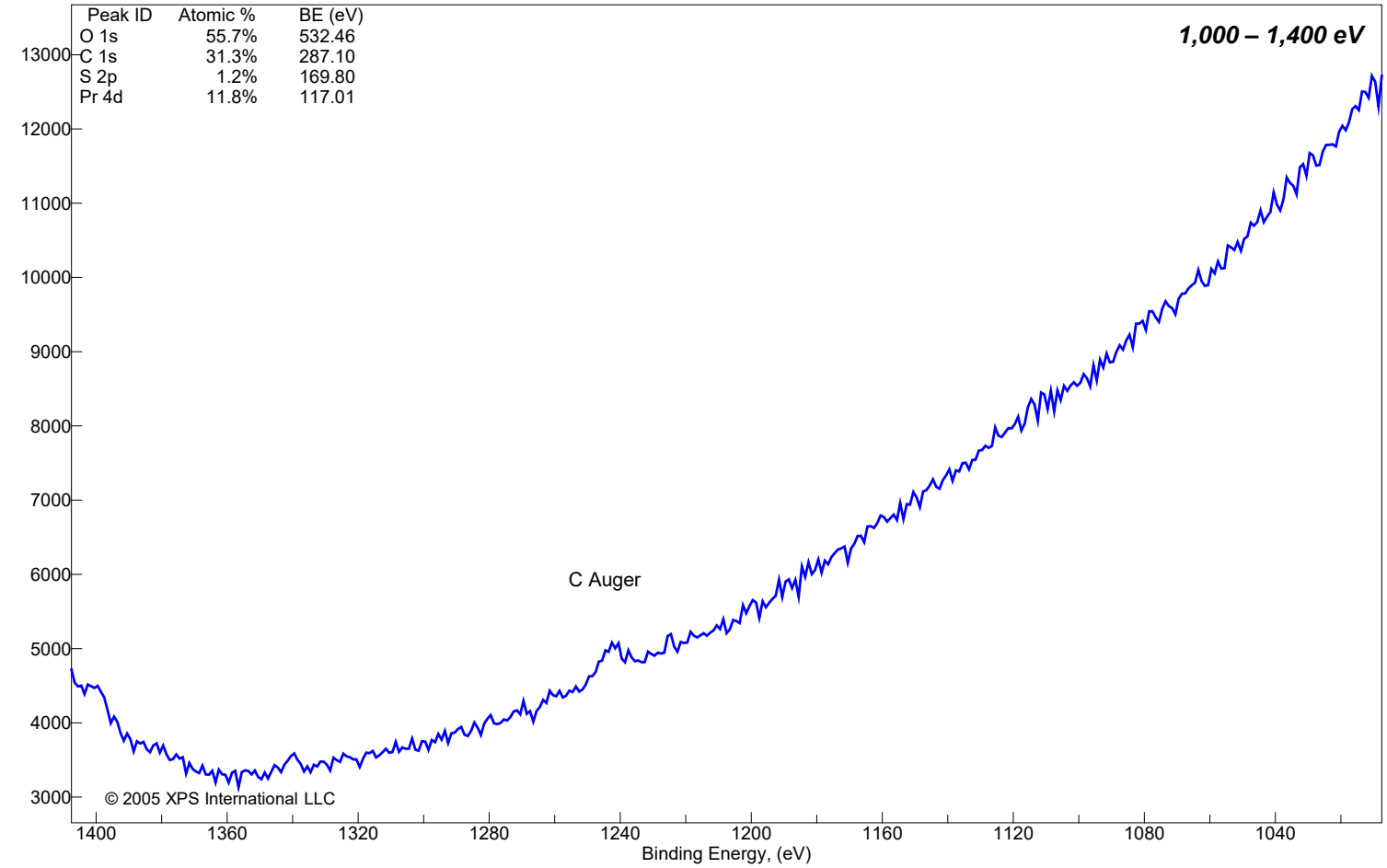


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Pr_6O_{11}

Praseodymium (III, IV) Oxide (FW = 329.82)

Sample Description: Pr(III,IV)oxide 99.999% Aldrich#09826LX 90TOA plt mesh at <1mm



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PtO_2

Platinum (IV) Oxide (FW = 227.09)
Surface Composition Table

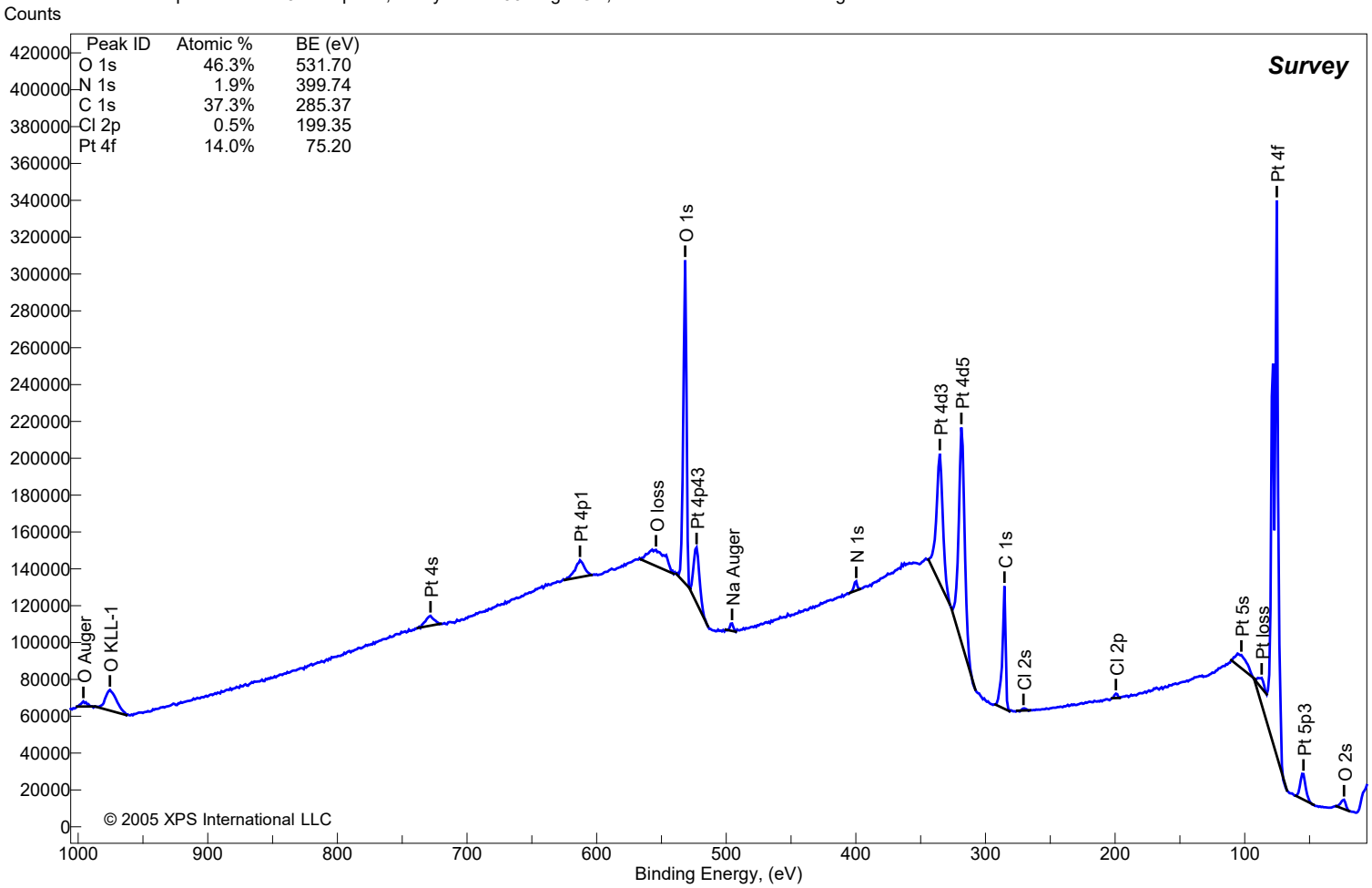
Description: PtO_2-H_2O (99.99%) from Aldrich Co. Lot# 09605EV, analyzed at 90 deg TOA, mesh at 1 mm, semi-conductive black powder pressed into 3 mm pellet, mp 450 C, d 10.2

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	23.4	23.4	0.14	1.5	3,756	
Pt 5p3	54.7	54.7	1.04	1.5	11,389	
Pt 4f	75.2	75.2	15.46	1.5	241,010	14.0%
Pt loss	86.9	86.9	0.00	1.5	4,512	
Pt 5s	102.6	102.6	0.46	1.5	12,184	
Cl 2p	199.3	199.3	2.28	1.5	1,187	0.5%
Cl 2s	270.7	270.7	1.69	1.5	567	
C 1s	285.4	285.4	1.00	1.5	32,720	37.3%
Pt 4d5	318.6	318.6	11.32	1.5	104,147	
Pt 4d3	335.2	335.2	7.78	1.5	68,148	
N 1s	399.7	399.7	1.80	1.5	2,539	1.9%
Na Auger	495.5	495.5	0.00	1.5	1,991	
Pt 4p43	522.9	522.9	0.00	1.5	26,618	
O 1s	531.7	531.7	2.93	1.5	84,446	46.3%
O loss	554.2	554.2	0.00	1.5	23,485	
Pt 4p1	612.8	612.8	2.14	1.5	12,893	
Pt 4s	728.2	728.2	1.90	1.5	6,832	
O KLL-1	975.5	975.5	0.70	1.5	18,880	
O Auger	996.0	996.0	0.00	1.5	2,279	

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Platinum (IV) Oxide (FW = 227.09)

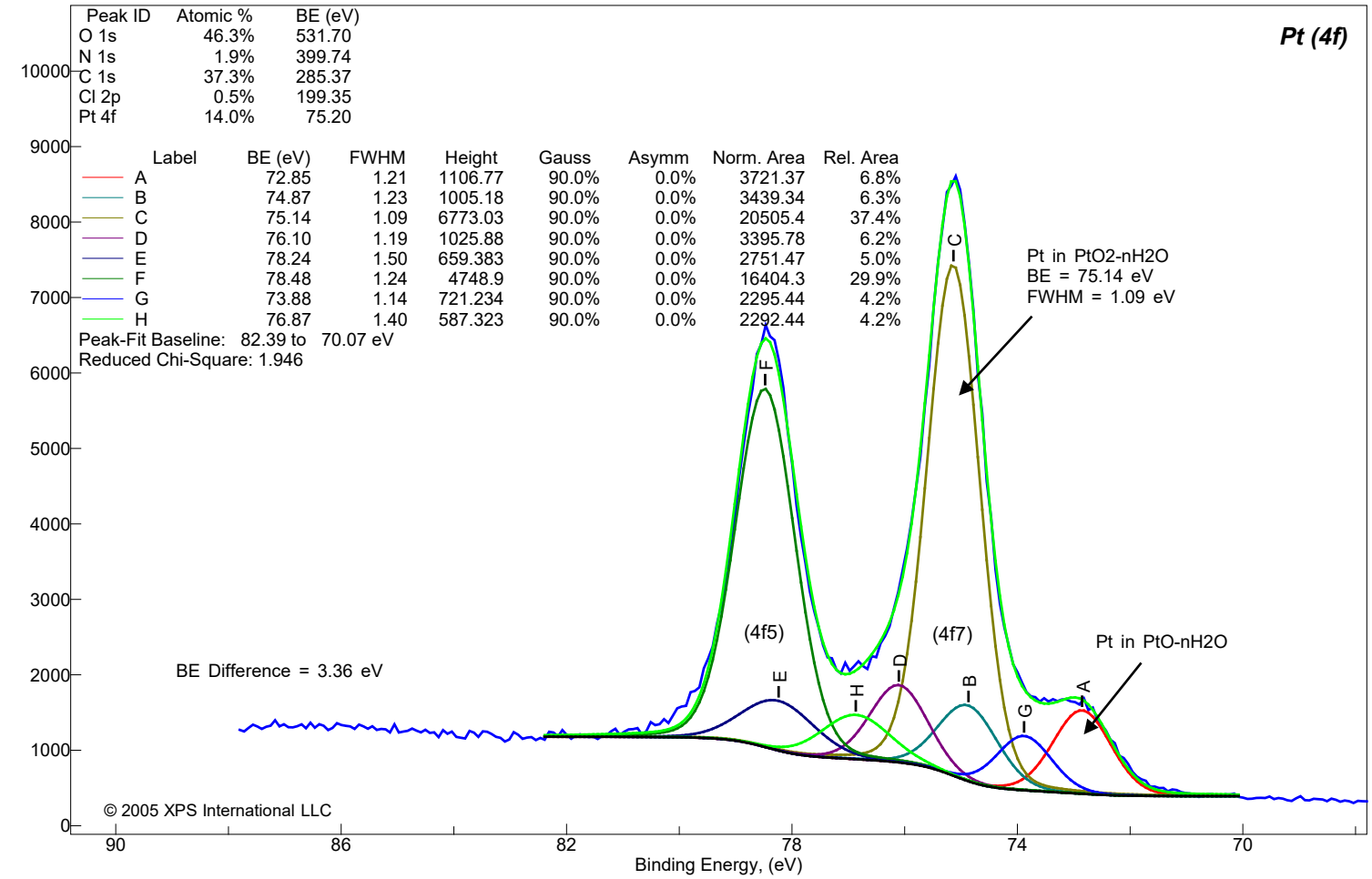
Sample Description: PtO2-nH2O (99.99%) from Aldrich Lot# 09605EV, semi-conductive
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Platinum (IV) Oxide (FW = 227.09)

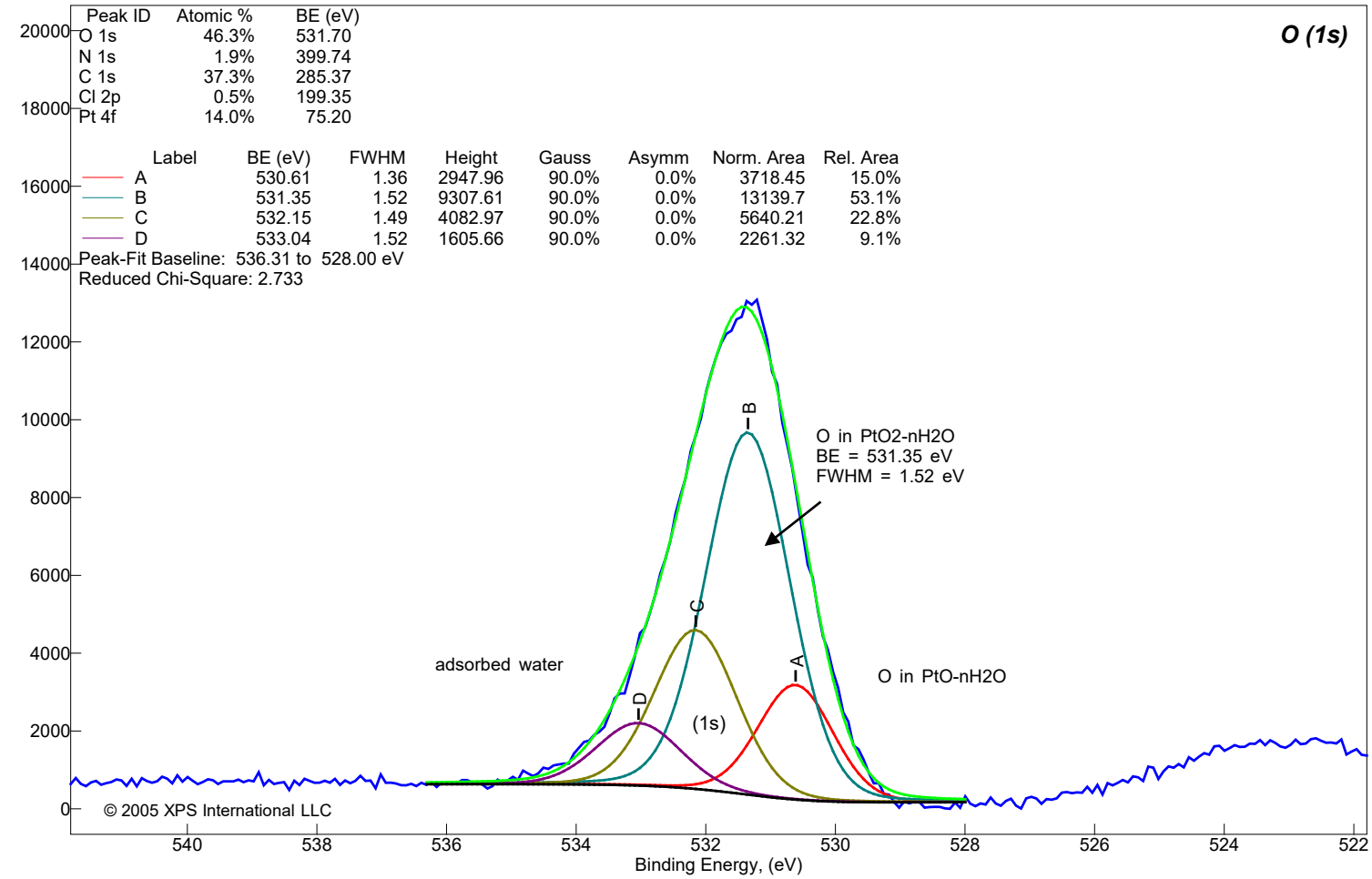
Sample Description: PtO2-nH2O (99.99%) Aldrich Lot# 09605EV, 3mm pellet, Semi-con, 90 TOA



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Platinum (IV) Oxide (FW = 227.09)

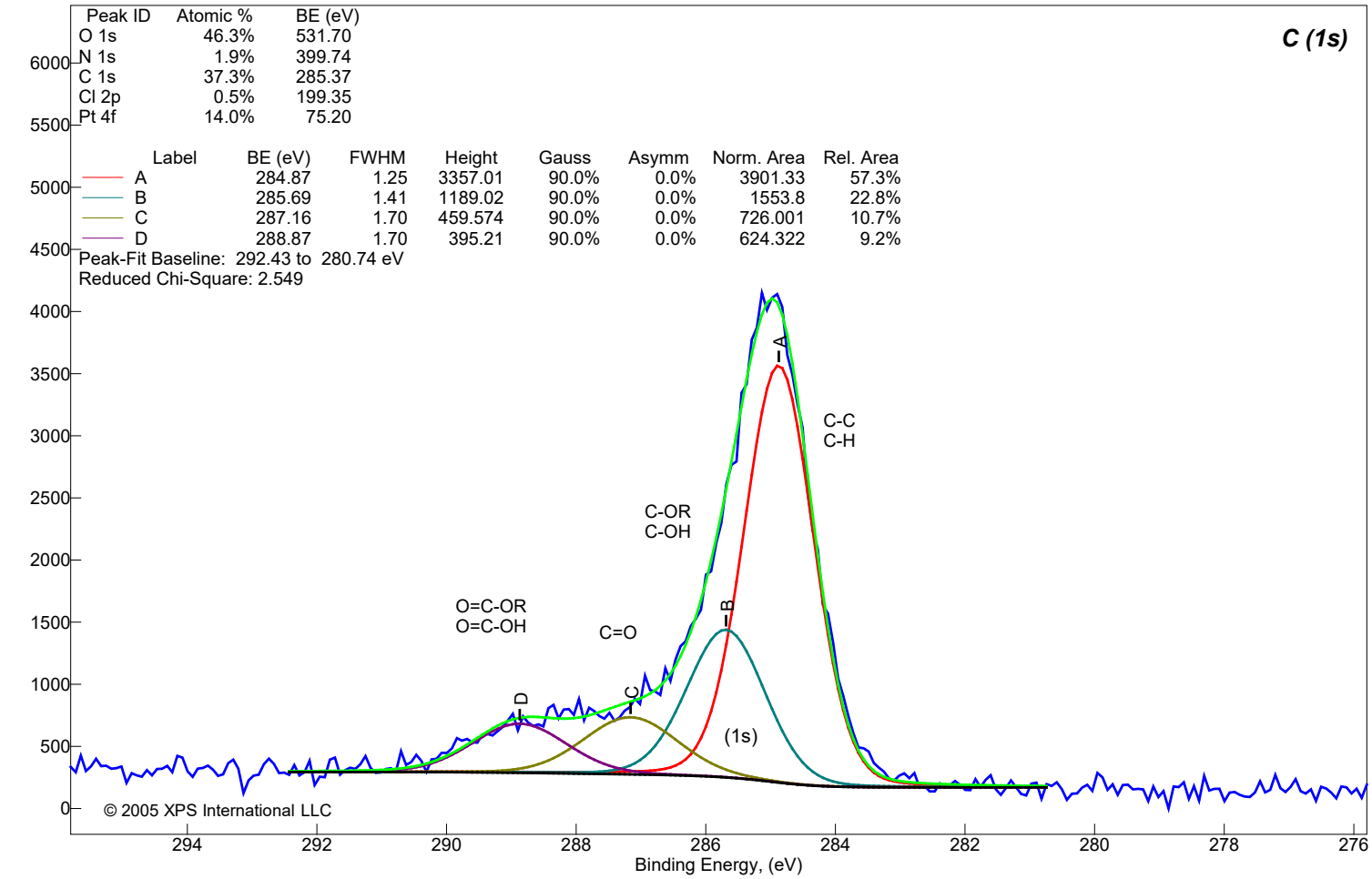
Sample Description: PtO2-nH2O (99.99%) Aldrich Lot# 09605EV, 3mm pellet, Semi-con, 90 TOA



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Platinum (IV) Oxide (FW = 227.09)

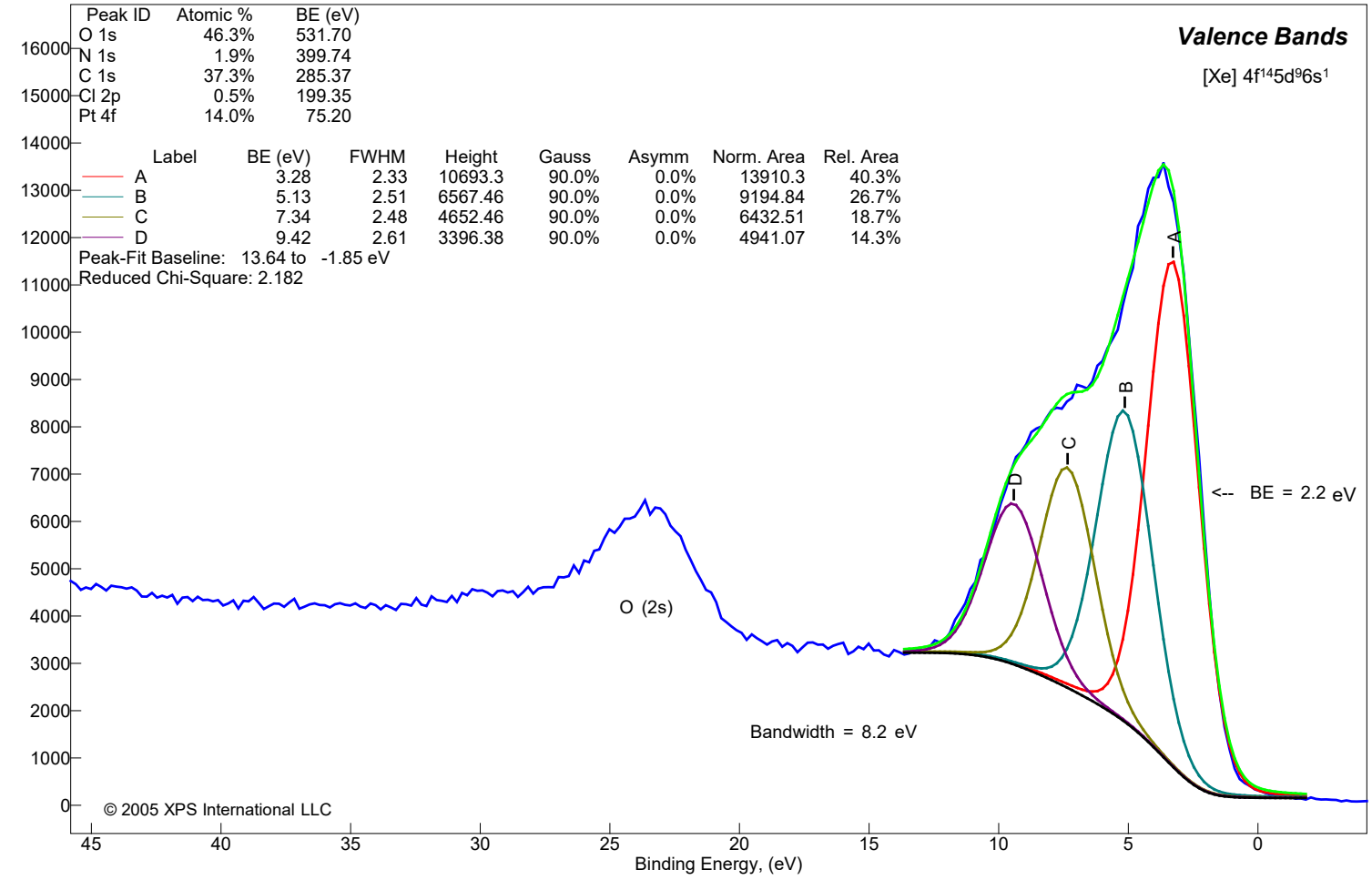
Sample Description: PtO2-nH2O (99.99%) Aldrich Lot# 09605EV, 3mm pellet, Semi-con, 90 TOA



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Platinum (IV) Oxide (FW = 227.09)

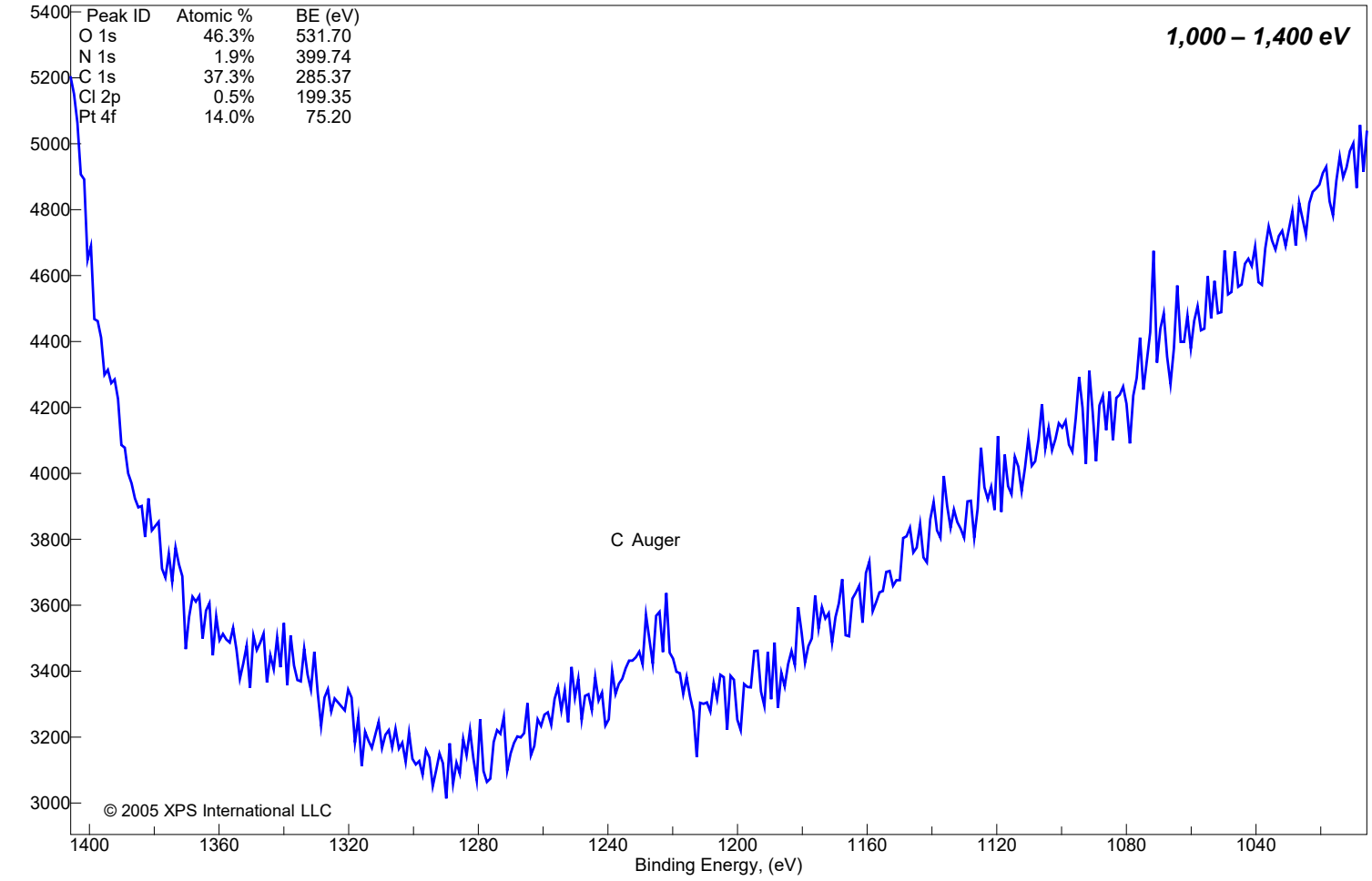
Sample Description: PtO2-nH2O (99.99%) Aldrich Lot# 09605EV, 3mm pellet, Semi-con, 90 TOA



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Platinum (IV) Oxide (FW = 227.09)

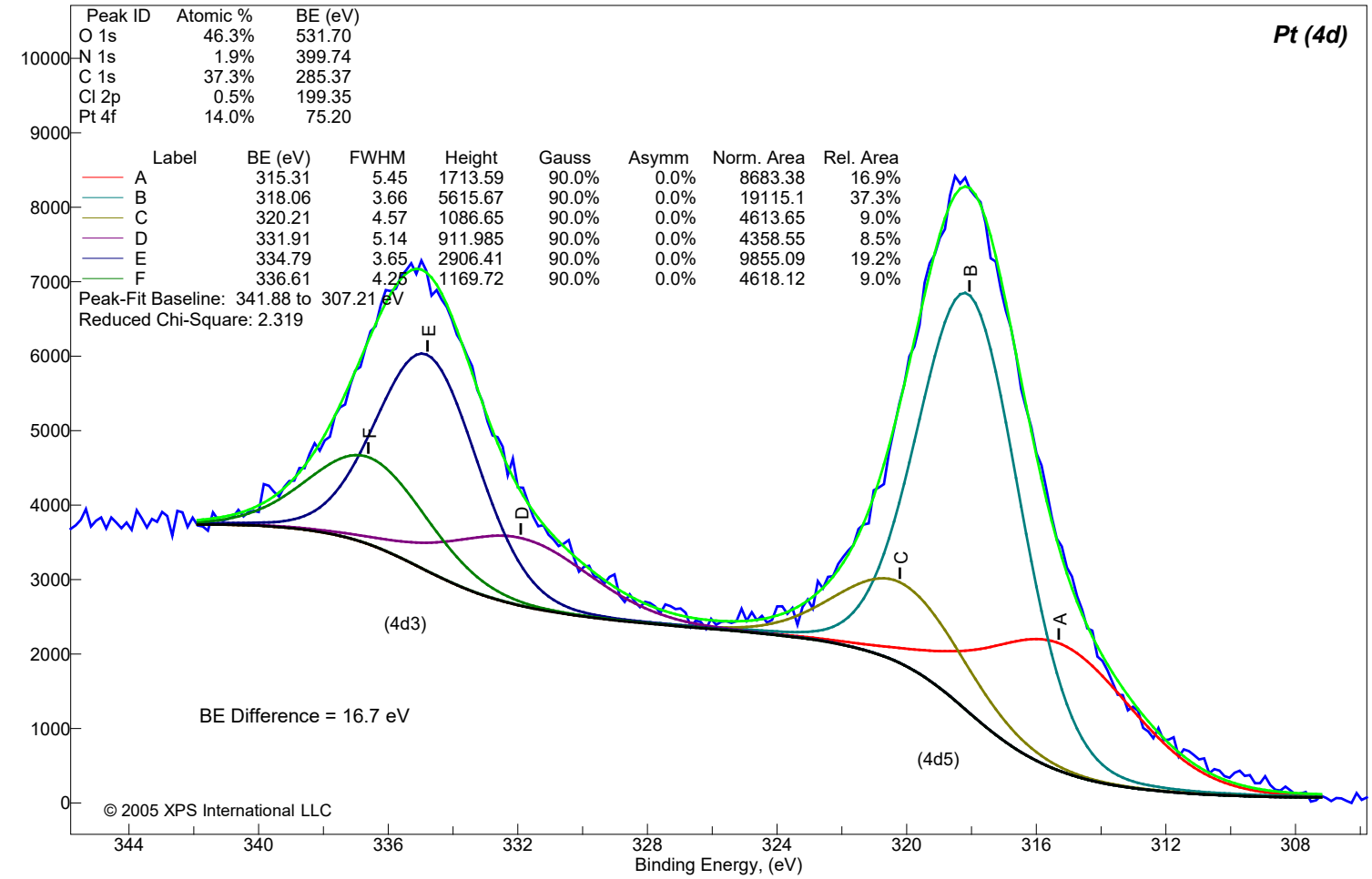
Sample Description: PtO2-nH2O (99.99%) Aldrich Lot# 09605EV, 3mm pellet, Semi-con, 90 TOA



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Platinum (IV) Oxide (FW = 227.09)

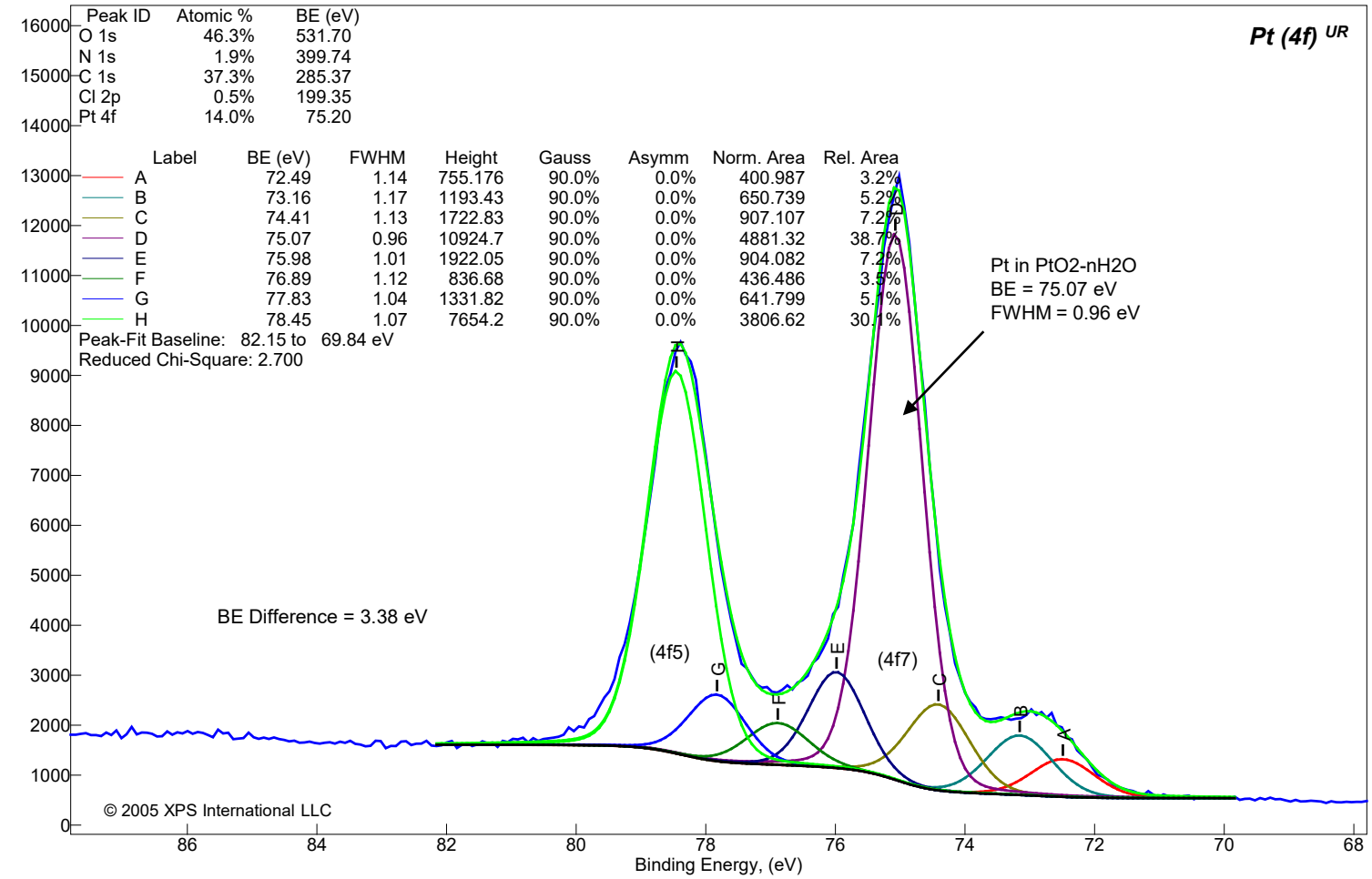
Sample Description: PtO2-nH2O (99.99%) Aldrich Lot# 09605EV, 3mm pellet, Semi-con, 90 TOA



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Platinum (IV) Oxide (FW = 227.09)

Sample Description: PtO2-nH2O (99.99%) Aldrich Lot# 09605EV, 3mm pellet, Semi-con, 90 TOA



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Re_2O_7

Rhenium (VII) Oxide (FW = 484.42)
Surface Composition Table

Description: Re_2O_7 (99.9+%) from Aldrich Co. Lot# 04418PV, analyzed at 35 deg TOA, mesh at 1 mm, semi-conductive yellow powder pressed into 3 mm pellet, mp 300 C, sol in water, very hygroscopic

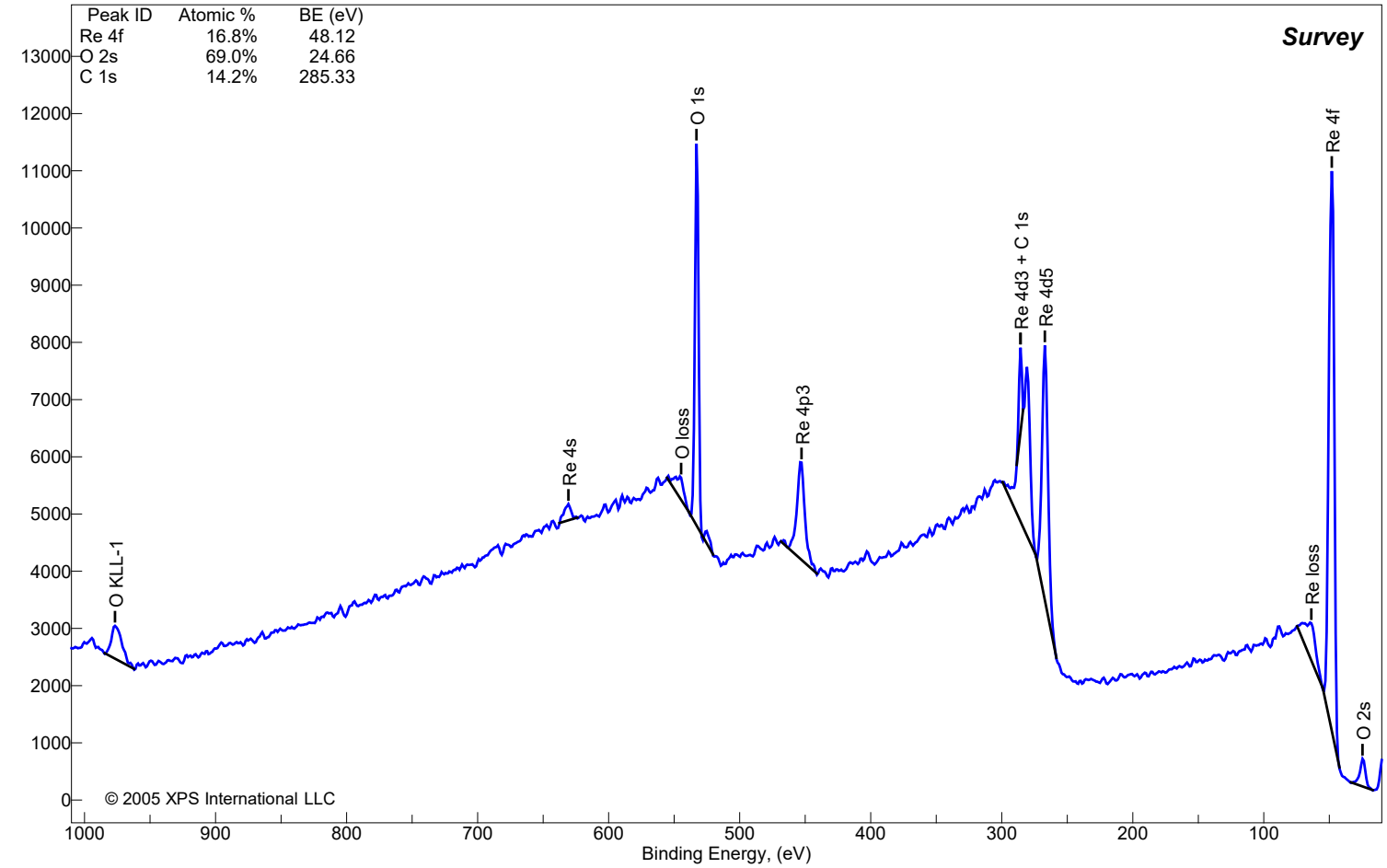
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	24.7	24.7	0.14	1.5	2,108	69.0%
Re 4f	48.1	48.1	11.08	1.5	39,520	16.8%
Re loss	63.8	63.8	0.00	1.5	5,450	
Re 4d5	267.1	267.1	10.06	1.5	20,392	
C 1s	285.3	285.3	1.00	1.1	1,124	14.2%
Re 4d3 + C 1s	285.7	285.7	6.95	1.5	24,168	
Re 4p3	452.8	452.8	5.30	1.5	10,486	
O 1s	533.0	533.0	2.93	1.5	18,766	
O loss	544.7	544.7	0.00	1.5	2,400	
Re 4s	630.7	630.7	1.84	1.5	1,660	
O KLL-1	976.8	976.8	0.70	1.5	4,874	

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Re_2O_7

Rhenium (VII) Oxide (FW = 484.42)

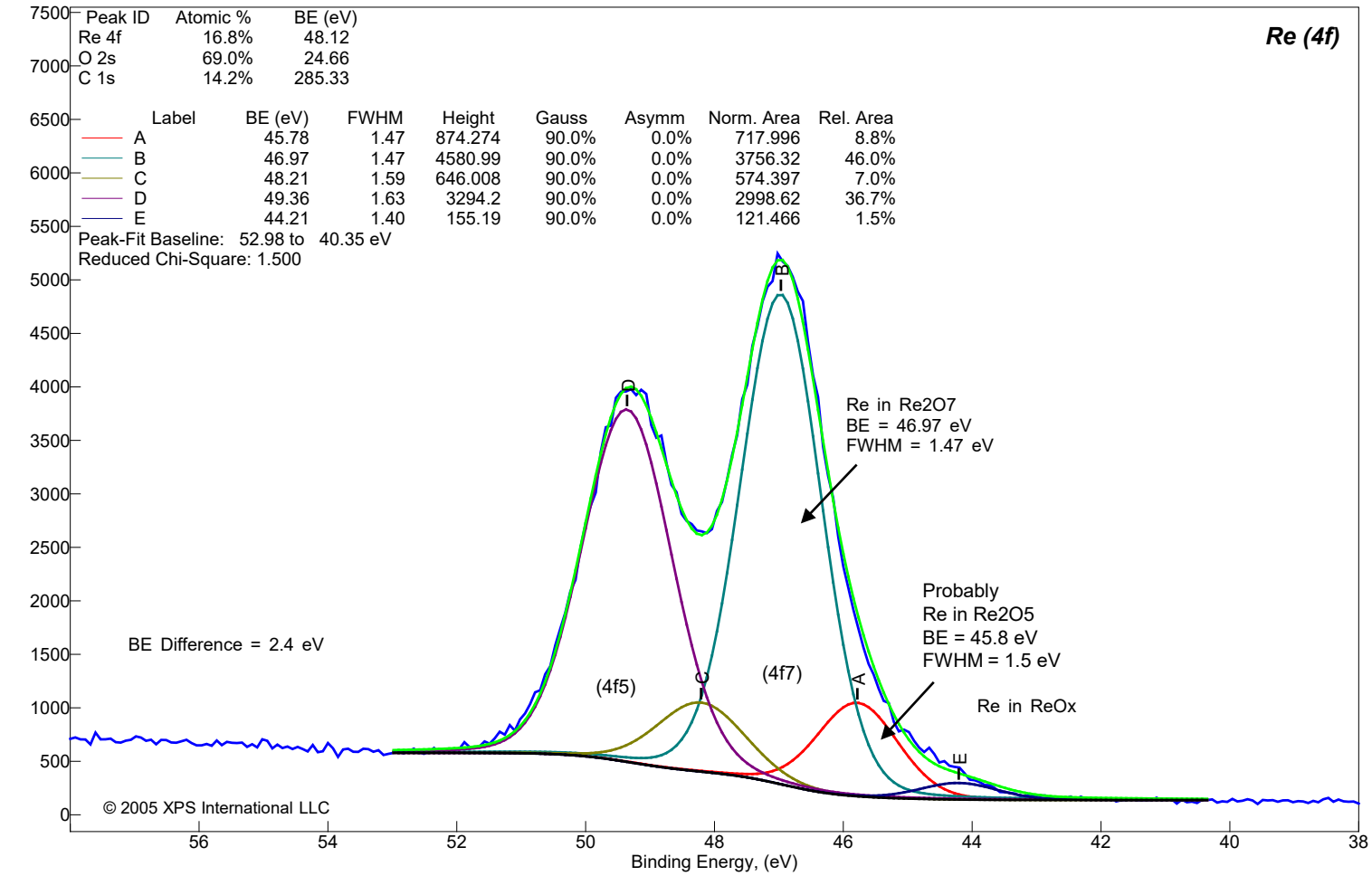
Sample Description: Re2O7 (99.9+%) from Aldrich lot# 04418PV (minimized exposure to air)
pressed into 3 mm pellet, analyzed at 35 deg TOA, mesh-screen at 1 mm height



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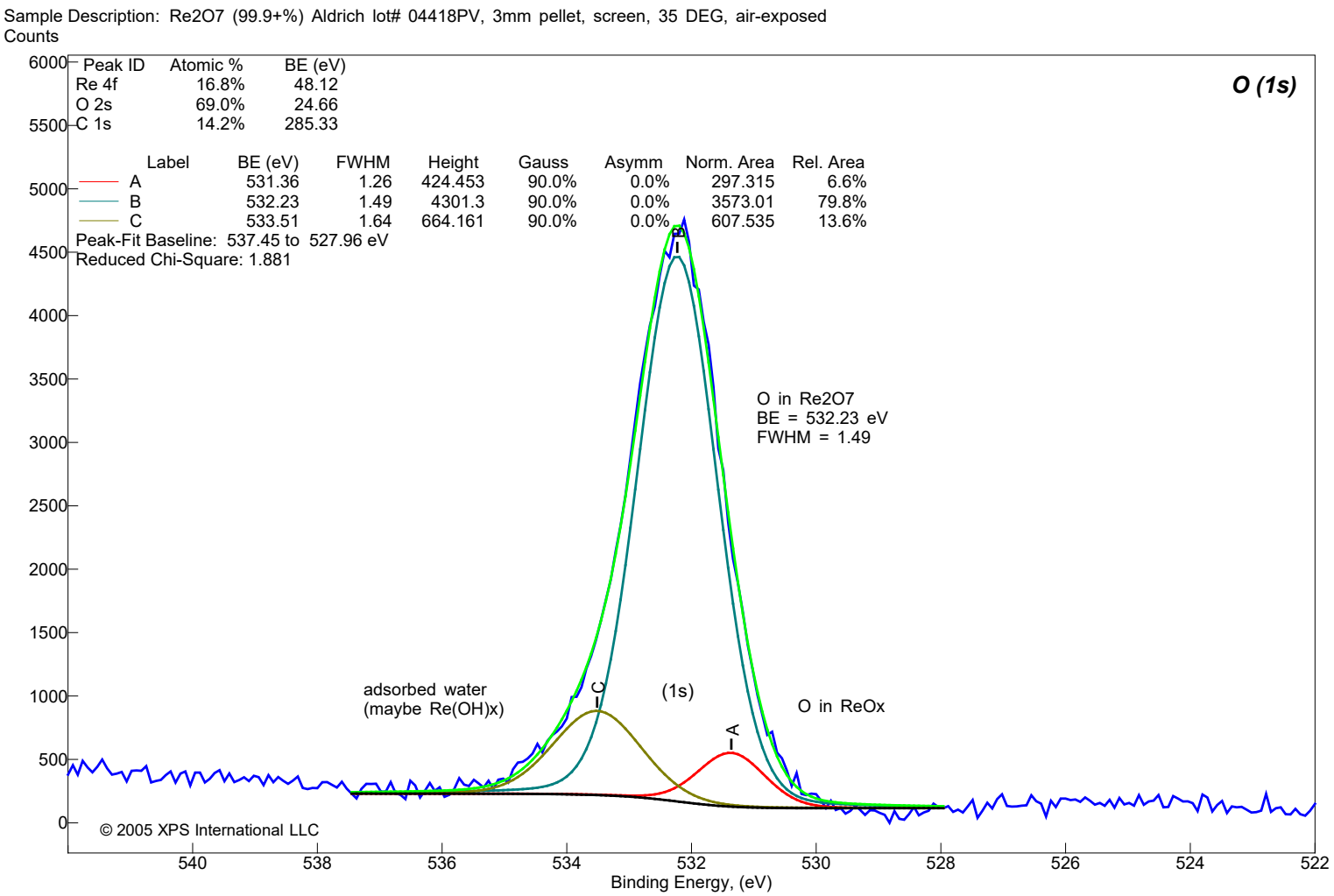
Rhenium (VII) Oxide (FW = 484.42)

Sample Description: Re2O7 (99.9+%) Aldrich lot# 04418PV, 3mm pellet, screen, 35 DEG, air-exposed



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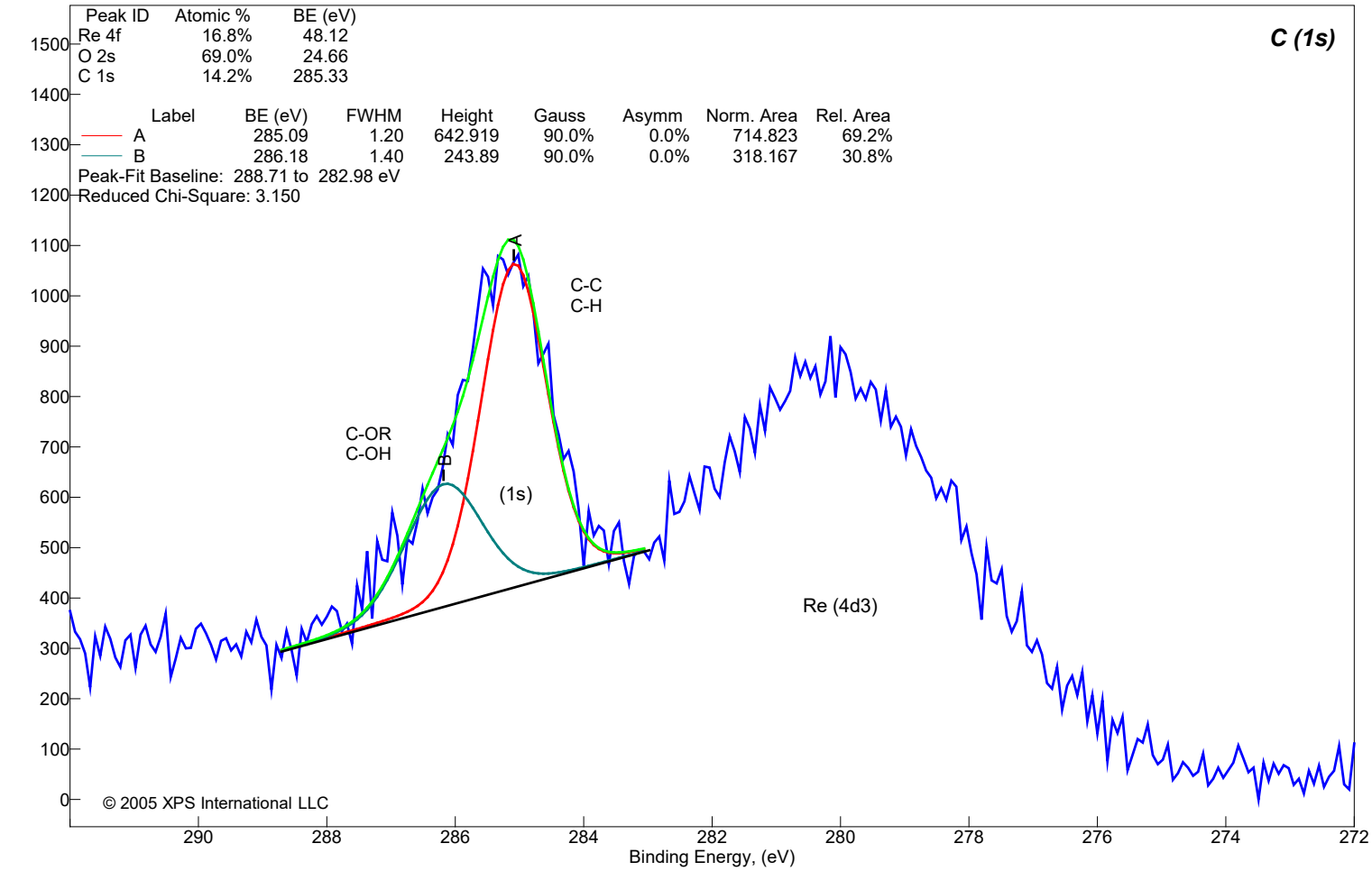
Rhenium (VII) Oxide (FW = 484.42)



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Rhenium (VII) Oxide (FW = 484.42)

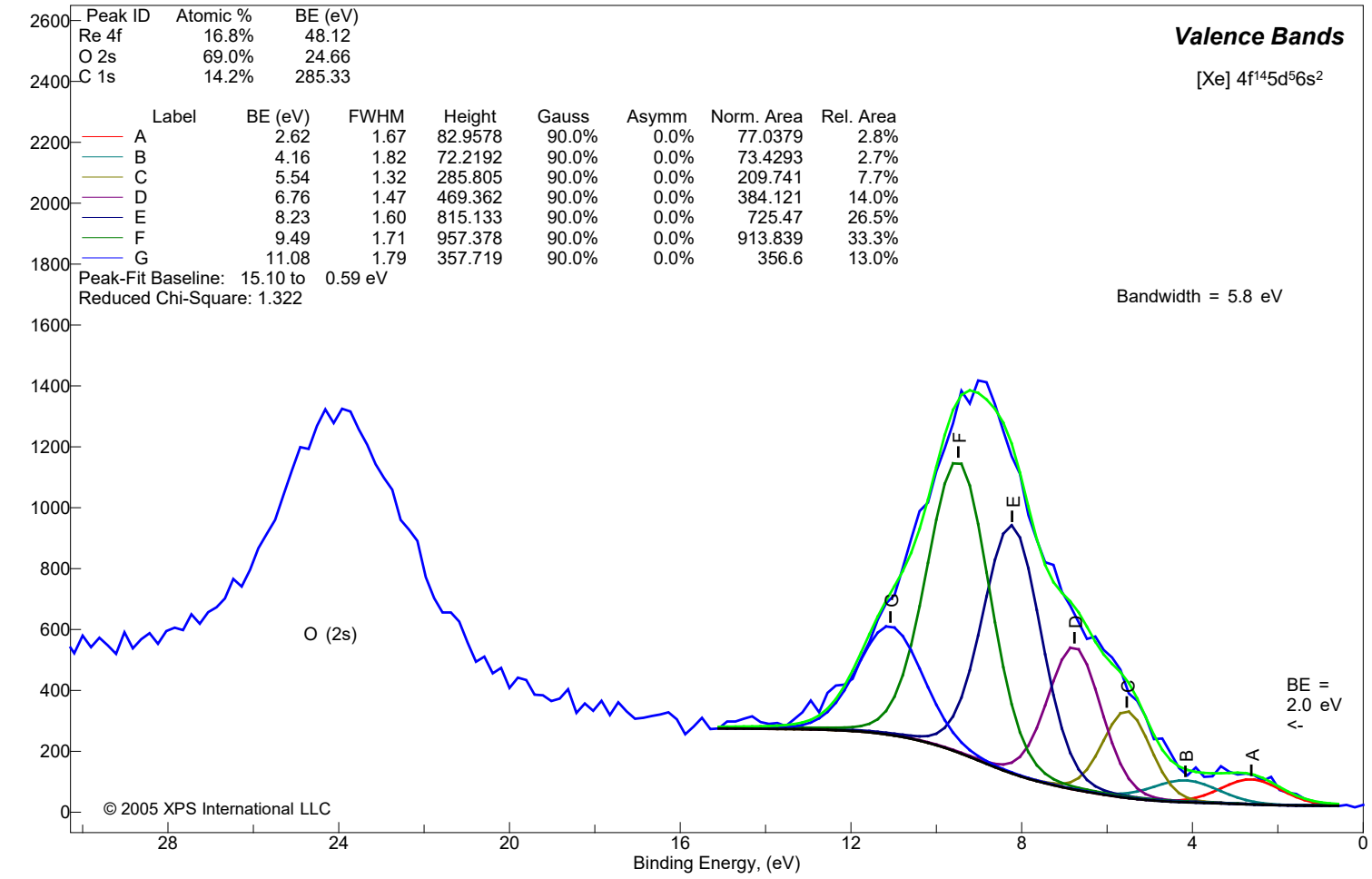
Sample Description: Re2O7 (99.9+%) Aldrich lot# 04418PV, 3mm pellet, screen, 35 DEG, air-exposed



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Rhenium (VII) Oxide (FW = 484.42)

Sample Description: Re2O7 (99.9+%) Aldrich lot# 04418PV, 3mm pellet, screen, 35 DEG, air-exposed

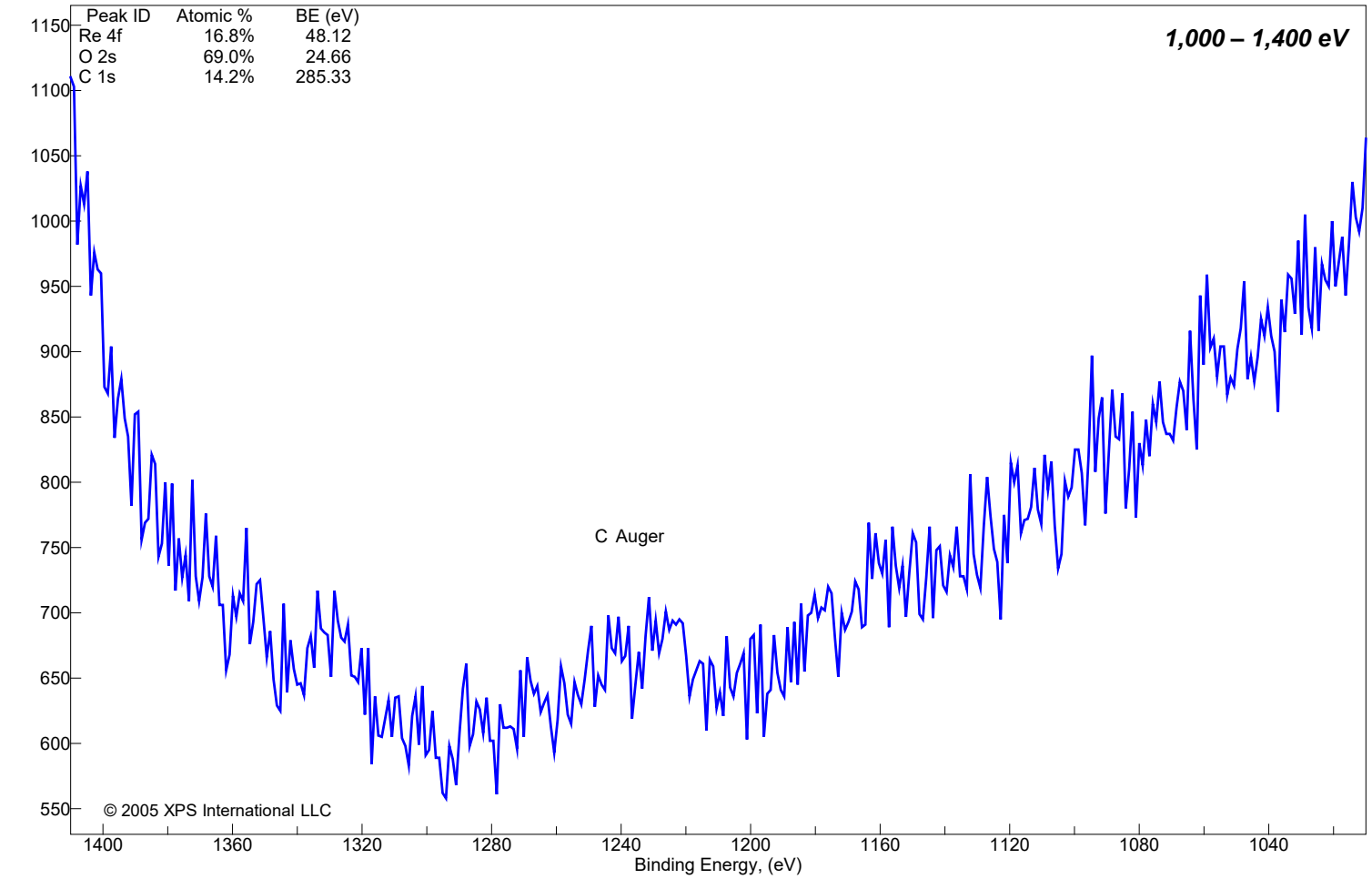


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Re_2O_7

Rhenium (VII) Oxide (FW = 484.42)

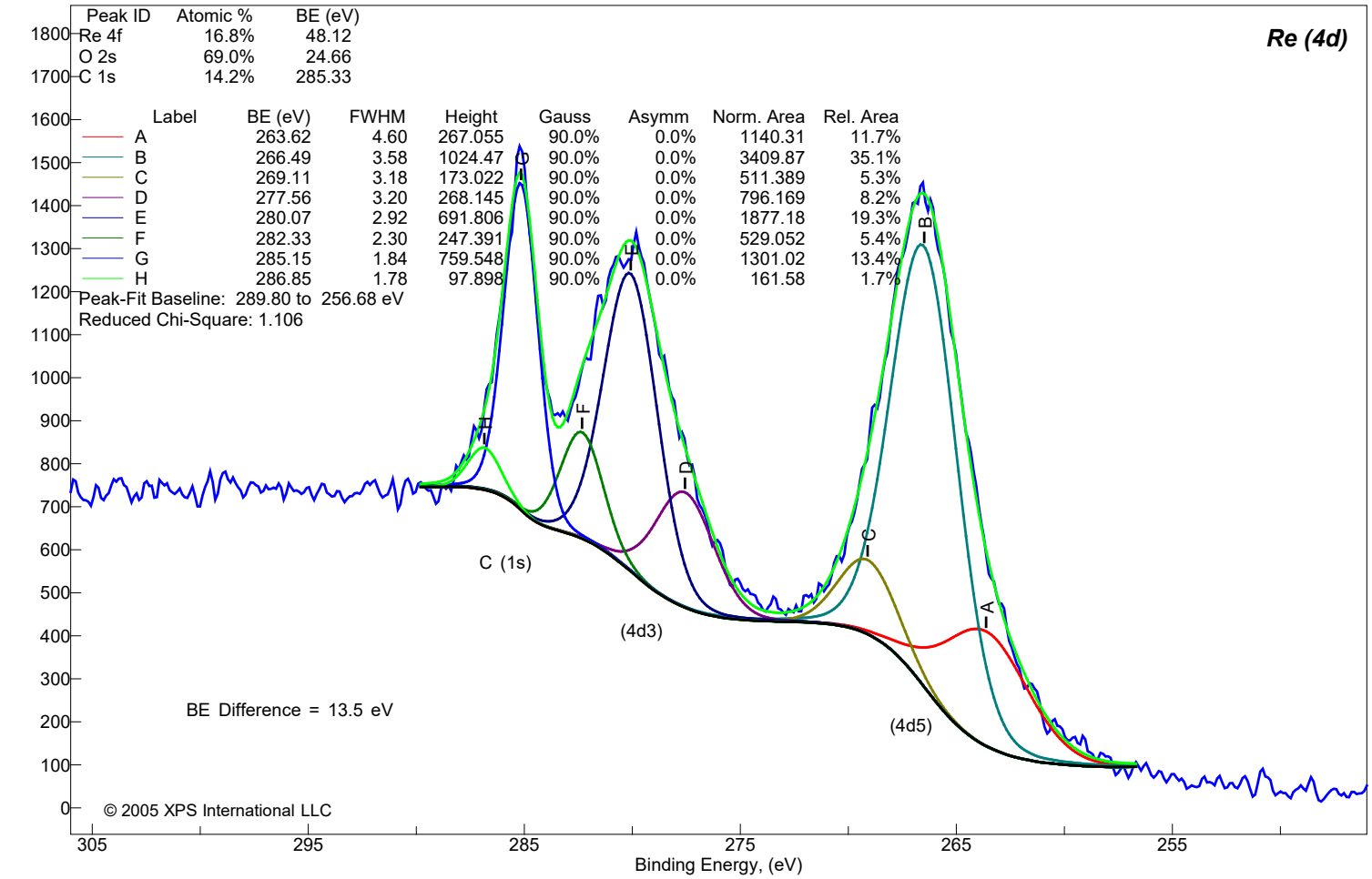
Sample Description: Re2O7 (99.9+%) Aldrich lot# 04418PV, 3mm pellet, screen, 35 DEG, air-exposed



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Rhenium (VII) Oxide (FW = 484.42)

Sample Description: Re2O7 (99.9+%) Aldrich lot# 04418PV, 3mm pellet, screen, 35 DEG, air-exposed



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Rh_2O_3

Rhodium (III) Oxide (FW = 253.82)
Surface Composition Table

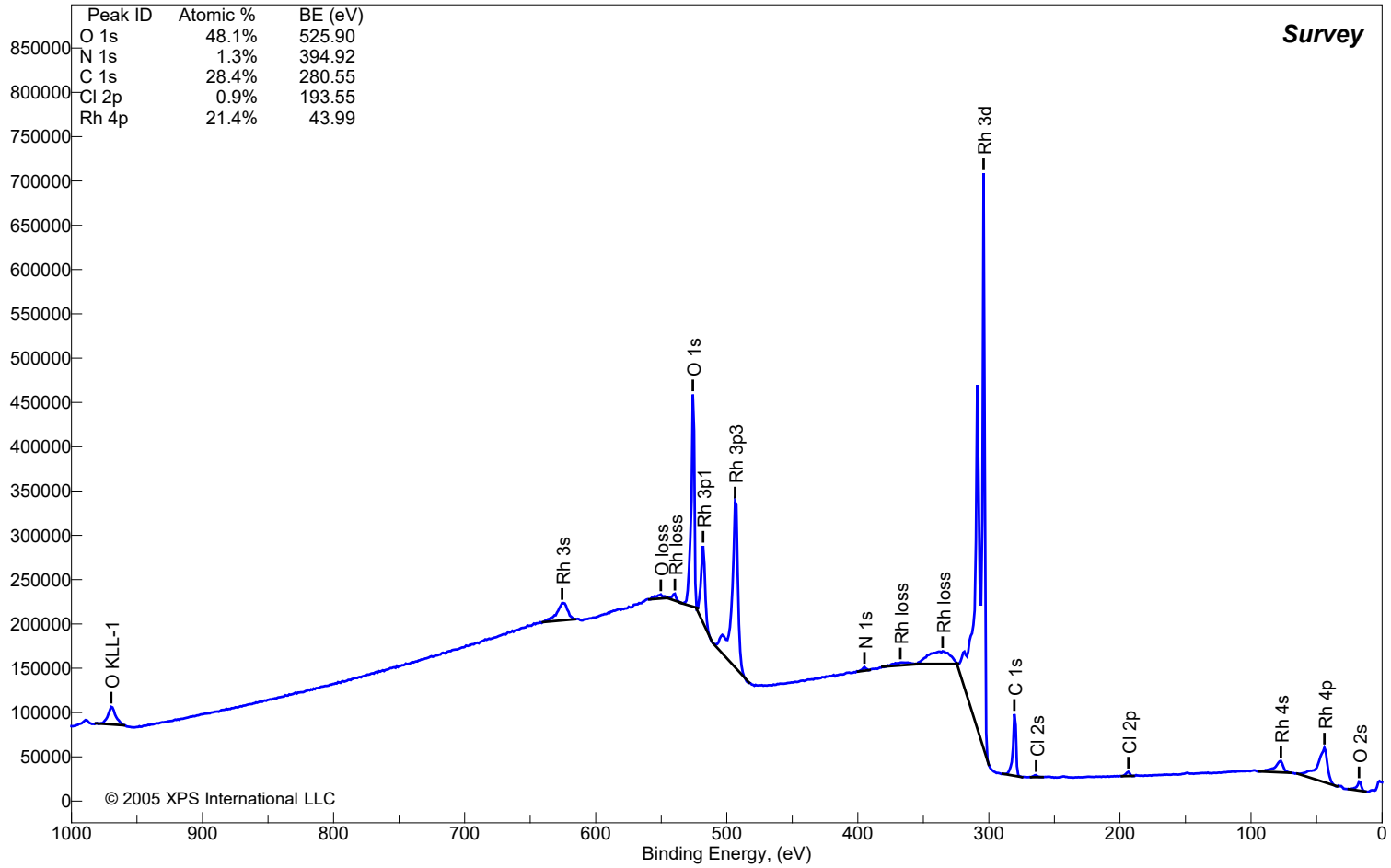
Description: Rh_2O_3 (99.8%) from Aldrich Co. Lot# 05318TW, analyzed at 90 deg TOA, mesh at 1 mm, conductive brown-black powder pressed into 3 mm pellet, mp 1100 C

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	22.1	17.6	0.14	1.5	6,891	
Rh 4p	48.5	44.0	1.75	1.5	57,889	21.4%
Rh 4s	81.7	77.2	0.56	1.5	16,384	
Cl 2p	198.0	193.5	2.28	1.5	2,669	0.9%
Cl 2s	268.4	263.9	1.69	1.5	1,232	
C 1s	285.0	280.5	1.00	1.5	33,403	28.4%
Rh 3d	308.5	304.0	14.19	1.5	521,679	
Rh loss	339.8	335.3	0.00	1.5	46,312	
Rh loss	372.0	367.5	0.00	1.5	7,363	
N 1s	399.4	394.9	1.80	1.5	2,286	1.3%
Rh 3p3	498.1	493.6	7.21	1.5	173,741	
Rh 3p1	522.6	518.1	3.64	1.5	52,004	
O 1s	530.4	525.9	2.93	1.5	117,740	48.1%
Rh loss	544.1	539.6	0.00	1.5	4,534	
O loss	554.8	550.3	0.00	1.5	5,333	
Rh 3s	630.1	625.6	2.70	1.5	31,353	
O KLL-1	974.2	969.7	0.70	1.5	22,894	

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Rhodium (III) Oxide (FW = 253.82)

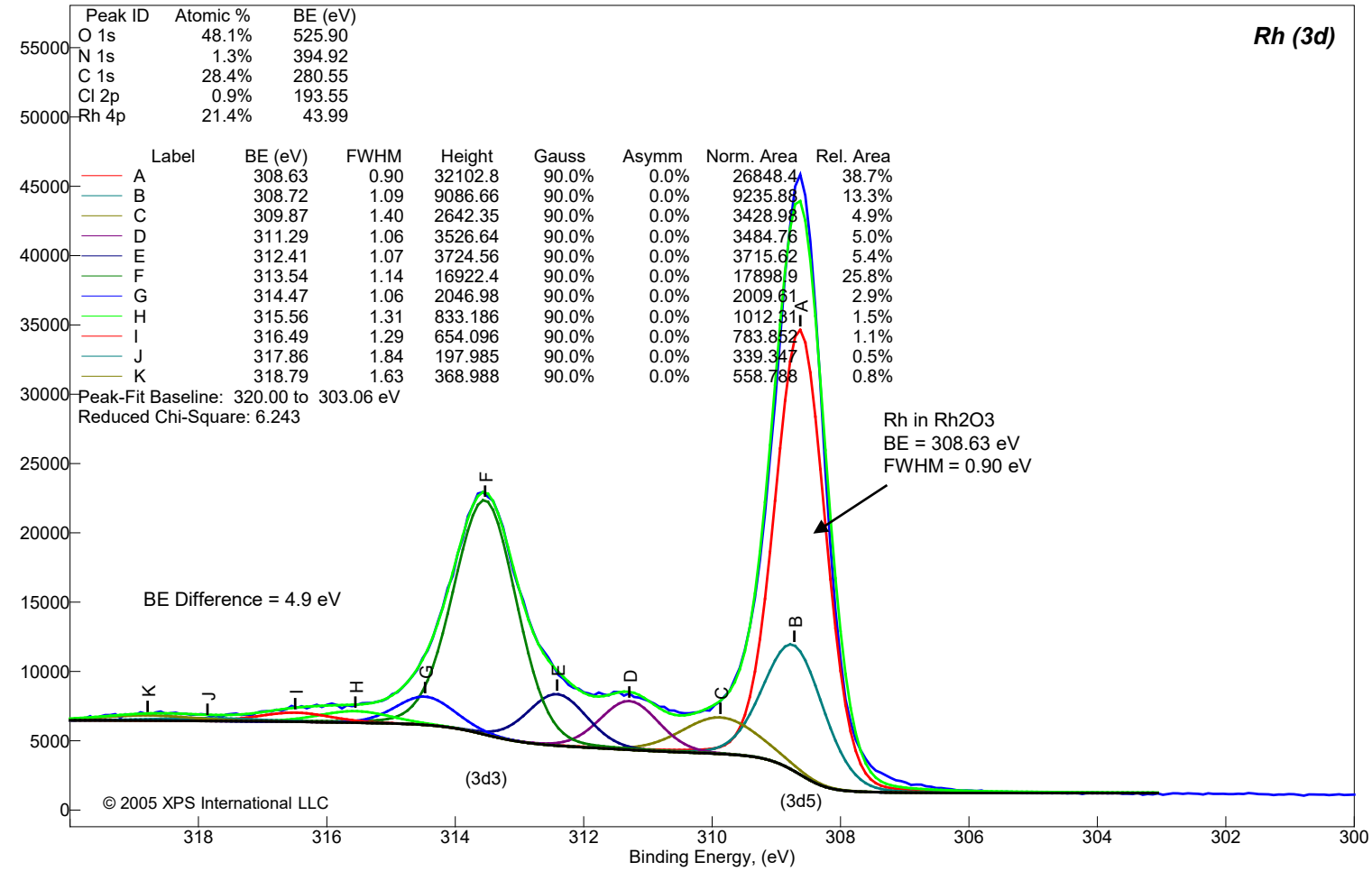
Sample Description: Rh2O3 (99.8%) from Aldrich lot# 05318TW, conductive
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Rhodium (III) Oxide (FW = 253.82)

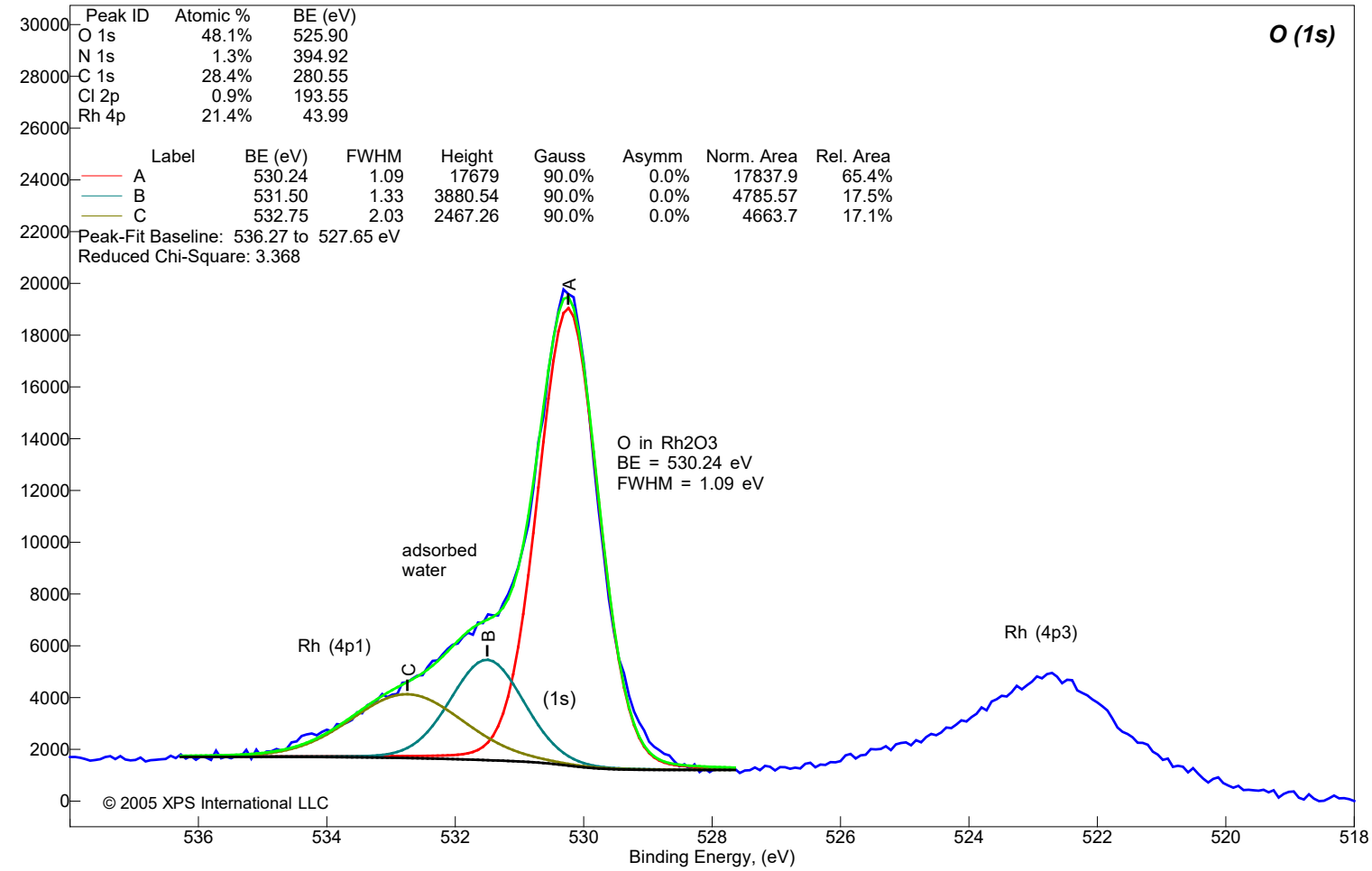
Sample Description: Rh2O3 (99.8%) Aldrich lot# 05318TW, 3mm pellet, CONDUCTIVE, screen, 90 TOA



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Rhodium (III) Oxide (FW = 253.82)

Sample Description: Rh2O3 (99.8%) Aldrich lot# 05318TW, 3mm pellet, CONDUCTIVE, screen, 90 TOA

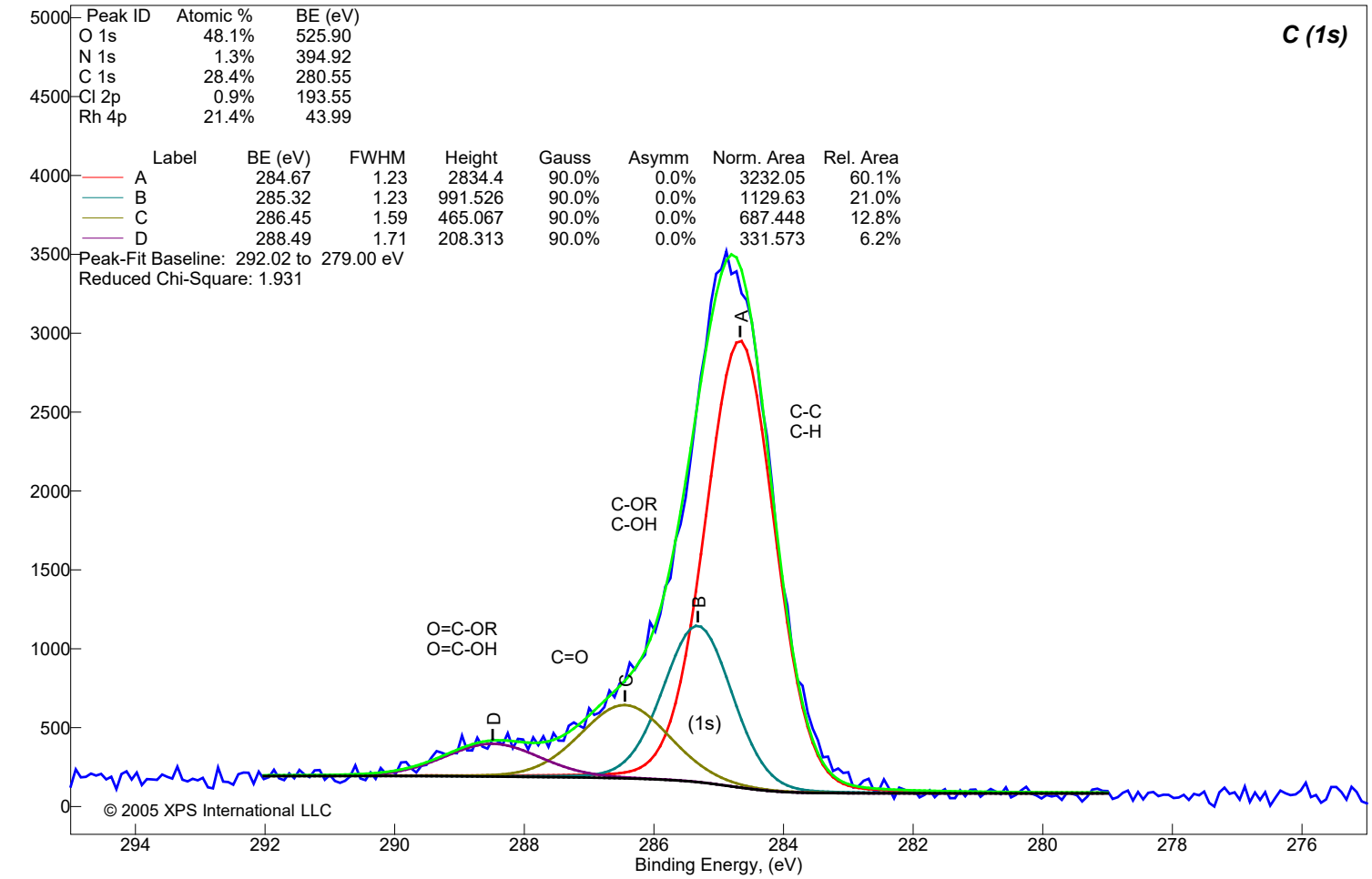


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Rh_2O_3

Rhodium (III) Oxide (FW = 253.82)

Sample Description: Rh2O3 (99.8%) Aldrich lot# 05318TW, 3mm pellet, CONDUCTIVE, screen, 90 TOA

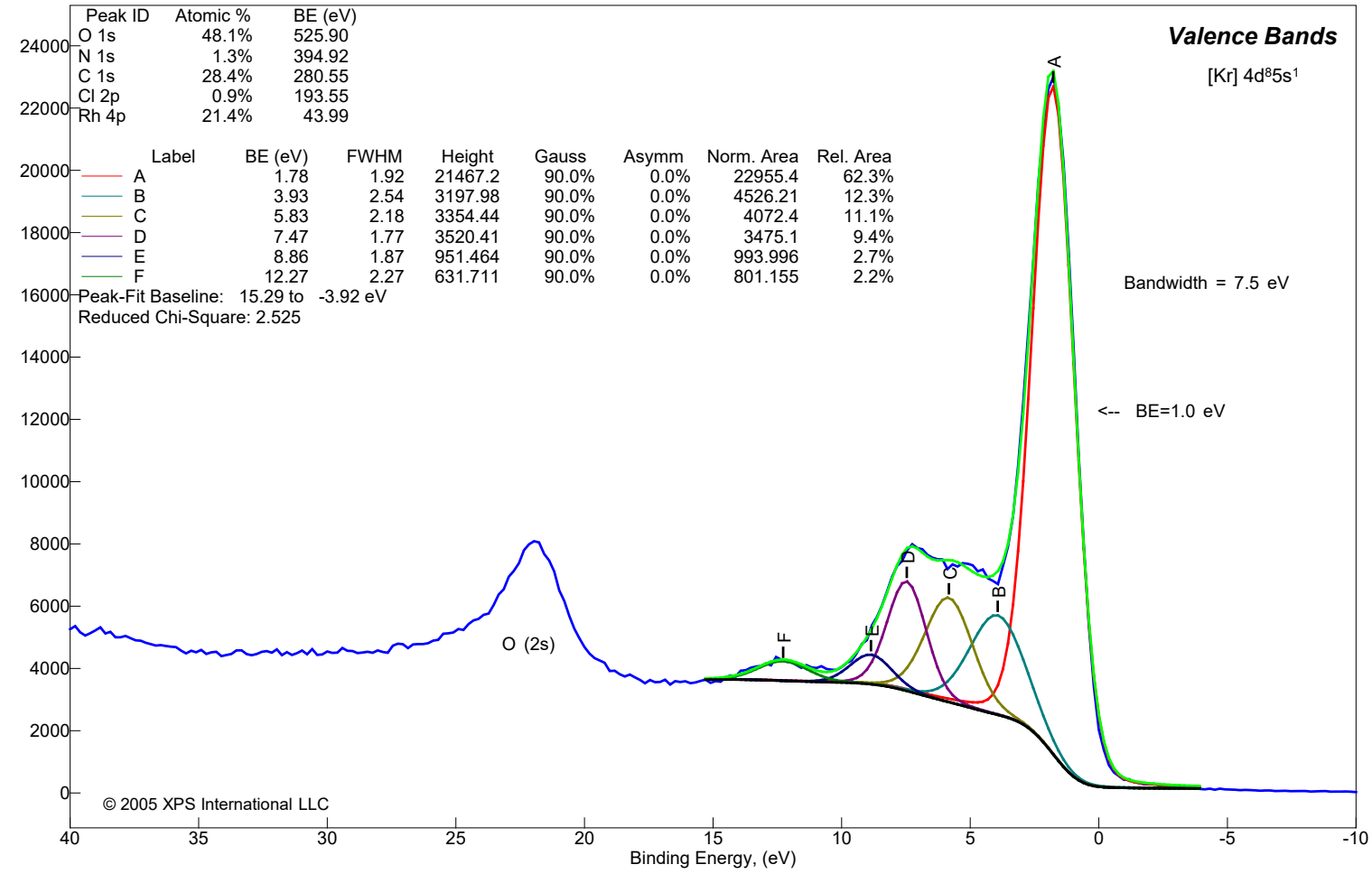


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Rh_2O_3

Rhodium (III) Oxide (FW = 253.82)

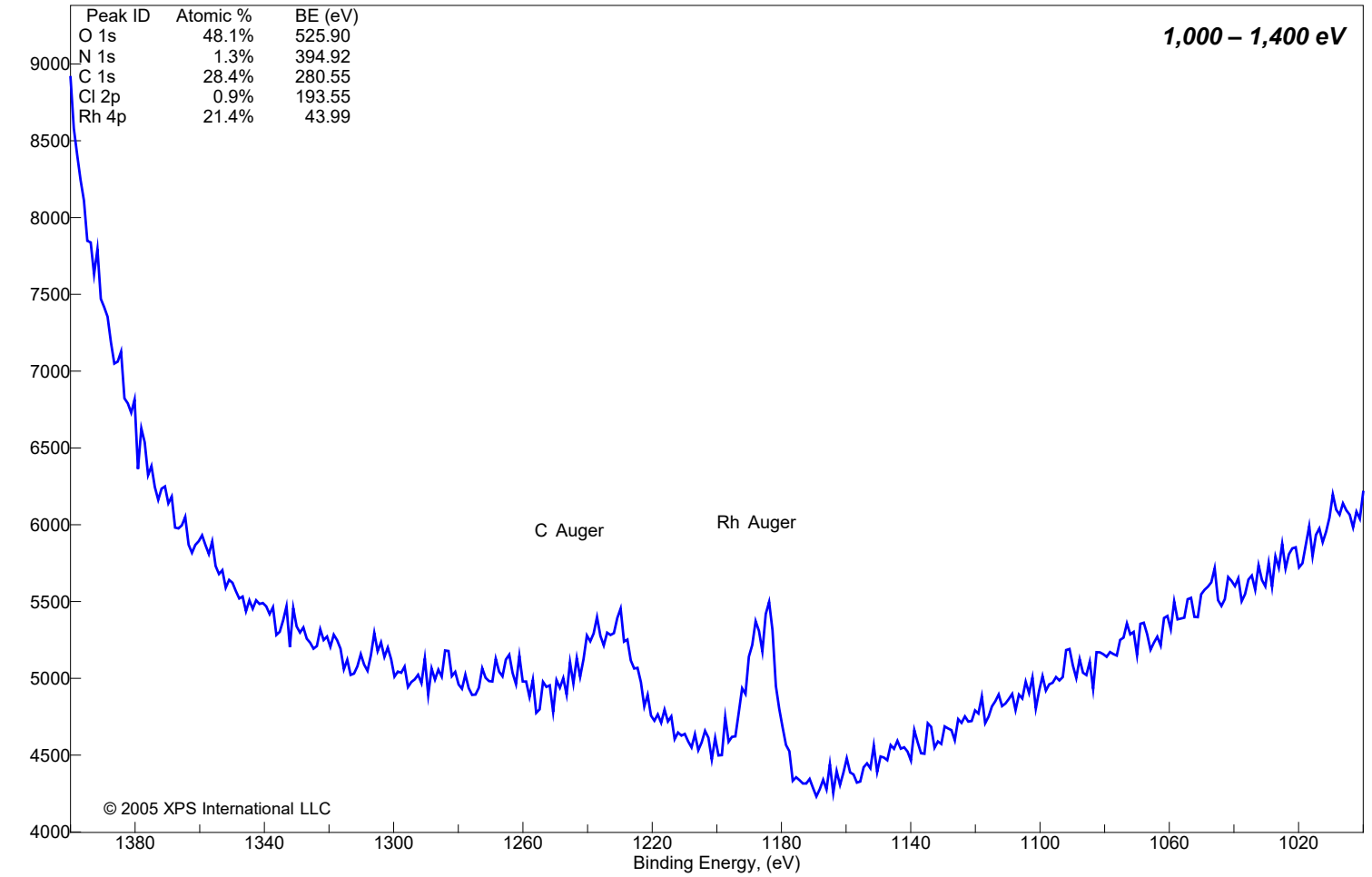
Sample Description: Rh2O3 (99.8%) Aldrich lot# 05318TW, 3mm pellet, CONDUCTIVE, screen, 90 TOA



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Rhodium (III) Oxide (FW = 253.82)

Sample Description: Rh2O3 (99.8%) Aldrich lot# 05318TW, 3mm pellet, CONDUCTIVE, screen, 90 TOA



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RuO_2

Ruthenium (IV) Oxide (FW = 133.07)
Surface Composition Table

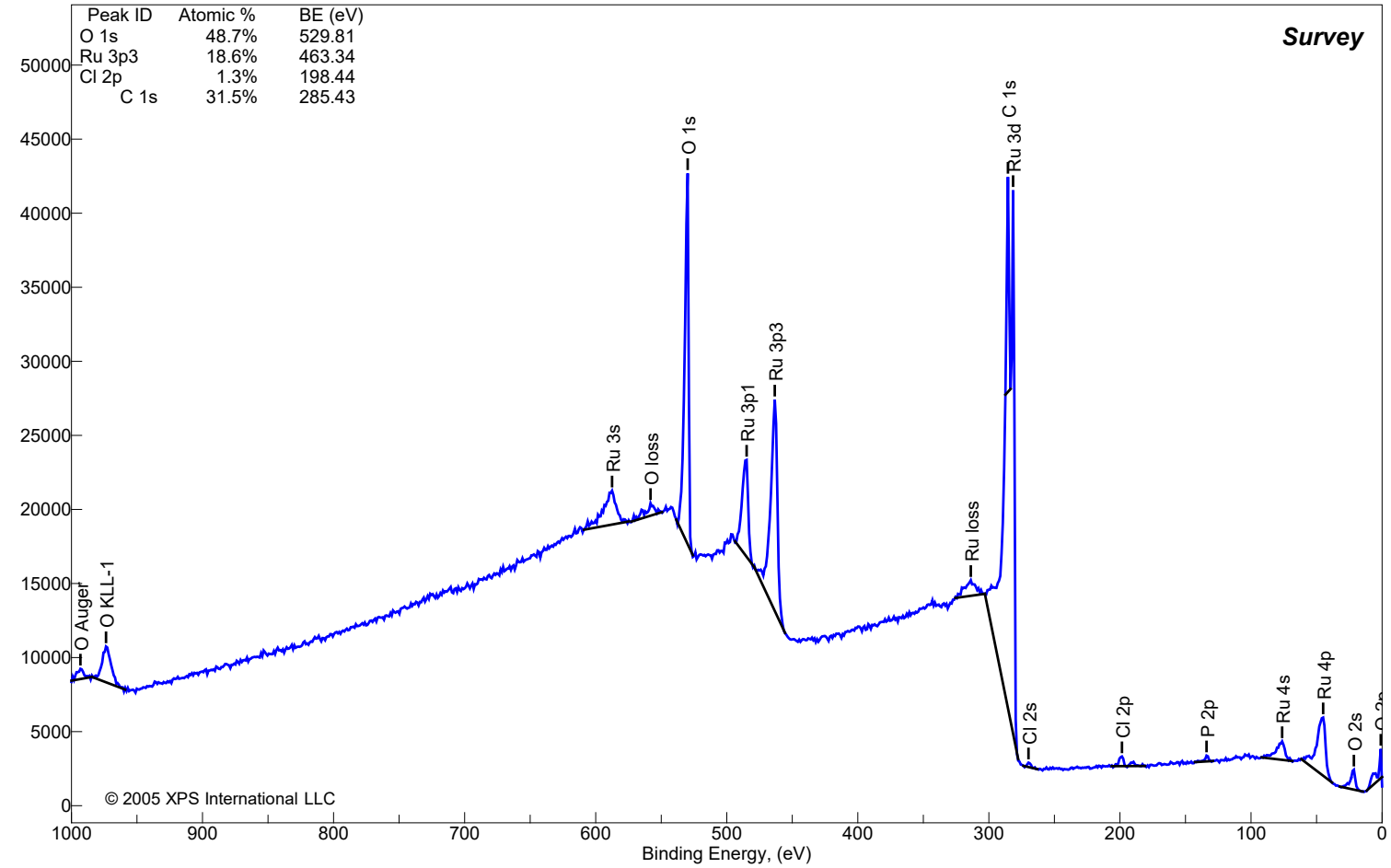
Description: RuO_2 (99.9%) from Aldrich Co. Lot# 06522PV, analyzed at 90 deg TOA, mesh at 1 mm, conductive black powder pressed into 3 mm pellet, mp 1200 C sublimes, insol in acid

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2p	1.0	1.0	0.02	1.5	12,703	
O 2s	21.5	21.5	0.14	1.5	7,278	
Ru 4p	45.0	45.0	1.59	1.5	38,789	
Ru 4s	76.2	76.2	0.52	1.5	12,658	
P 2p	133.9	133.9	1.19	1.5	1,265	
Cl 2p	198.4	198.4	2.28	1.5	3,564	1.3%
Cl 2s	269.8	269.8	1.69	1.5	1,053	
Ru 3d	281.5	281.5	12.49	1.5	361,963	
C 1s	285.4	285.4	1.00	1.5	34,330	31.5%
Ru loss	313.8	313.8	0.00	1.5	11,944	
Ru 3p3	463.3	463.3	6.78	1.5	107,943	18.6%
Ru 3p1	484.8	484.8	3.44	1.5	43,844	
O 1s	529.8	529.8	2.93	1.5	110,725	48.7%
O 1s	531.3	531.3	2.93	1.1	23,334	
O loss	558.2	558.2	0.00	1.5	9,978	
Ru 3s	587.5	587.5	2.57	1.5	31,064	
O KLL-1	973.6	973.6	0.70	1.5	21,164	
O Auger	993.2	993.2	0.00	1.5	5,245	

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Ruthenium (IV) Oxide (FW = 133.07)

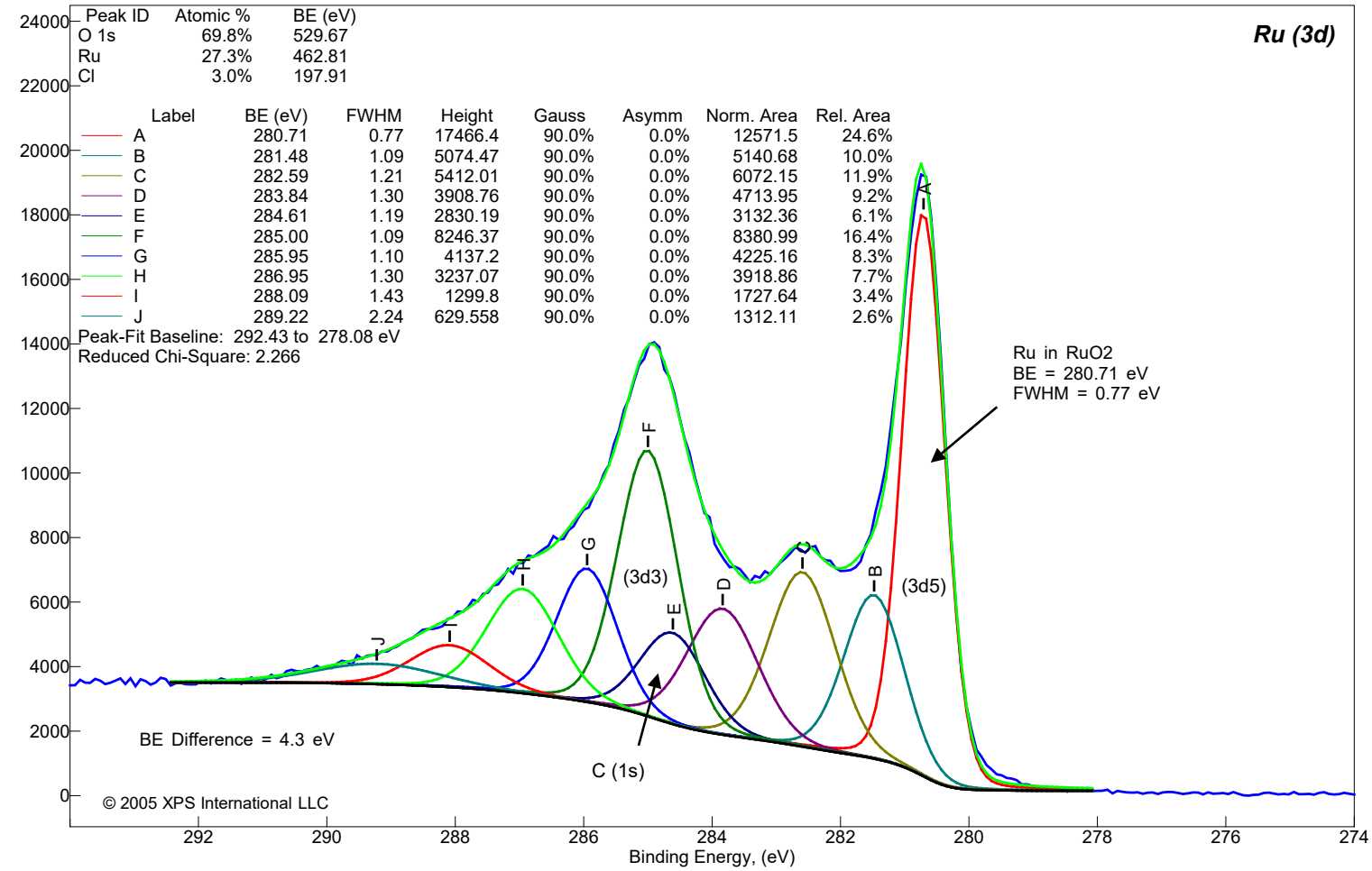
Sample Description: RuO2 (99.9%) from Aldrich lot# 06522PV, conductive
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Ruthenium (IV) Oxide (FW = 133.07)

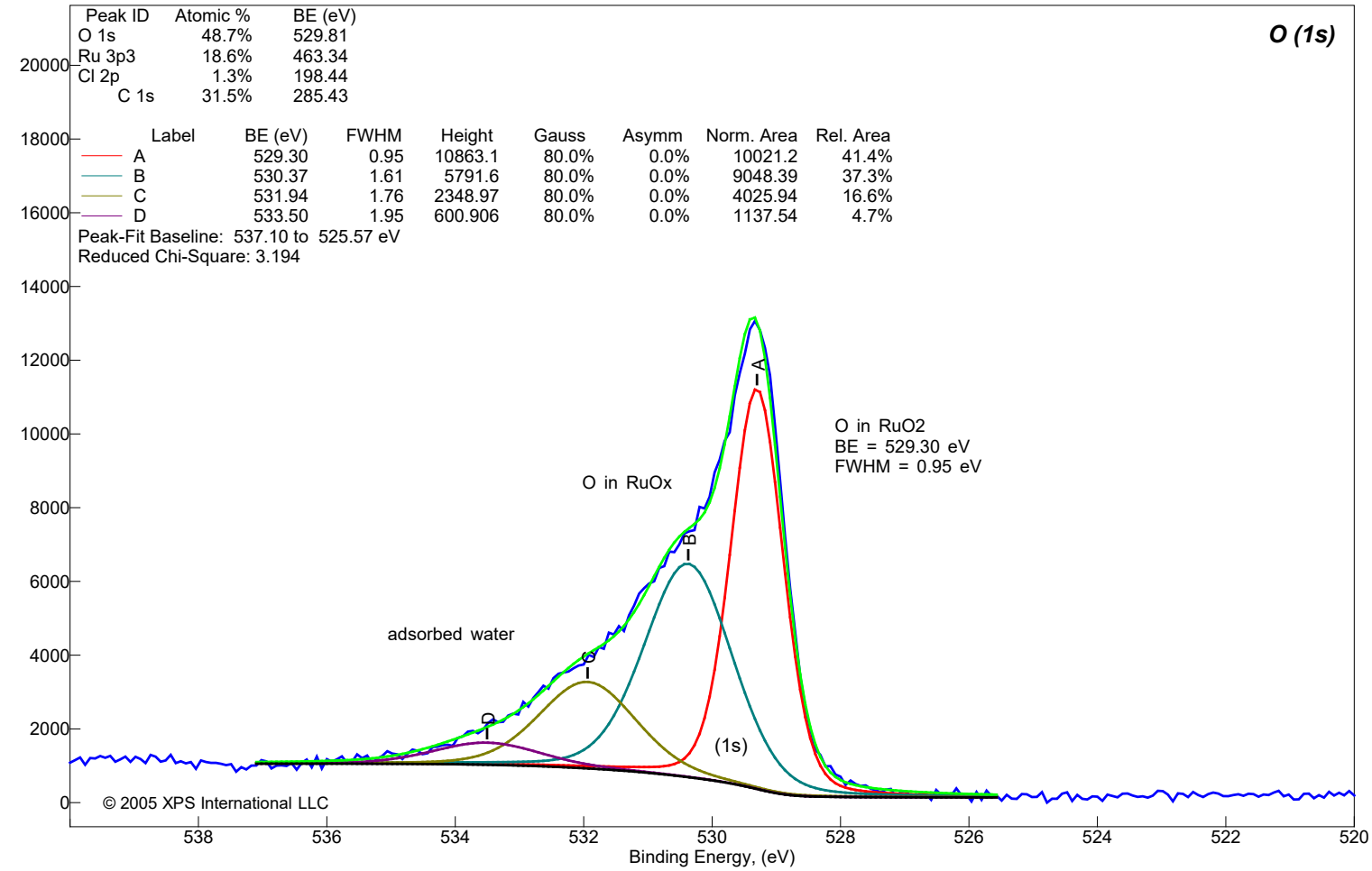
Sample Description: RuO2 (99.9%) Aldrich lot# 06522PV, 3mm pellet, CONDUCTIVE, screen, 90 TOA



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Ruthenium (IV) Oxide (FW = 133.07)

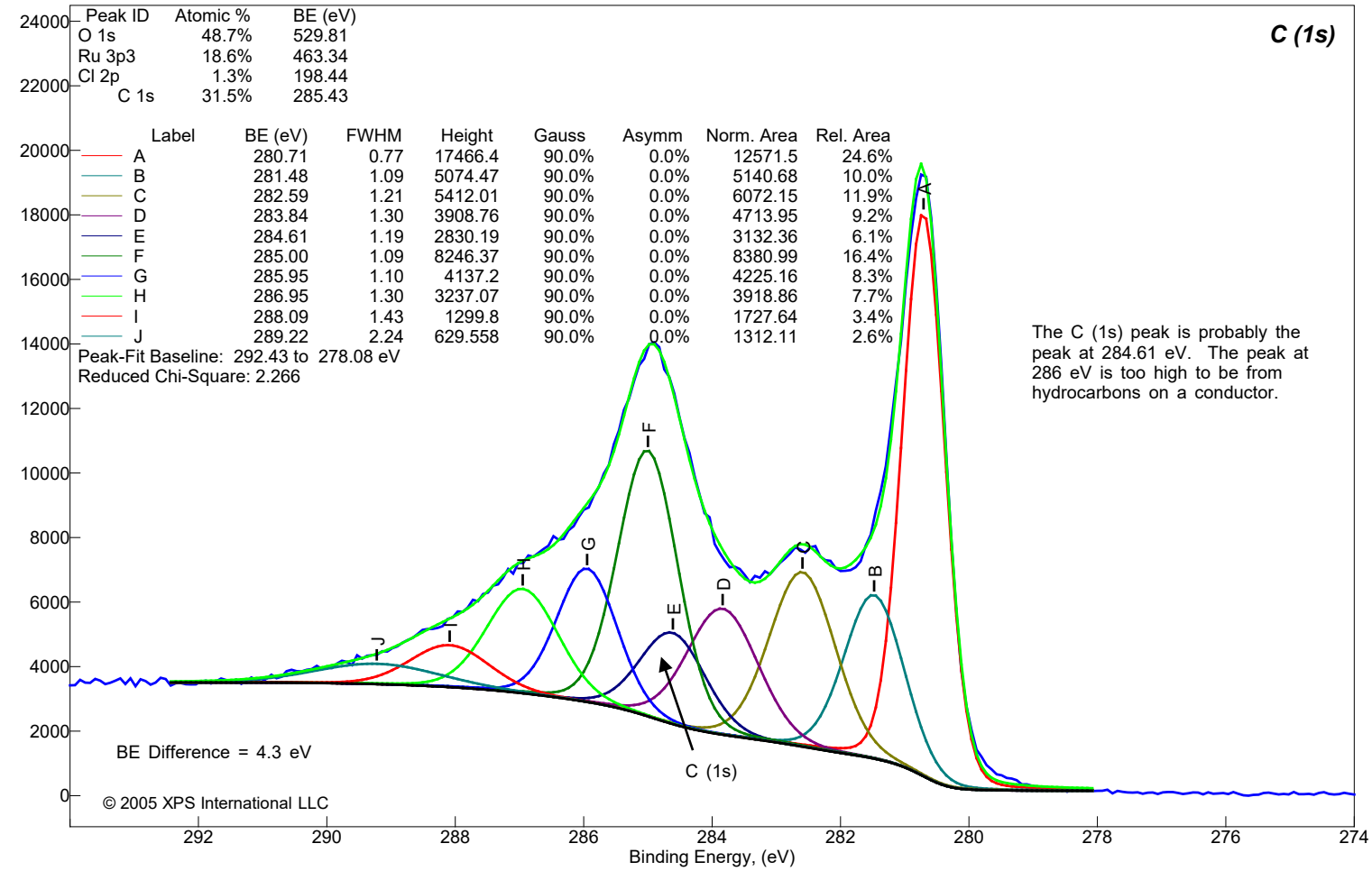
Sample Description: RuO2 (99.9%) Aldrich lot# 06522PV, 3mm pellet, CONDUCTIVE, screen, 90 TOA



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Ruthenium (IV) Oxide (FW = 133.07)

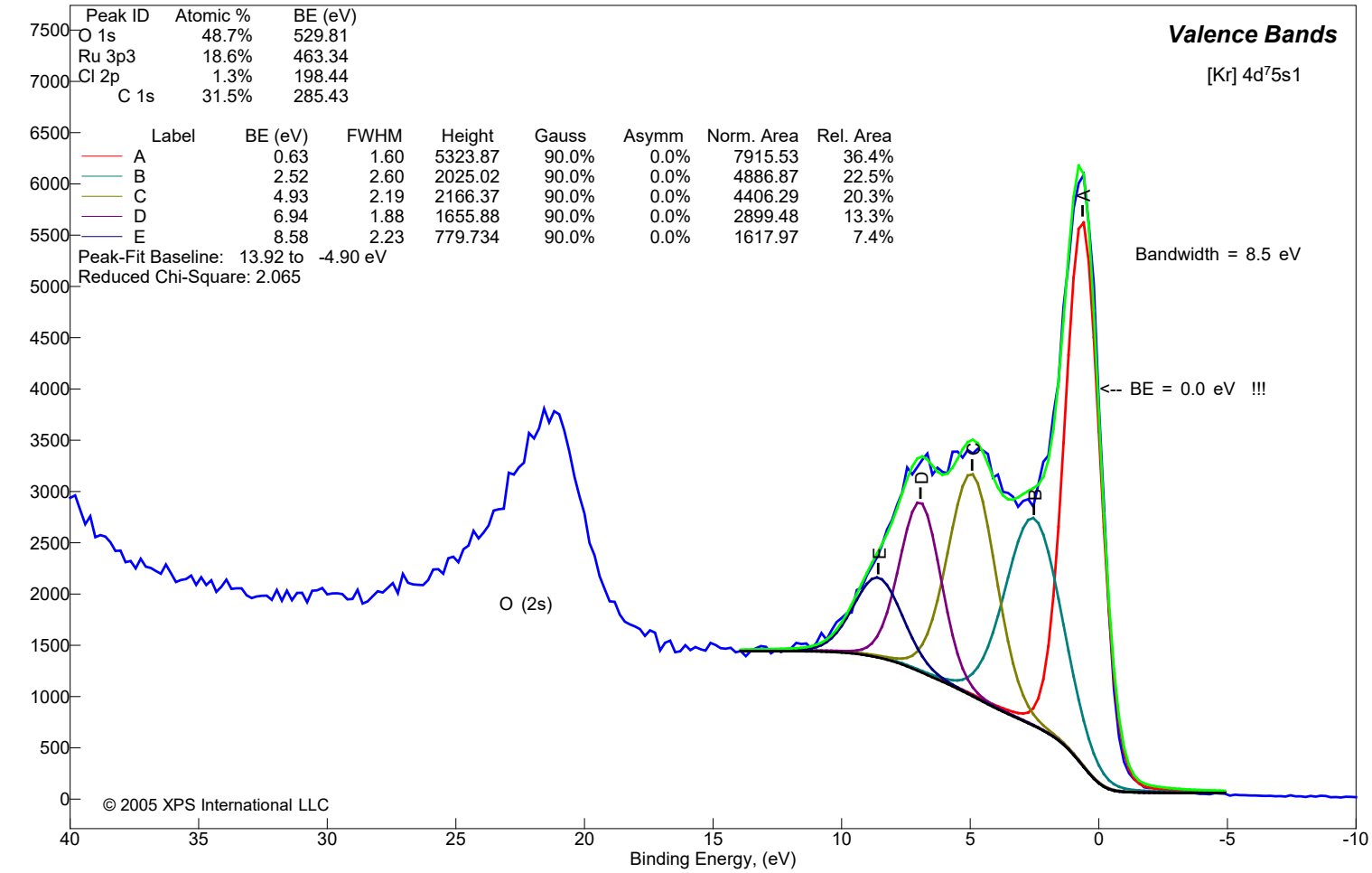
Sample Description: RuO2 (99.9%) Aldrich lot# 06522PV, 3mm pellet, CONDUCTIVE, screen, 90 TOA



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Ruthenium (IV) Oxide (FW = 133.07)

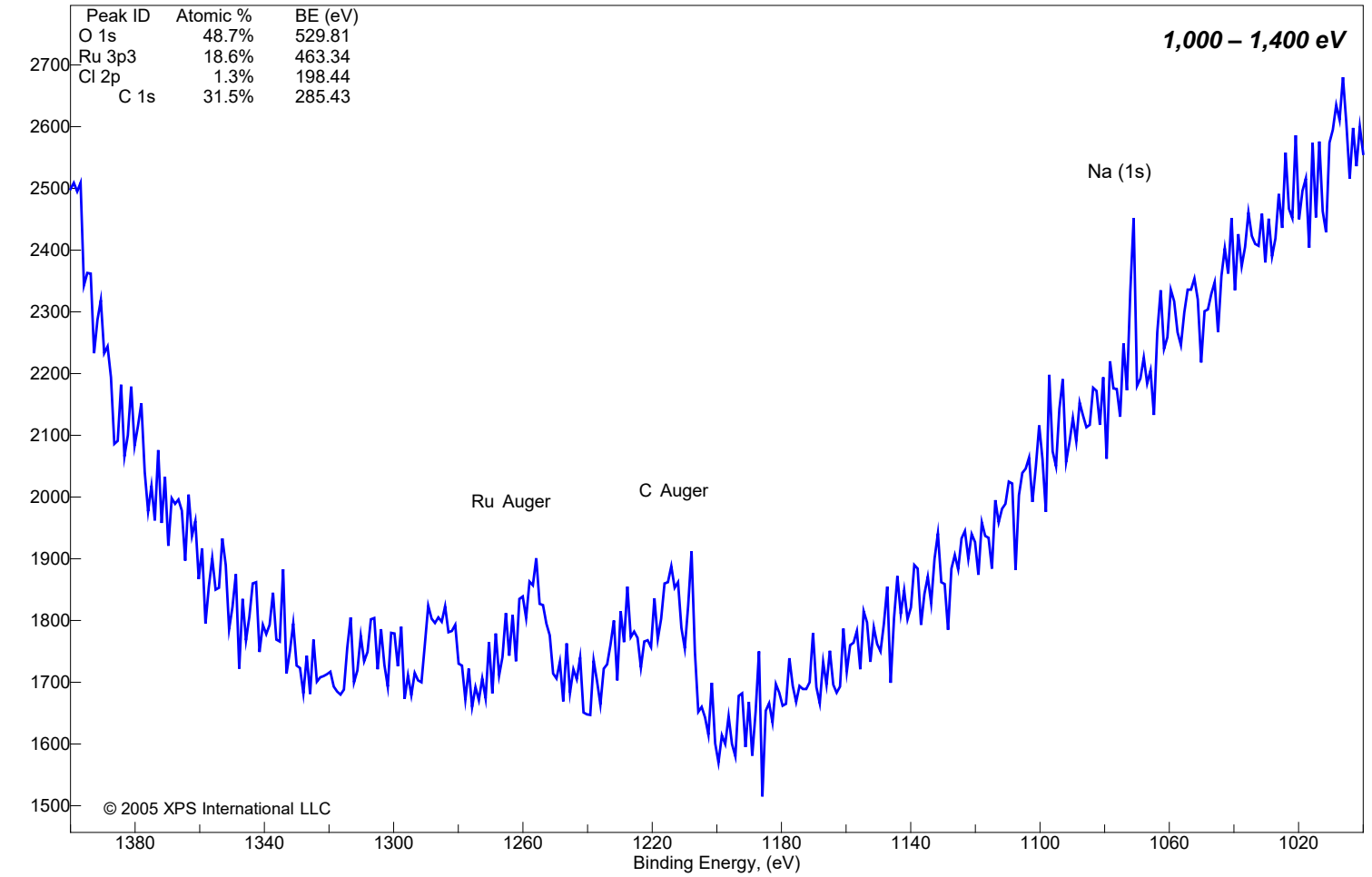
Sample Description: RuO2 (99.9%) Aldrich lot# 06522PV, 3mm pellet, CONDUCTIVE, screen, 90 TOA



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Ruthenium (IV) Oxide (FW = 133.07)

Sample Description: RuO2 (99.9%) Aldrich lot# 06522PV, 3mm pellet, CONDUCTIVE, screen, 90 TOA



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Sb_2O_3

Antimony (III) Oxide (FW = 291.50)
Surface Composition Table

Description: Sb_2O_3 (99.999%) from Aldrich Co. Lot# 06924HV, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white powder pressed into 3 mm pellet, mp 655 C, slightly sol in water, dil acid

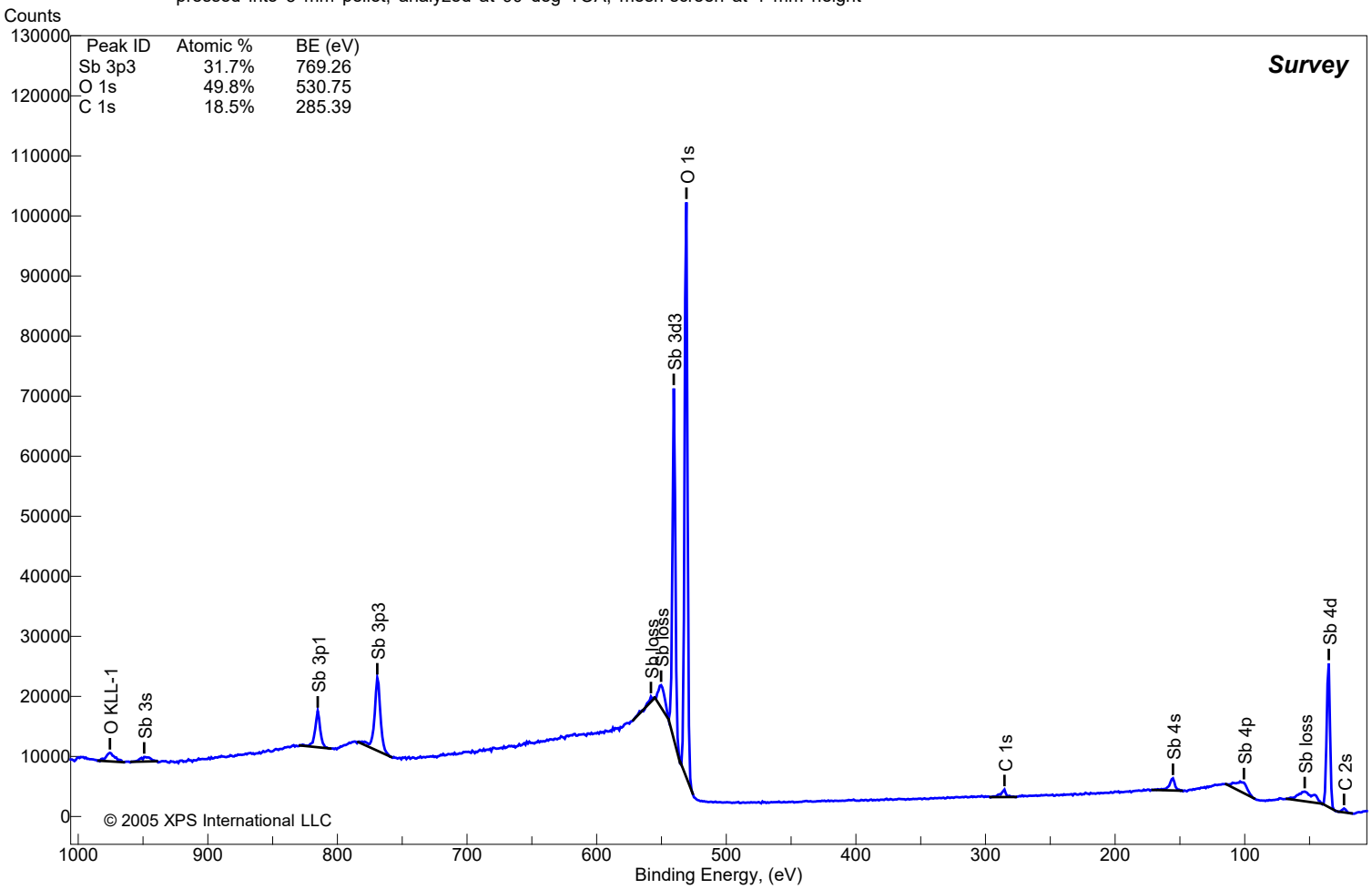
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
C 2s	23.4	19.1	0.15	1.1	1,124	
Sb 4d	35.1	30.8	3.14	1.1	36,367	
Sb loss	53.7	49.4	0.00	1.1	12,174	
Sb 4p	100.6	96.3	2.88	1.1	9,239	
Sb 4s	155.4	151.1	0.85	1.1	4,971	
C 1s	285.4	281.1	1.00	1.1	3,416	18.5%
O 1s	530.7	526.4	18.00	1.1	128,600	49.8%
Sb 3d3	540.5	536.2	11.35	1.1	77,944	
Sb loss	550.3	546.0	0.00	1.1	10,823	
Sb loss	558.1	553.8	0.00	1.1	1,501	
Sb 3p3	769.3	765.0	9.77	1.1	32,327	31.7%
Sb 3p1	815.2	810.9	4.76	1.1	13,706	
Sb 3s	949.1	944.8	3.36	1.1	2,914	
O KLL-1	975.5	971.2	0.70	1.1	5,692	

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Sb_2O_3

Antimony (III) Oxide (FW = 291.50)

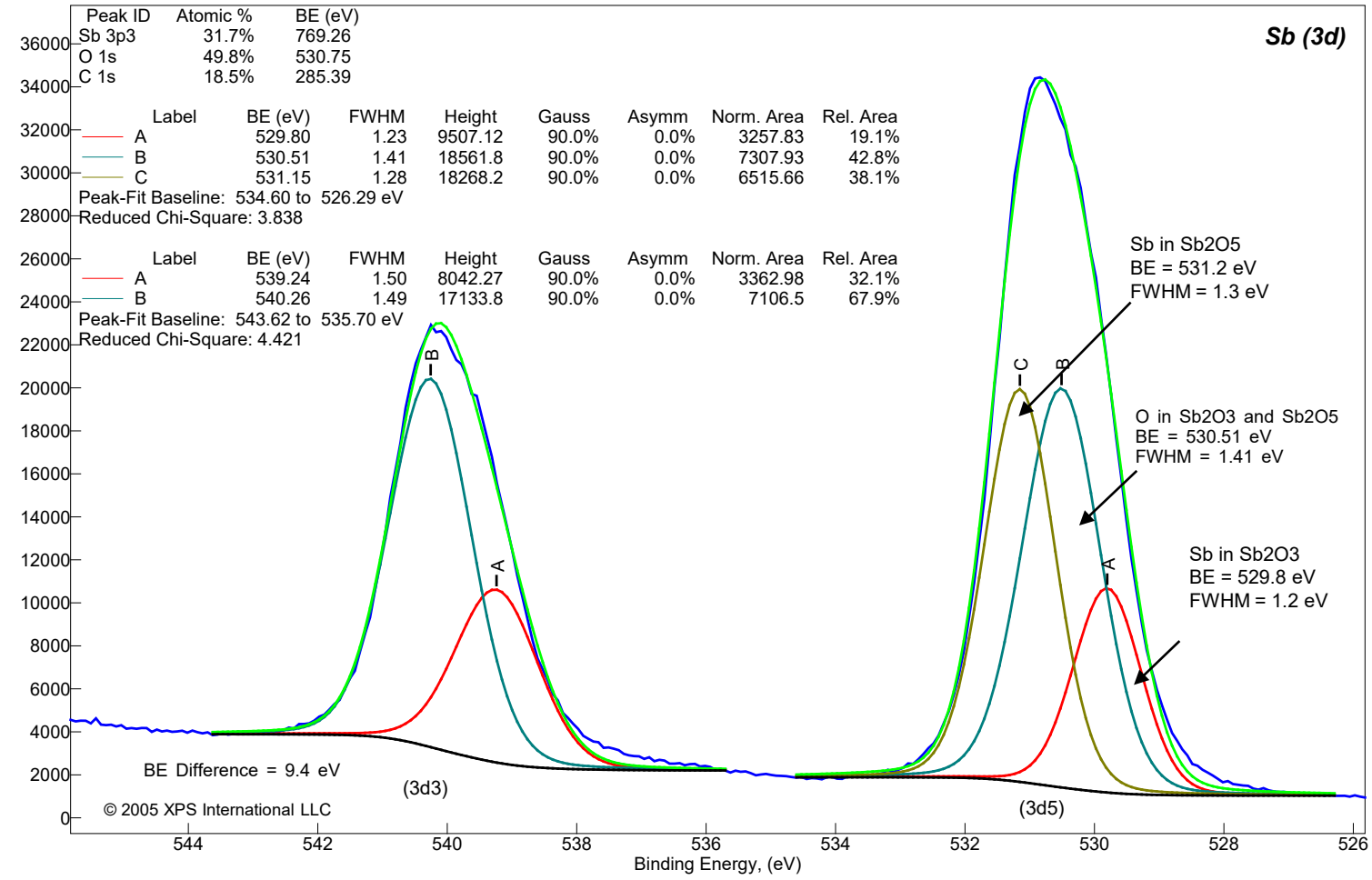
Sample Description: Sb2O3 (99.999%) from Aldrich Lot# 06924HV
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Antimony (III) Oxide (FW = 291.50)

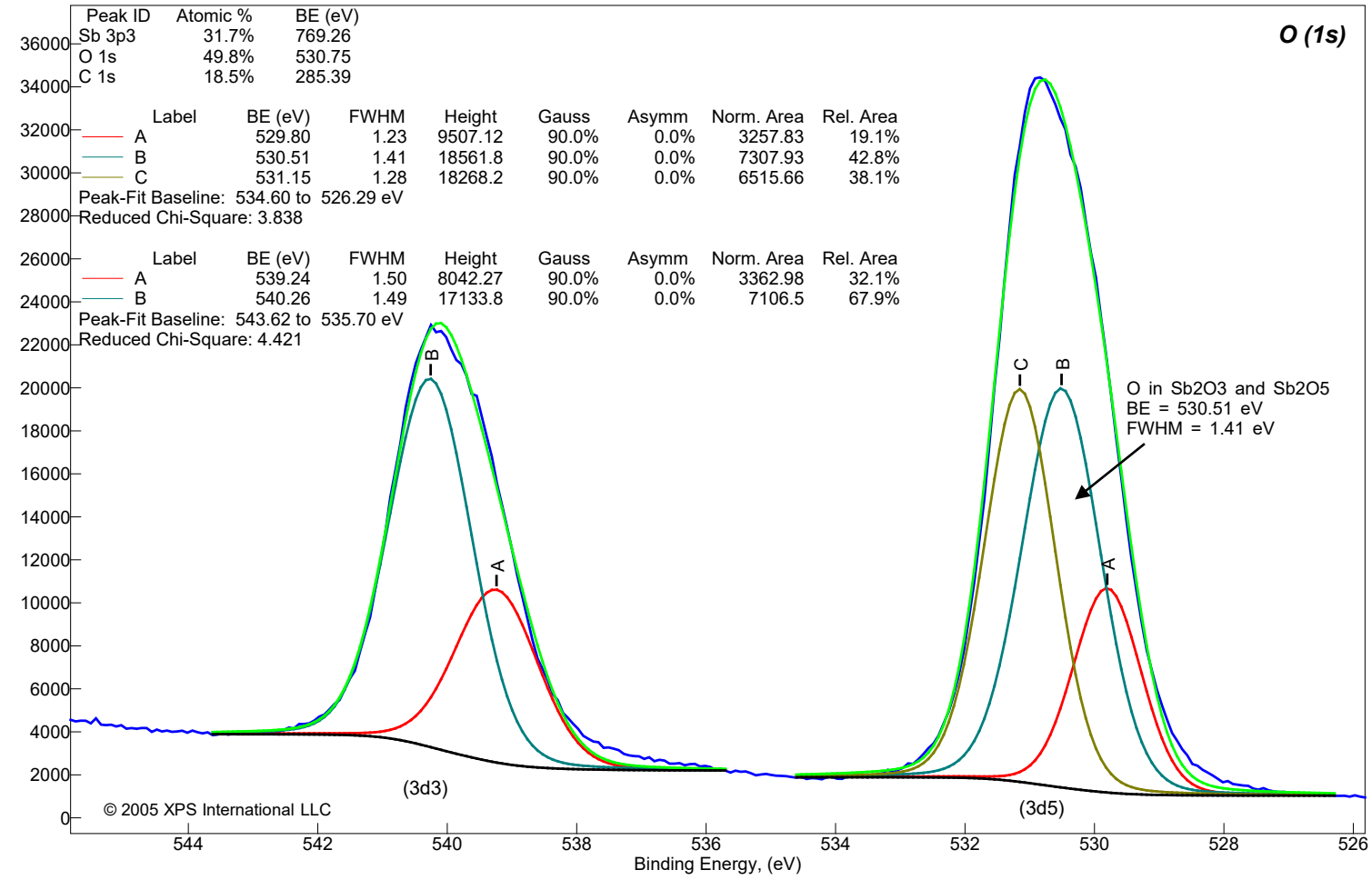
Sample Description: Sb2O3 (99.999%) Aldrich Lot# 06924HV, 3mm pellet, Screen, 90 TOA



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Antimony (III) Oxide (FW = 291.50)

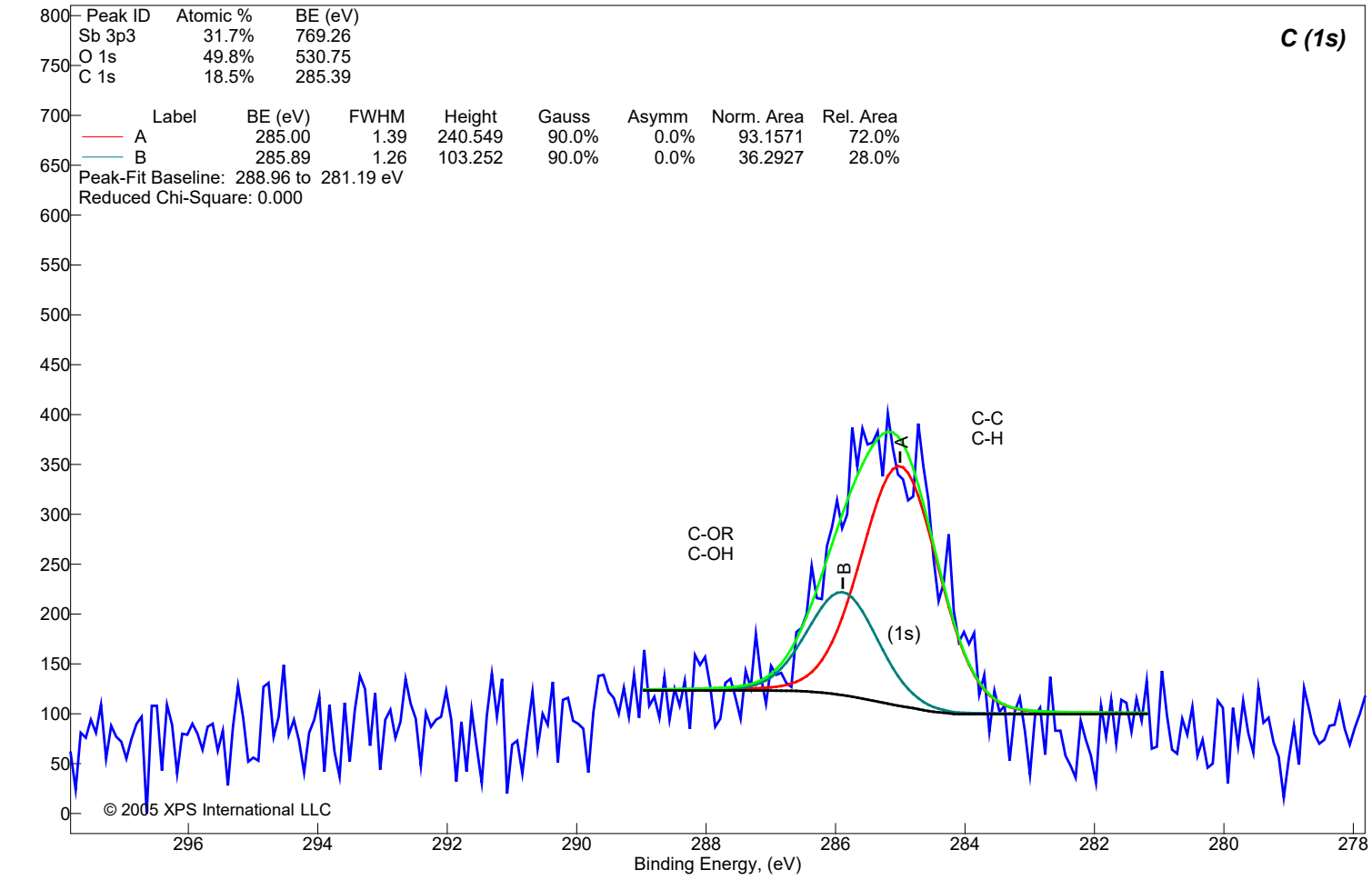
Sample Description: Sb2O3 (99.999%) Aldrich Lot# 06924HV, 3mm pellet, Screen, 90 TOA



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Antimony (III) Oxide (FW = 291.50)

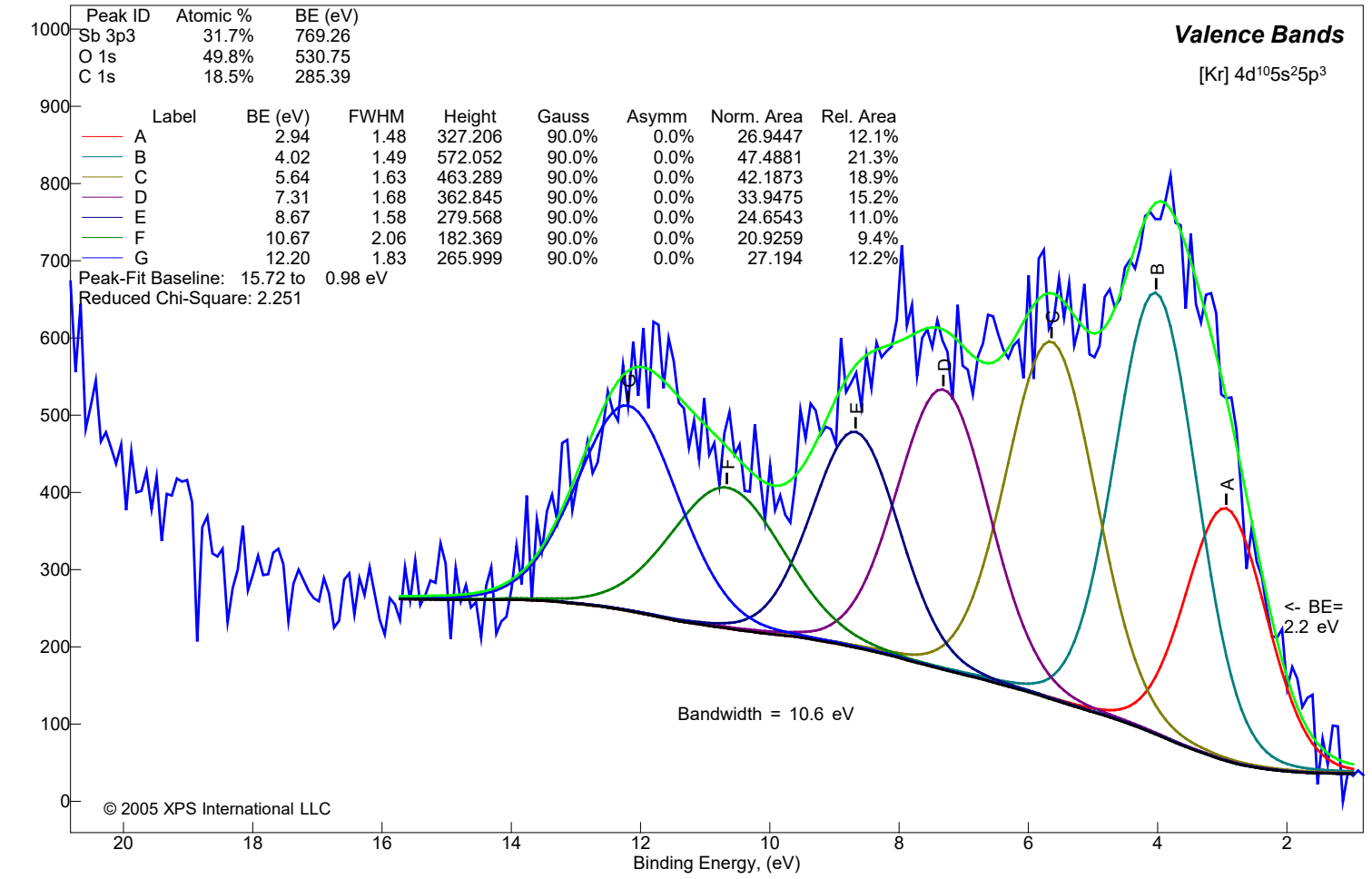
Sample Description: Sb2O3 (99.999%) Aldrich Lot# 06924HV, 3mm pellet, Screen, 90 TOA



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Antimony (III) Oxide (FW = 291.50)

Sample Description: Sb2O3 (99.999%) Aldrich Lot# 06924HV, 3mm pellet, Screen, 90 TOA



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Sb_2O_5

Antimony (V) Oxide (FW = 323.50)
Surface Composition Table

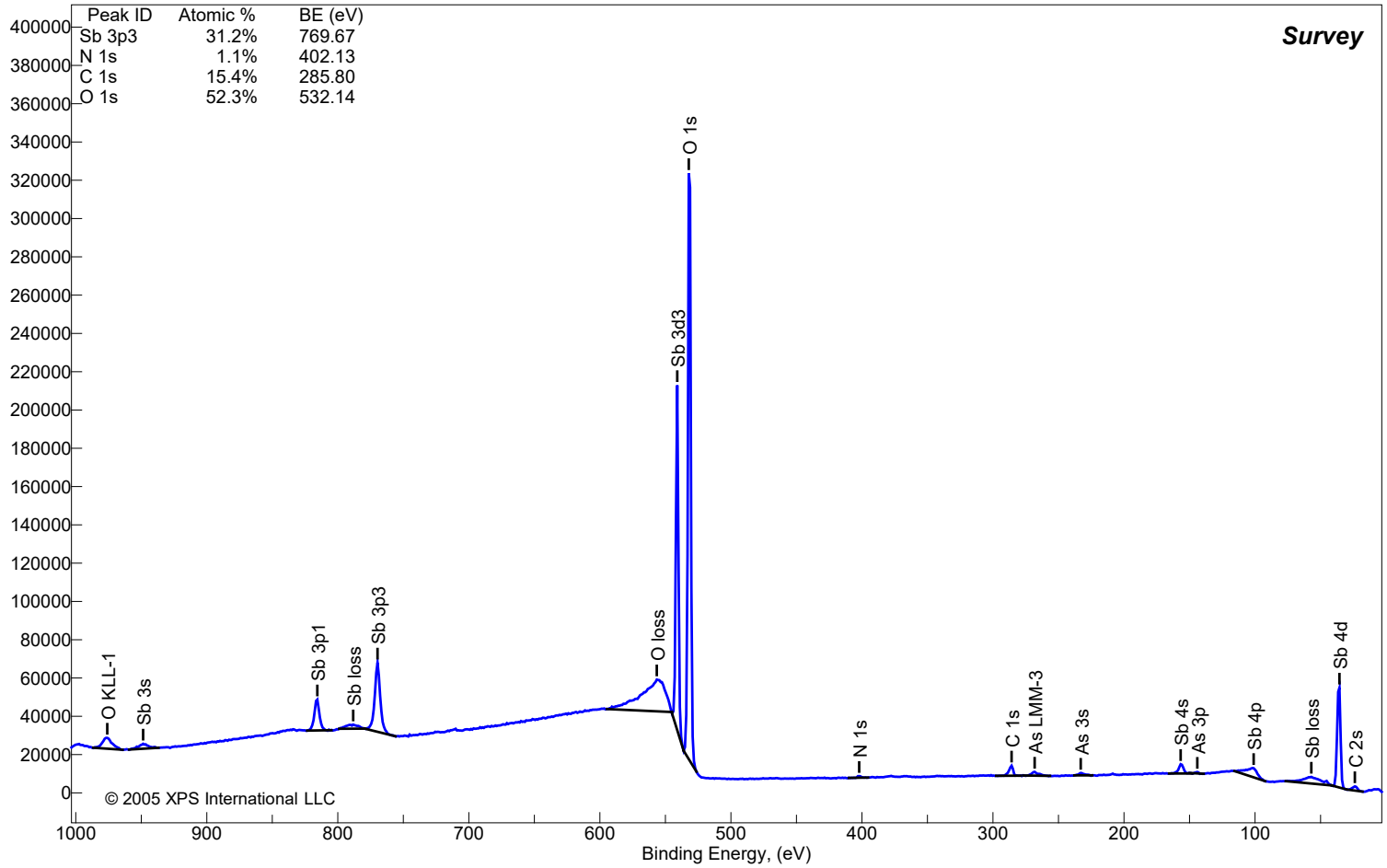
Description: Sb_2O_5 (99.995%) from Aldrich Co. Lot# 02413JW, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive yellow-white powder pressed into 3 mm pellet, mp 300 C dec, sol in warm HCl

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
As 4p	5.7	1.2	0.12	1.4	8,403	
C 2s	23.8	19.3	0.15	1.4	6,381	
Sb 4d	35.6	31.1	3.14	1.4	99,825	
Sb loss	57.1	52.6	0.00	1.4	36,093	
Sb 4p	101.1	96.6	2.88	1.4	30,938	
As 3p	144.1	139.6	4.07	1.4	888	
Sb 4s	156.8	152.3	0.85	1.4	14,253	
As 3s	233.0	228.5	1.32	1.4	3,496	
As LMM-3	268.2	263.7	0.40	1.4	5,705	
C 1s	285.8	281.3	1.00	1.4	11,634	15.4%
N 1s	402.1	397.6	1.80	1.4	1,359	1.1%
O 1s	532.1	527.6	18.00	1.4	516,872	52.3%
Sb 3d3	540.9	536.4	11.35	1.4	258,058	
O loss	556.6	552.1	0.00	1.4	233,804	
Sb 3p3	769.7	765.2	9.77	1.4	112,475	31.2%
Sb loss	788.2	783.7	0.00	1.4	14,725	
Sb 3p1	815.6	811.1	4.76	1.4	46,326	
Sb 3s	948.6	944.1	3.36	1.4	14,200	
O KLL-1	975.9	971.4	0.70	1.4	33,212	
As 2p3	1327.3	1322.8	6.00	1.2	1,699	
As 2p1	1362.3	1357.8	3.00	1.2	768	

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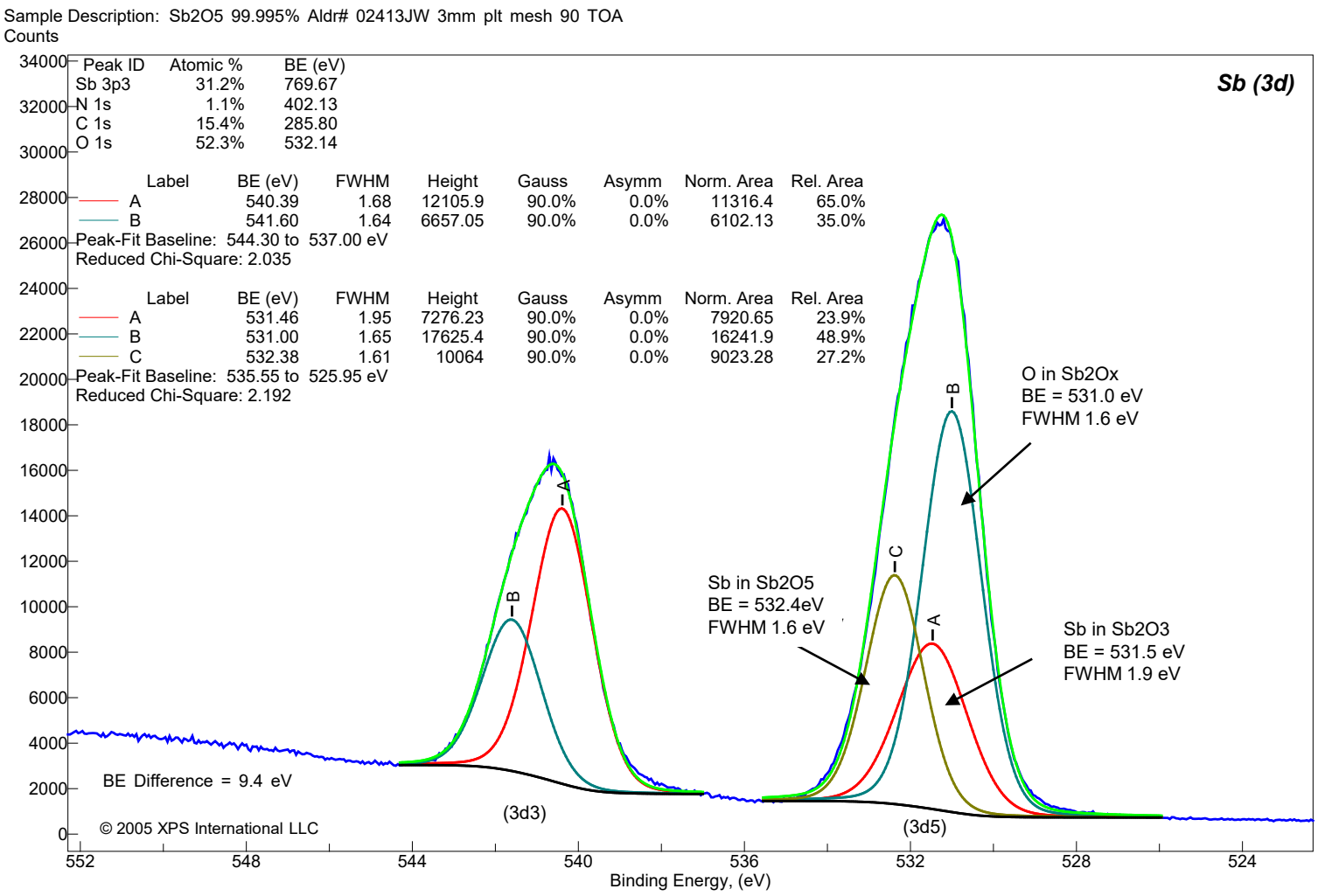
Antimony (V) Oxide (FW = 323.50)

Sample Description: Sb2O5 (99.995%) from Aldrich lot# 02413JW
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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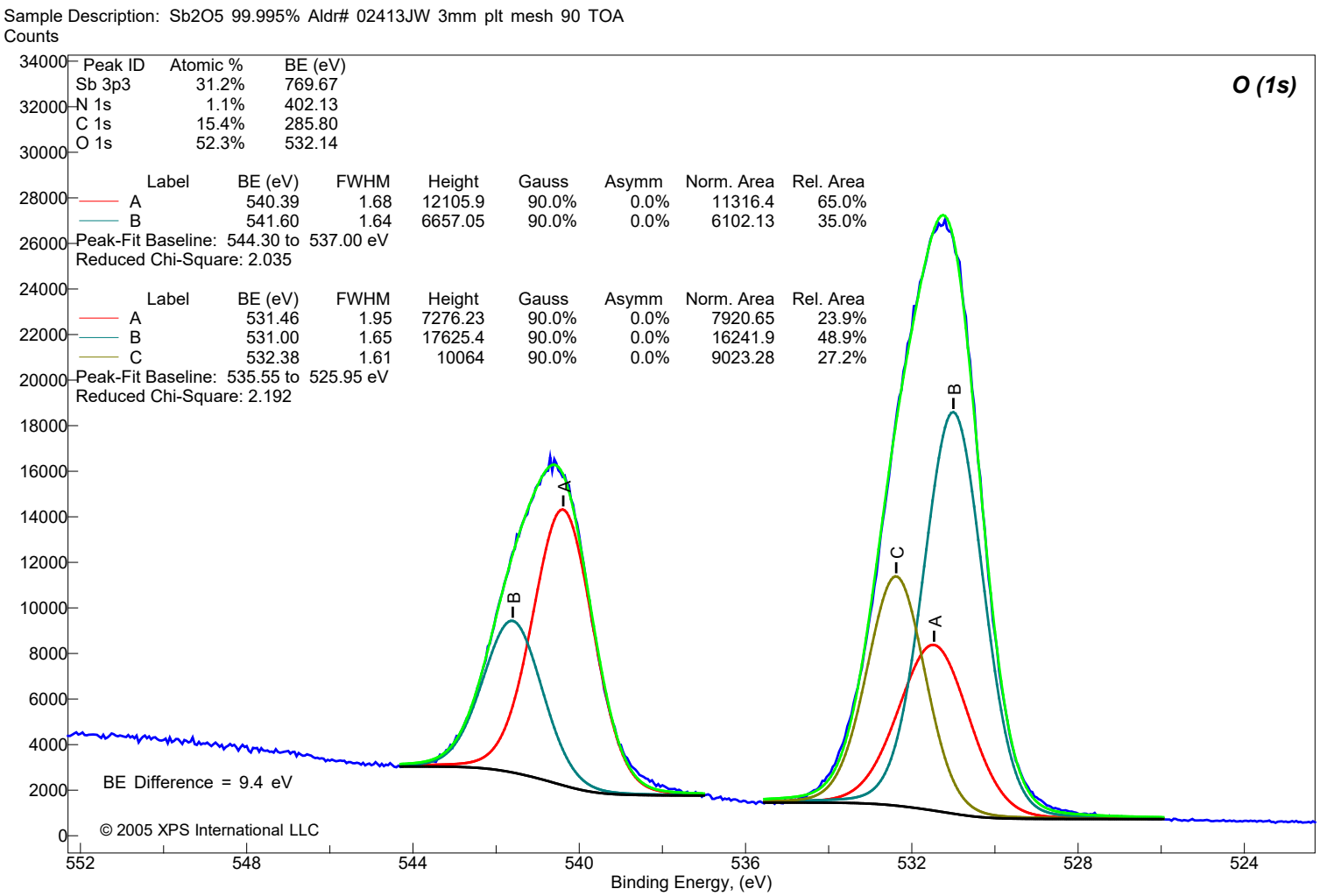
Antimony (V) Oxide (FW = 323.50)



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Sb_2O_5

Antimony (V) Oxide (FW = 323.50)

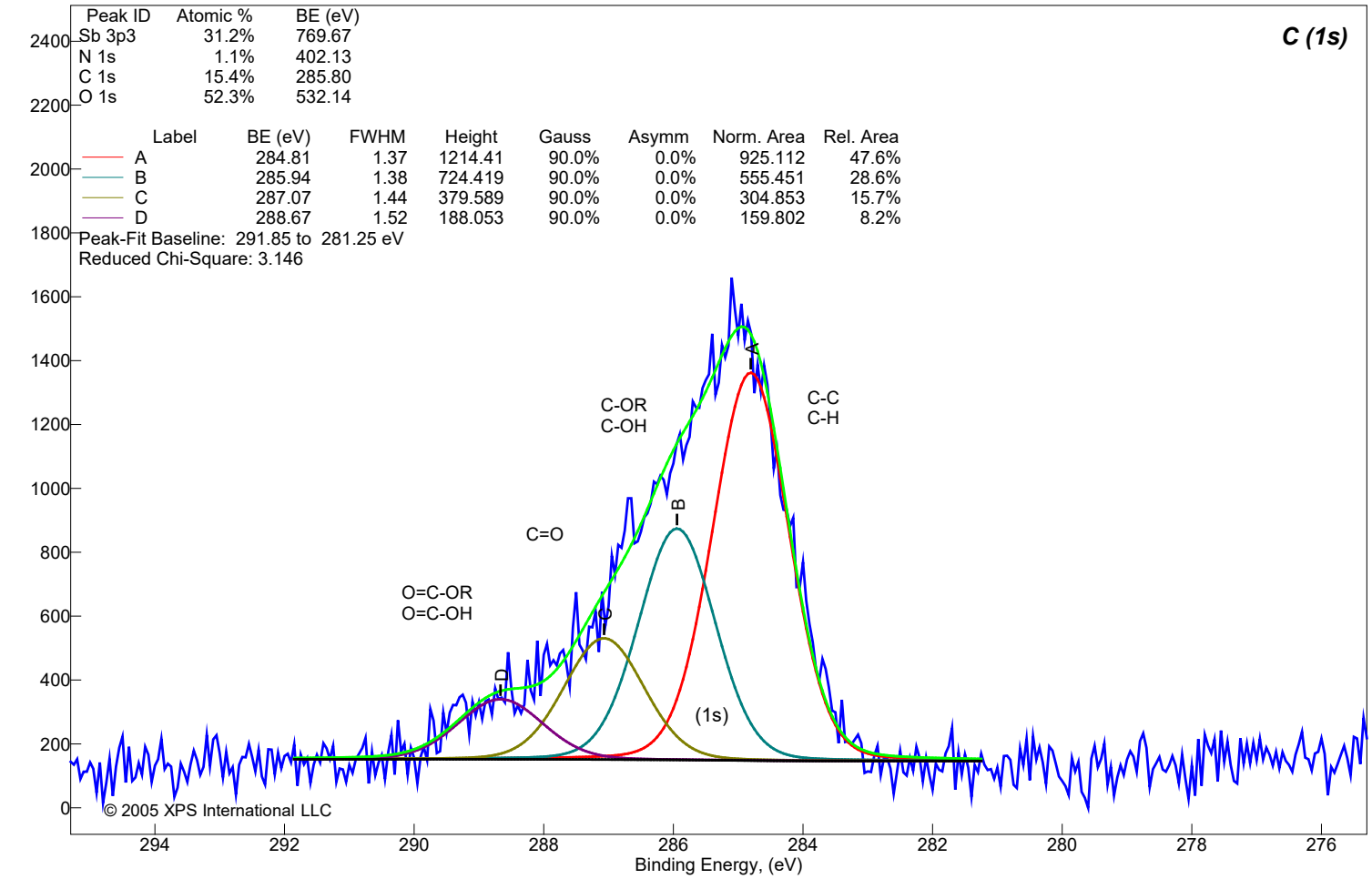


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Sb_2O_5

Antimony (V) Oxide (FW = 323.50)

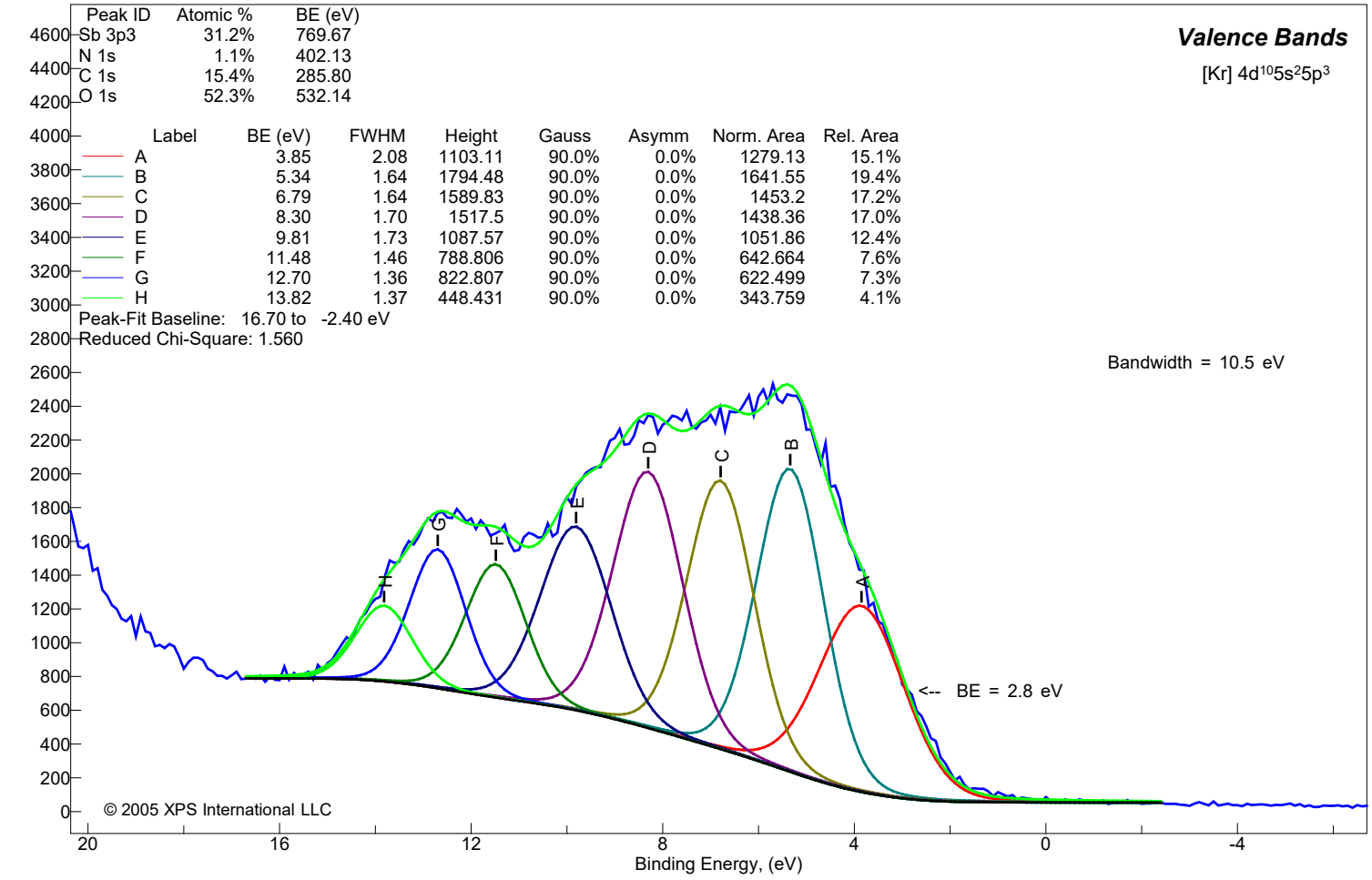
Sample Description: Sb2O5 99.995% Aldr# 02413JW 3mm plt mesh 90 TOA



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Antimony (V) Oxide (FW = 323.50)

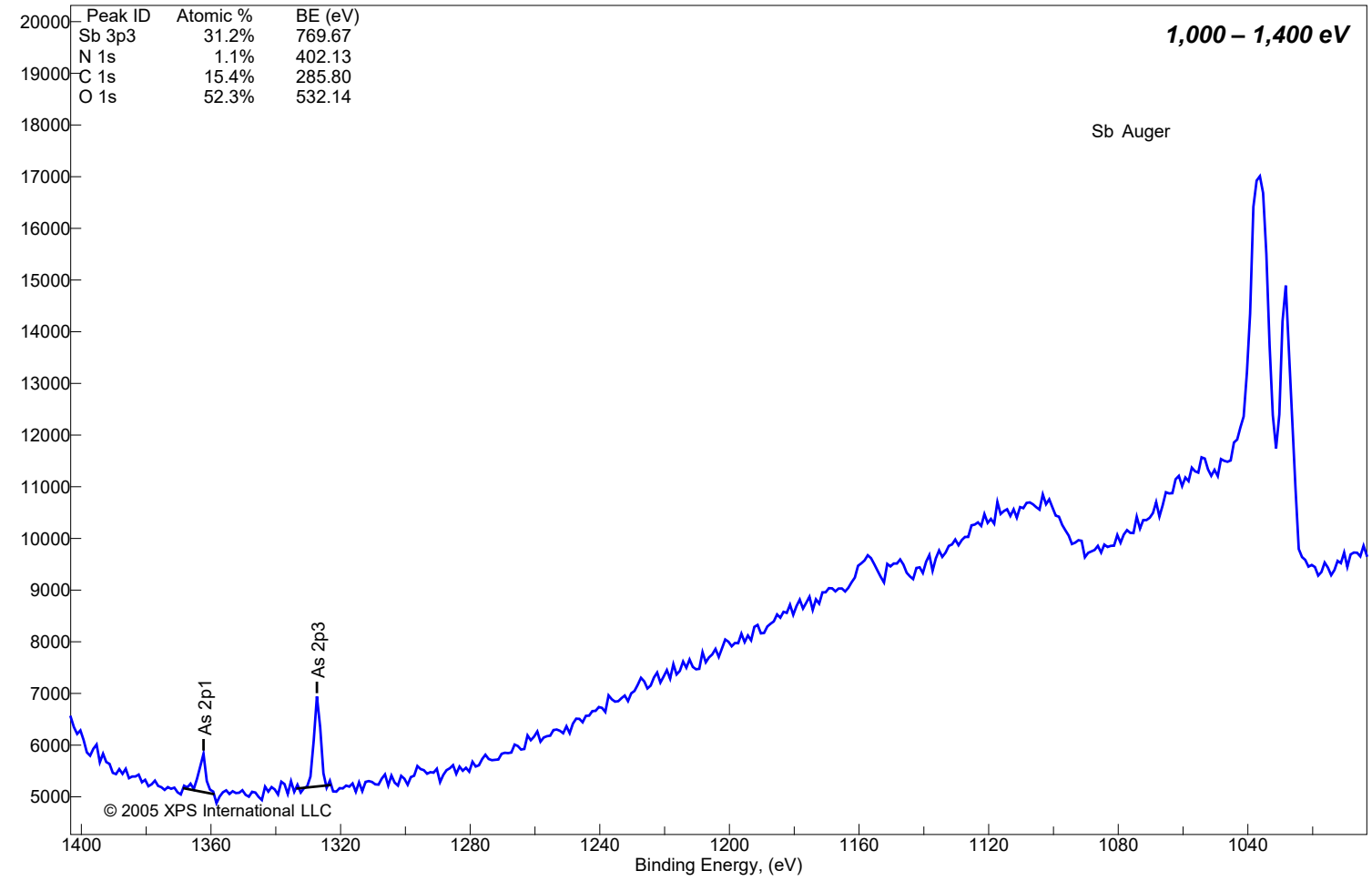
Sample Description: Sb2O5 99.995% Aldr# 02413JW 3mm plt mesh 90 TOA



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Antimony (V) Oxide (FW = 323.50)

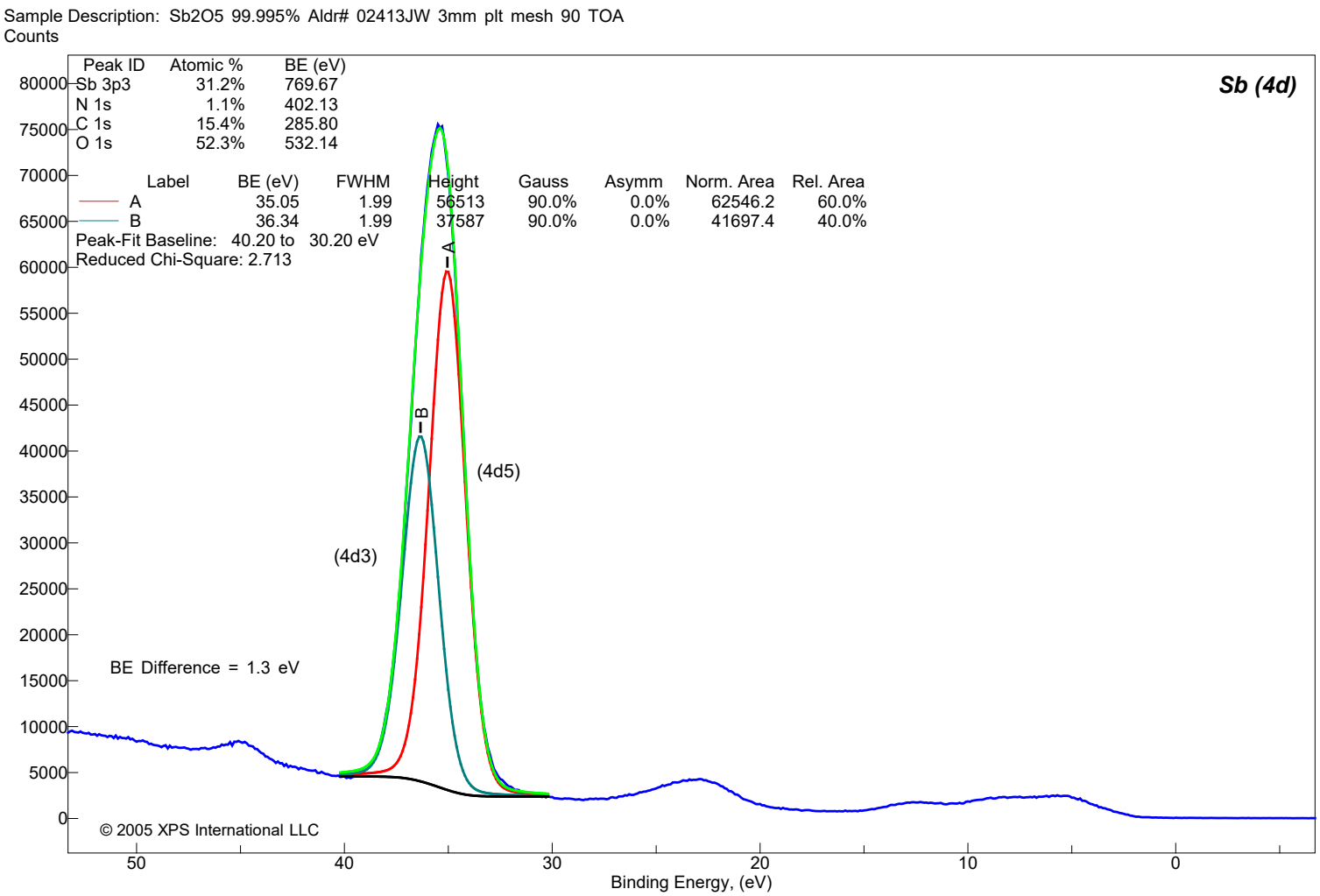
Sample Description: Sb2O5 99.995% Aldr# 02413JW 3mm plt mesh 90 TOA



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Sb_2O_5

Antimony (V) Oxide (FW = 323.50)



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Sc_2O_3

Scandium (III) Oxide (FW = 137.92)
Surface Composition Table

Description: Sc_2O_3 (99.99%) from Aldrich Co. Lot# 06010BT, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white powder pressed into 3 mm pellet, mp 2485 C, d 3.86, sol in acid

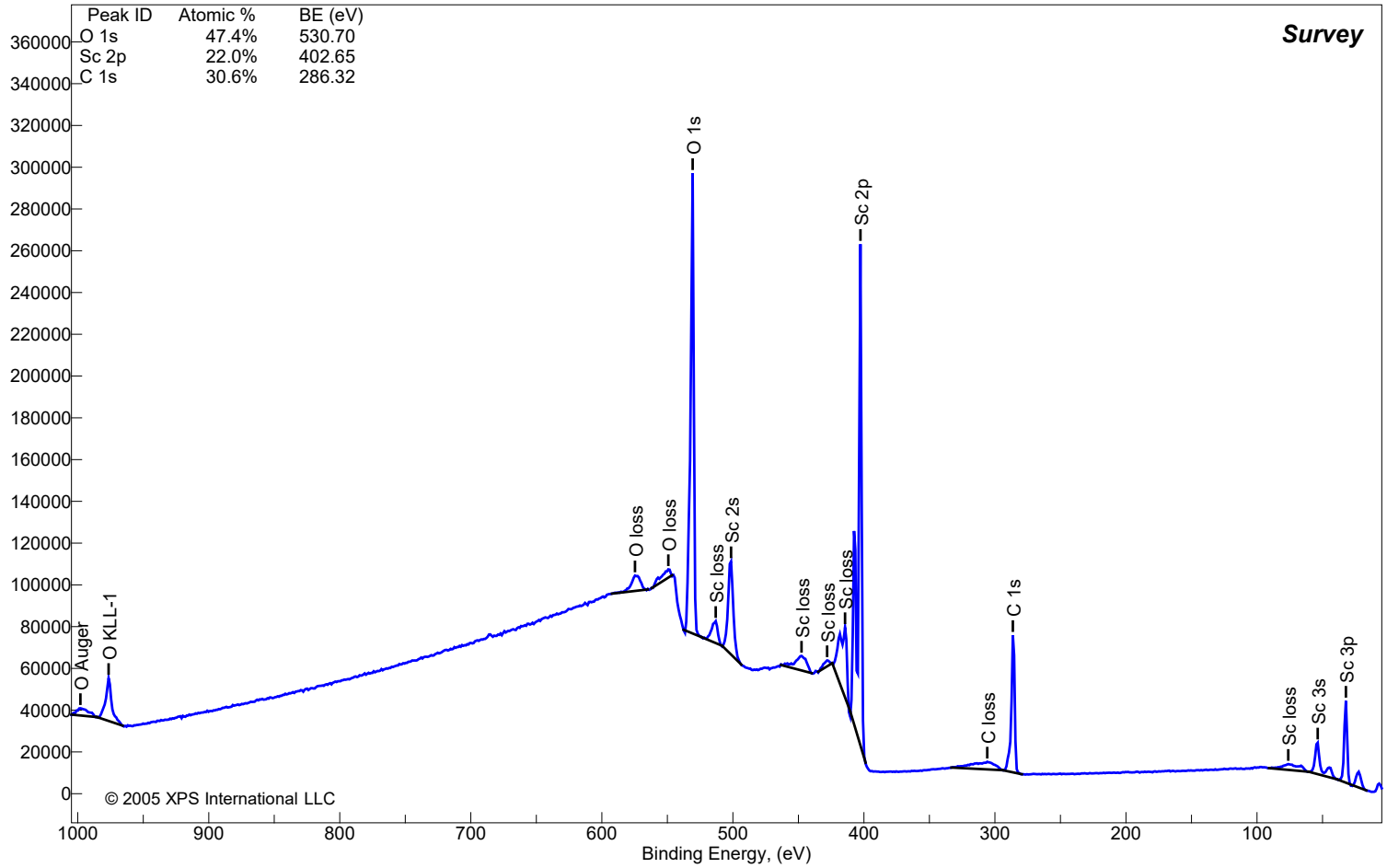
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Sc 3p	32.2	28.2	0.65	1.5	34,247	
Sc 3s	53.7	49.7	0.41	1.5	21,029	
Sc loss	76.2	72.2	0.00	1.5	10,840	
C 1s	286.3	282.3	1.00	1.5	50,506	30.6%
C loss	305.9	301.9	0.00	1.5	18,520	
Sc 2p	402.6	398.6	6.38	1.5	199,121	22.0%
Sc loss	414.4	410.4	0.00	1.5	56,202	
Sc loss	428.1	424.1	0.00	1.5	4,327	
Sc loss	447.6	443.6	0.00	1.5	17,624	
Sc 2s	501.4	497.4	2.91	1.5	53,384	
Sc loss	513.1	509.1	0.00	1.5	14,614	
O 1s	530.7	526.7	2.93	1.5	163,030	47.4%
O loss	549.3	545.3	0.00	1.5	9,584	
O loss	574.7	570.7	0.00	1.5	14,027	
O KLL-1	976.5	972.5	0.70	1.5	27,997	
O Auger	998.0	994.0	0.00	1.5	9,396	

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Sc_2O_3

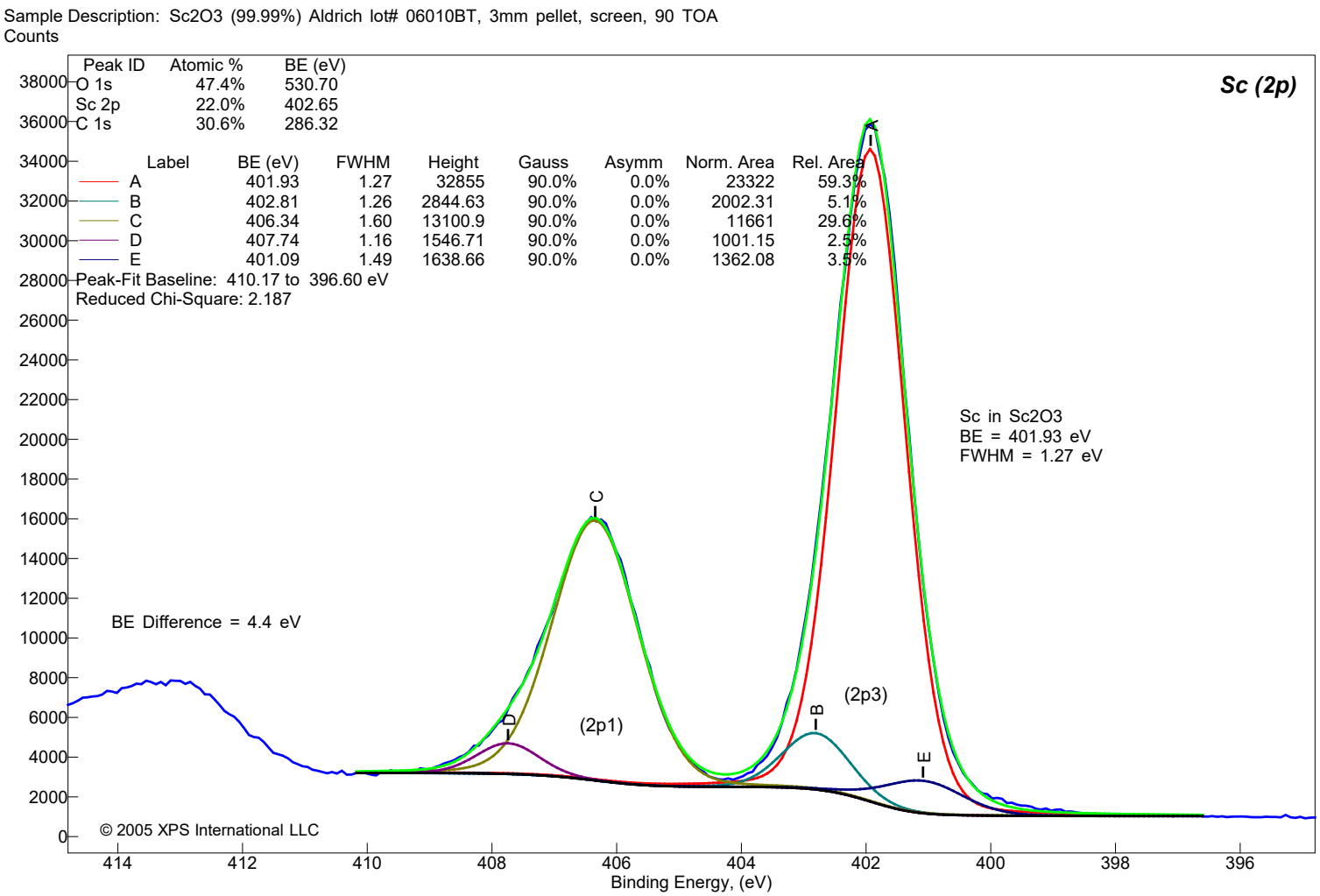
Scandium (III) Oxide (FW = 137.92)

Sample Description: Sc2O3 (99.99%) from Aldrich lot# 06010BT
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



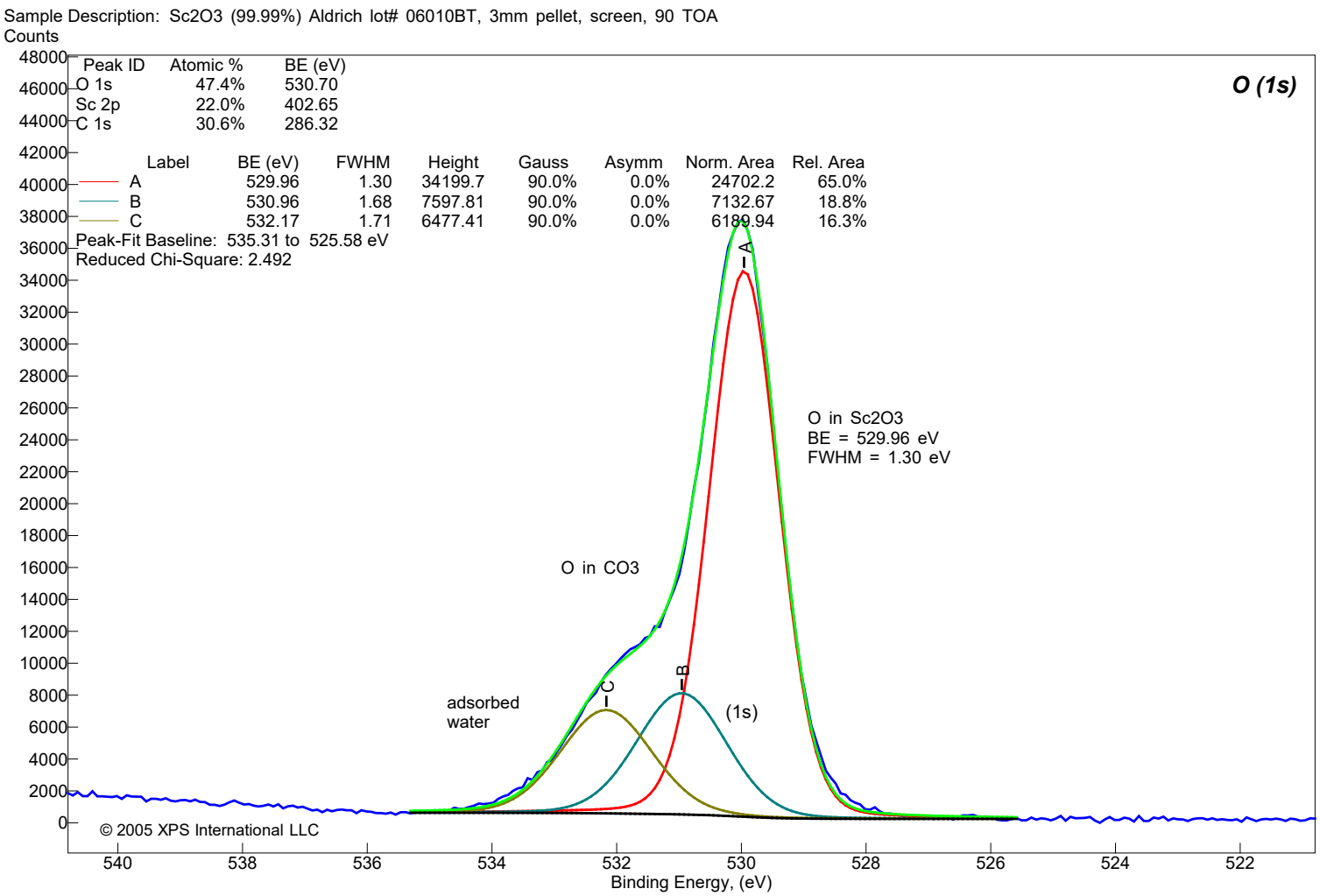
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Scandium (III) Oxide (FW = 137.92)



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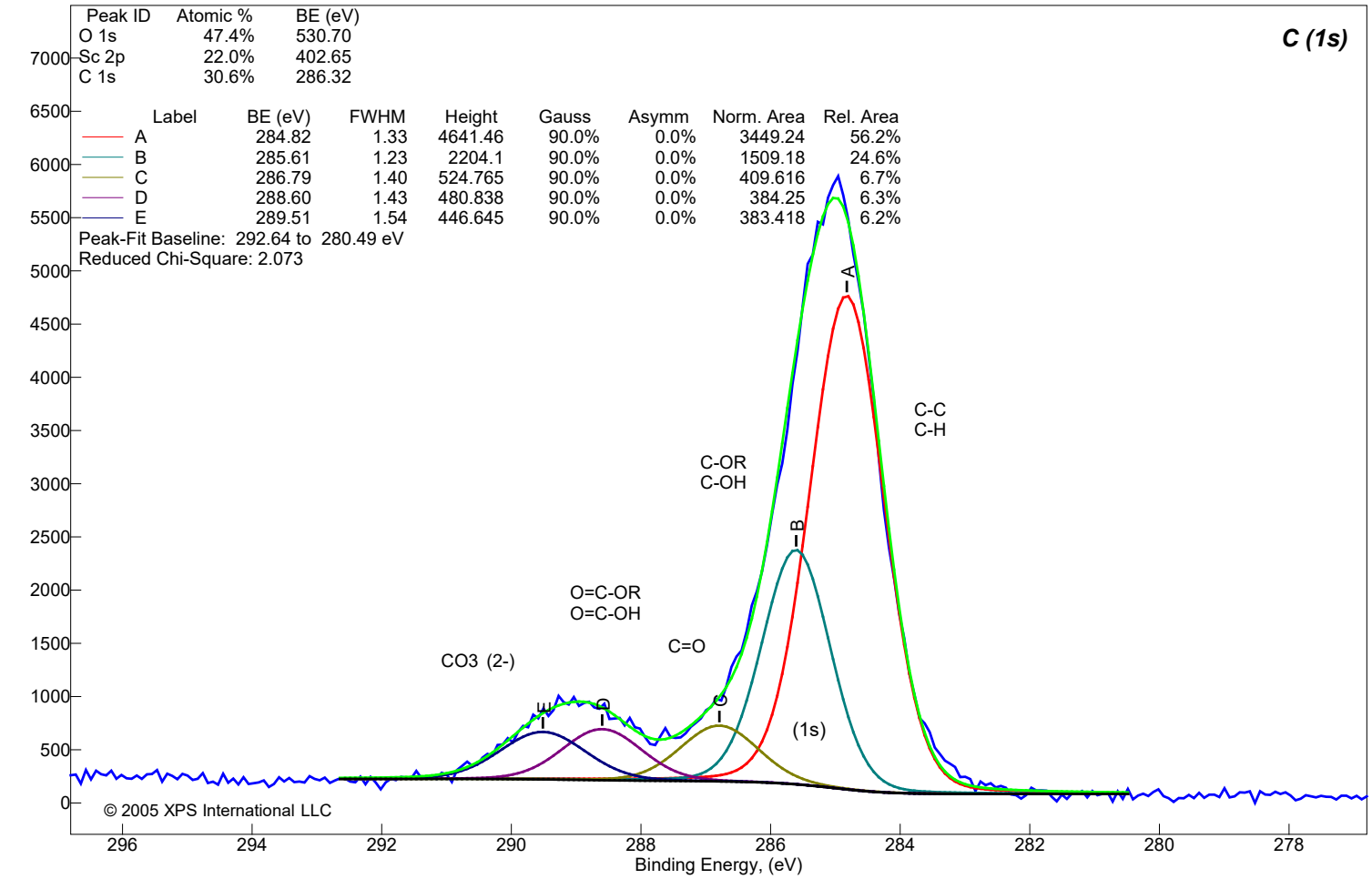
Scandium (III) Oxide (FW = 137.92)



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Scandium (III) Oxide (FW = 137.92)

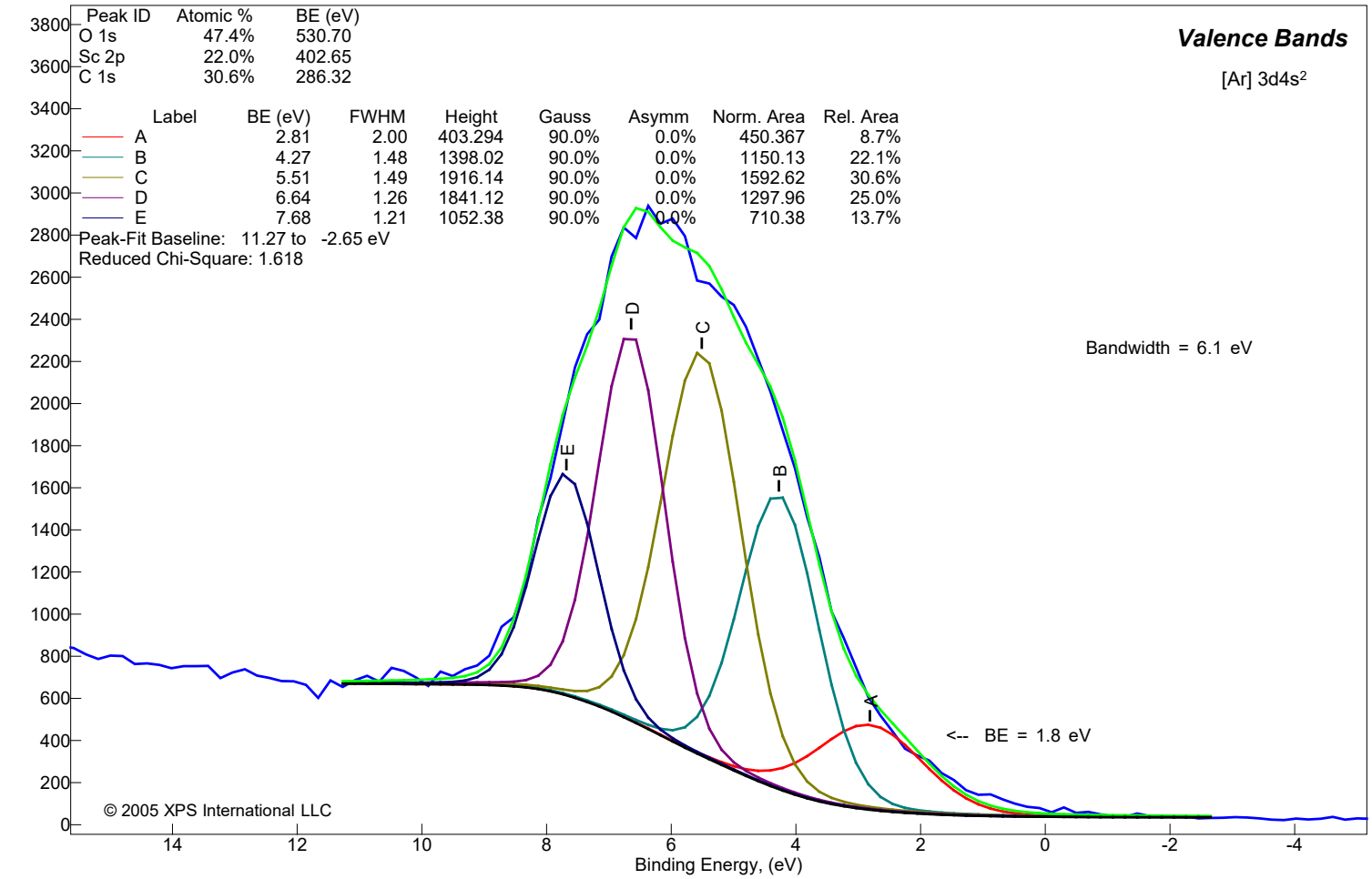
Sample Description: Sc2O3 (99.99%) Aldrich lot# 06010BT, 3mm pellet, screen, 90 TOA



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Scandium (III) Oxide (FW = 137.92)

Sample Description: Sc2O3 (99.99%) Aldrich lot# 06010BT, 3mm pellet, screen, 90 TOA

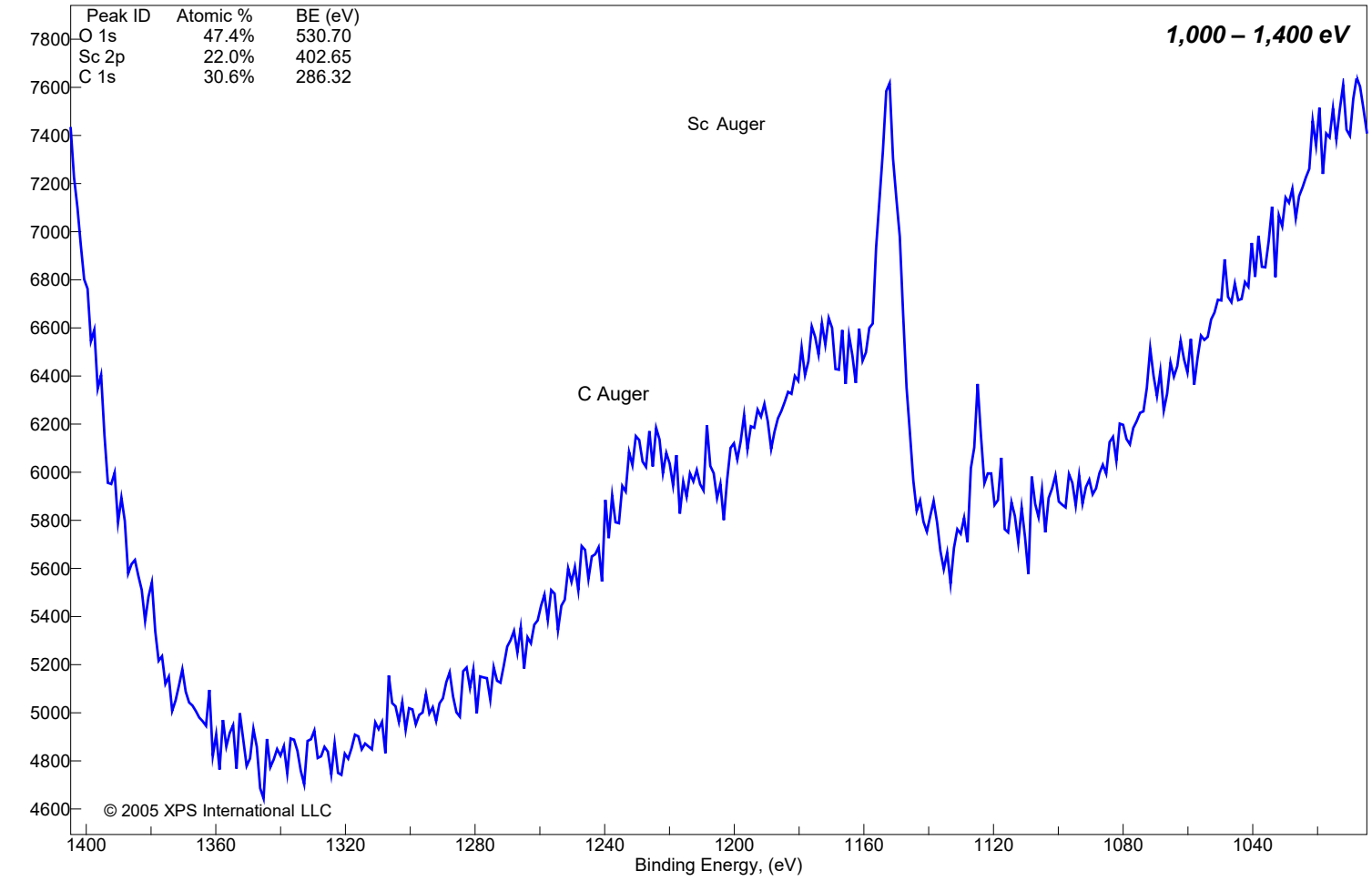


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Sc_2O_3

Scandium (III) Oxide (FW = 137.92)

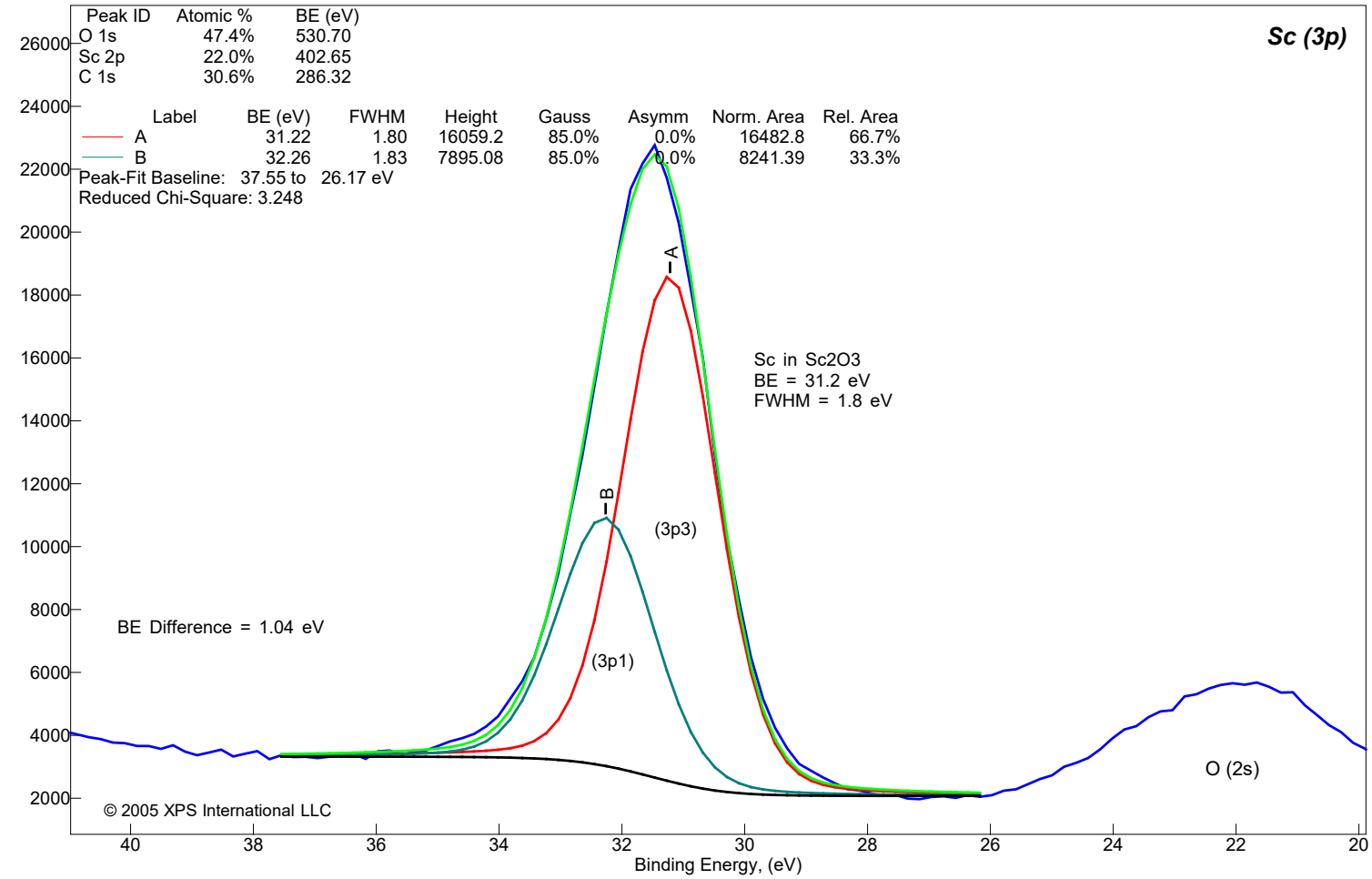
Sample Description: Sc2O3 (99.99%) Aldrich lot# 06010BT, 3mm pellet, screen, 90 TOA



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Scandium (III) Oxide (FW = 137.92)

Sample Description: Sc2O3 (99.99%) Aldrich lot# 06010BT, 3mm pellet, screen, 90 TOA



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SiO

Silicon (II) Oxide (FW = 44.09)
Surface Composition Table

Description: SiO (99.99%) from Rare Metallics Co. Lot# 70924-70, analyzed at 90 deg TOA, no mesh, conductive black chip, ion etched at 4 keV for 8 min, mp 1702 C, d 2.13

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2p	11.0	10.0	0.02	1.4	2,475	
O 2s	27.6	26.6	0.14	1.4	7,068	
Si 2p	104.9	103.9	0.82	1.4	37,978	
Si loss	125.4	124.4	0.00	1.4	11,585	
Si 2s	155.7	154.7	0.96	1.4	43,730	44.1%
Si loss	174.3	173.3	0.00	1.4	13,796	
Ar 2p	243.7	242.7	3.04	1.4	4,146	1.4%
C 1s	286.7	285.7	1.00	1.4	4,188	4.7%
C loss	321.9	320.9	0.00	1.4	1,730	
N 1s	400.1	399.1	1.80	1.4	1,778	1.3%
O 1s	534.0	533.0	2.93	1.4	92,565	48.5%
O loss	553.5	552.5	0.00	1.4	29,053	
O KLL-1	979.7	978.7	0.70	1.4	14,462	

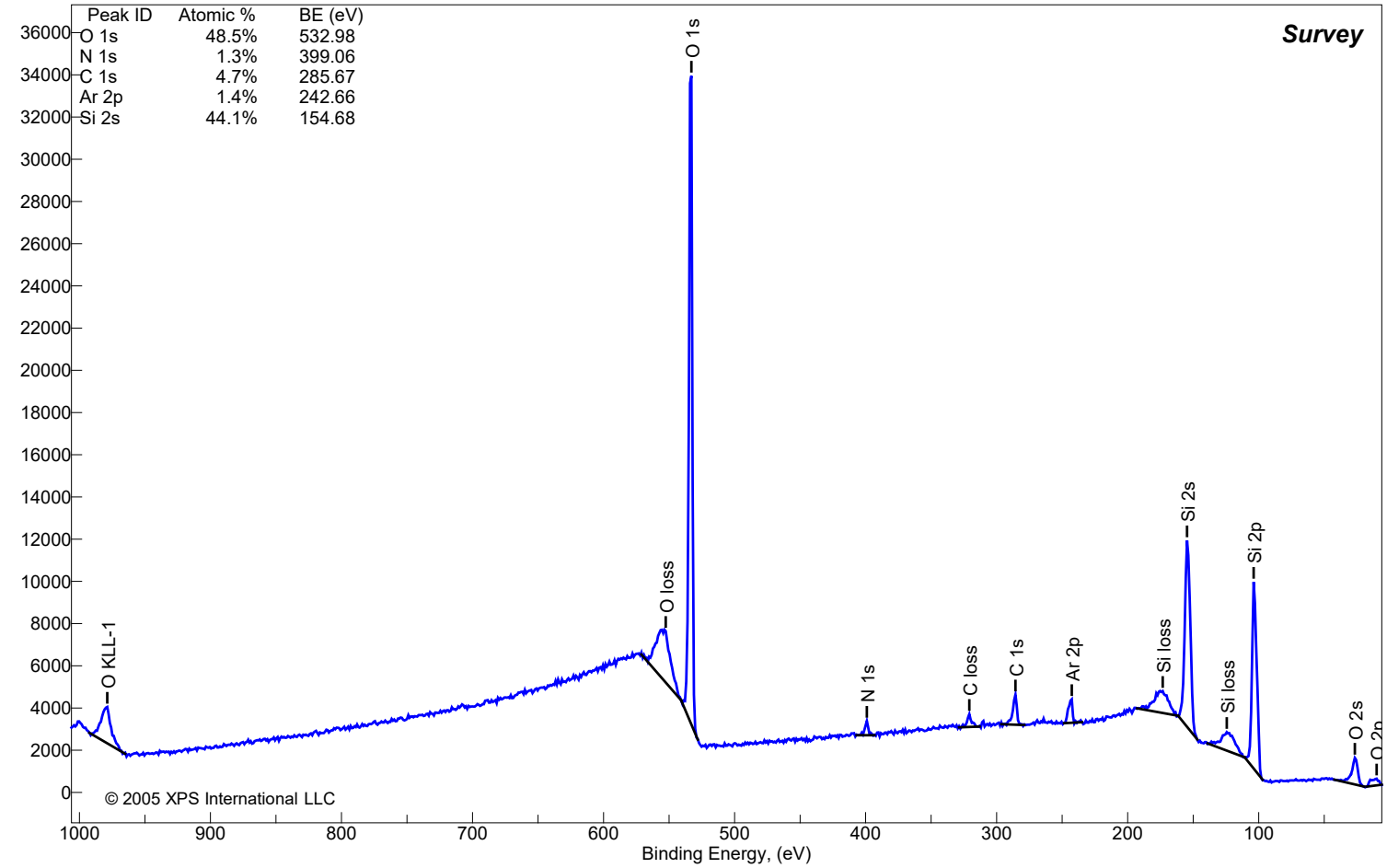
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SiO

Silicon (II) Oxide (FW = 44.09)

Sample Description: SiO (99.99%) from Rare Metallics Corp. lot# 70924-70, conductive ion etched 8 min at 4 keV, no mesh-screen

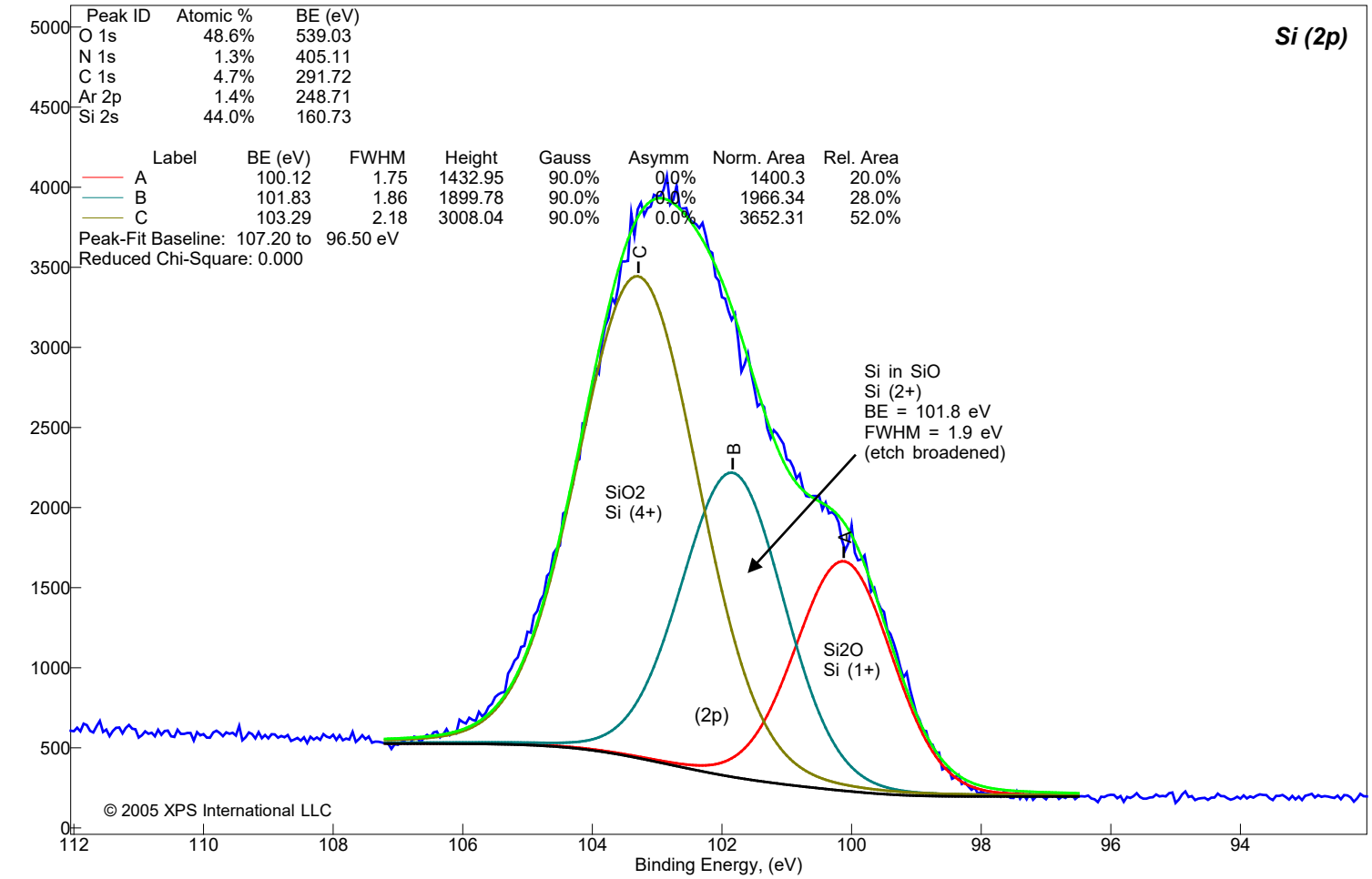


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SiO

Silicon (II) Oxide (FW = 44.09)

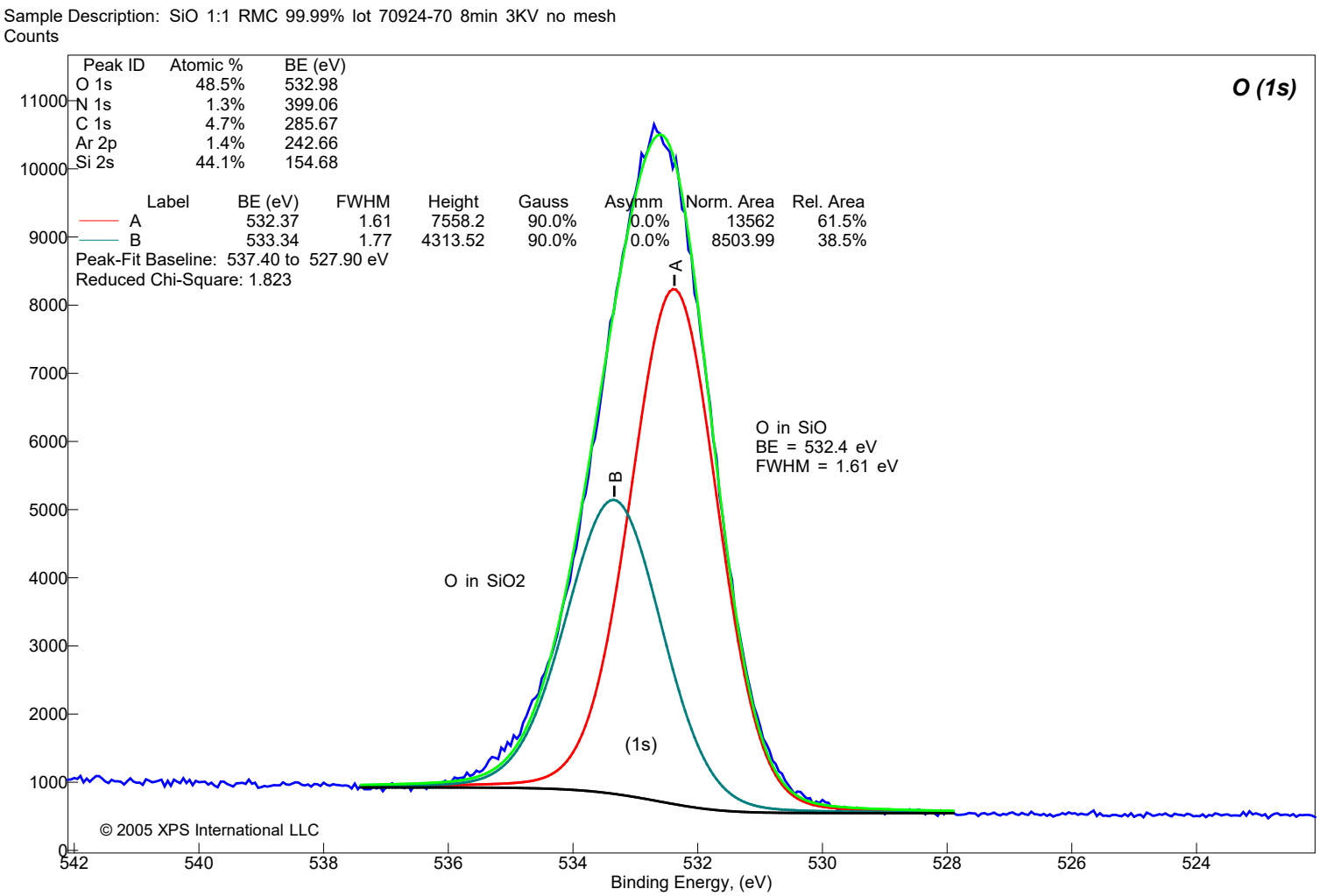
Sample Description: SiO 1:1 RMC 99.99% lot 70924-70 8min 3KV no mesh



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SiO

Silicon (II) Oxide (FW = 44.09)

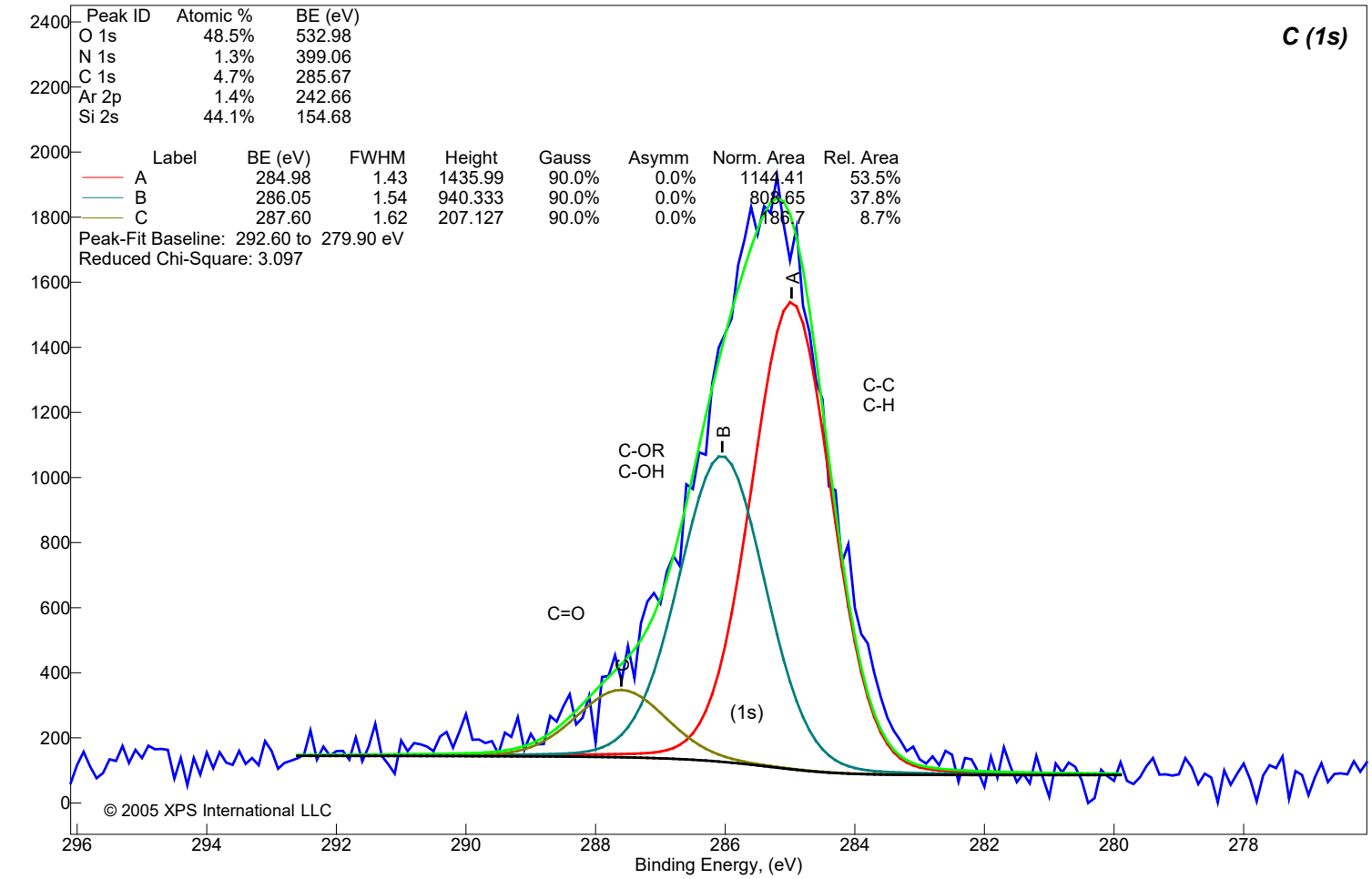


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SiO

Silicon (II) Oxide (FW = 44.09)

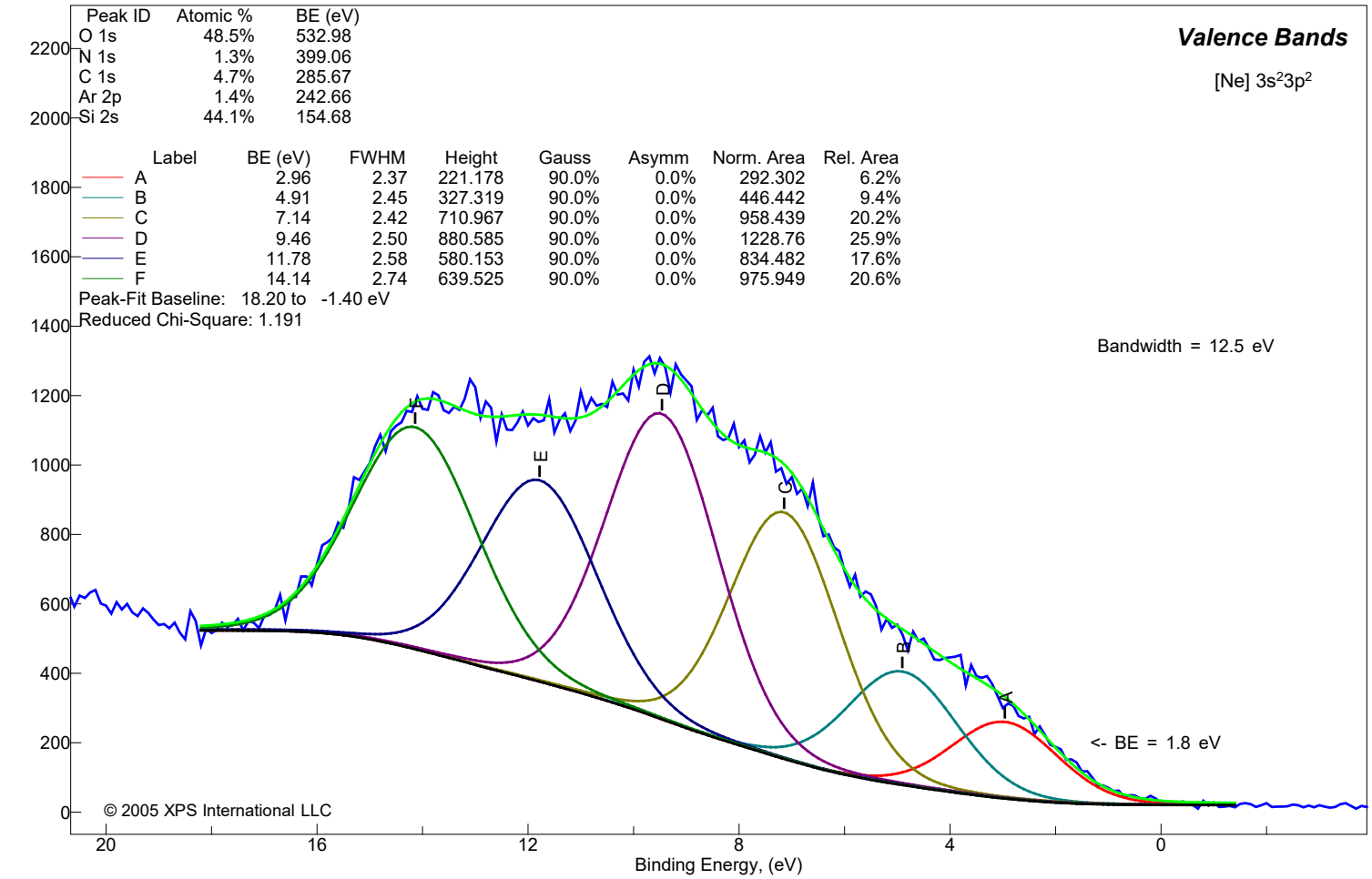
Sample Description: SiO 1:1 RMC 99.99% lot 70924-70 8min 3KV no mesh



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Silicon (II) Oxide (FW = 44.09)

Sample Description: SiO 1:1 RMC 99.99% lot 70924-70 8min 3KV no mesh

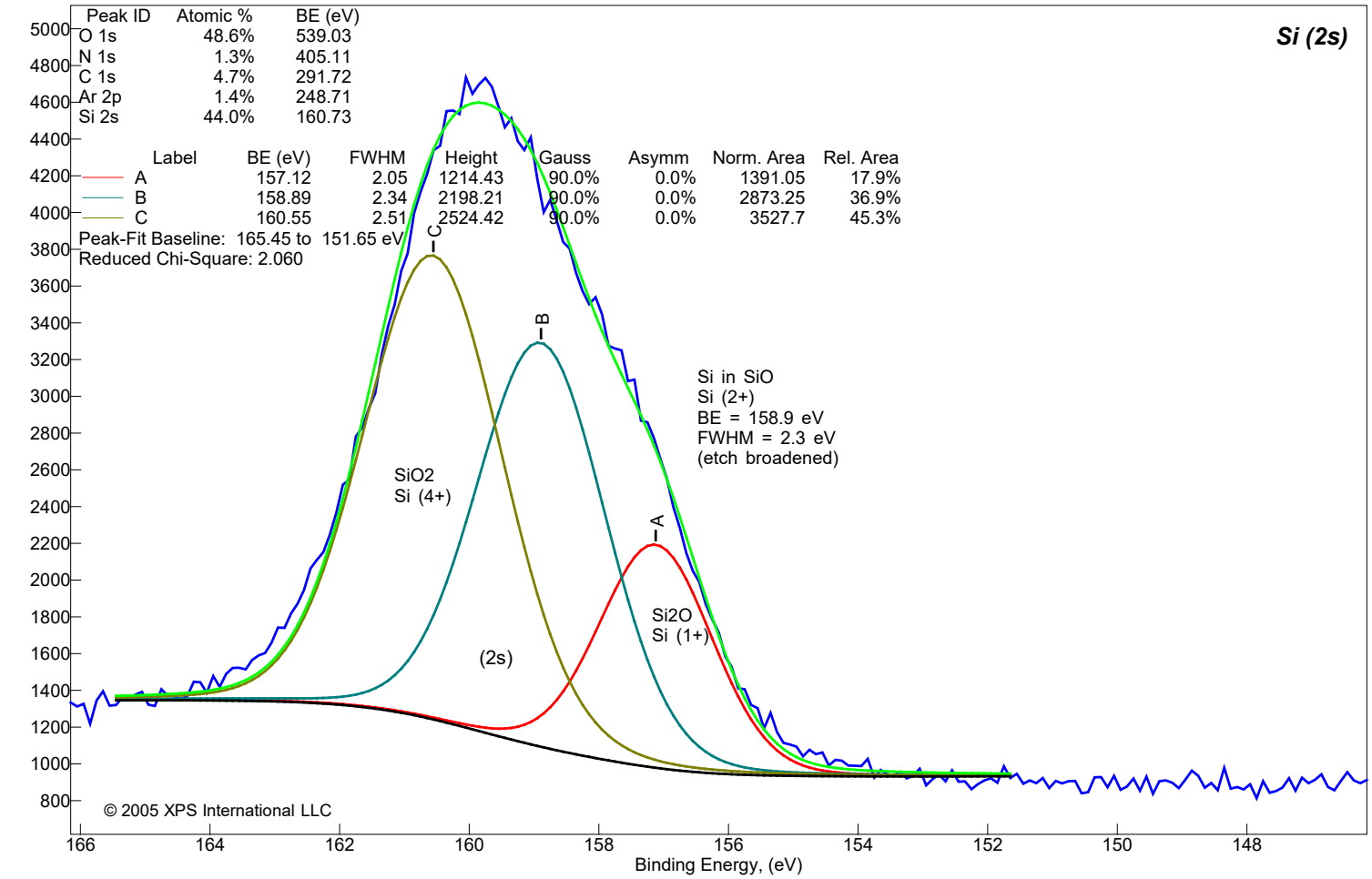


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SiO

Silicon (II) Oxide (FW = 44.09)

Sample Description: SiO 1:1 RMC 99.99% lot 70924-70 8min 3KV no mesh



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SiO_2
Quartz

Silicon (IV) Oxide (FW = 60.09)
Surface Composition Table

Description: SiO_2 (99+%) from Brazil Quartz (natural crystal), analyzed at 90 deg TOA, non-conductive, (-) optical activity clear transparent crystal cleaved in air just before analysis, mp 1710 C, d 2.2

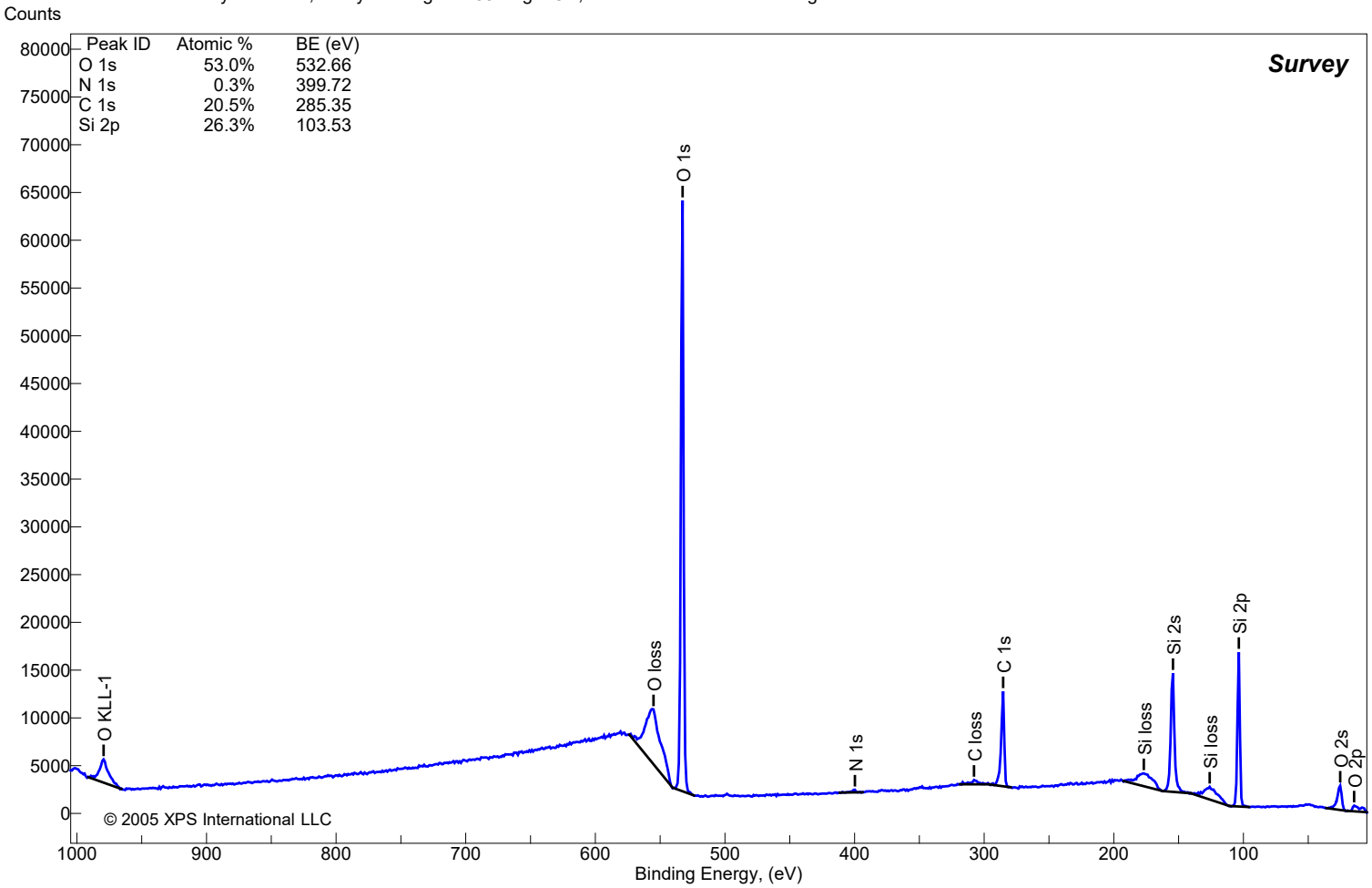
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2p	14.6	11.4	0.02	1.5	6,240	
O 2s	25.3	22.1	0.14	1.5	13,627	
Si 2p	103.5	100.3	0.82	1.5	45,650	26.3%
Si 2s	154.1	150.9	0.96	1.1	8,834	
Si 2s	154.4	151.2	0.96	1.5	53,228	
Si loss	176.8	173.6	0.00	1.5	26,204	
C 1s	285.3	282.1	1.00	1.5	35,258	20.5%
C loss	307.8	304.6	0.00	1.5	4,218	
N 1s	399.7	396.5	1.80	1.5	843	0.3%
O 1s	532.7	529.5	2.93	1.5	189,298	53.0%
O loss	555.1	551.9	0.00	1.5	100,734	
O KLL-1	979.4	976.2	0.70	1.5	24,450	

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SiO_2
Quartz

Silicon (IV) Oxide (FW = 60.09)

Sample Description: SiO2 (99+%) natural quartz from Brazil (-) type (10x10x2 mm, polished)
freshly fractured, analyzed edge at 55 deg TOA, mesh-screen at 1 mm height

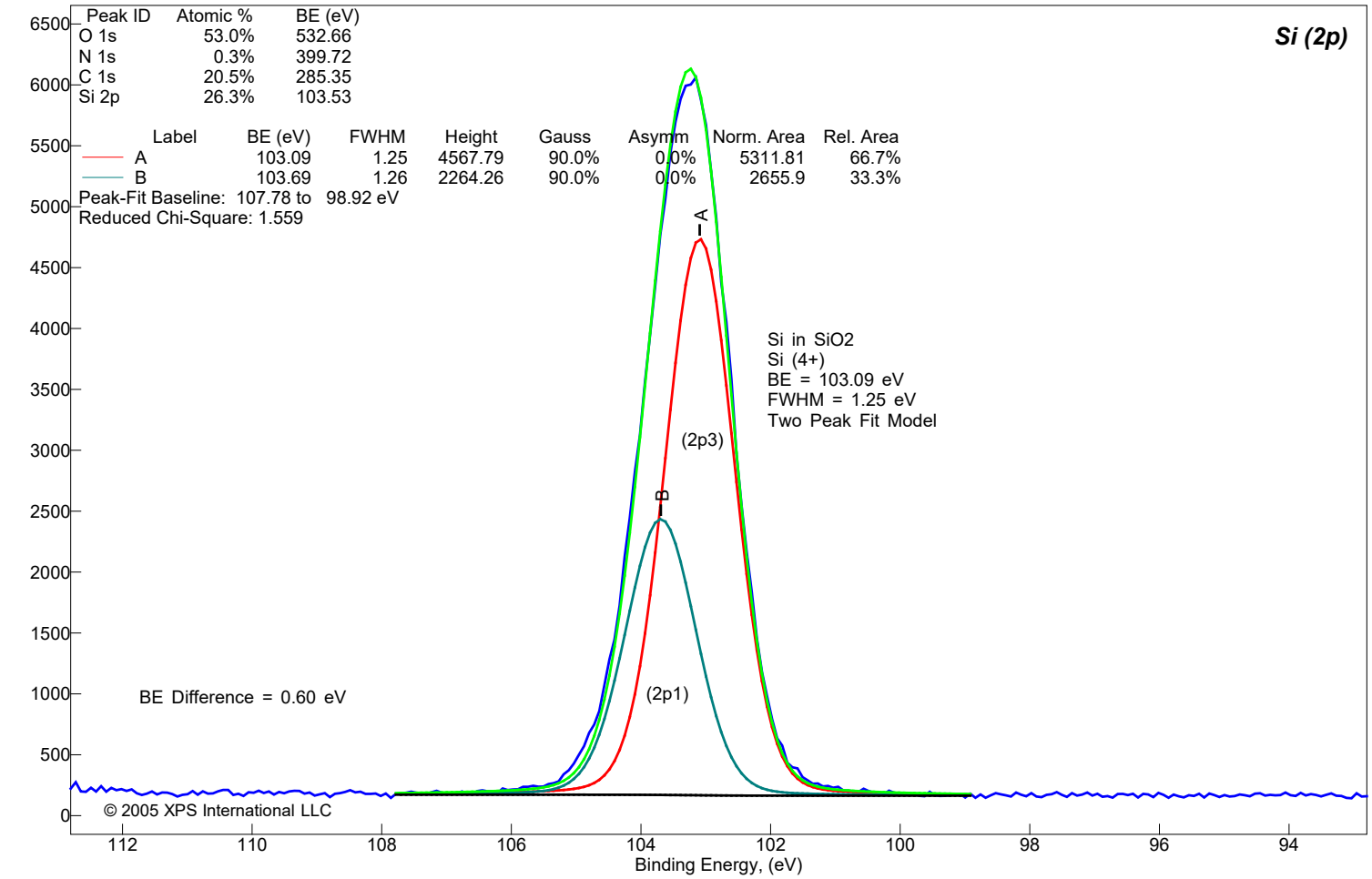


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SiO_2
Quartz

Silicon (IV) Oxide (FW = 60.09)

Sample Description: (-) SiO2 (10x10x2 mm, polished, from Brazil, screen, 90 TOA, as rec'd)

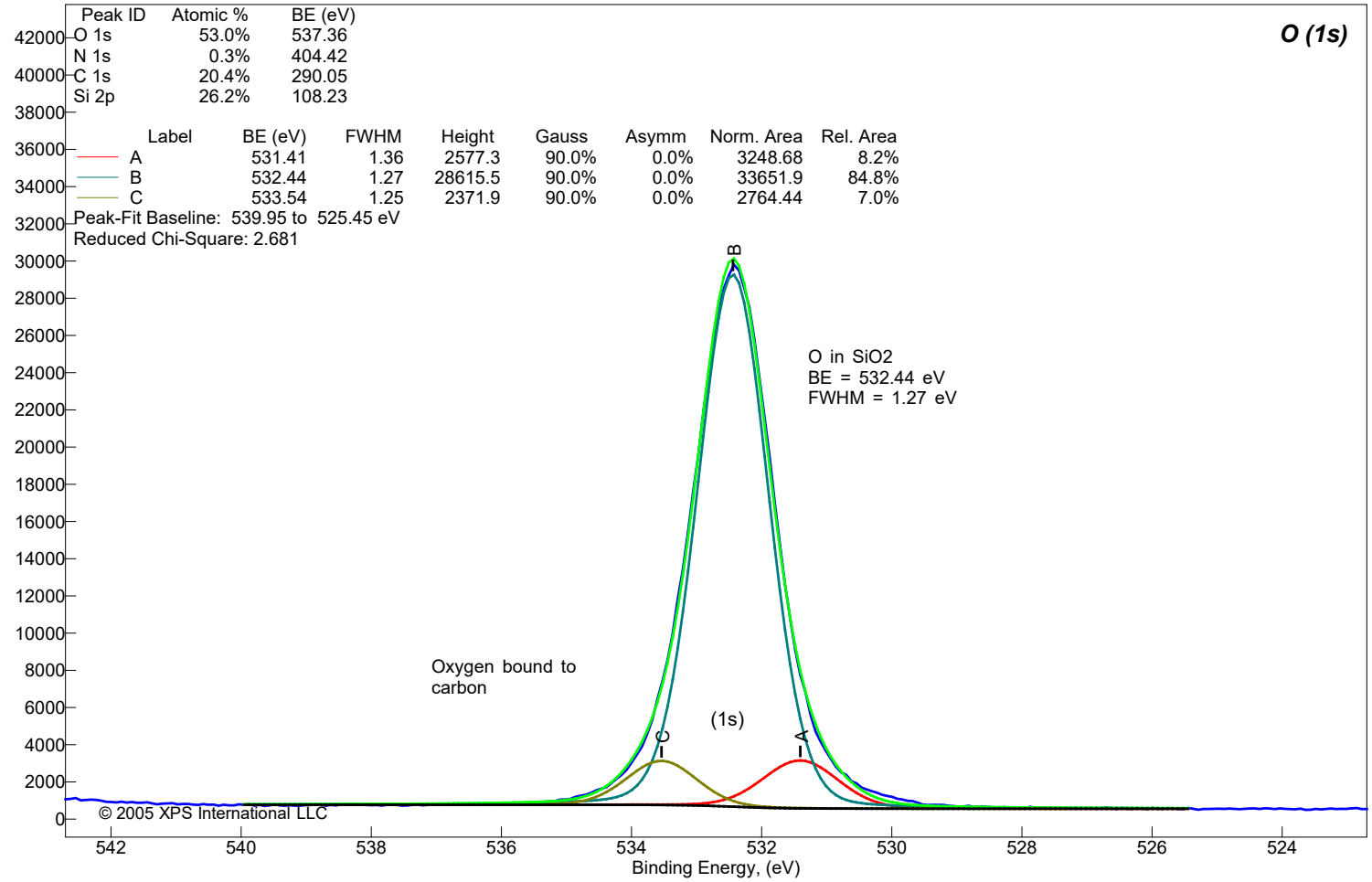


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SiO_2
Quartz

Silicon (IV) Oxide (FW = 60.09)

Sample Description: (-) SiO2 (10x10x2 mm, polished, from Brazil, screen, 90 TOA, as rec'd)

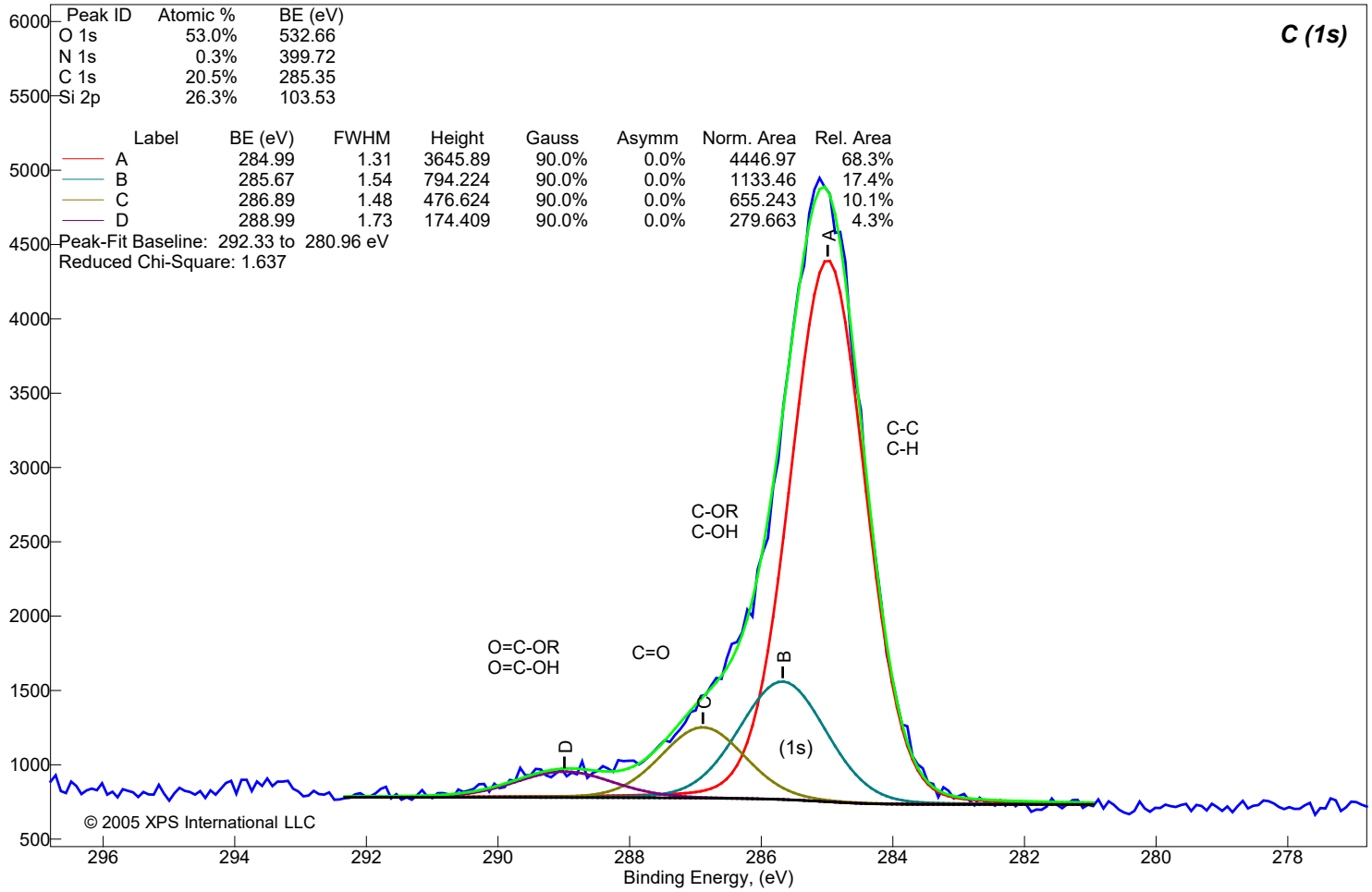


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SiO_2
Quartz

Silicon (IV) Oxide (FW = 60.09)

Sample Description: (-) SiO2 (10x10x2 mm, polished, from Brazil, screen, 90 TOA, as rec'd)

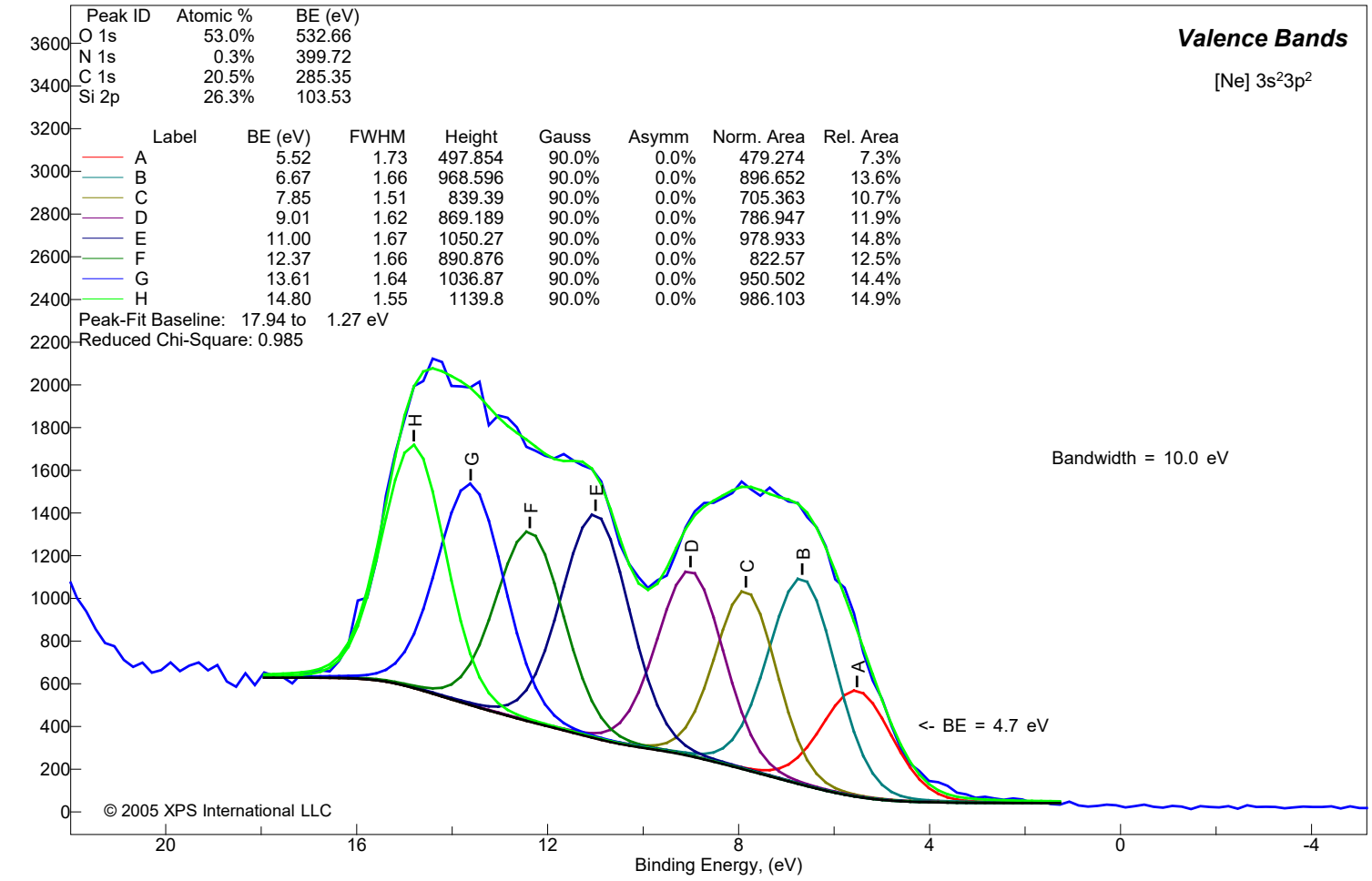


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SiO_2
Quartz

Silicon (IV) Oxide (FW = 60.09)

Sample Description: (-) SiO2 (10x10x2 mm, polished, from Brazil, screen, 90 TOA, as rec'd)

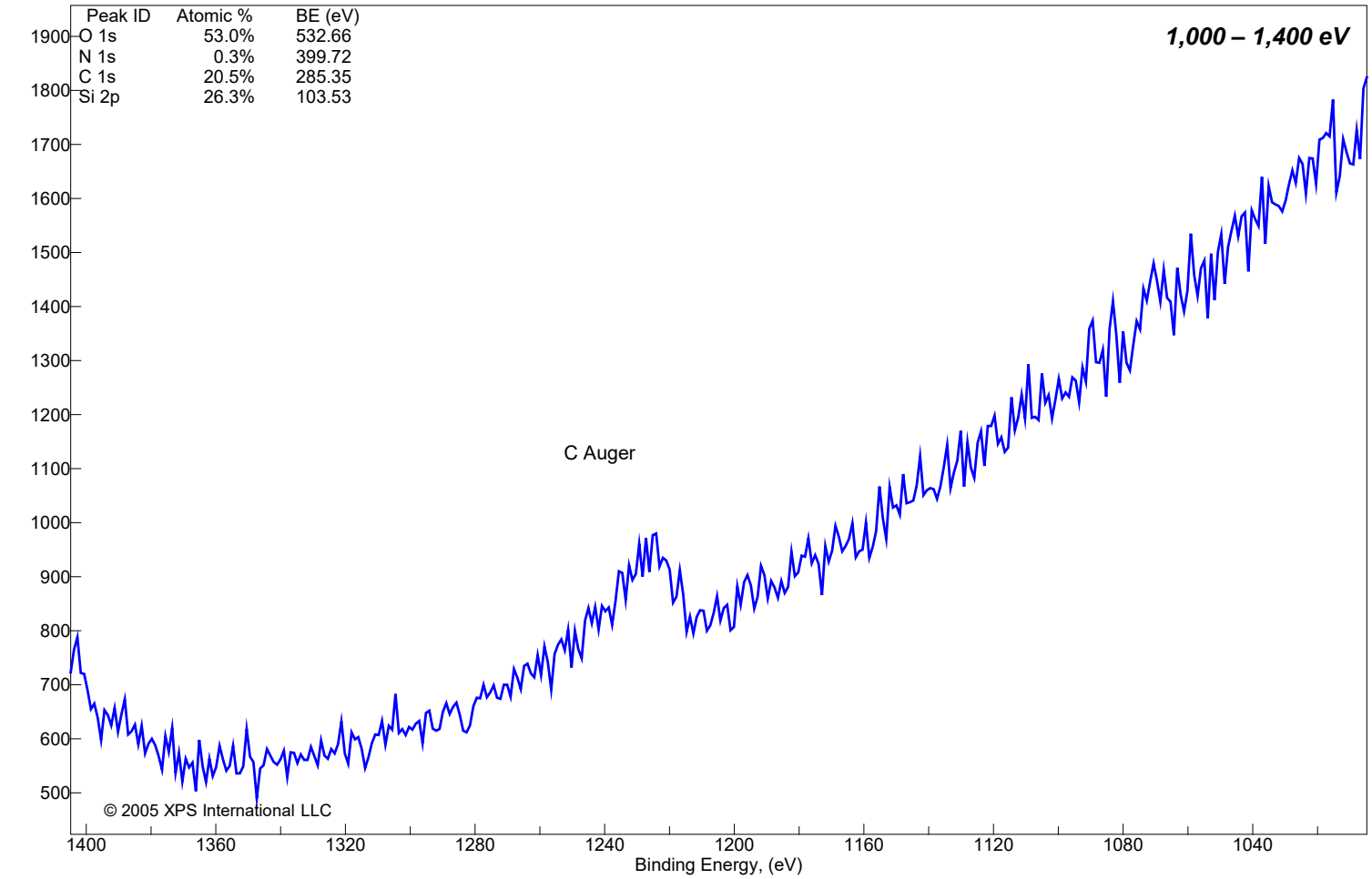


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SiO_2
Quartz

Silicon (IV) Oxide (FW = 60.09)

Sample Description: (-) SiO2 (10x10x2 mm, polished, from Brazil, screen, 90 TOA, as rec'd)

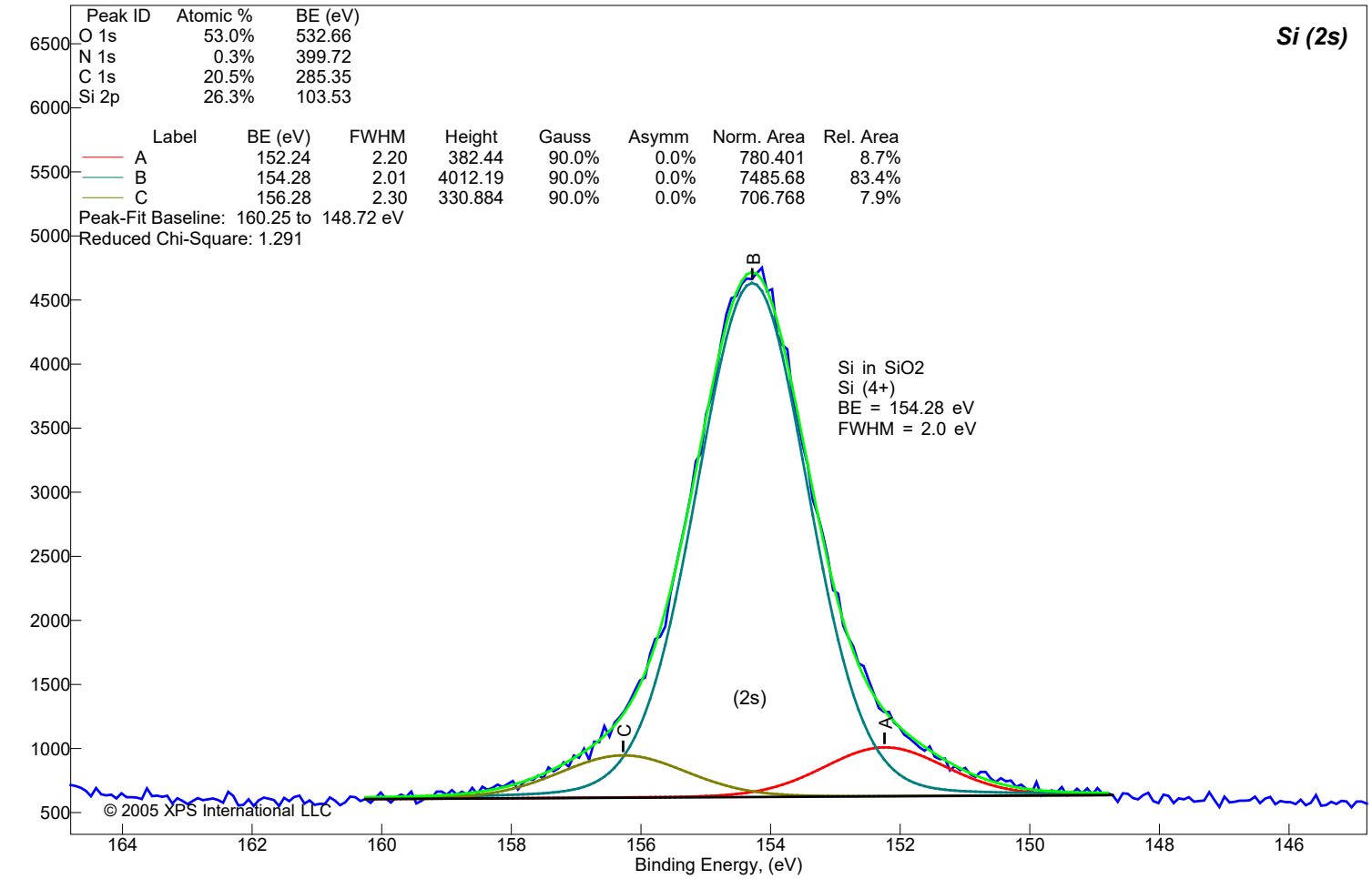


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SiO_2
Quartz

Silicon (IV) Oxide (FW = 60.09)

Sample Description: (-) SiO2 (10x10x2 mm, polished, from Brazil, screen, 90 TOA, as rec'd)

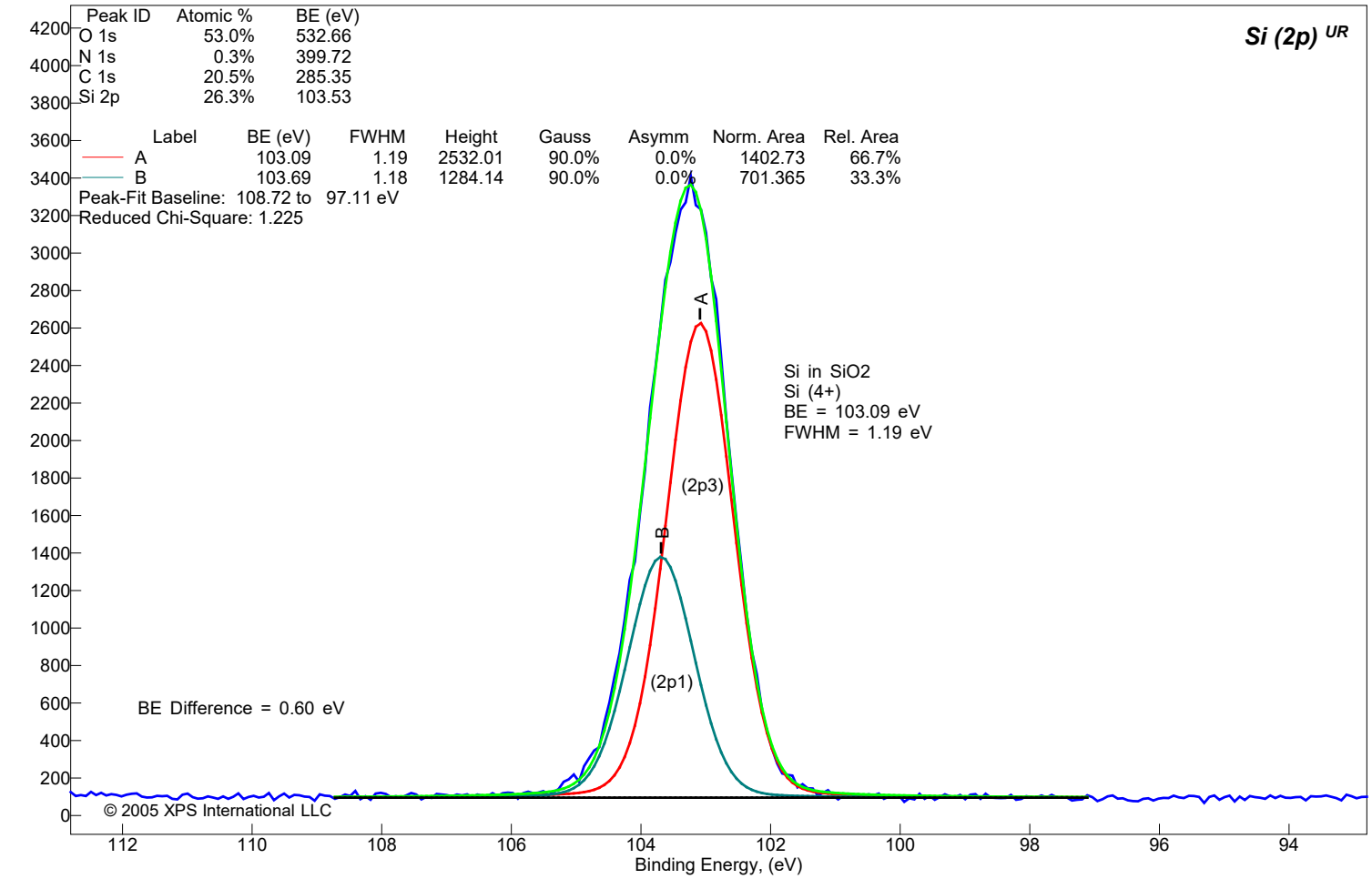


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SiO_2
Quartz

Silicon (IV) Oxide (FW = 60.09)

Sample Description: (-) SiO2 (10x10x2 mm, polished, from Brazil, screen, 90 TOA, as rec'd)



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$Si(OH)_4$
Opal

Silicon (IV) Hydroxide (FW = 96.12)
Surface Composition Table

Description: $Si(OH)_4$ from Brazil Opal (natural crystal), analyzed at 90 deg TOA, mesh at 1 mm, non-conductive blue-white crystal cleaved in air just before analysis,

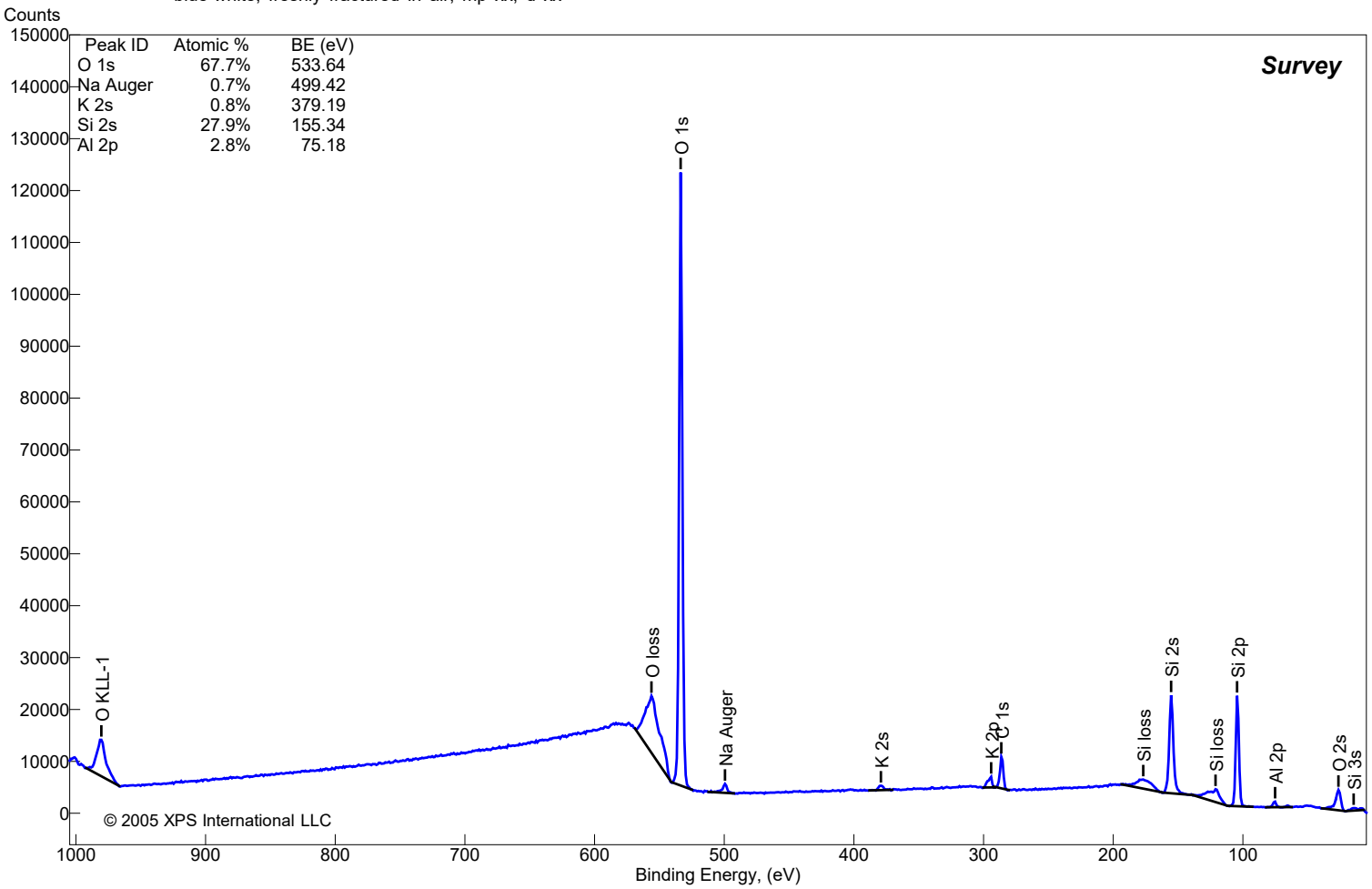
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Si 3s	16.6	14.6	0.08	1.4	1,002	
O 2s	28.3	26.3	0.14	1.4	4,949	
Al 2p	77.2	75.2	0.54	1.4	1,135	2.8%
Si 2p	106.5	104.5	0.82	1.4	15,512	
Si loss	123.1	121.1	0.00	1.4	6,915	
Si 2s	157.3	155.3	0.96	1.4	18,421	27.9%
Si loss	178.8	176.8	0.00	1.4	6,165	
K 2s	381.2	379.2	2.27	1.4	972	0.8%
Na Auger	501.4	499.4	6.00	1.4	2,016	0.7%
O 1s	535.6	533.6	2.93	1.4	86,012	67.7%
O loss	558.1	556.1	0.00	1.4	36,359	
O KLL-1	982.4	980.4	0.70	1.4	15,617	

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$Si(OH)_4$
Opal

Silicon (IV) Hydroxide (FW = 96.12)

Sample Description: Si(OH)4 (Opal, SiO2-nH2O) from Mexico, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive blue-white, freshly fractured in air, mp xx, d xx

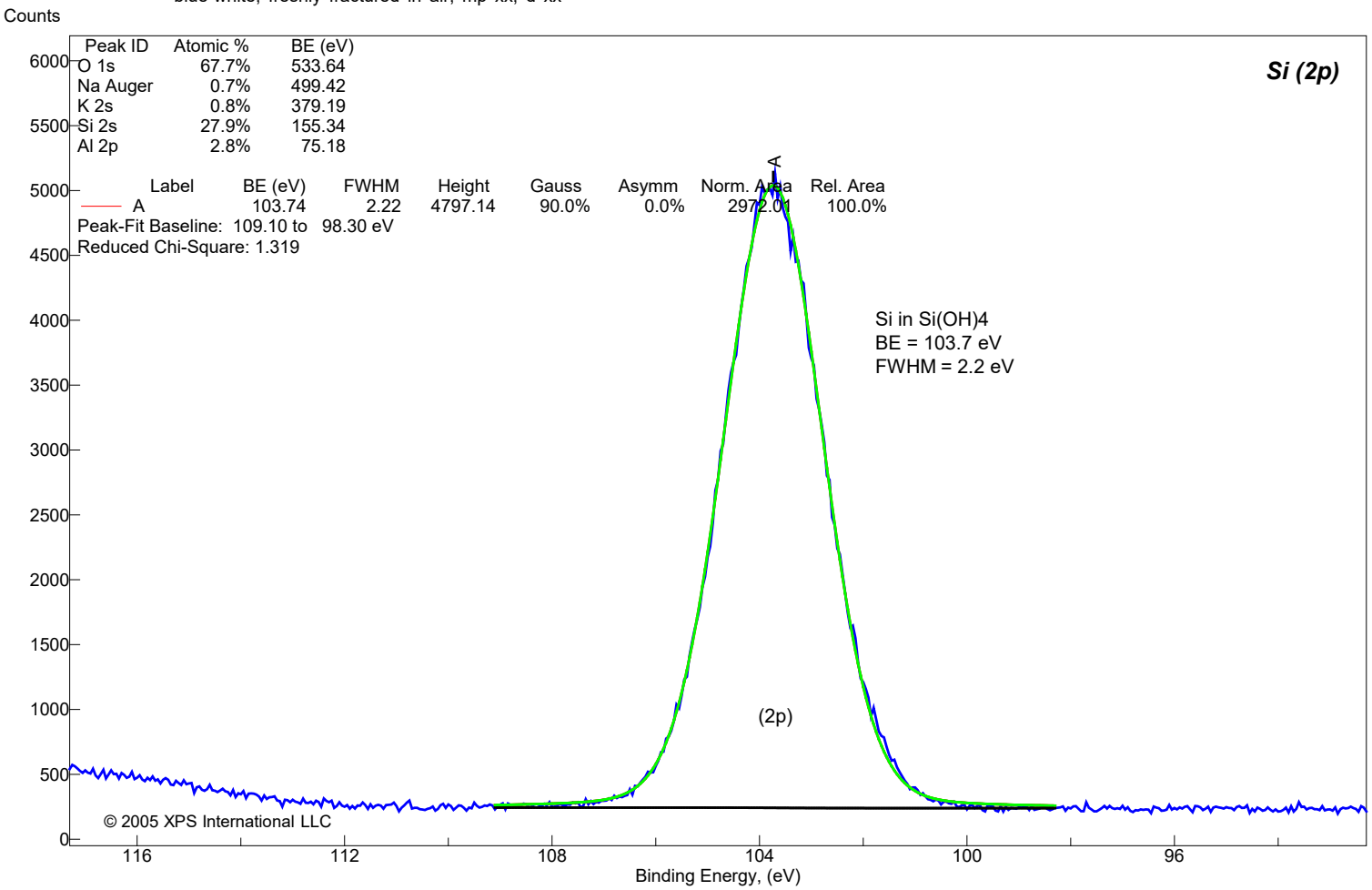


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$Si(OH)_4$
Opal

Silicon (IV) Hydroxide (FW = 96.12)

Sample Description: Si(OH)4 (Opal, SiO2-nH2O) from Mexico, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive blue-white, freshly fractured in air, mp xx, d xx

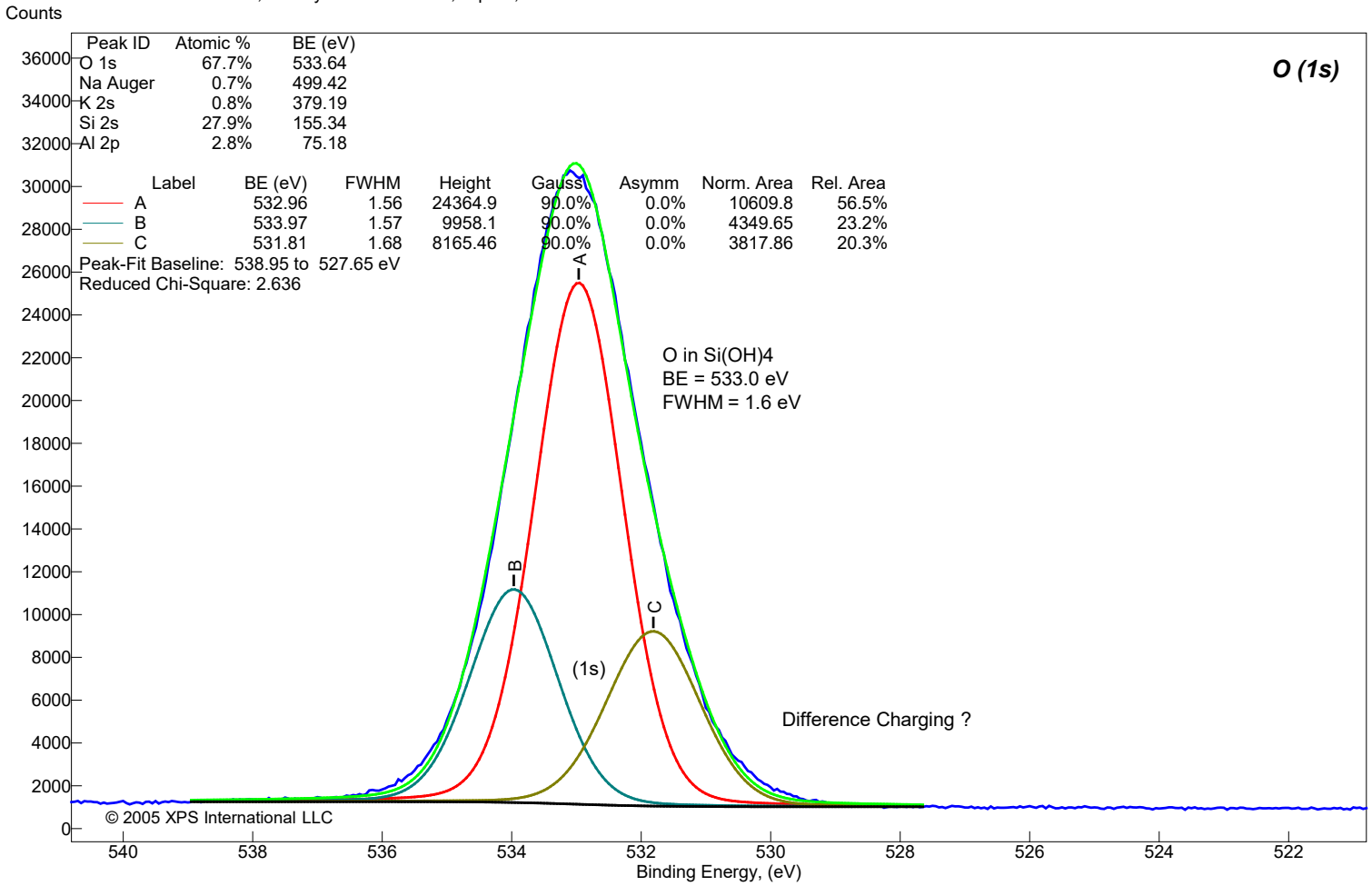


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$Si(OH)_4$
Opal

Silicon (IV) Hydroxide (FW = 96.12)

Sample Description: Si(OH)4 (Opal, SiO2-nH2O) from Mexico, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive blue-white, freshly fractured in air, mp xx, d xx

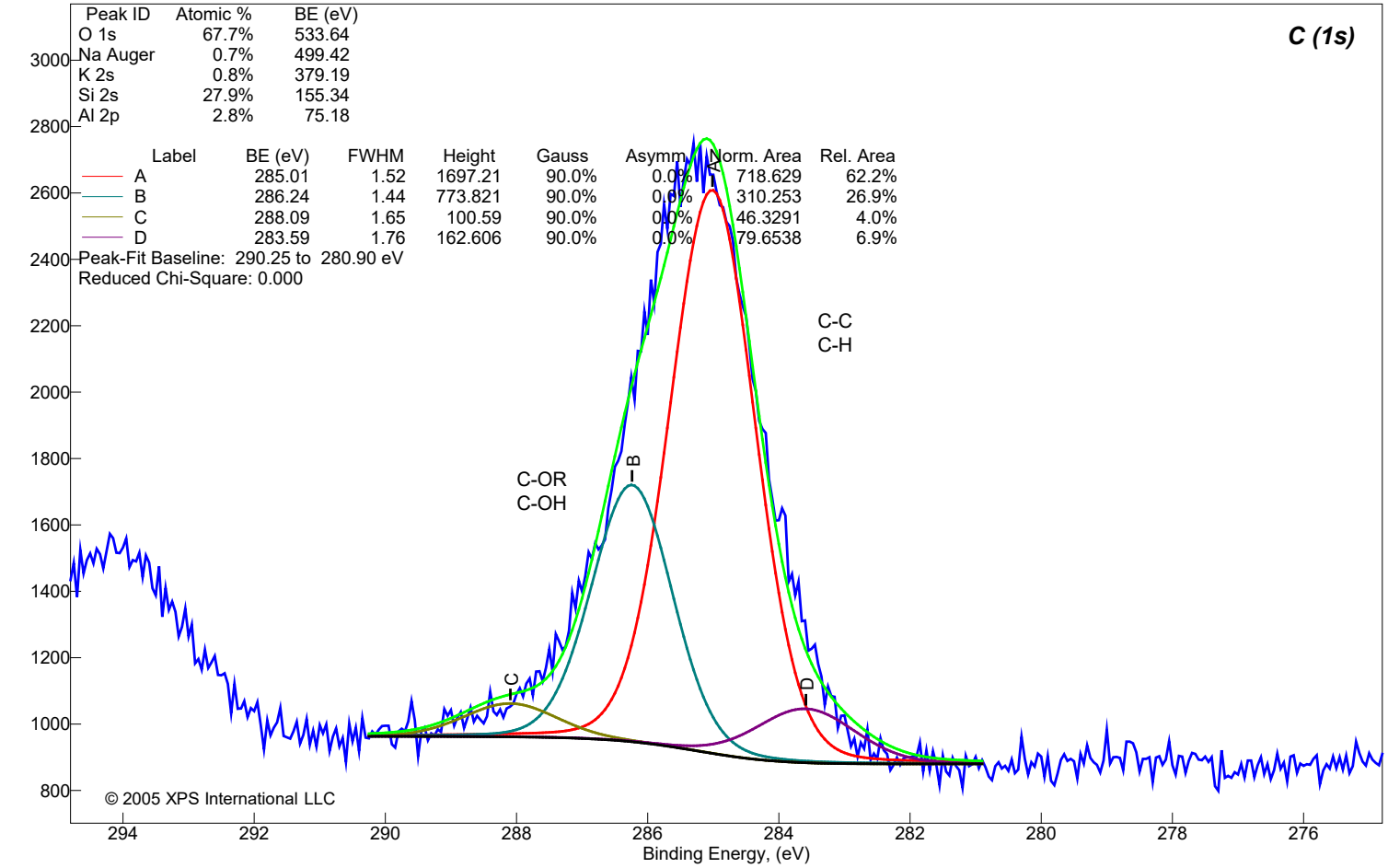


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$Si(OH)_4$
Opal

Silicon (IV) Hydroxide (FW = 96.12)

Sample Description: Si(OH)4 (Opal, SiO2-nH2O) from Mexico, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive blue-white, freshly fractured in air, mp xx, d xx

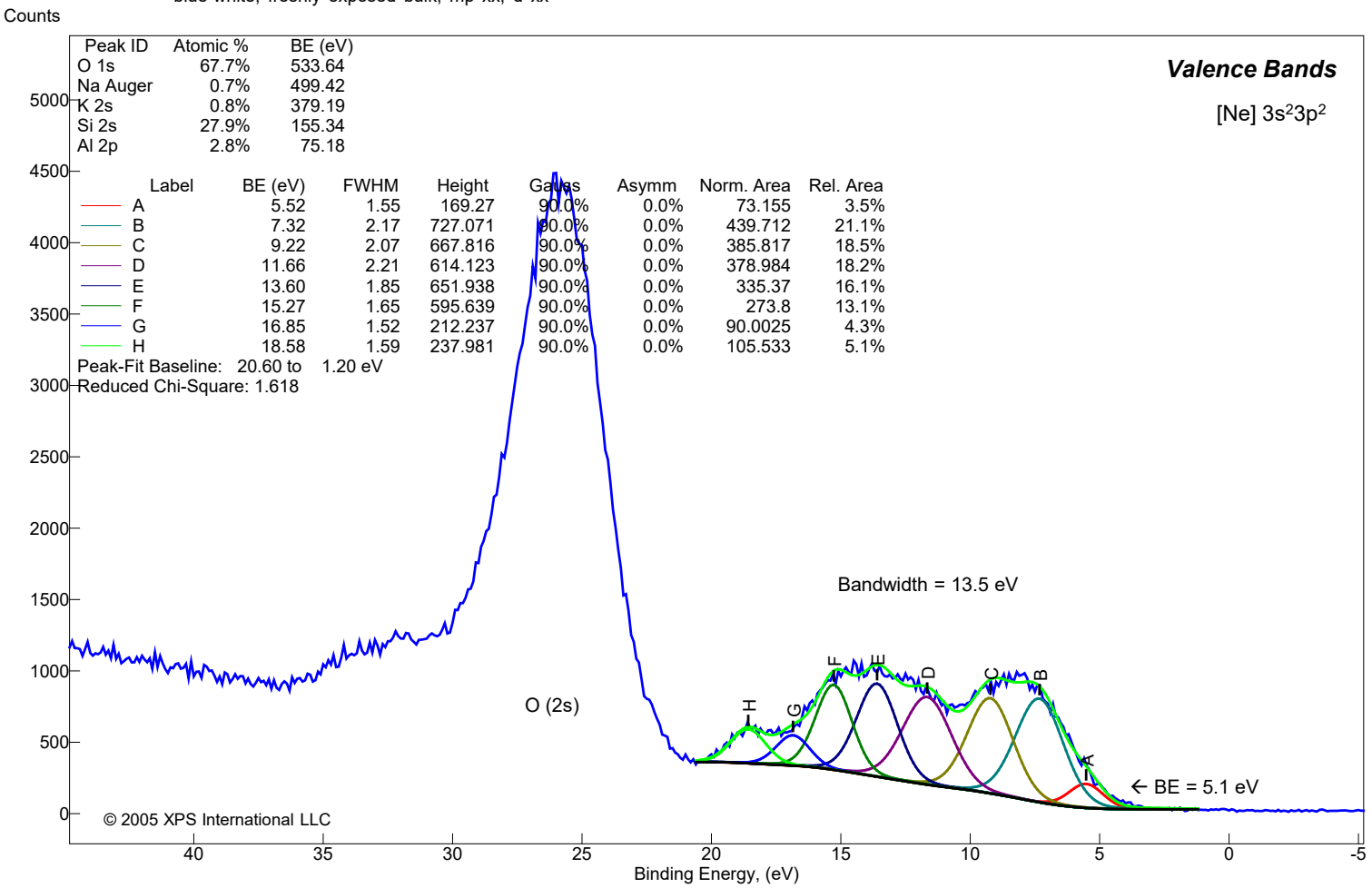


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$Si(OH)_4$
Opal

Silicon (IV) Hydroxide (FW = 96.12)

Sample Description: Si(OH)4 (Opal, SiO2-nH2O) from Mexico, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive blue-white, freshly exposed bulk, mp xx, d xx

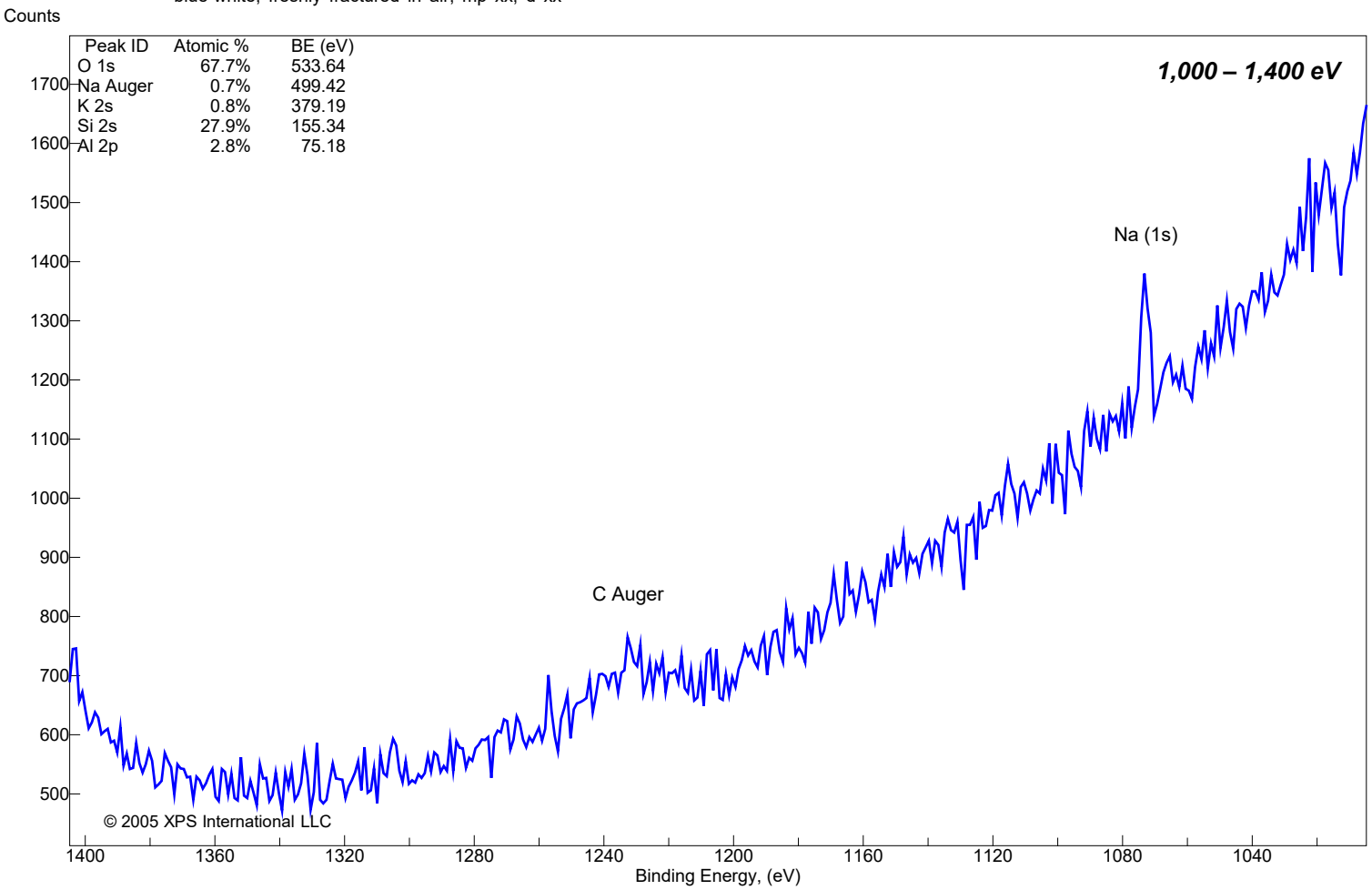


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$Si(OH)_4$
Opal

Silicon (IV) Hydroxide (FW = 96.12)

Sample Description: Si(OH)4 (Opal, SiO2-nH2O) from Mexico, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive blue-white, freshly fractured in air, mp xx, d xx

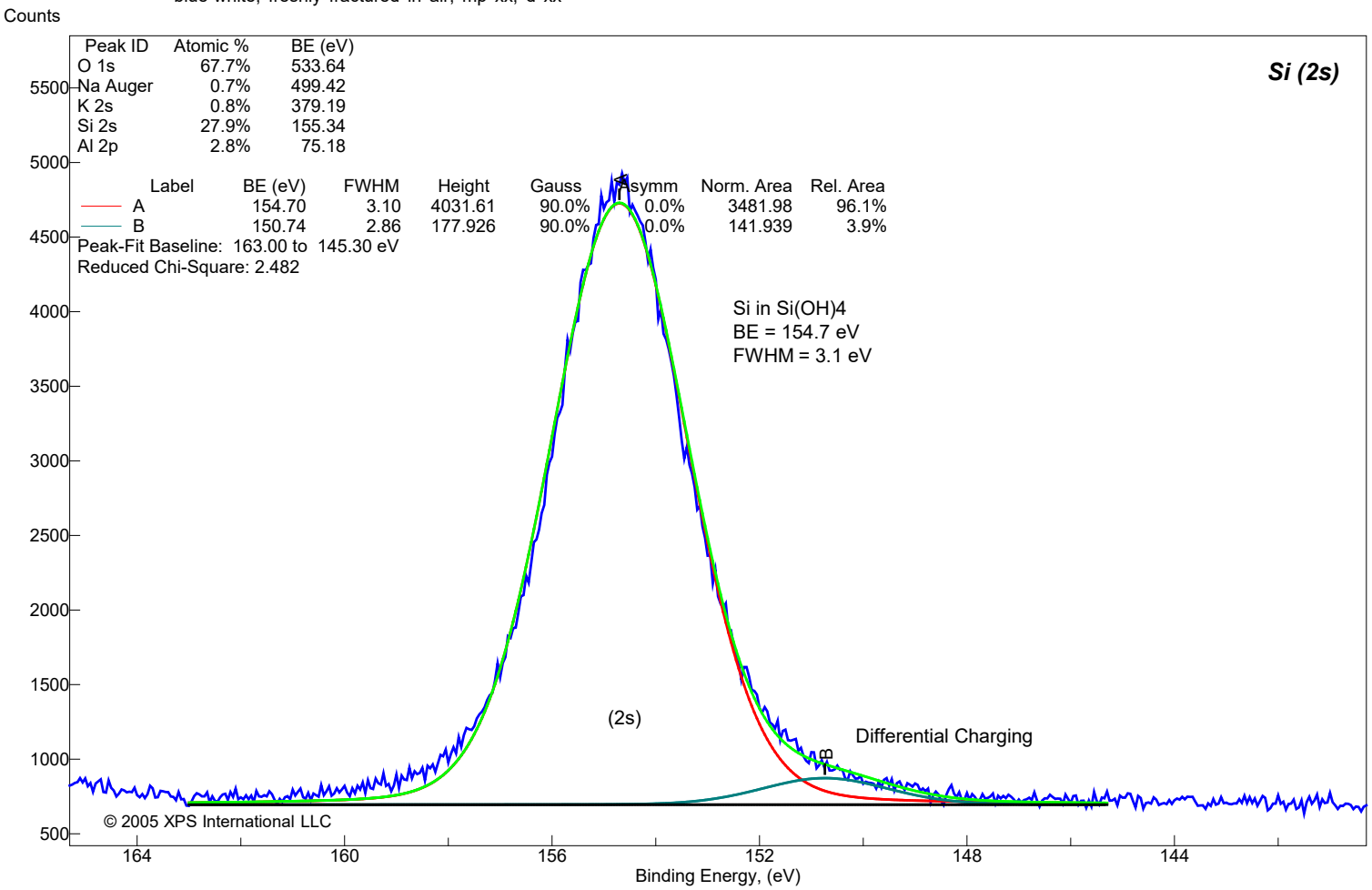


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$Si(OH)_4$
Opal

Silicon (IV) Hydroxide (FW = 96.12)

Sample Description: Si(OH)4 (Opal, SiO2-nH2O) from Mexico, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive blue-white, freshly fractured in air, mp xx, d xx

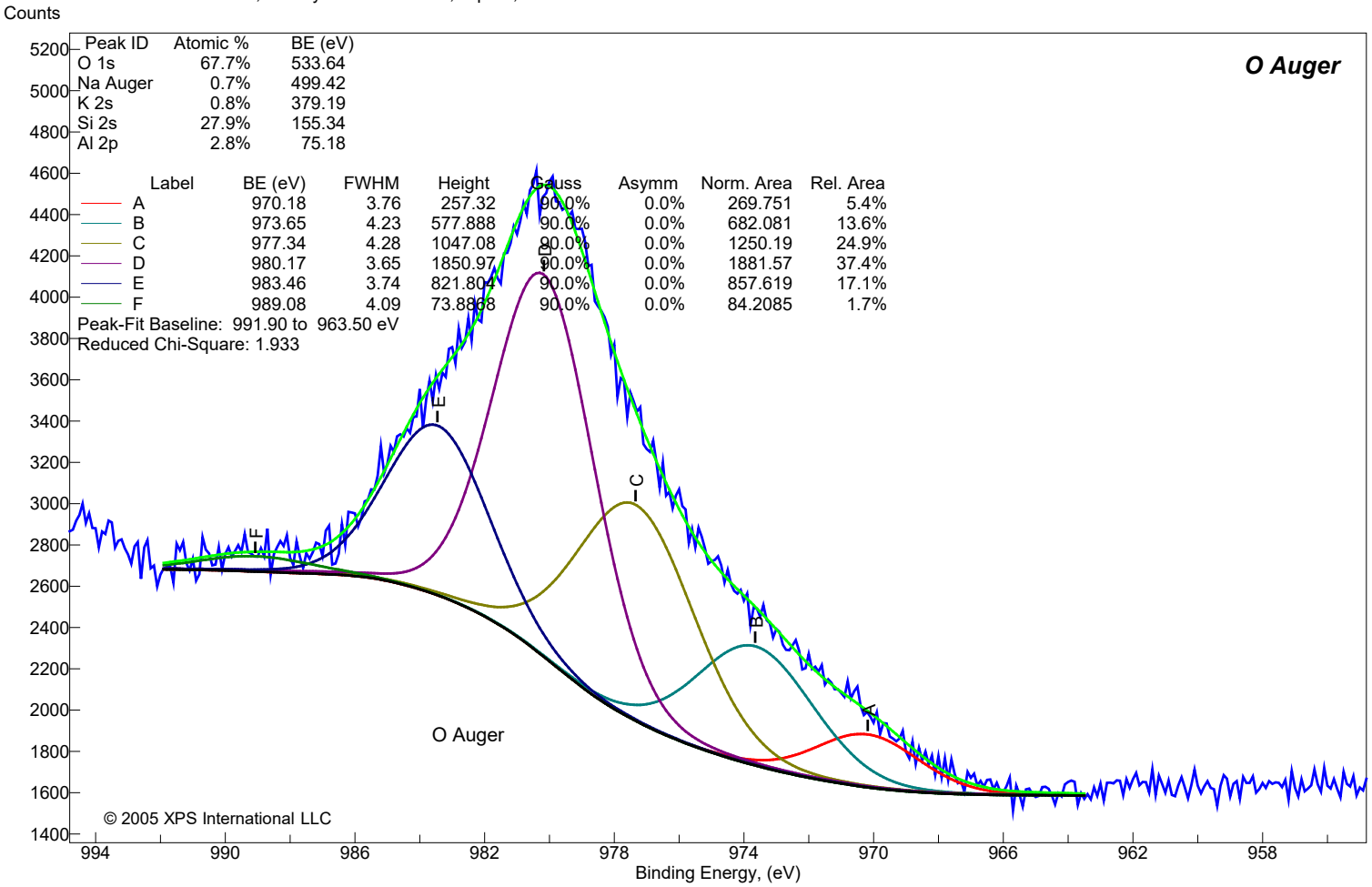


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$Si(OH)_4$
Opal

Silicon (IV) Hydroxide (FW = 96.12)

Sample Description: Si(OH)4 (Opal, SiO2-nH2O) from Mexico, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive blue-white, freshly fractured in air, mp xx, d xx



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Sm_2O_3

Samarium (III) Oxide (FW = 348.80)
Surface Composition Table

Description: Sm_2O_3 from Rare Metallics Co. Lot# 70202-13, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white powder pressed into 3 mm pellet, mp 2300 C, very hygroscopic

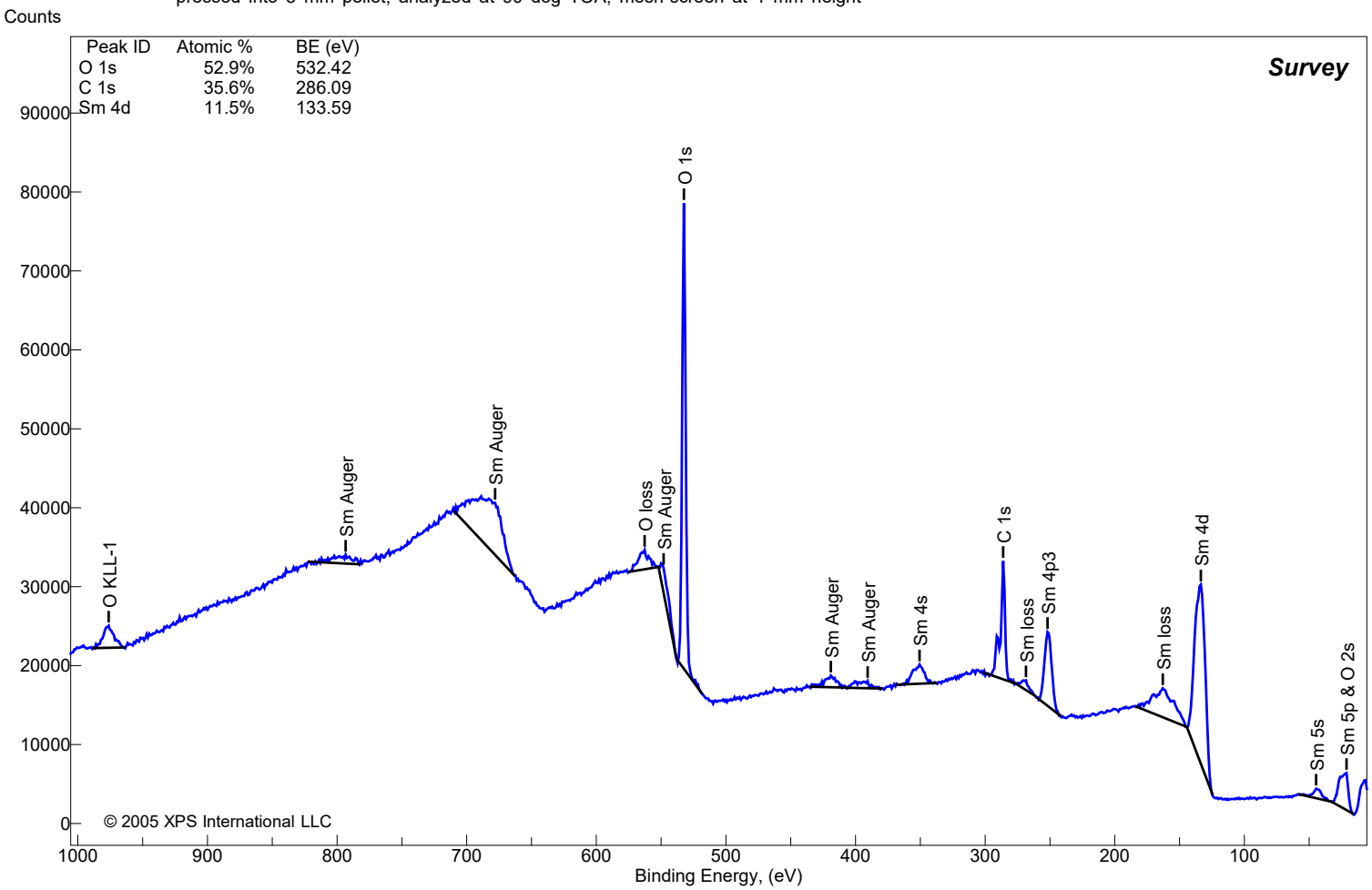
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2p	6.1	2.4	0.02	1.4	16,412	
Sm 5p & O 2s	21.2	17.5	0.75	1.4	18,926	
Sm 5s	44.6	40.9	0.26	1.4	4,954	
Sm 4d	133.6	129.9	9.16	1.4	107,135	11.5%
Sm loss	162.9	159.2	0.00	1.4	35,872	
Sm 4p3	251.9	248.2	3.59	1.4	30,010	
Sm loss	268.5	264.8	0.00	1.4	3,742	
C 1s	286.1	282.4	1.00	1.4	30,600	35.6%
Sm 4s	350.6	346.9	1.42	1.4	11,448	
Sm Auger	390.7	387.0	0.00	1.4	6,016	
Sm Auger	419.0	415.3	0.00	1.4	9,462	
O 1s	532.4	528.7	2.93	1.4	96,569	52.9%
Sm Auger	548.1	544.4	0.00	1.4	12,172	
O loss	562.7	559.0	0.00	1.4	11,697	
Sm Auger	678.1	674.4	0.00	1.4	85,448	
Sm Auger	793.4	789.7	0.00	1.4	8,336	
O KLL-1	976.2	972.5	0.70	1.4	13,093	
Sm 3d5	1083.7	1080.0	40.37	1.2	15,423	

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Sm_2O_3

Samarium (III) Oxide (FW = 348.80)

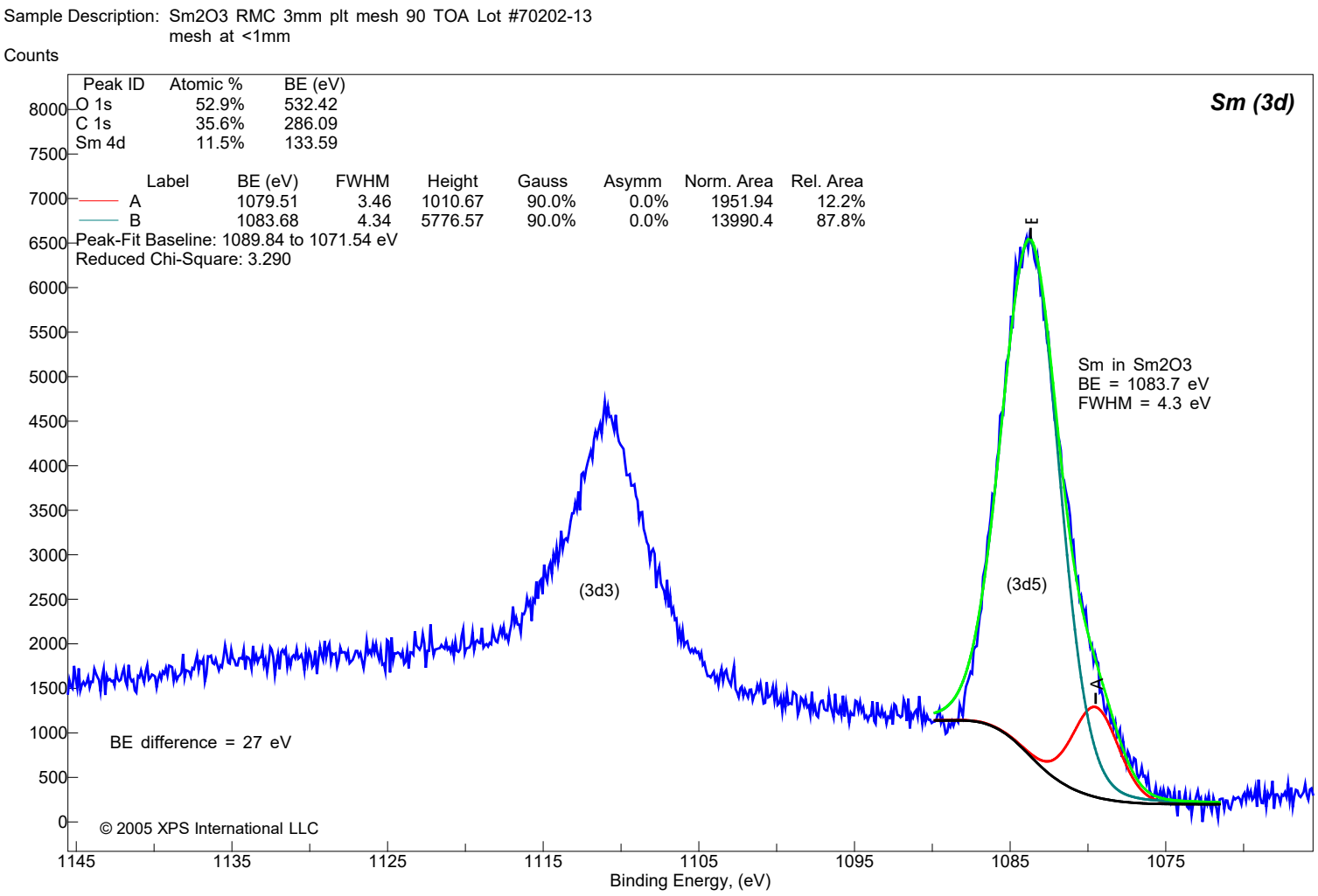
Sample Description: Sm2O3 (99%) from Rare Metallics Corp. Lot #70202-13
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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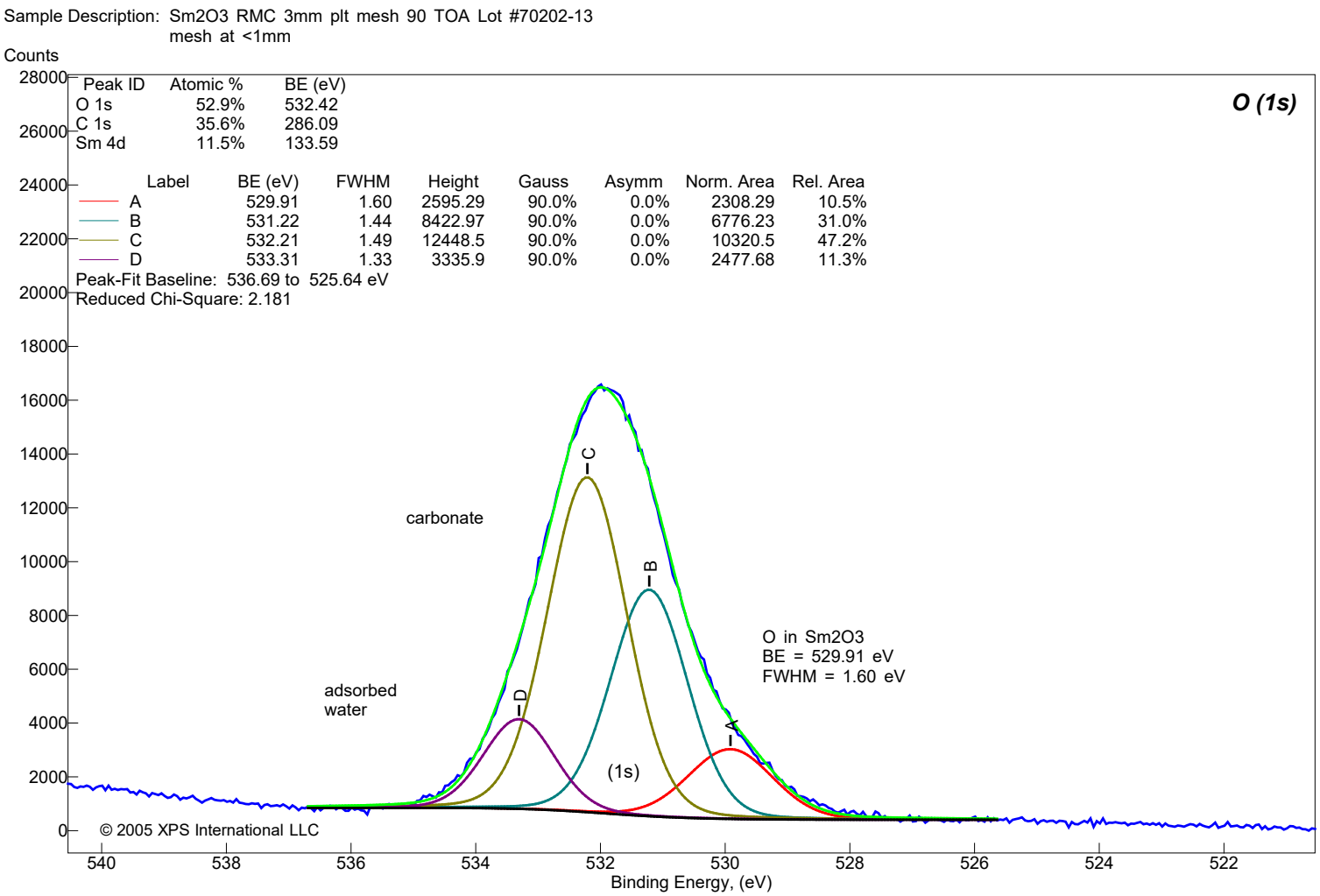
Sm_2O_3

Samarium (III) Oxide (FW = 348.80)



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Samarium (III) Oxide (FW = 348.80)

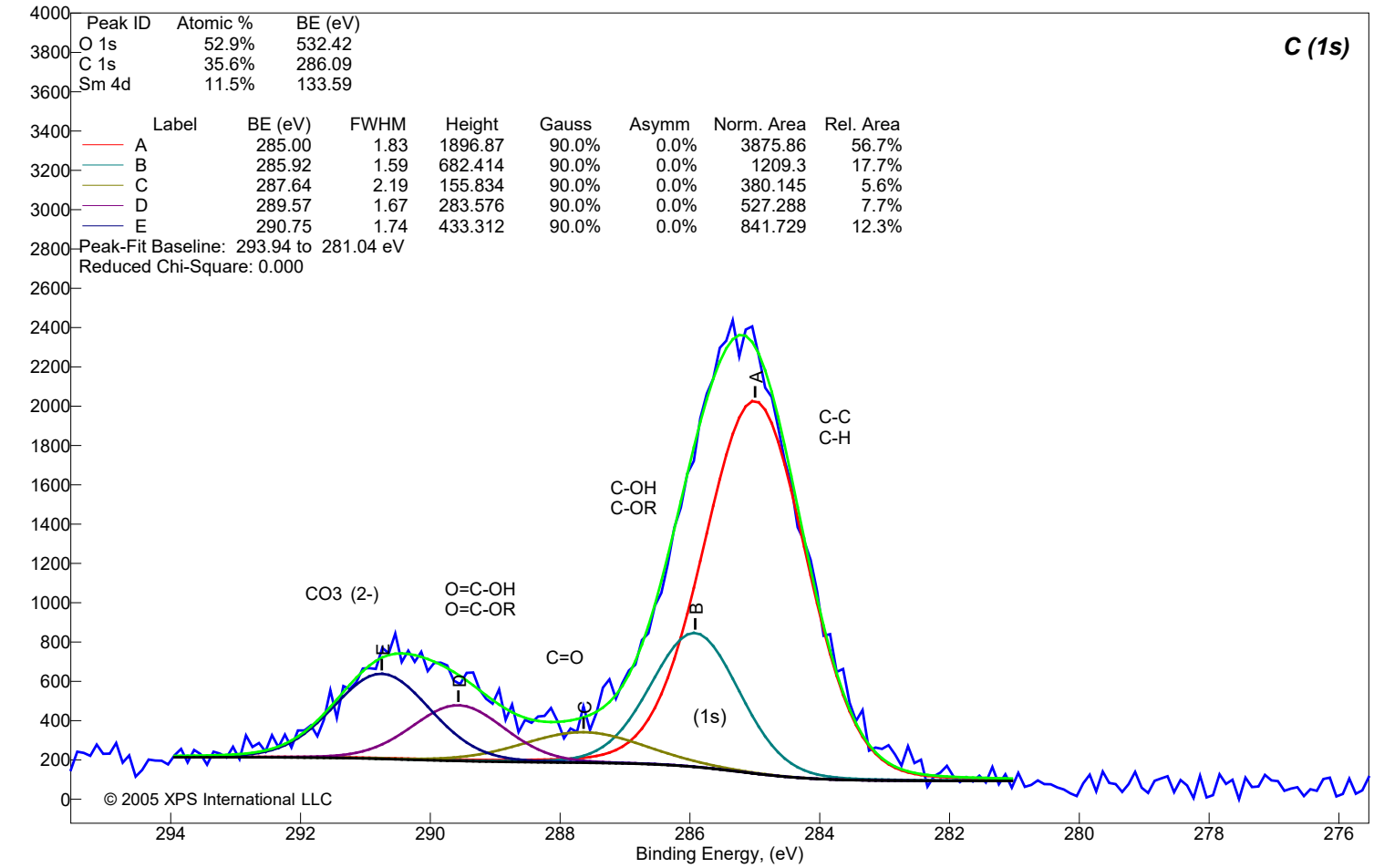


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Sm_2O_3

Samarium (III) Oxide (FW = 348.80)

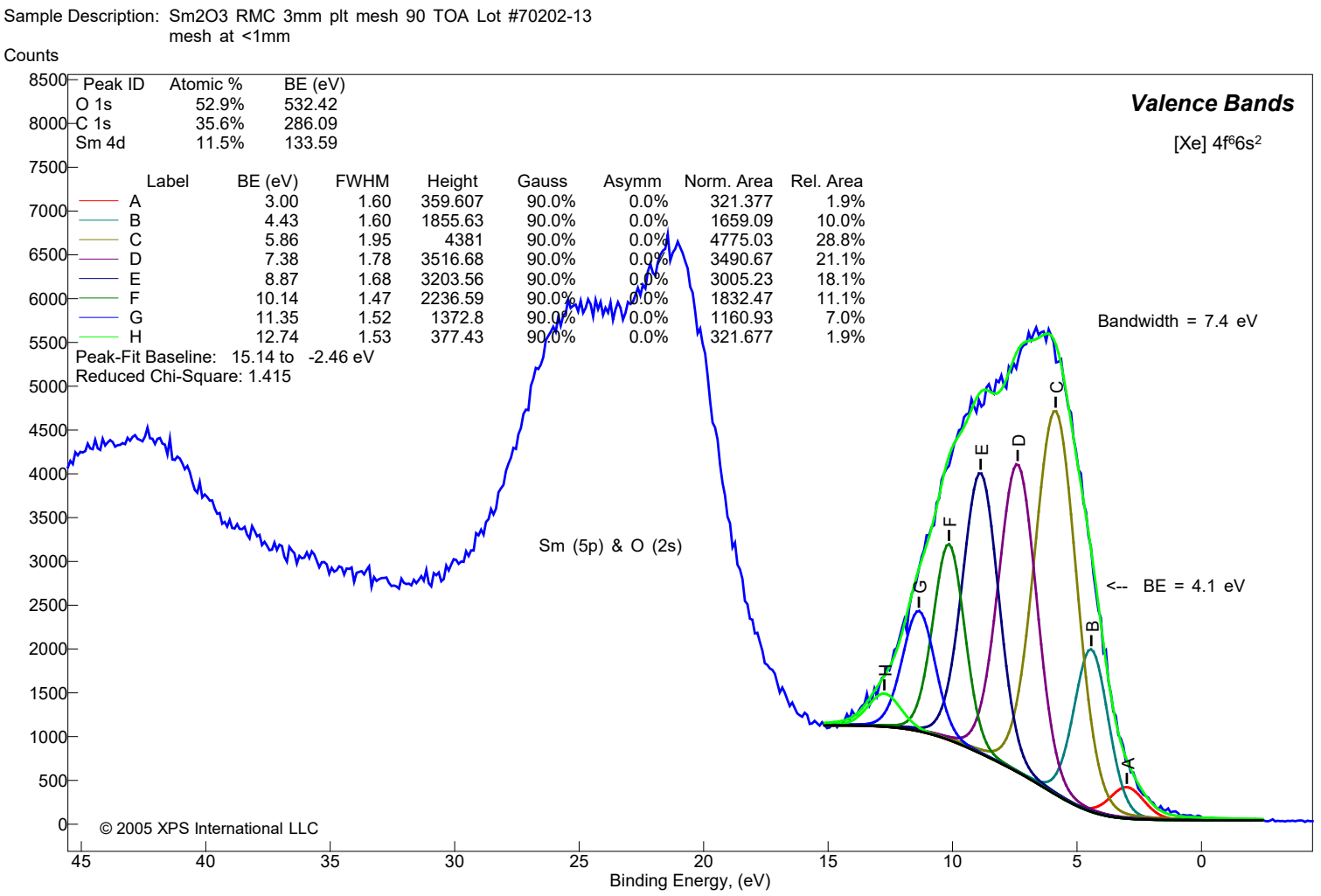
Sample Description: Sm2O3 RMC 3mm plt mesh 90 TOA Lot #70202-13
mesh at <1mm



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Sm_2O_3

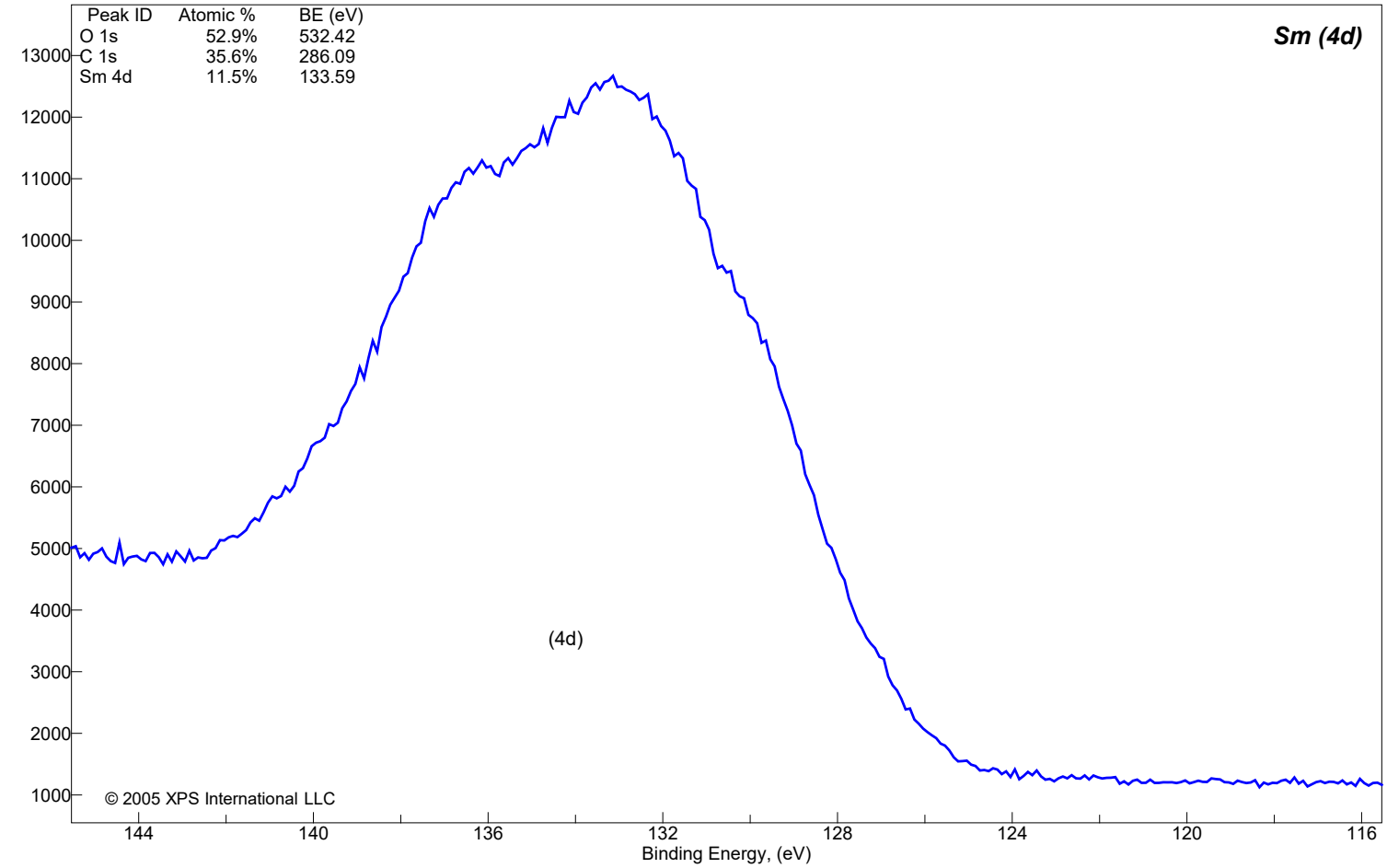
Samarium (III) Oxide (FW = 348.80)



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Samarium (III) Oxide (FW = 348.80)

Sample Description: Sm2O3 RMC 3mm plt mesh 90 TOA Lot #70202-13
mesh at <1mm



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SnO

Tin (II) Oxide (FW = 134.69)
Surface Composition Table

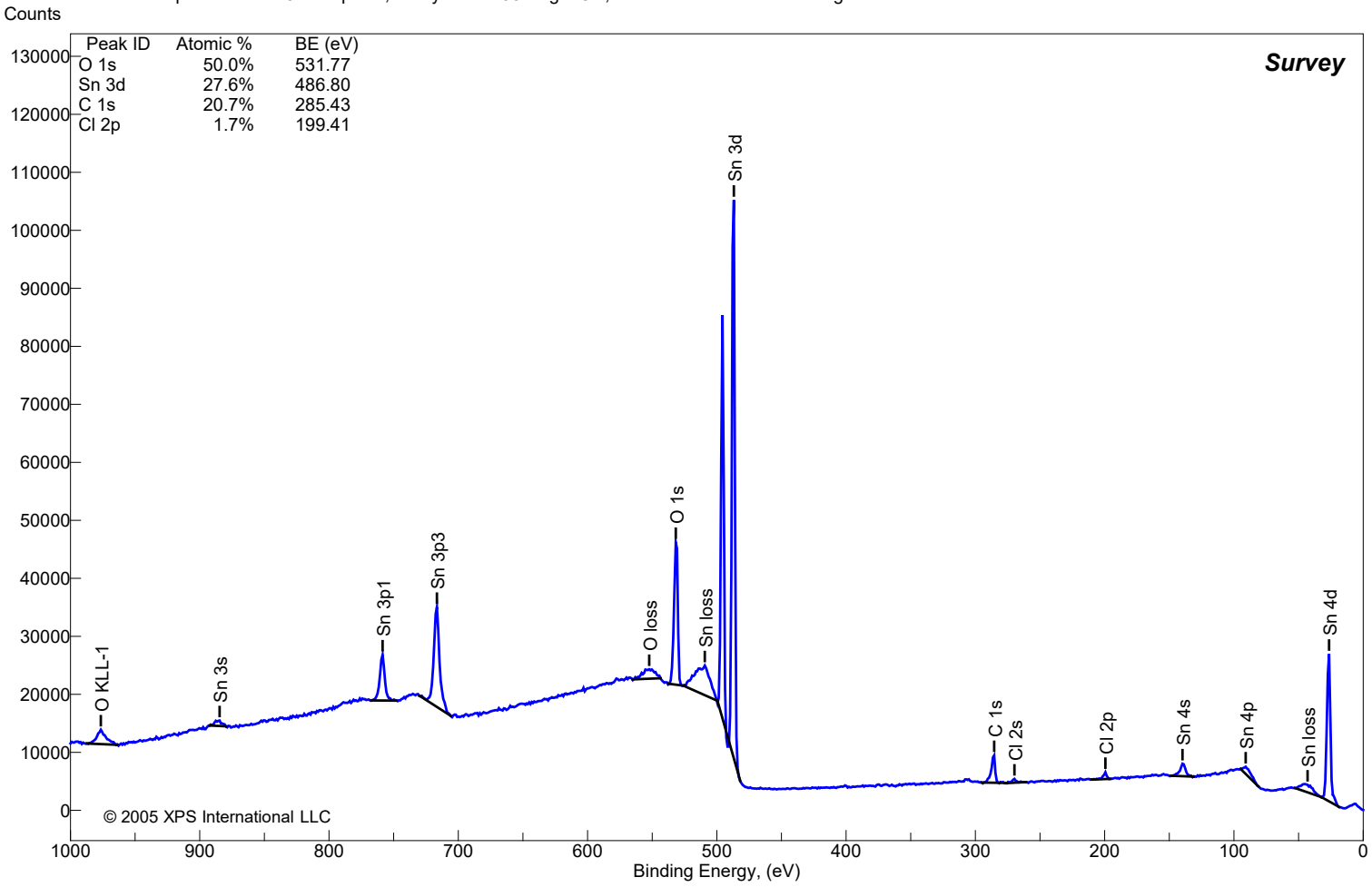
Description: SnO (99+%) from Aldrich Co. Lot# 14613HW, analyzed at 90 deg TOA, mesh at 1 mm, conductive brown-black powder pressed into 3 mm pellet, mp 1080 C, d 6.45, sol in acid

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Sn 4d	28.4	26.4	2.70	1.5	104,177	
Sn loss	45.0	43.0	0.00	1.5	18,438	
Sn 4p	92.9	90.9	2.67	1.5	10,476	
Sn 4s	141.8	139.8	0.79	1.5	13,113	
Cl 2p	201.4	199.4	2.28	1.5	4,428	1.7%
Cl 2s	271.8	269.8	1.69	1.5	3,068	
C 1s	287.4	285.4	1.00	1.5	21,107	20.7%
Sn 3d	488.8	486.8	25.05	1.5	536,756	27.6%
Sn loss	511.3	509.3	0.00	1.5	92,780	
O 1s	533.8	531.8	2.93	1.5	106,260	50.0%
O 1s	534.5	532.5	2.93	1.1	26,007	
O loss	554.3	552.3	0.00	1.5	25,900	
Sn 3p3	718.5	716.5	9.35	1.5	114,940	
Sn 3p1	760.6	758.6	4.58	1.5	45,587	
Sn 3s	886.7	884.7	3.26	1.5	8,349	
O KLL-1	978.5	976.5	0.70	1.5	23,639	

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Tin (II) Oxide (FW = 134.69)

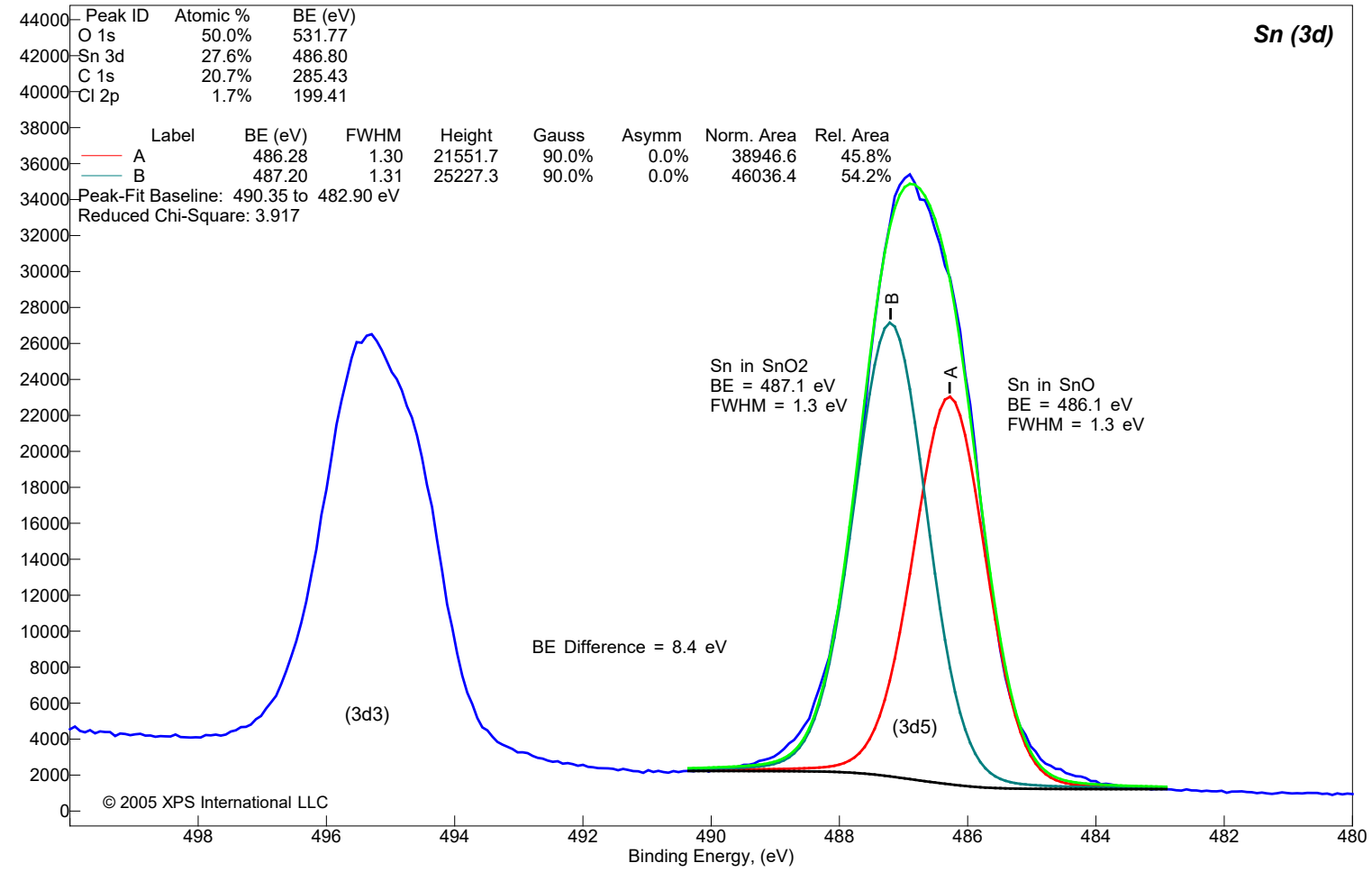
Sample Description: SnO (99+%) from Aldrich Lot# 14613HW, conductive
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Tin (II) Oxide (FW = 134.69)

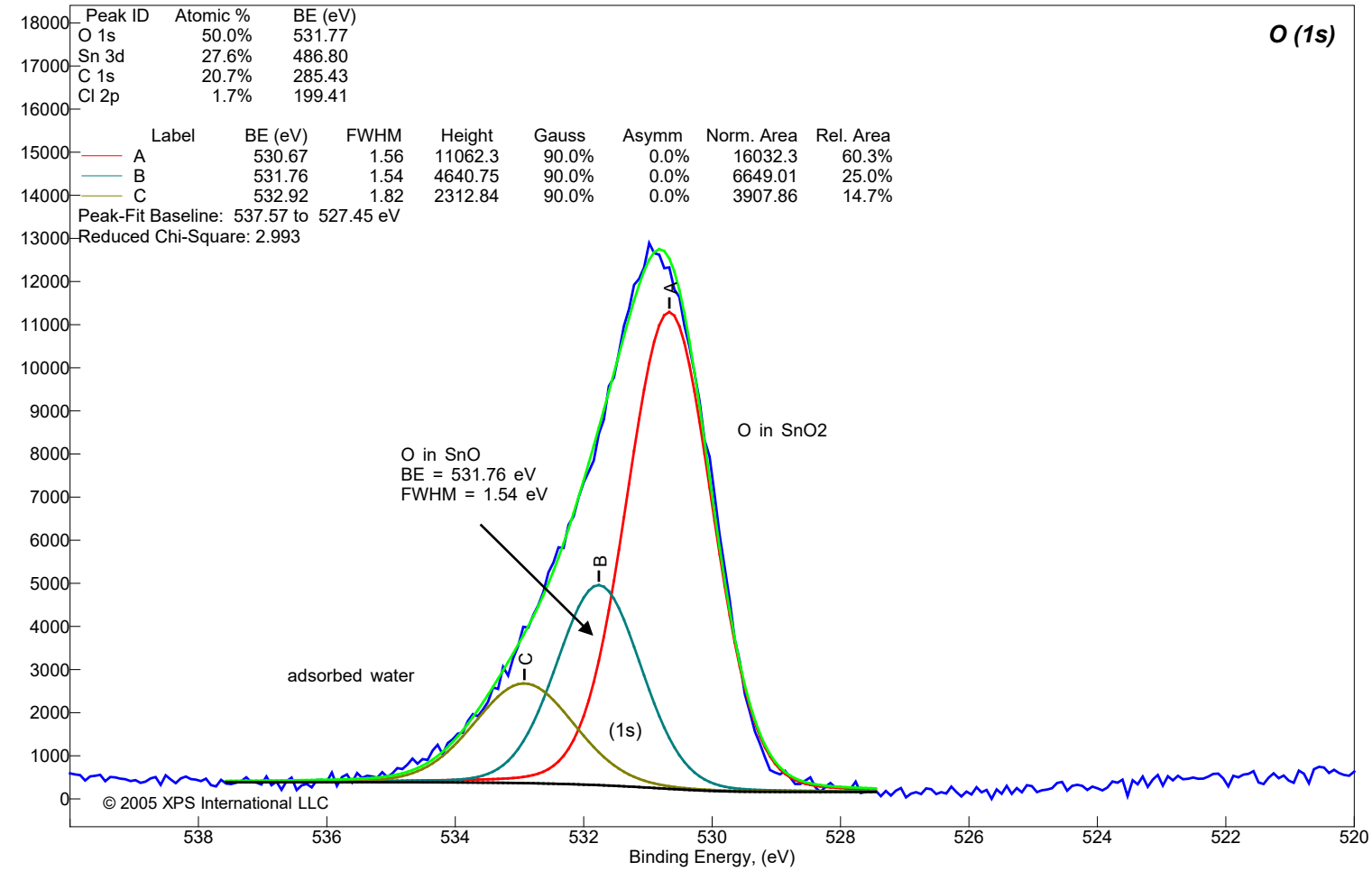
Sample Description: SnO (99+%) Aldrich Lot# 14613HW, 3mm pellet, CONDU



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Tin (II) Oxide (FW = 134.69)

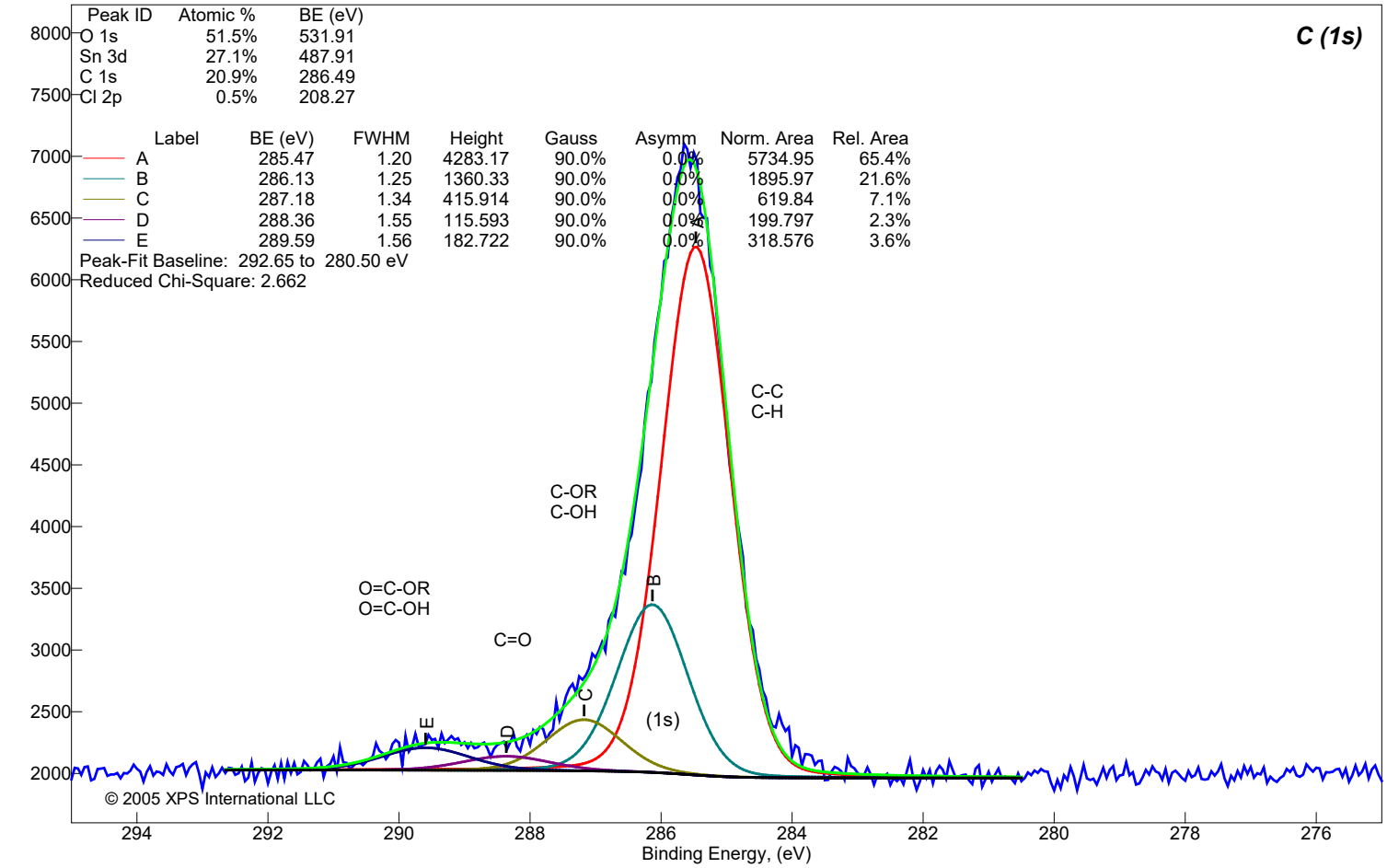
Sample Description: SnO (99+%) Aldrich Lot# 14613HW, 3mm pellet, CONDU



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Tin (II) Oxide (FW = 134.69)

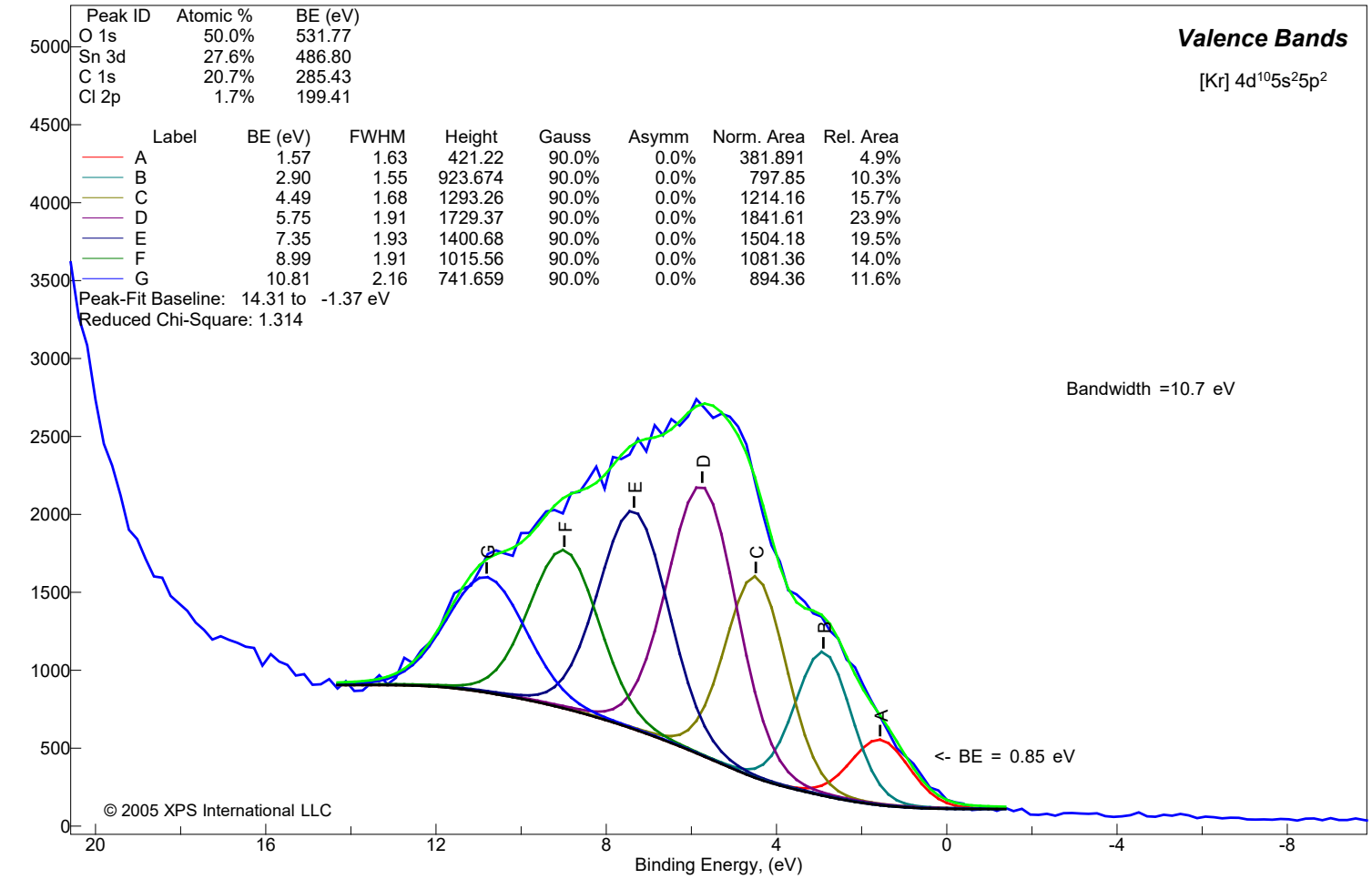
Sample Description: SnO (99+%) Aldrich Lot# 14613HW, 3mm pellet, CONDU rerun



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Tin (II) Oxide (FW = 134.69)

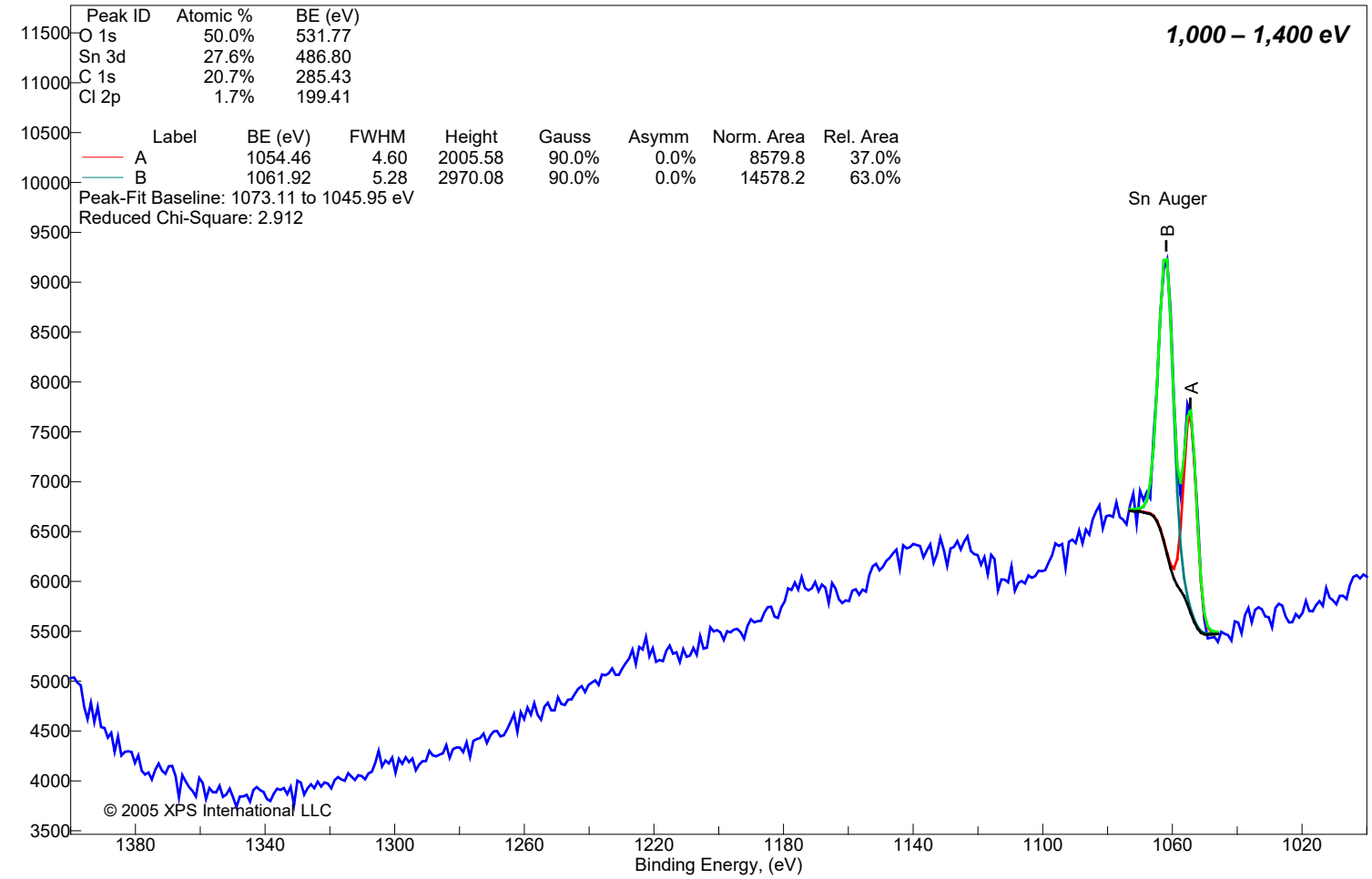
Sample Description: SnO (99+%) Aldrich Lot# 14613HW, 3mm pellet, CONDU



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Tin (II) Oxide (FW = 134.69)

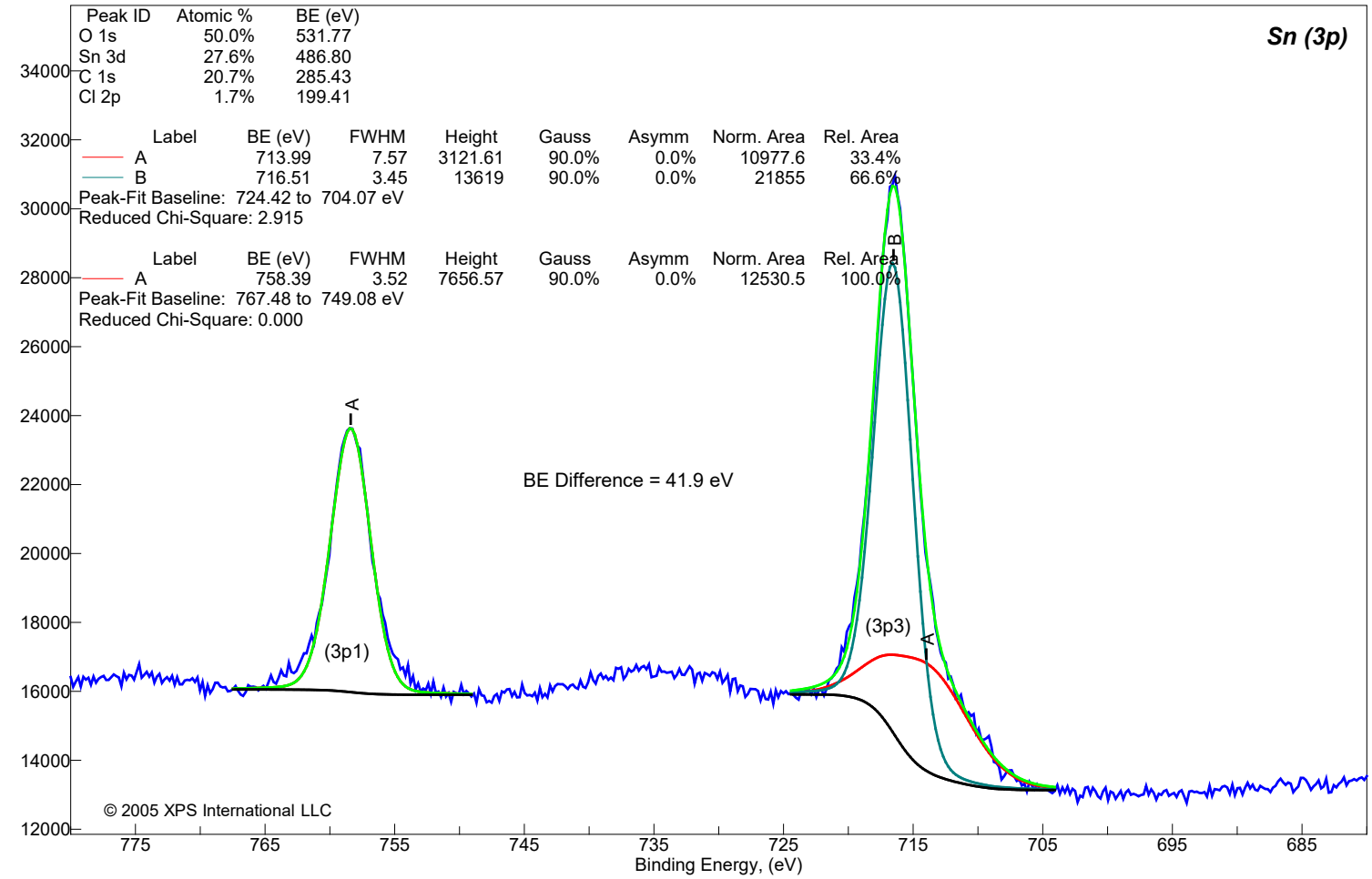
Sample Description: SnO (99+%) Aldrich Lot# 14613HW, 3mm pellet, CONDU



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Tin (II) Oxide (FW = 134.69)

Sample Description: SnO (99+%) Aldrich Lot# 14613HW, 3mm pellet, CONDU



SnO_2
Cassiterite

Tin (IV) Oxide (FW = 150.69)
Surface Composition Table

Description: SnO_2 (99+%) from Brazil Cassiterite (natural crystal), analyzed at 90 deg TOA, conductive black crystal cleaved in air just before analysis, mp 1630 C dec., d 6.95

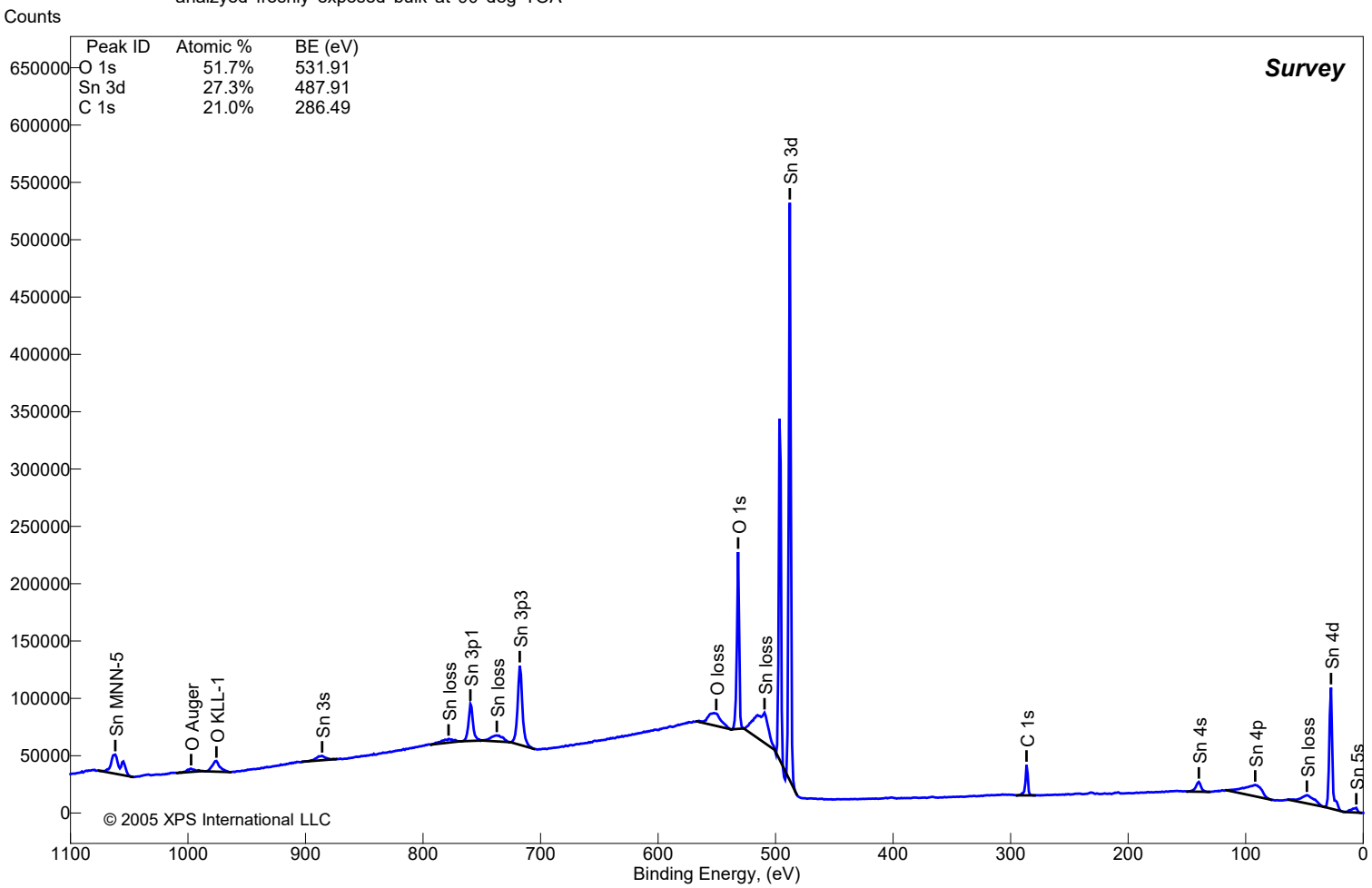
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Sn 5s	5.9	5.9	0.09	1.4	12,112	
Sn 4d	27.4	27.4	2.70	1.4	162,776	
Sn loss	47.9	47.9	0.00	1.4	49,862	
Sn 4p	91.9	91.9	2.67	1.4	88,684	
Sn 4s	139.8	139.8	0.79	1.4	22,963	
C 1s	286.5	286.5	1.00	1.4	34,000	21.0%
Sn 3d	487.9	487.9	25.05	1.4	853,485	27.3%
Sn loss	509.4	509.4	0.00	1.4	173,725	
O 1s	531.9	531.9	2.93	1.4	177,724	51.7%
O loss	550.5	550.5	0.00	1.4	69,213	
Sn 3p3	717.7	717.7	9.35	1.4	163,863	
Sn loss	737.2	737.2	0.00	1.4	30,016	
Sn 3p1	759.7	759.7	4.58	1.4	70,573	
Sn loss	778.3	778.3	0.00	1.4	20,323	
Sn 3s	885.9	885.9	3.26	1.4	17,433	
O KLL-1	975.8	975.8	0.70	1.4	36,382	
O Auger	997.3	997.3	0.00	1.4	11,306	
Sn MNN-5	1061.9	1061.9	0.19	1.4	82,331	

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SnO_2
Cassiterite

Tin (IV) Oxide (FW = 150.69)

Sample Description: SnO2 (99+%) in natural Cassiterite crystal from Minas Gerais, Brazil, conductive analzyed freshly exposed bulk at 90 deg TOA

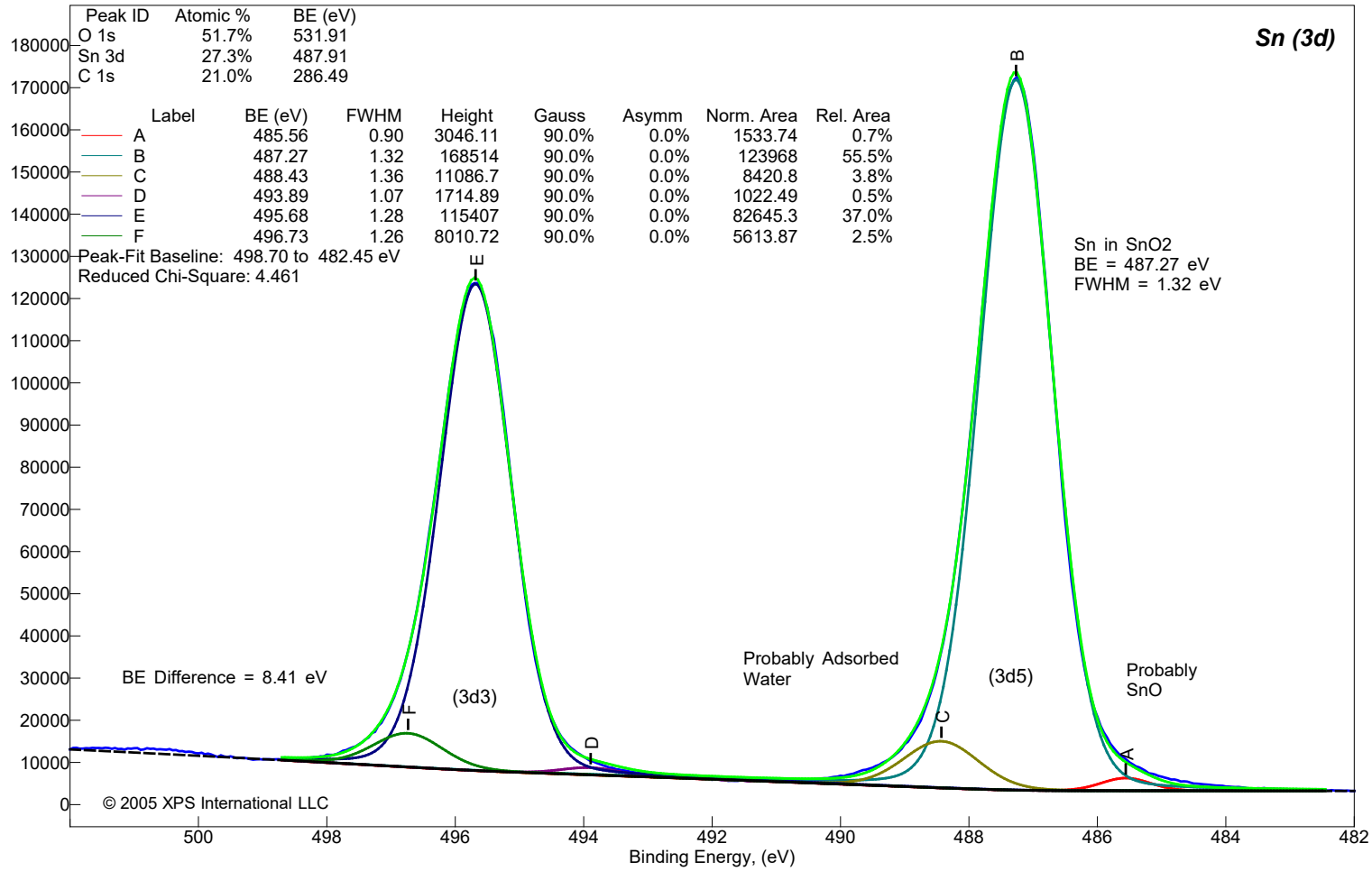


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SnO_2
Cassiterite

Tin (IV) Oxide (FW = 150.69)

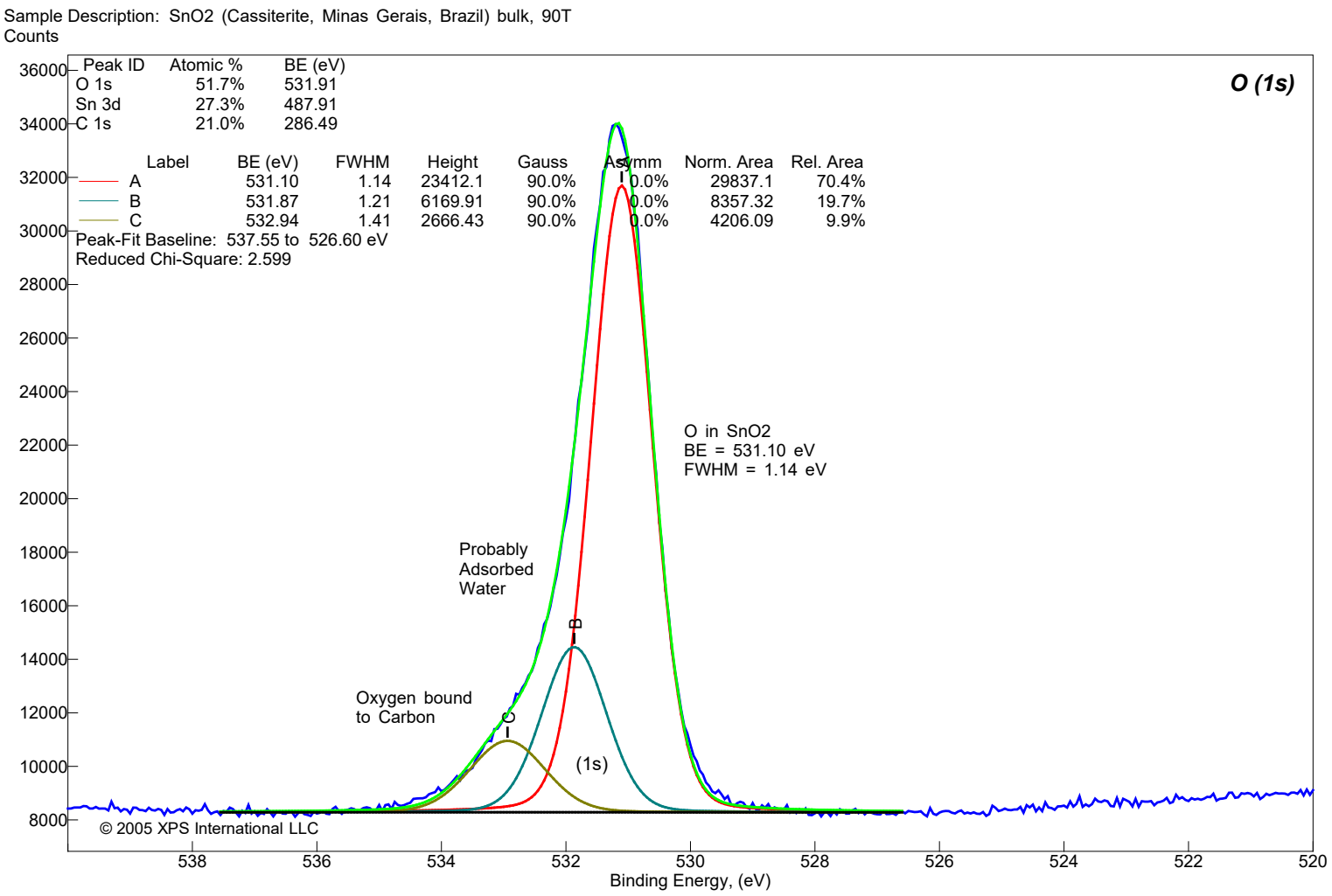
Sample Description: SnO2 (Cassiterite, Minas Gerais, Brazil) bulk, 90T



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SnO_2
Cassiterite

Tin (IV) Oxide (FW = 150.69)

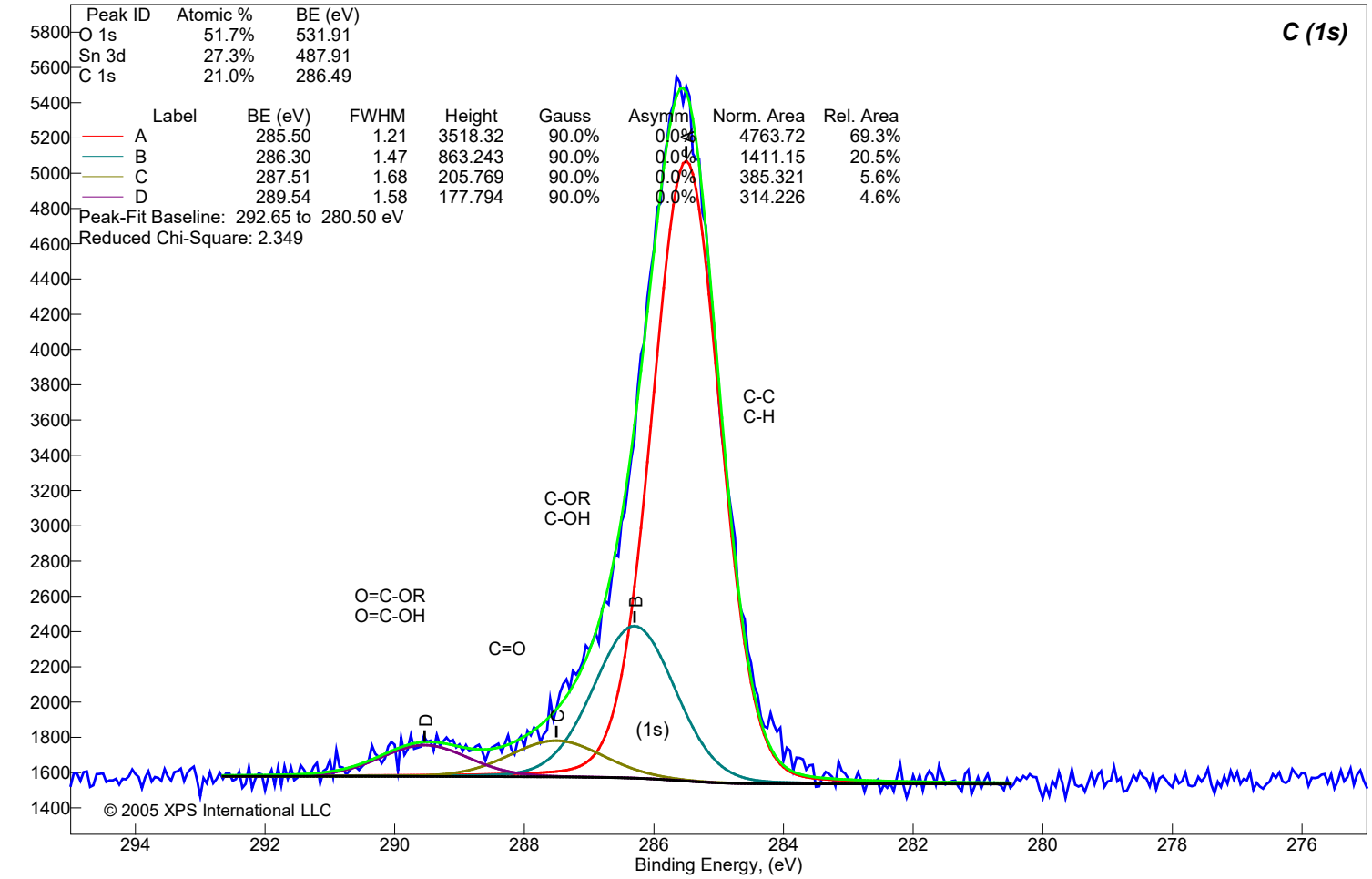


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SnO_2
Cassiterite

Tin (IV) Oxide (FW = 150.69)

Sample Description: SnO2 (Cassiterite, Minas Gerais, Brazil) bulk, 90T

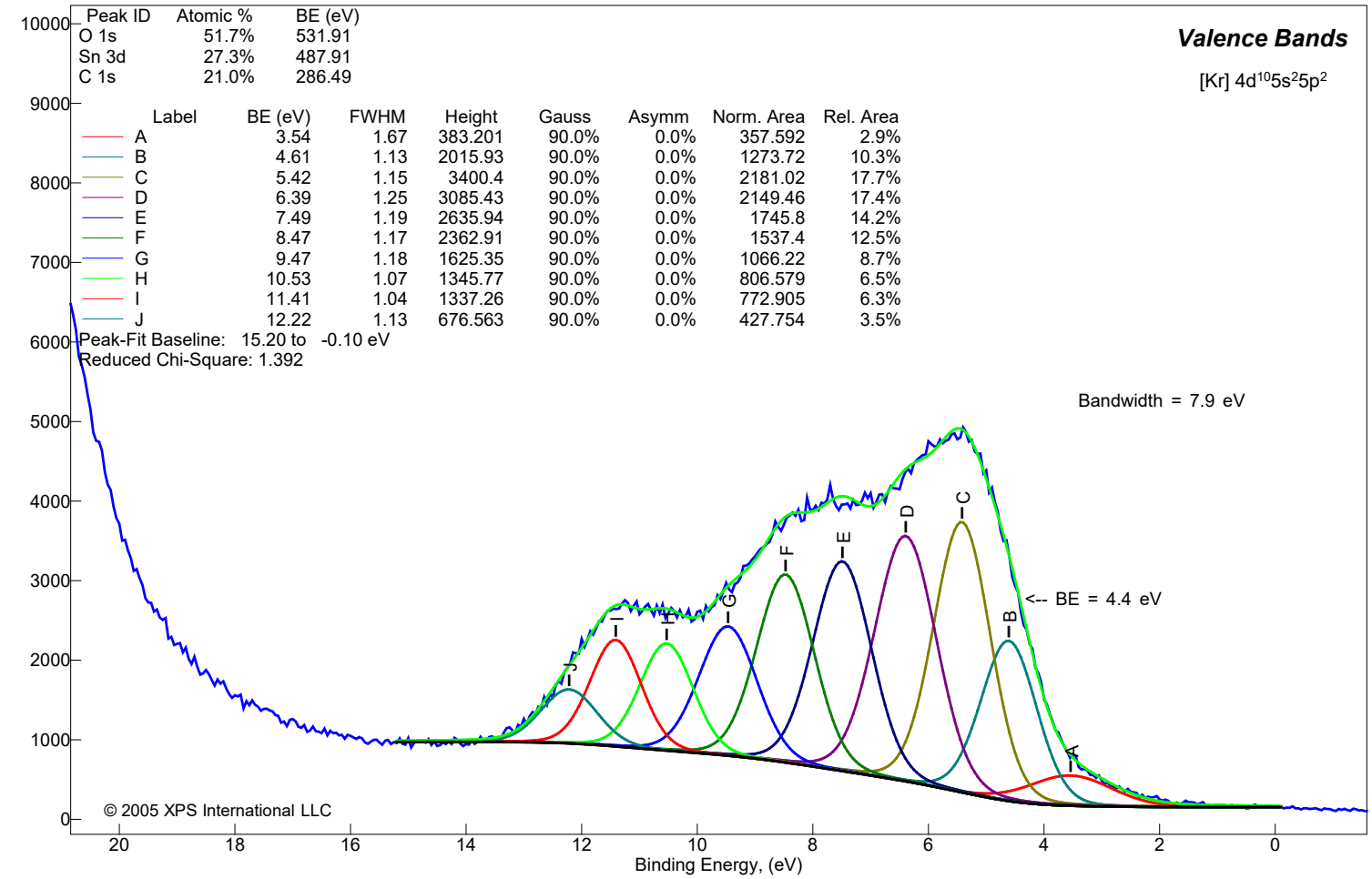


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SnO_2
Cassiterite

Tin (IV) Oxide (FW = 150.69)

Sample Description: SnO2 (Cassiterite, Minas Gerais, Brazil) bulk, 90T

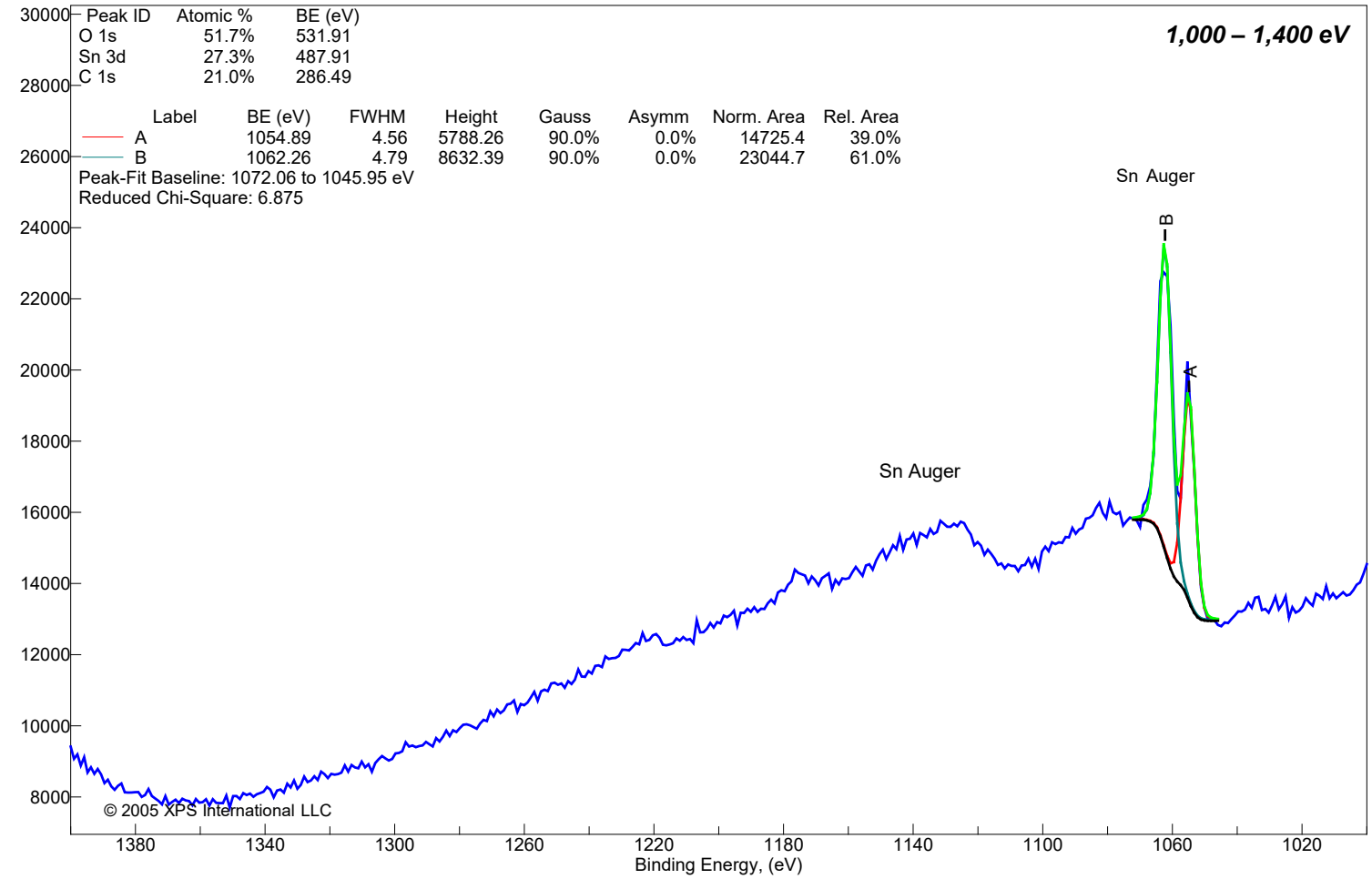


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SnO_2
Cassiterite

Tin (IV) Oxide (FW = 150.69)

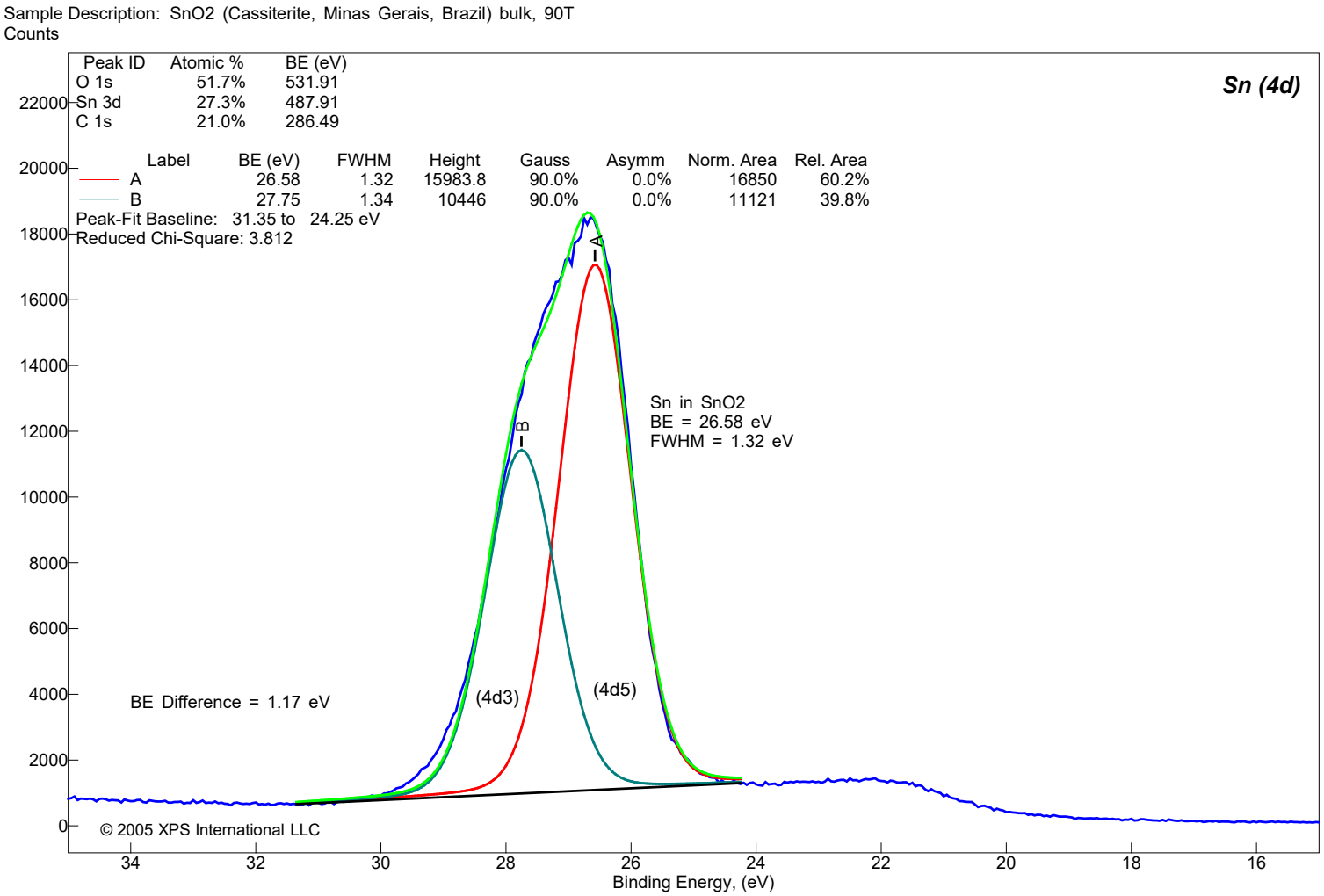
Sample Description: SnO2 (Cassiterite, Minas Gerais, Brazil) bulk, 90T



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SnO_2
Cassiterite

Tin (IV) Oxide (FW = 150.69)



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SrO

Strontium (II) Oxide (FW = 103.62)
Surface Composition Table

Description: SrO (99.5%) from Rare Metallics Co. Lot# 71208-30, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white powder pressed into 3 mm pellet, mp 2430 C, d 4.7, sol in fused KOH

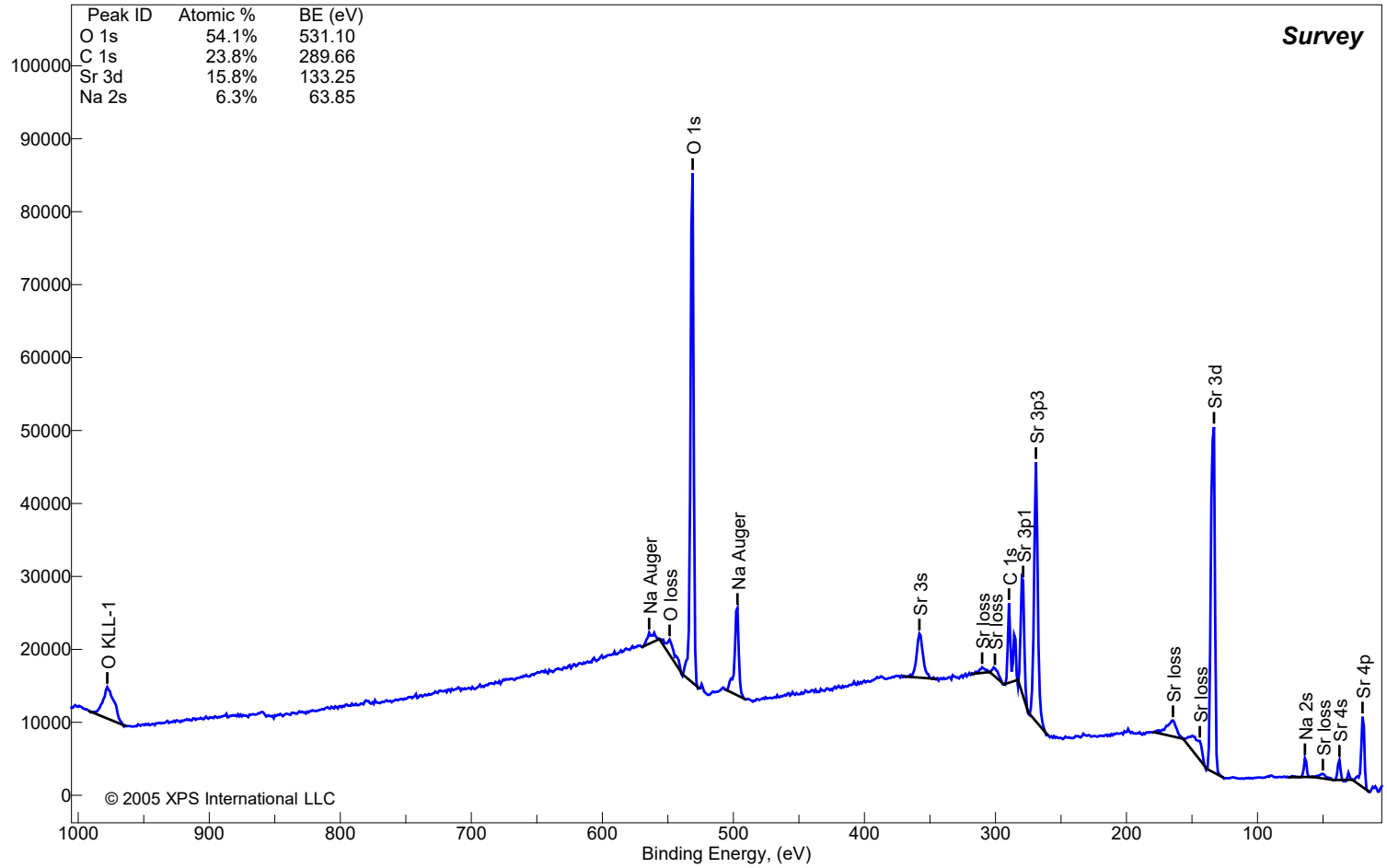
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Sr 4p	15.2	19.9	0.78	1.5	14,961	
Sr 4s	32.8	37.5	0.29	1.5	4,020	
Sr loss	45.5	50.2	0.00	1.5	2,061	
Na 2s	59.2	63.9	0.42	1.5	3,054	6.3%
Sr 3d	128.6	133.3	5.05	1.5	85,271	15.8%
Sr loss	139.3	144.0	0.00	1.5	12,802	
Sr loss	159.8	164.5	0.00	1.5	10,327	
Sr 3p3	264.4	269.1	4.37	1.5	59,781	
Sr 3p1	274.2	278.9	2.25	1.5	26,652	
C 1s	285.0	289.7	1.00	1.5	21,198	23.8%
Sr loss	295.7	300.4	0.00	1.5	3,282	
Sr loss	305.5	310.2	0.00	1.5	1,999	
Sr 3s	353.4	358.1	1.86	1.5	17,352	
Na Auger	492.2	496.9	0.00	1.5	22,866	
O 1s	526.4	531.1	2.93	1.5	100,609	54.1%
O loss	544.0	548.7	0.00	1.5	9,149	
Na Auger	559.6	564.3	0.00	1.5	4,618	
O KLL-1	973.1	977.8	0.70	1.5	20,812	

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SrO

Strontium (II) Oxide (FW = 103.62)

Sample Description: SrO (99.5%) from Rare Metallics Corp. lot #71208-30
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height

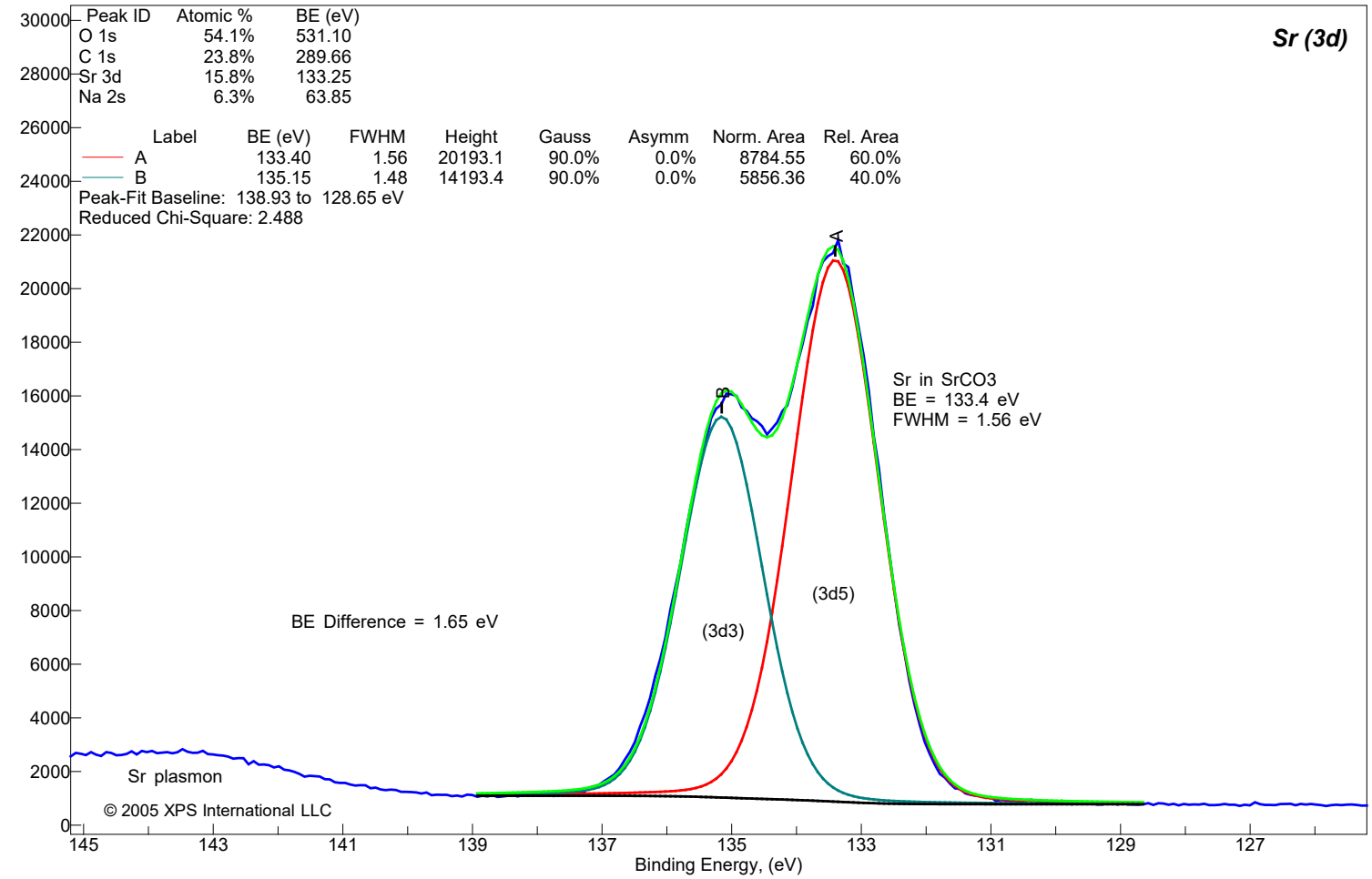


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SrO

Strontium (II) Oxide (FW = 103.62)

Sample Description: SrO (99.5%) RMC #71208-30, 3mm pellet, screen, 90 TOA

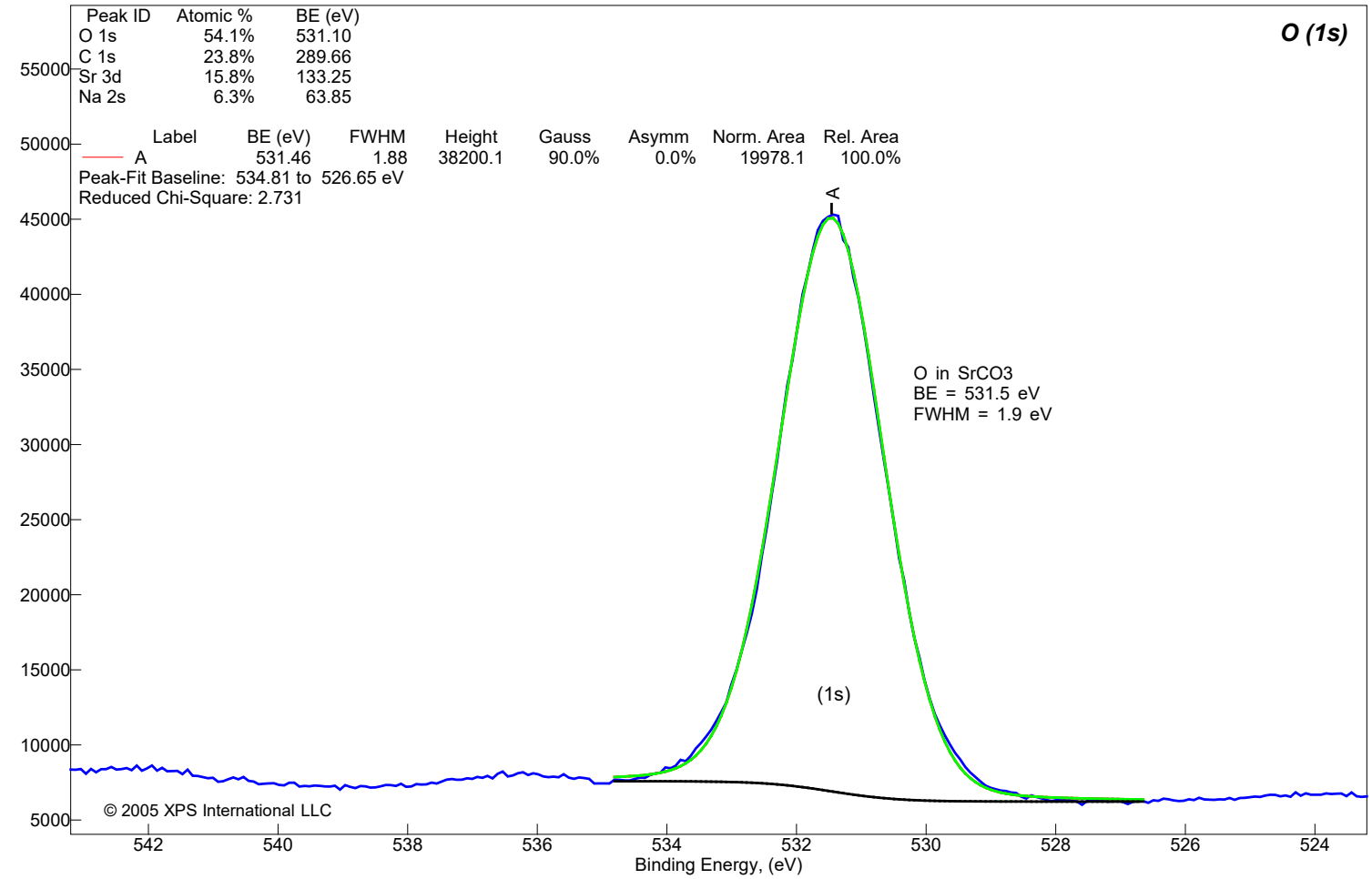


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SrO

Strontium (II) Oxide (FW = 103.62)

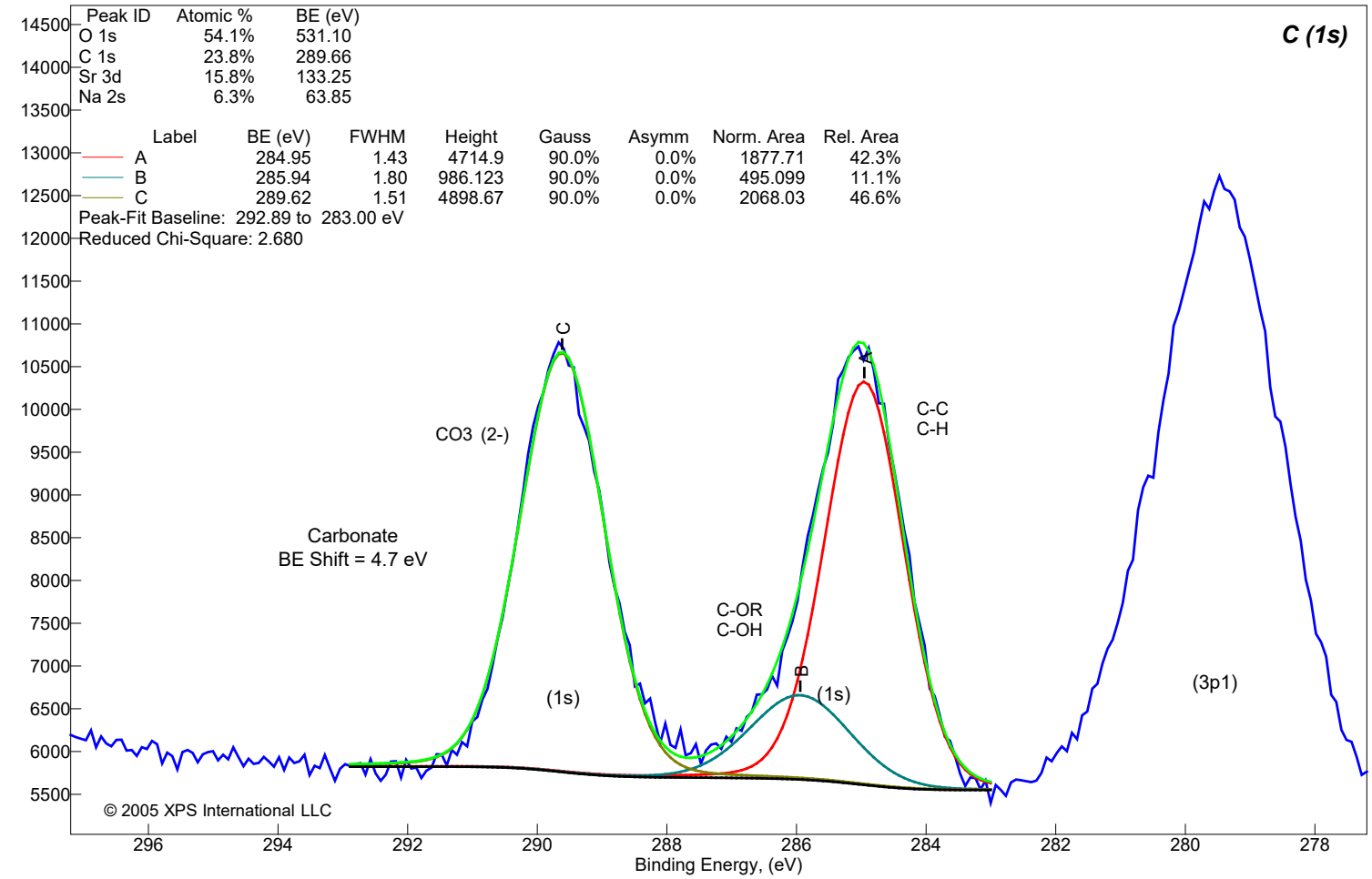
Sample Description: SrO (99.5%) RMC #71208-30, 3mm pellet, screen, 90 TOA



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Strontium (II) Oxide (FW = 103.62)

Sample Description: SrO (99.5%) RMC #71208-30, 3mm pellet, screen, 90 TOA

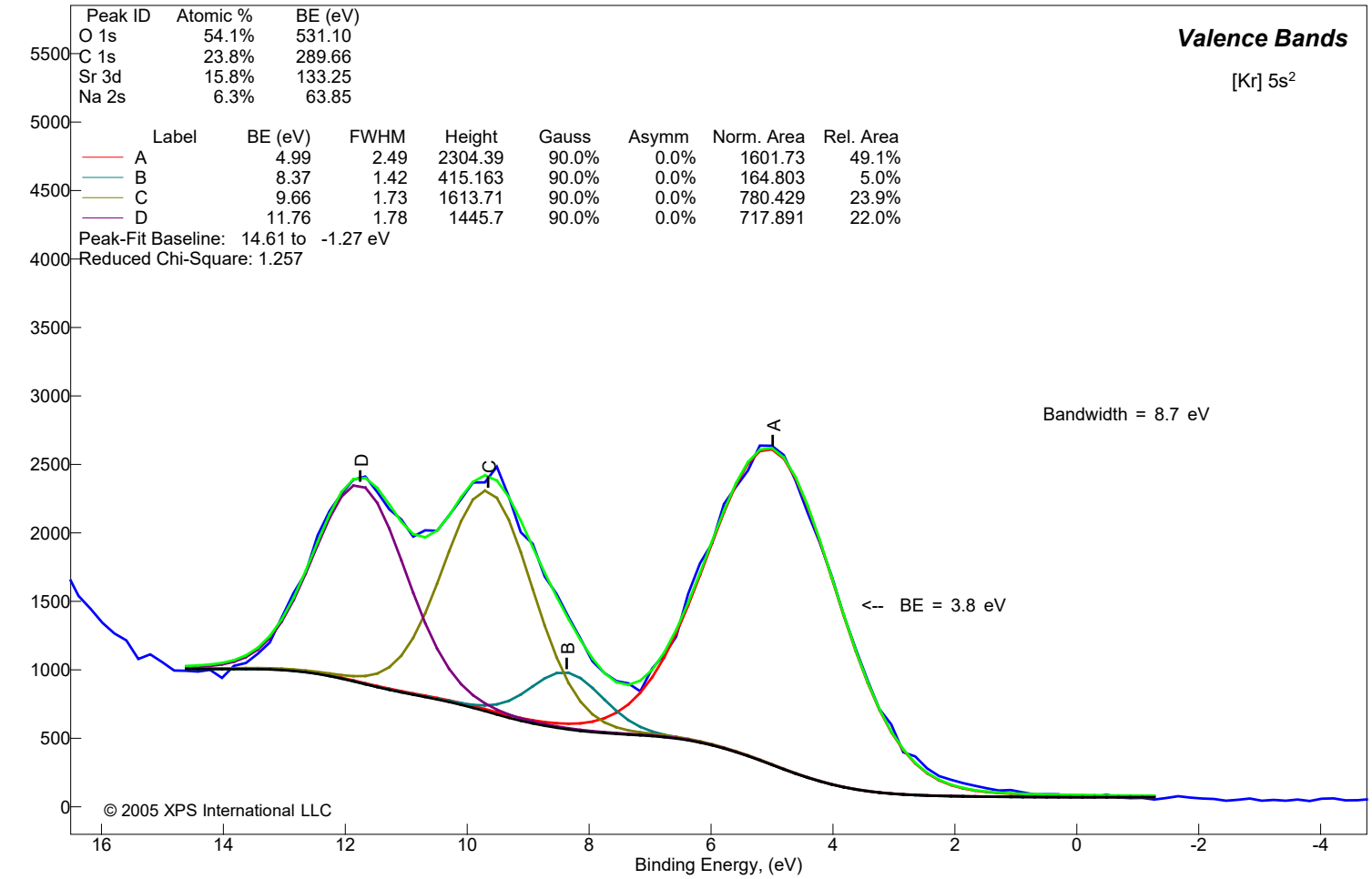


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SrO

Strontium (II) Oxide (FW = 103.62)

Sample Description: SrO (99.5%) RMC #71208-30, 3mm pellet, screen, 90 TOA

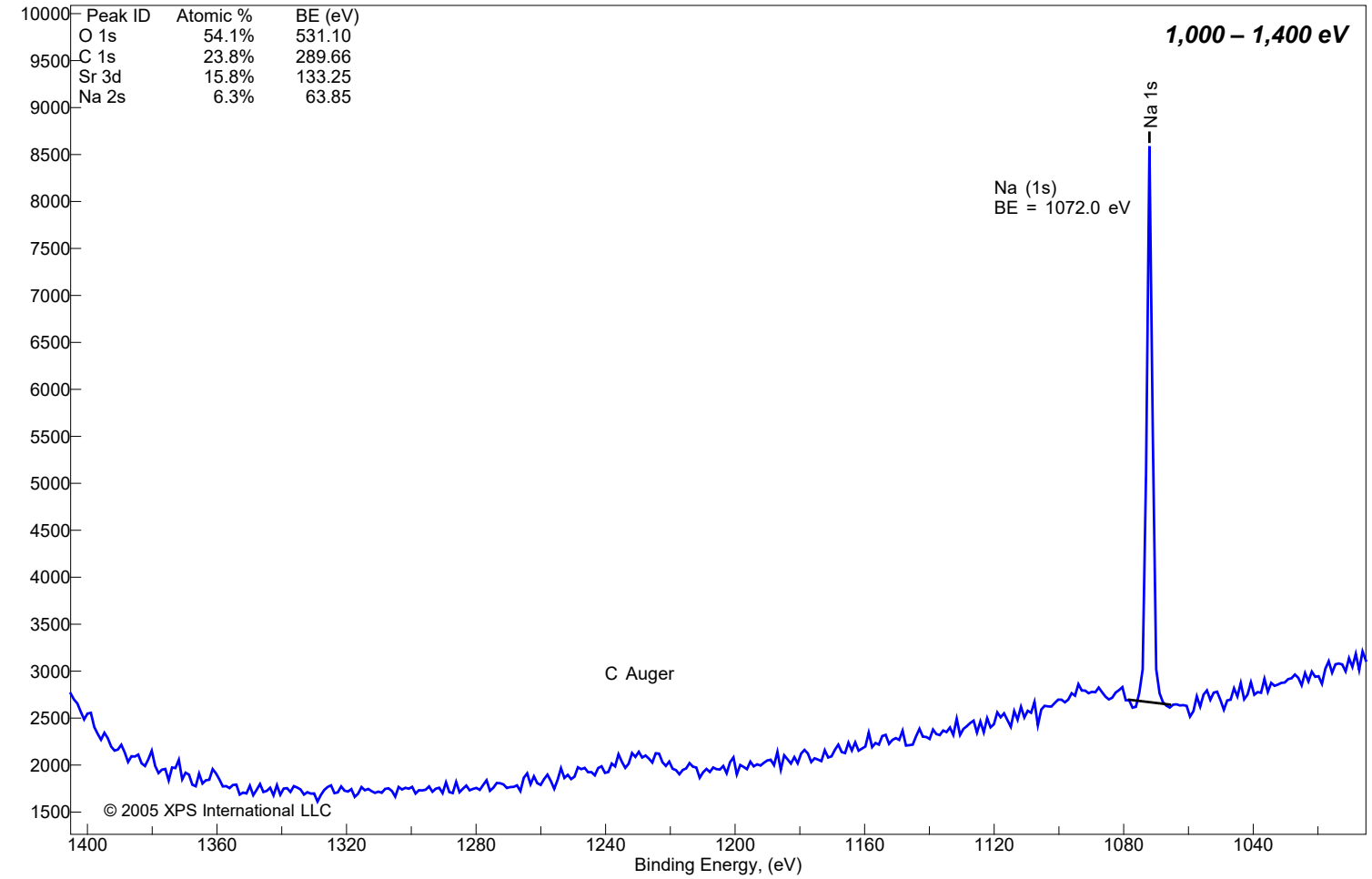


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SrO

Strontium (II) Oxide (FW = 103.62)

Sample Description: SrO (99.5%) RMC #71208-30, 3mm pellet, screen, 90 TOA

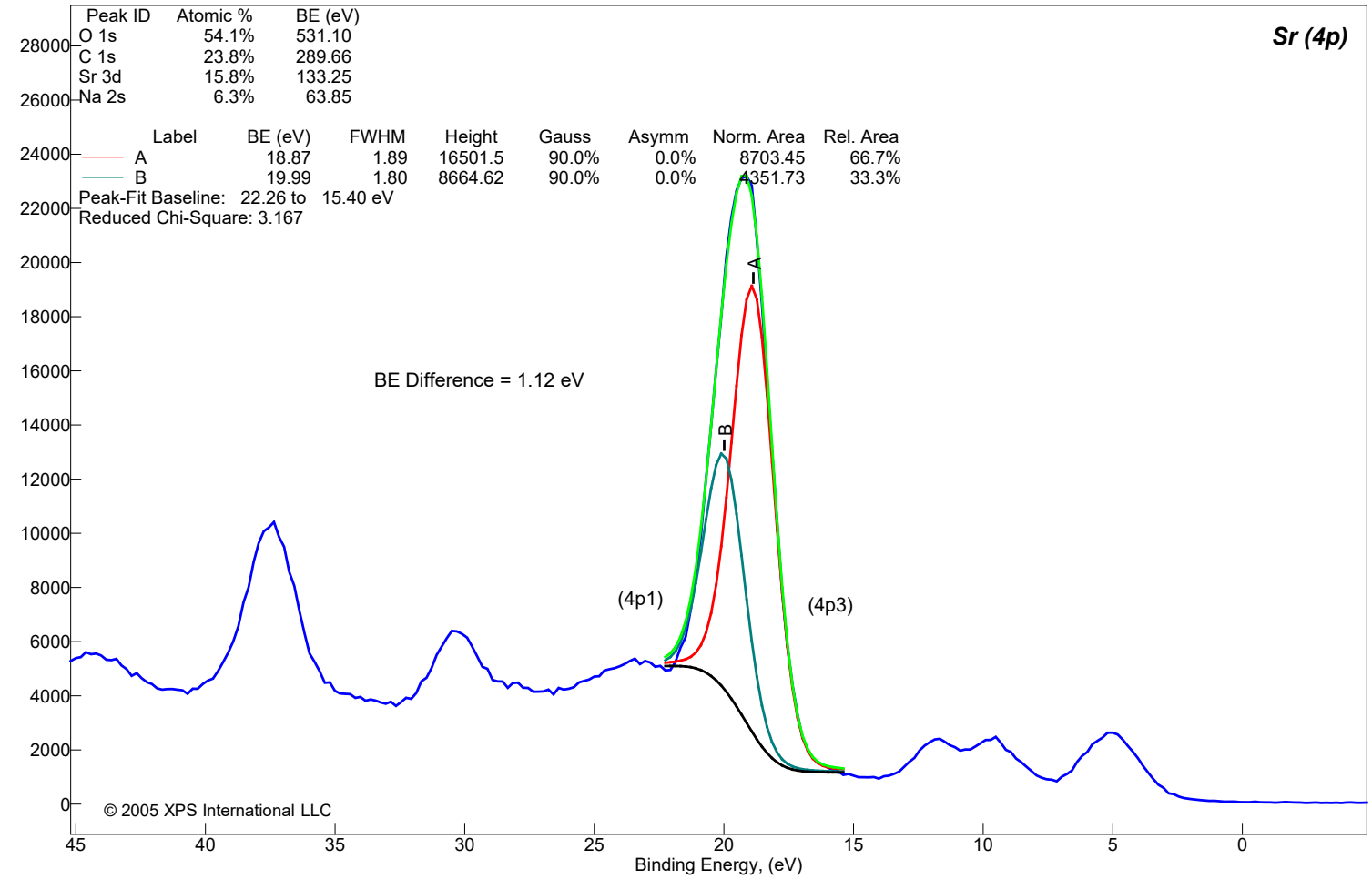


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SrO

Strontium (II) Oxide (FW = 103.62)

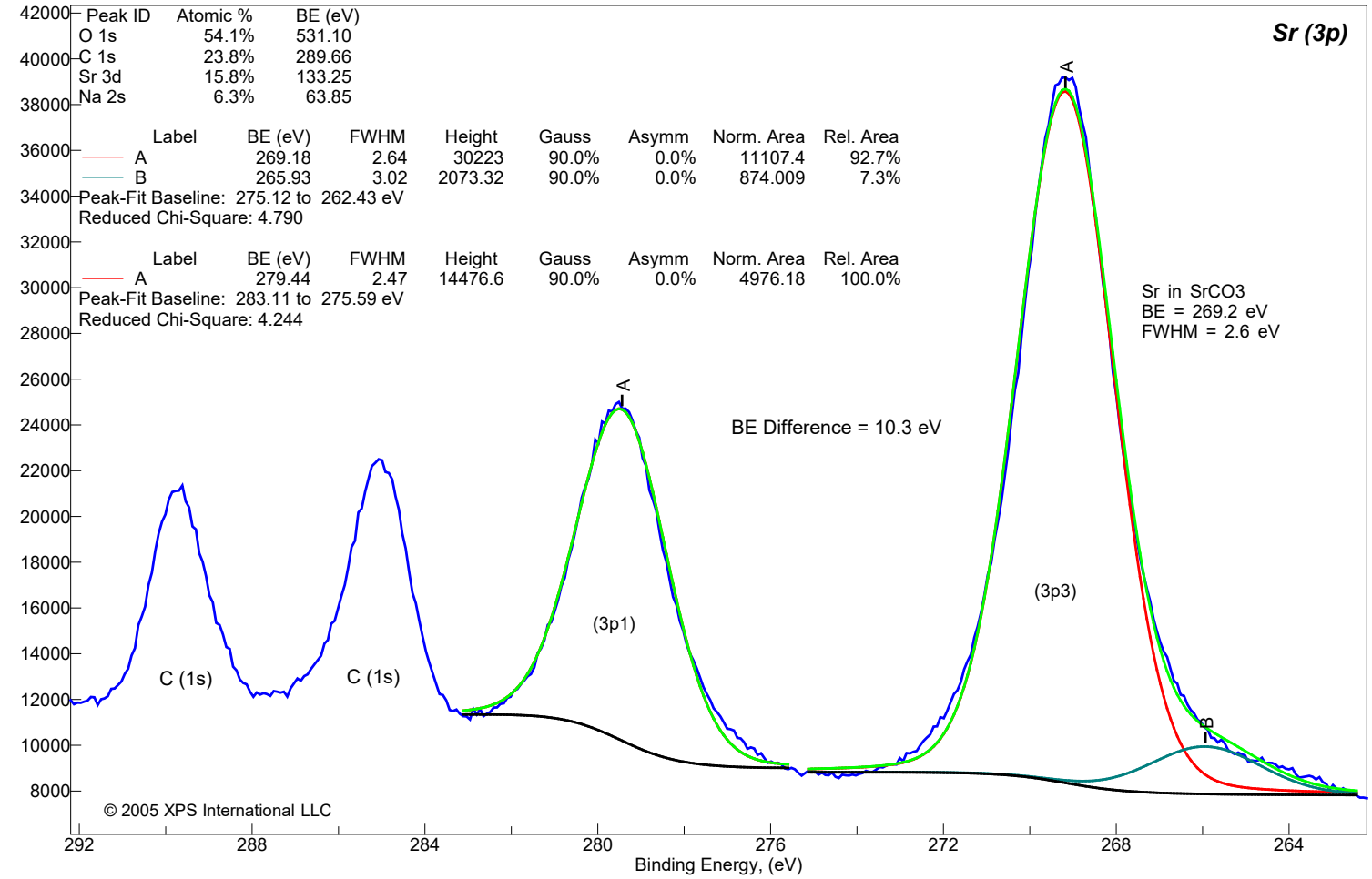
Sample Description: SrO (99.5%) RMC #71208-30, 3mm pellet, screen, 90 TOA



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Strontium (II) Oxide (FW = 103.62)

Sample Description: SrO (99.5%) RMC #71208-30, 3mm pellet, screen, 90 TOA



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$SrCO_3$

Strontium (II) Carbonate (FW = 147.63)
Surface Composition Table

Description: $SrCO_3$ (99.5%) from Rare Metallics Co. Lot# 71208-30, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white powder pressed into 3 mm pellet, mp 1100 C, d 3.7

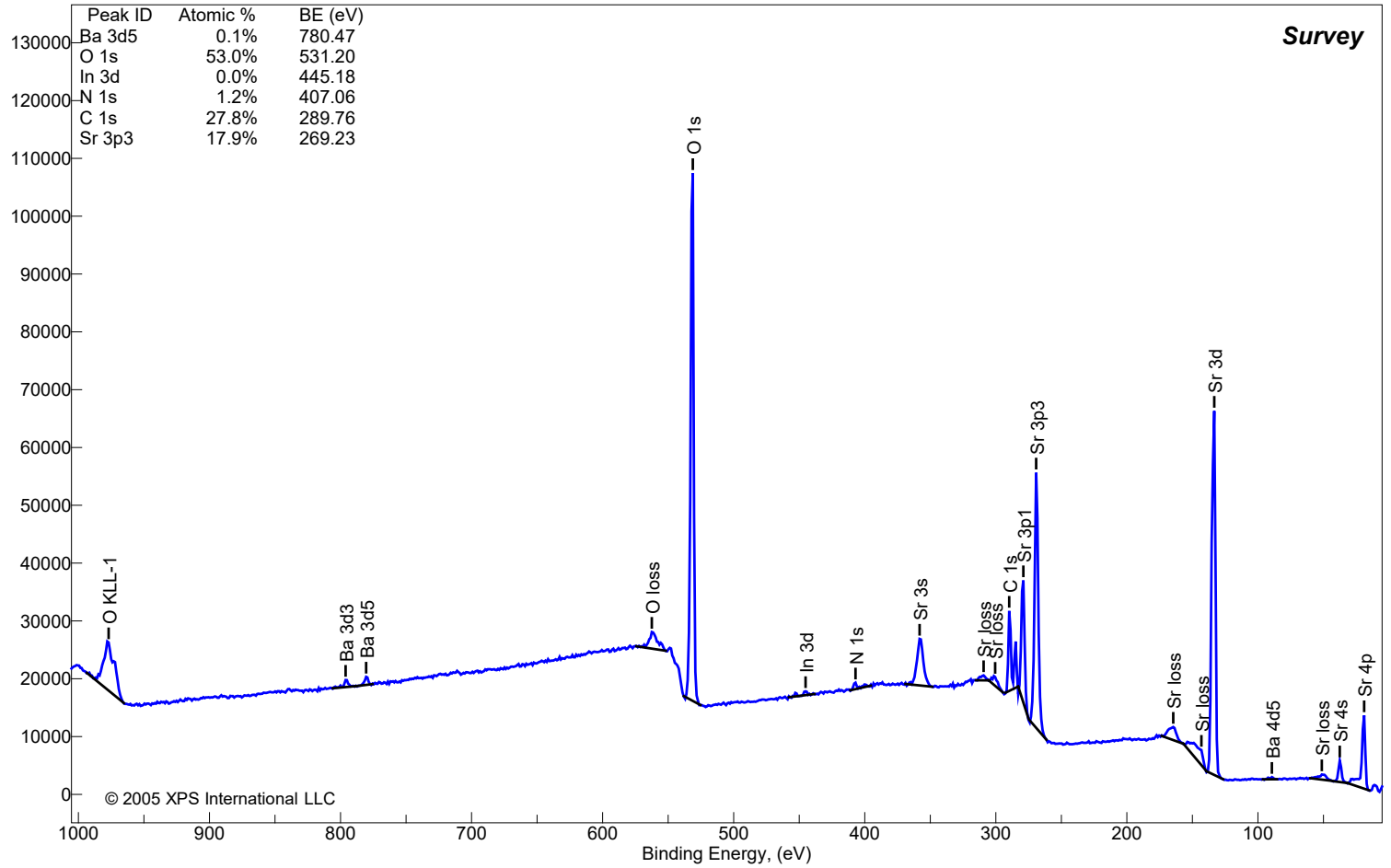
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Sr 4p	19.0	14.3	0.78	0.6	22,028	
Sr 4s	37.6	32.9	0.29	0.6	5,411	
Sr loss	51.2	46.5	0.00	0.6	3,523	
Ba 4d5	89.4	84.7	3.46	0.6	582	
Sr 3d	133.4	128.7	5.05	0.6	106,169	
Sr loss	143.1	138.4	0.00	0.6	14,333	
Sr loss	164.6	159.9	0.00	0.6	8,013	
Sr 3p3	269.2	264.5	4.37	0.6	75,042	17.9%
Sr 3p1	279.0	274.3	2.25	0.6	33,508	
C 1s	289.8	285.1	1.00	0.6	26,447	27.8%
Sr loss	300.5	295.8	0.00	0.6	3,995	
Sr loss	309.3	304.6	0.00	0.6	2,235	
Sr 3s	358.2	353.5	1.86	0.6	22,609	
N 1s	407.1	402.4	1.80	0.6	1,913	1.2%
In 3d	445.2	440.5	22.54	0.6	959	
O 1s	531.2	526.5	2.93	0.6	129,202	53.0%
O loss	562.5	557.8	0.00	0.6	10,854	
Ba 3d5	780.5	775.8	25.84	0.6	1,664	0.1%
Ba 3d3	796.1	791.4	17.92	0.6	2,598	
O KLL-1	977.0	972.3	0.70	0.6	41,957	

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$SrCO_3$

Strontium (II) Carbonate (FW = 147.63)

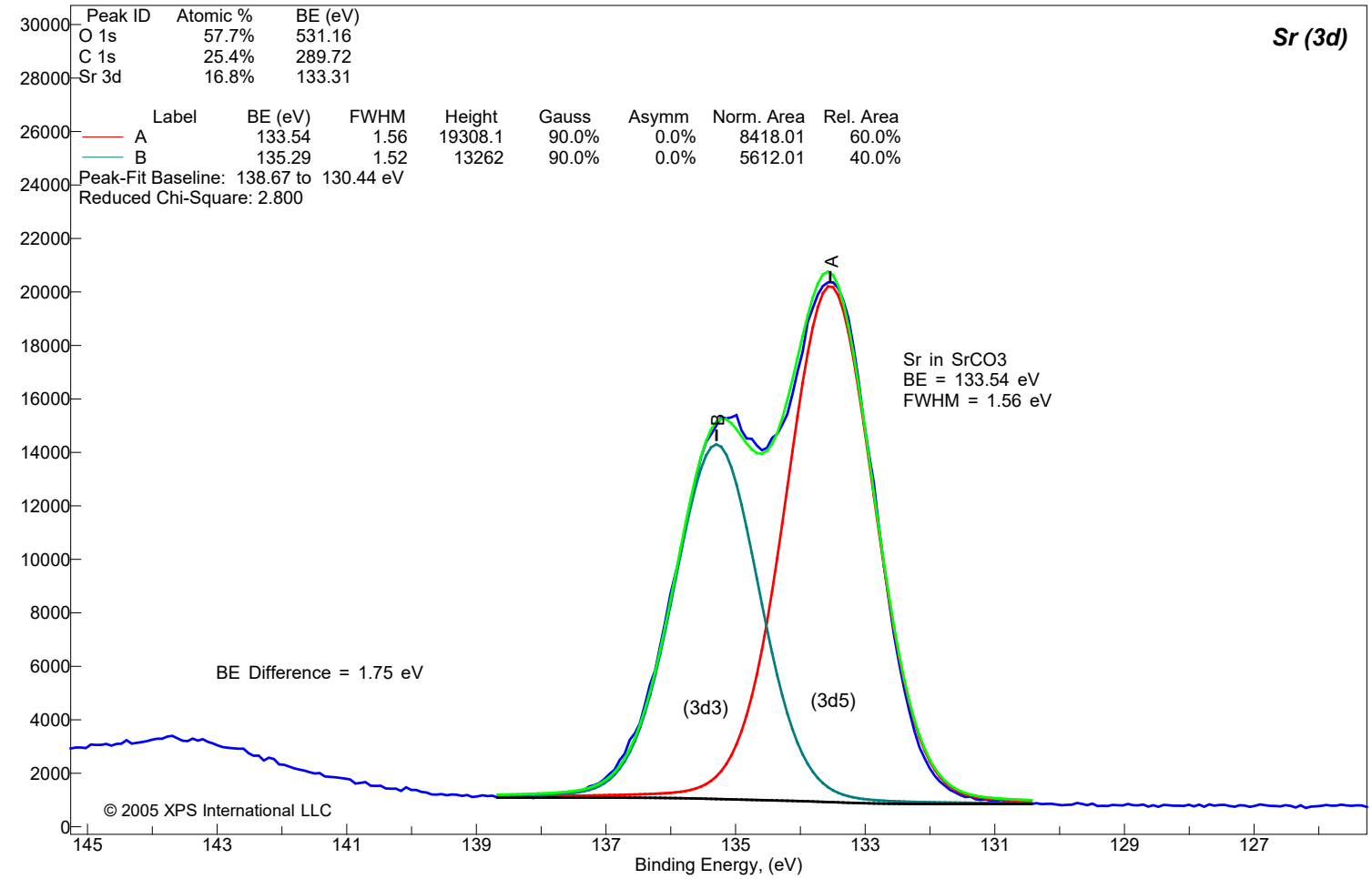
Sample Description: SrCO3 powder
pressed onto Indium foil, analyzed at 90 deg TOA, mesh-screen at 1 mm



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Strontium (II) Carbonate (FW = 147.63)

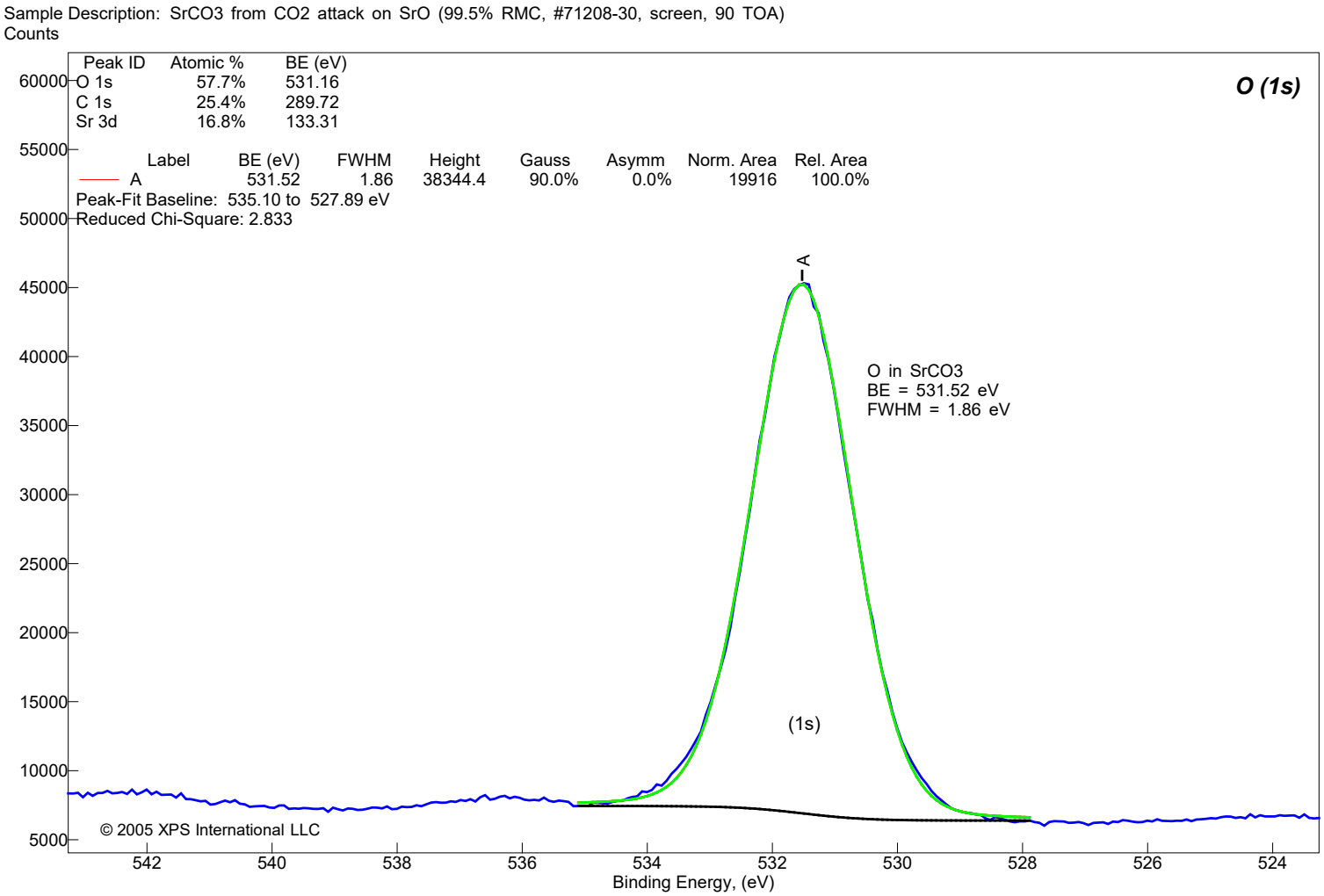
Sample Description: SrCO3 from CO2 attack on SrO (99.5% RMC, #71208-30, screen, 90 TOA)



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$SrCO_3$

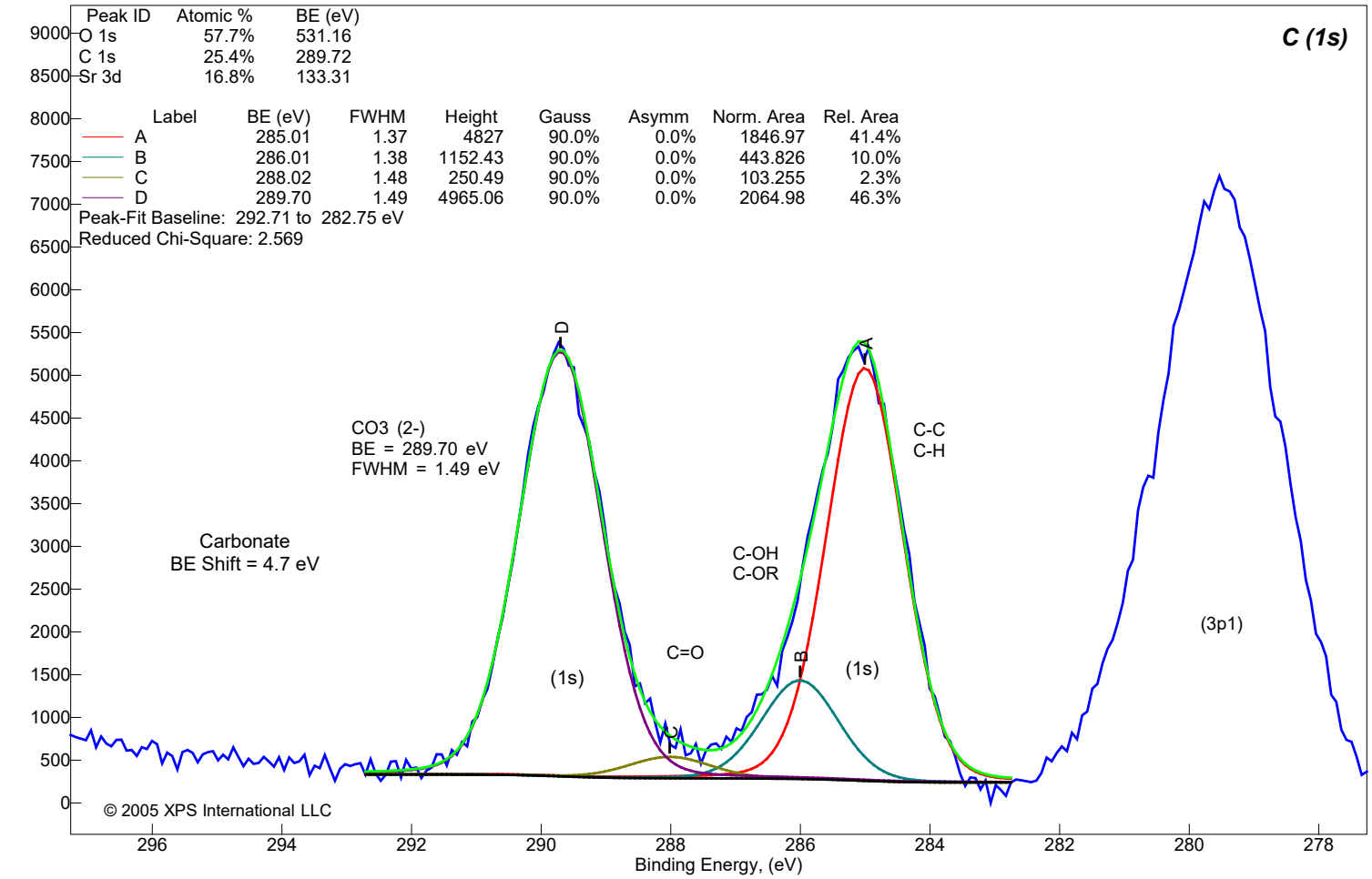
Strontium (II) Carbonate (FW = 147.63)



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Strontium (II) Carbonate (FW = 147.63)

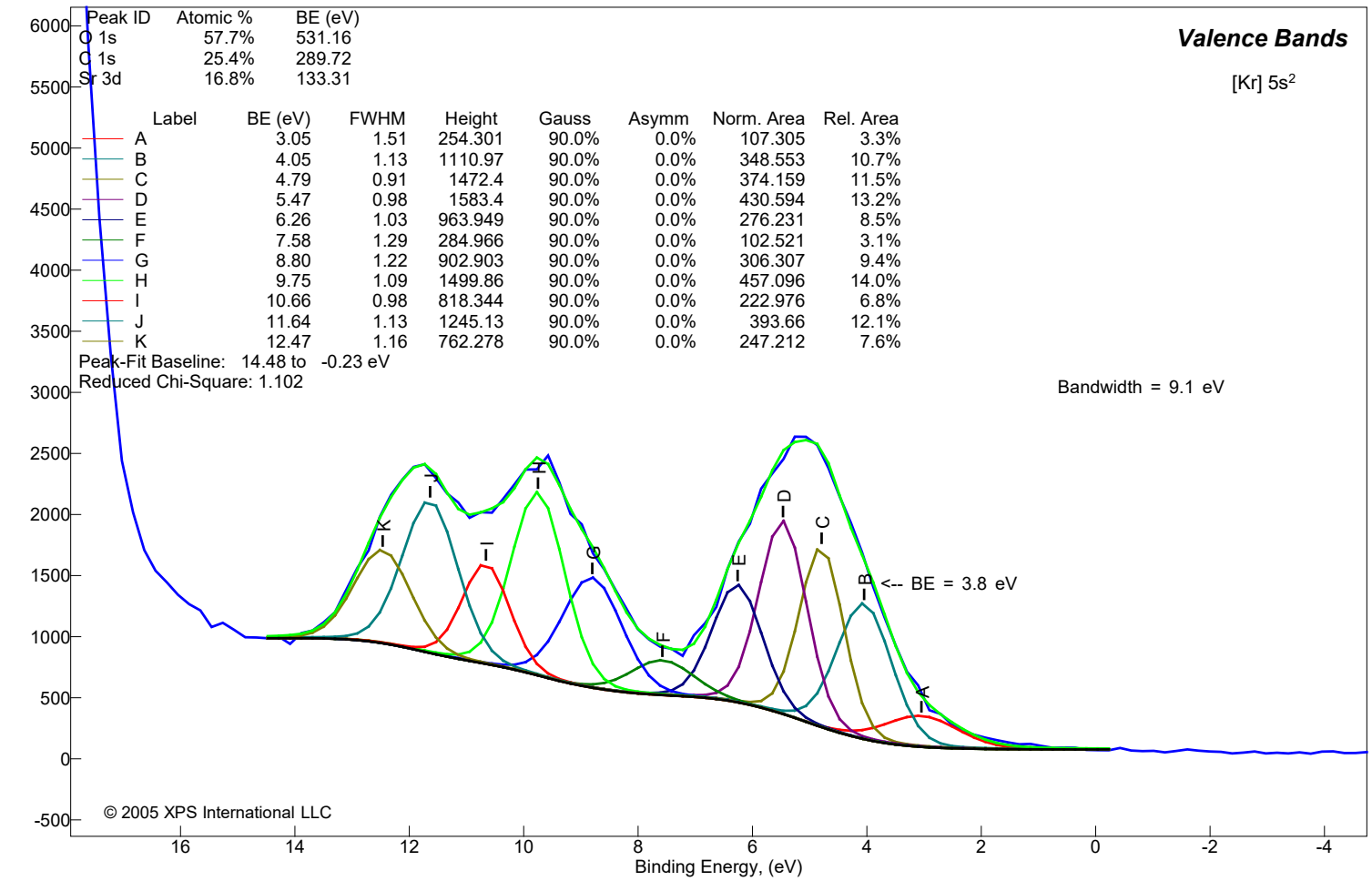
Sample Description: SrCO3 from CO2 attack on SrO (99.5% RMC, #71208-30, screen, 90 TOA)



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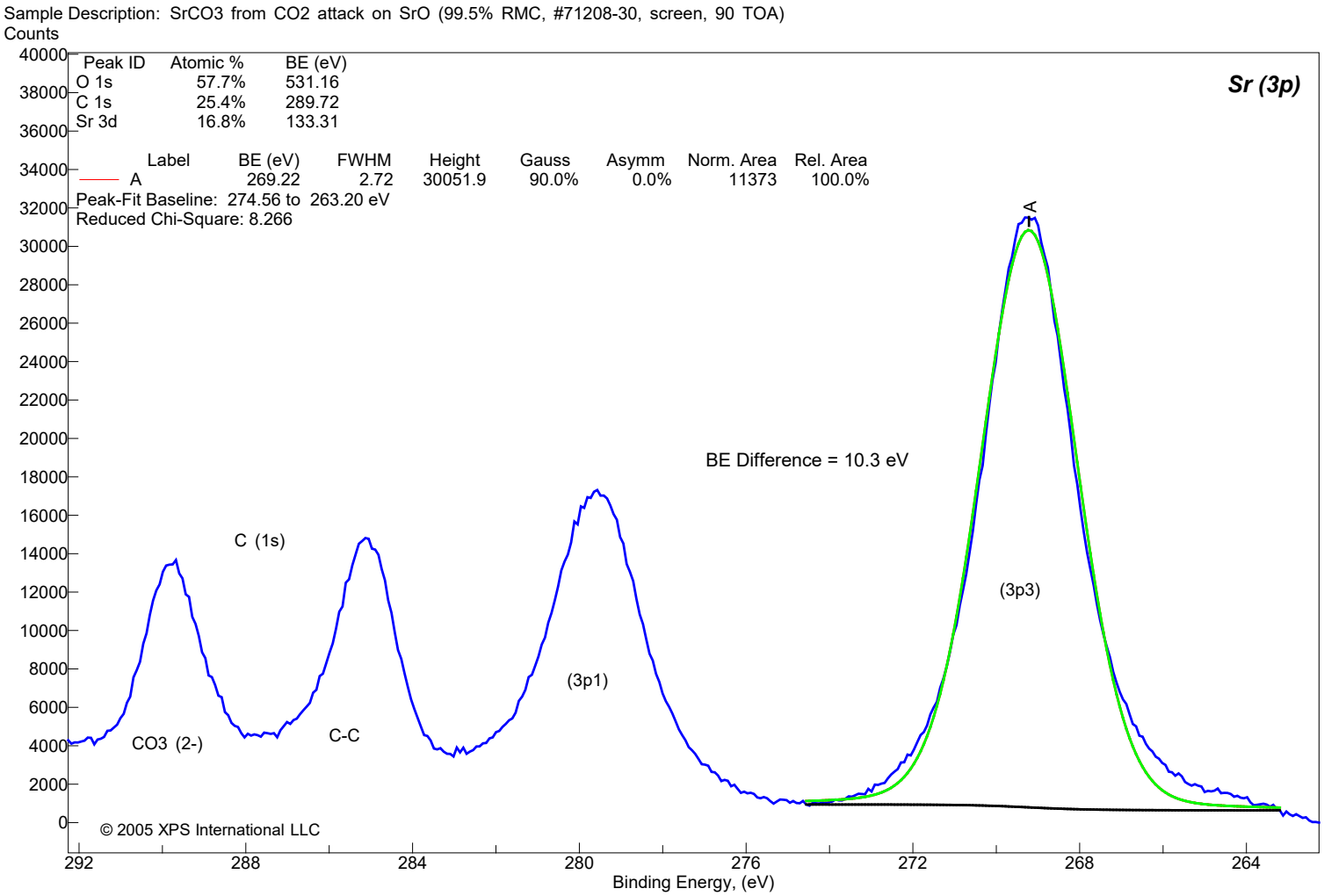
Strontium (II) Carbonate (FW = 147.63)

Sample Description: SrCO3 from CO2 attack on SrO (99.5% RMC, #71208-30, screen, 90 TOA)



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Strontium (II) Carbonate (FW = 147.63)



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Ta_2O_5

Tantalum (V) Oxide (FW = 441.90)
Surface Composition Table

Description: Ta_2O_5 (99.99%) from Aldrich Co. Lot# 09322CV, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white powder pressed into 3 mm pellet, mp 1800 C, d 8.2, sol in HF

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Ta 4f	27.6	19.6	8.62	1.4	34,639	
Ta 5p3	38.3	30.3	0.75	1.4	9,192	
Ta loss	56.9	48.9	0.00	1.4	556	
Ta 5s	73.5	65.5	0.36	1.4	2,094	
Ta 4d5	230.9	222.9	9.24	1.4	23,665	
Ta 4d3	242.6	234.6	6.40	1.4	17,089	
Ta loss	259.2	251.2	0.00	1.4	2,855	
C 1s	285.6	277.6	1.00	1.4	8,161	38.9%
Ta 4p3	405.8	397.8	5.02	1.4	12,415	13.7%
Ta loss	419.5	411.5	0.00	1.4	953	
Ta 4p1	467.4	459.4	2.08	1.4	4,216	
O 1s	531.9	523.9	2.93	1.4	21,185	47.5%
O loss	546.6	538.6	0.00	1.4	3,916	
Ta 4s	568.1	560.1	1.79	1.4	1,639	
O KLL-1	976.7	968.7	0.70	1.4	3,608	
O Auger	996.3	988.3	0.00	1.4	1,337	

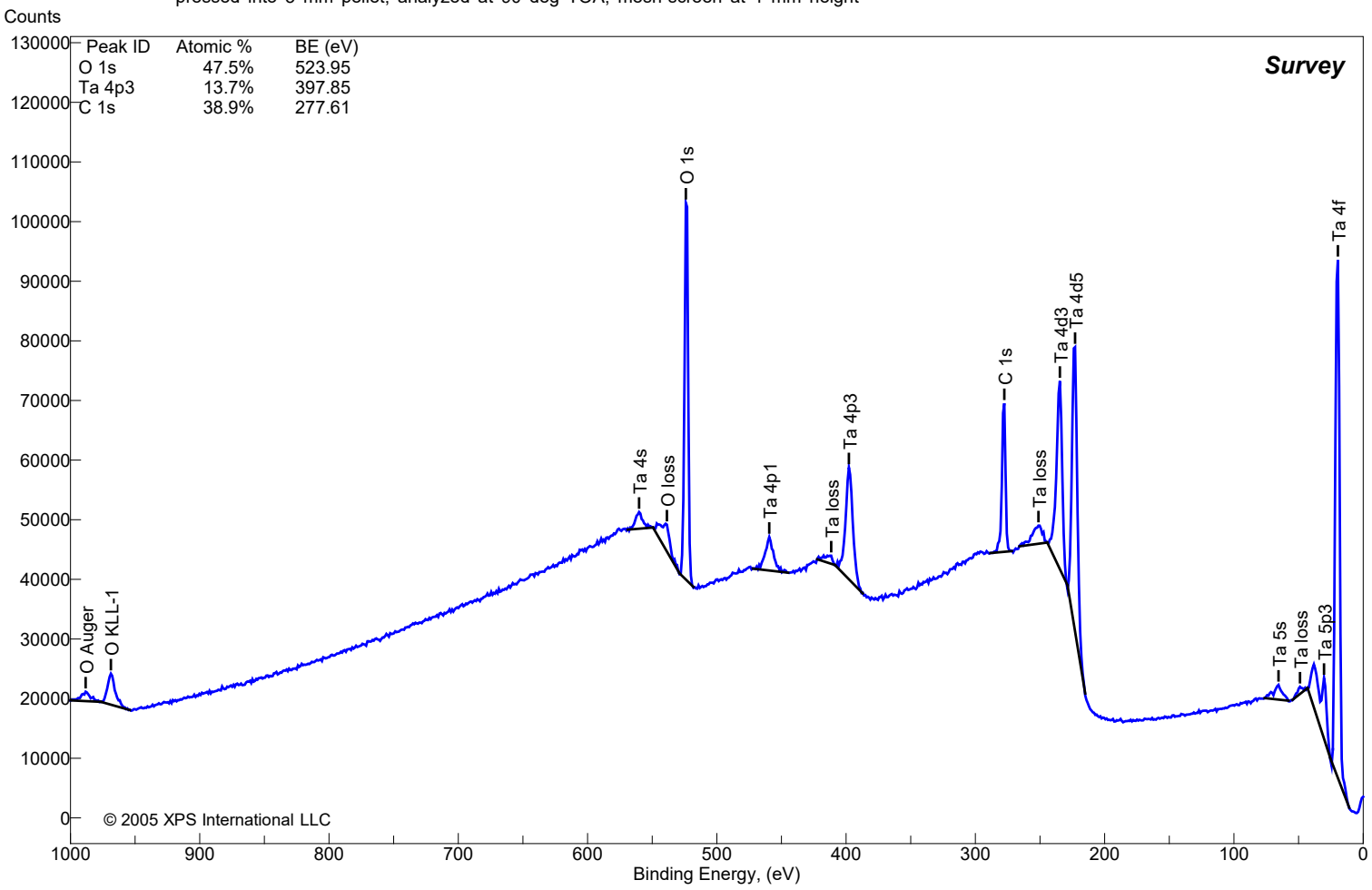
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Ta_2O_5

Tantalum (V) Oxide (FW = 441.90)

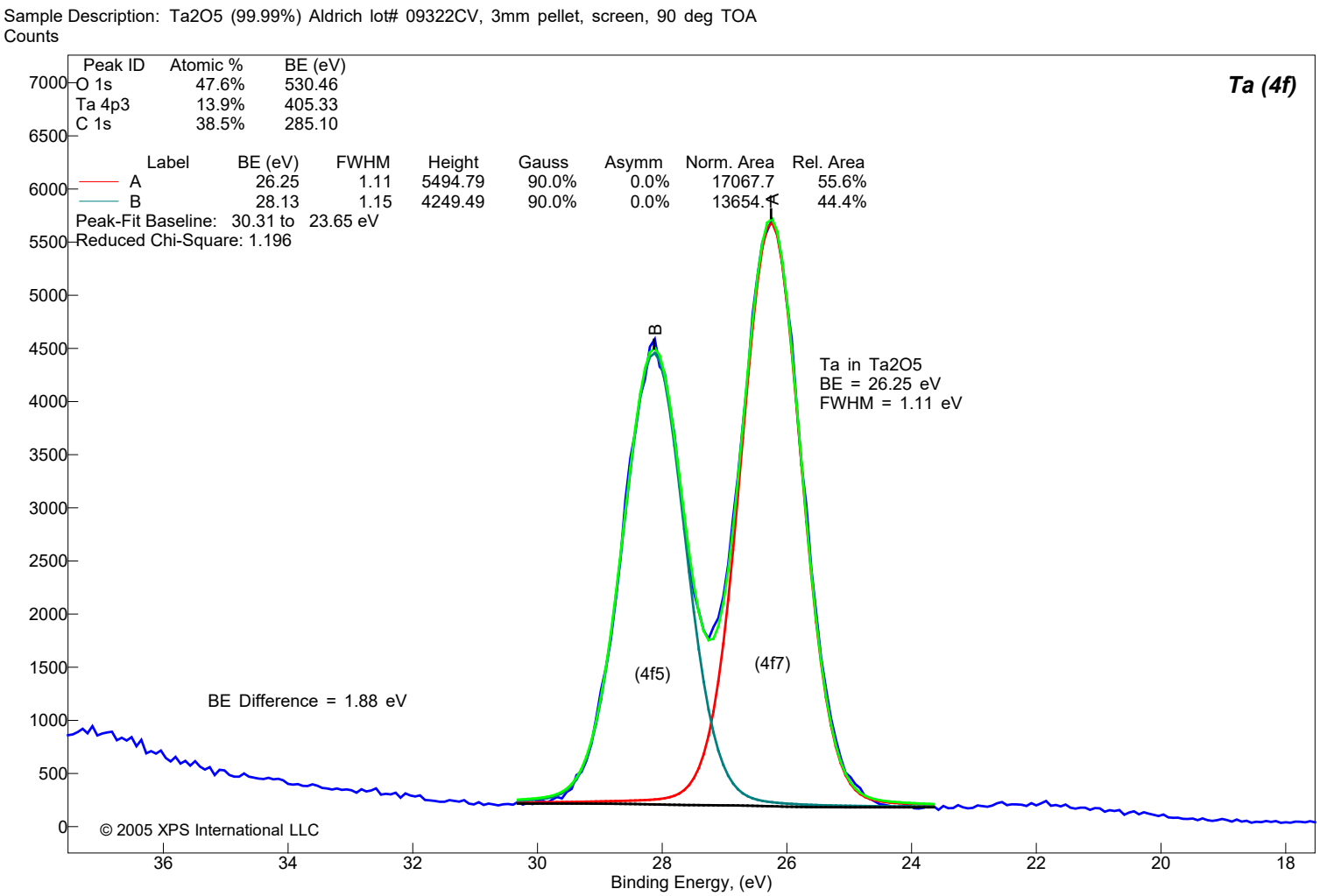
Sample Description: Ta2O5 (99.99%) from Aldrich lot# 09322CV
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Ta_2O_5

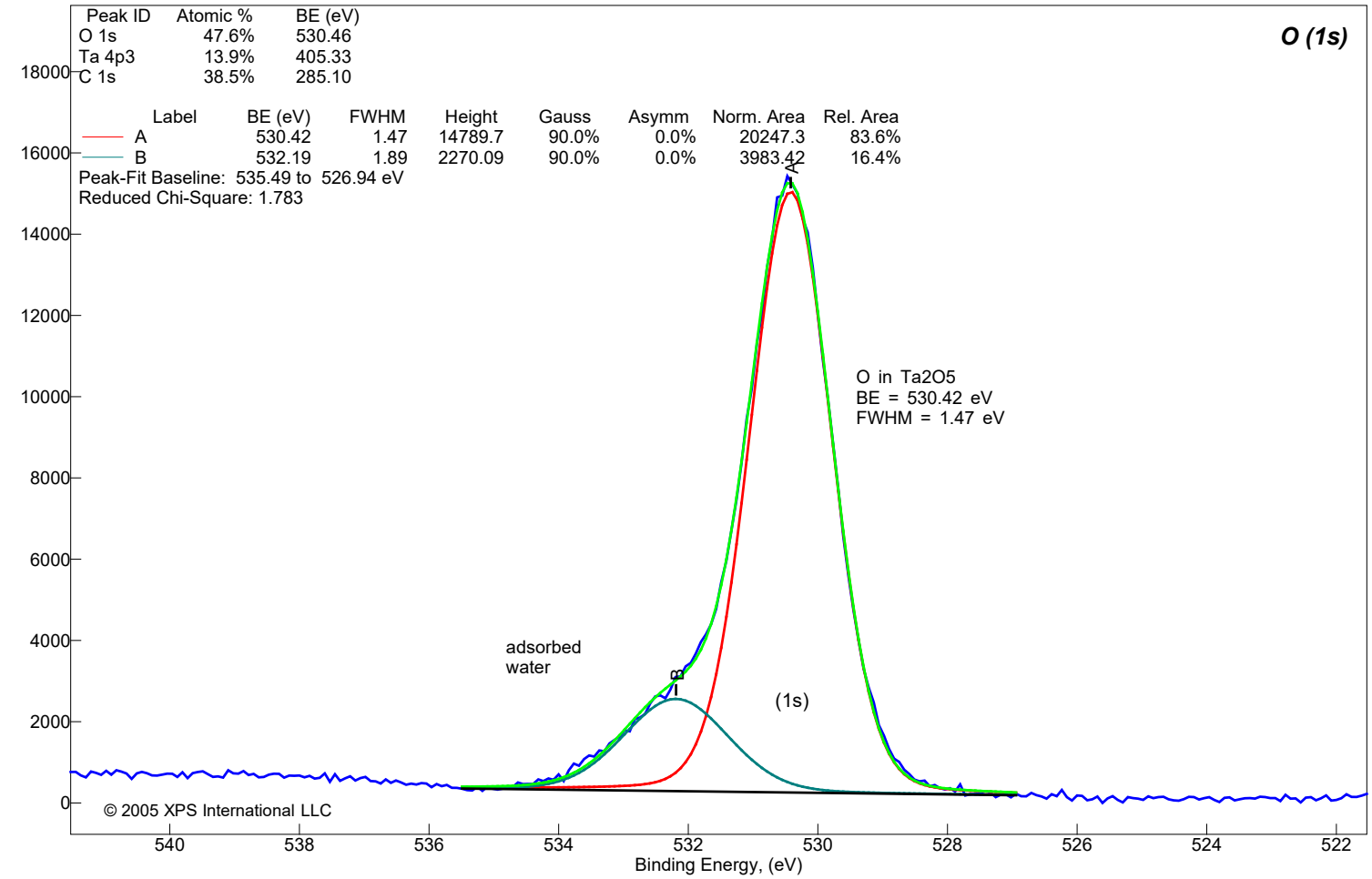
Tantalum (V) Oxide (FW = 441.90)



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Tantalum (V) Oxide (FW = 441.90)

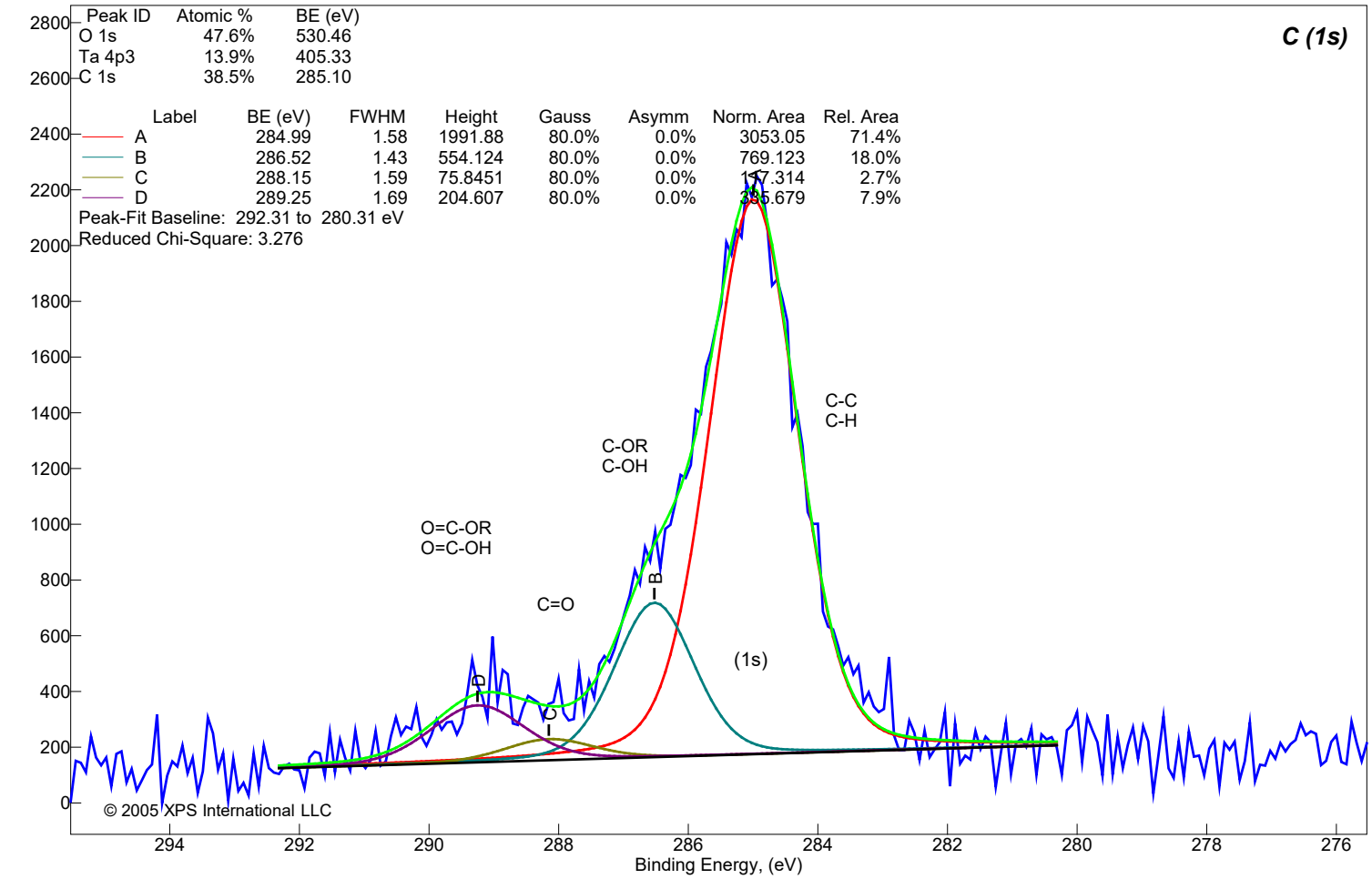
Sample Description: Ta2O5 (99.99%) Aldrich lot# 09322CV, 3mm pellet, screen, 90 deg TOA



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Tantalum (V) Oxide (FW = 441.90)

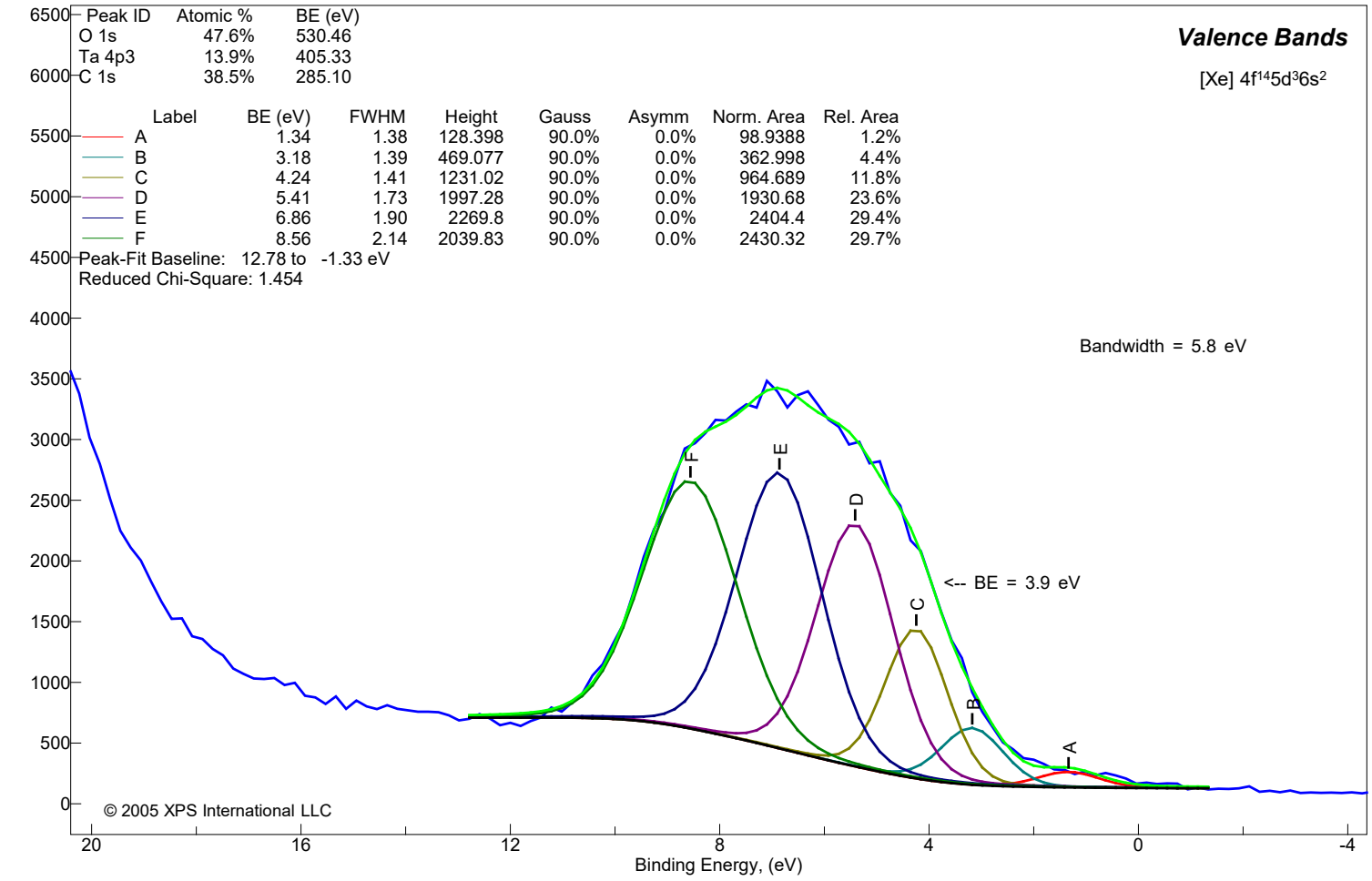
Sample Description: Ta2O5 (99.99%) Aldrich lot# 09322CV, 3mm pellet, screen, 90 deg TOA



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Tantalum (V) Oxide (FW = 441.90)

Sample Description: Ta2O5 (99.99%) Aldrich lot# 09322CV, 3mm pellet, screen, 90 deg TOA

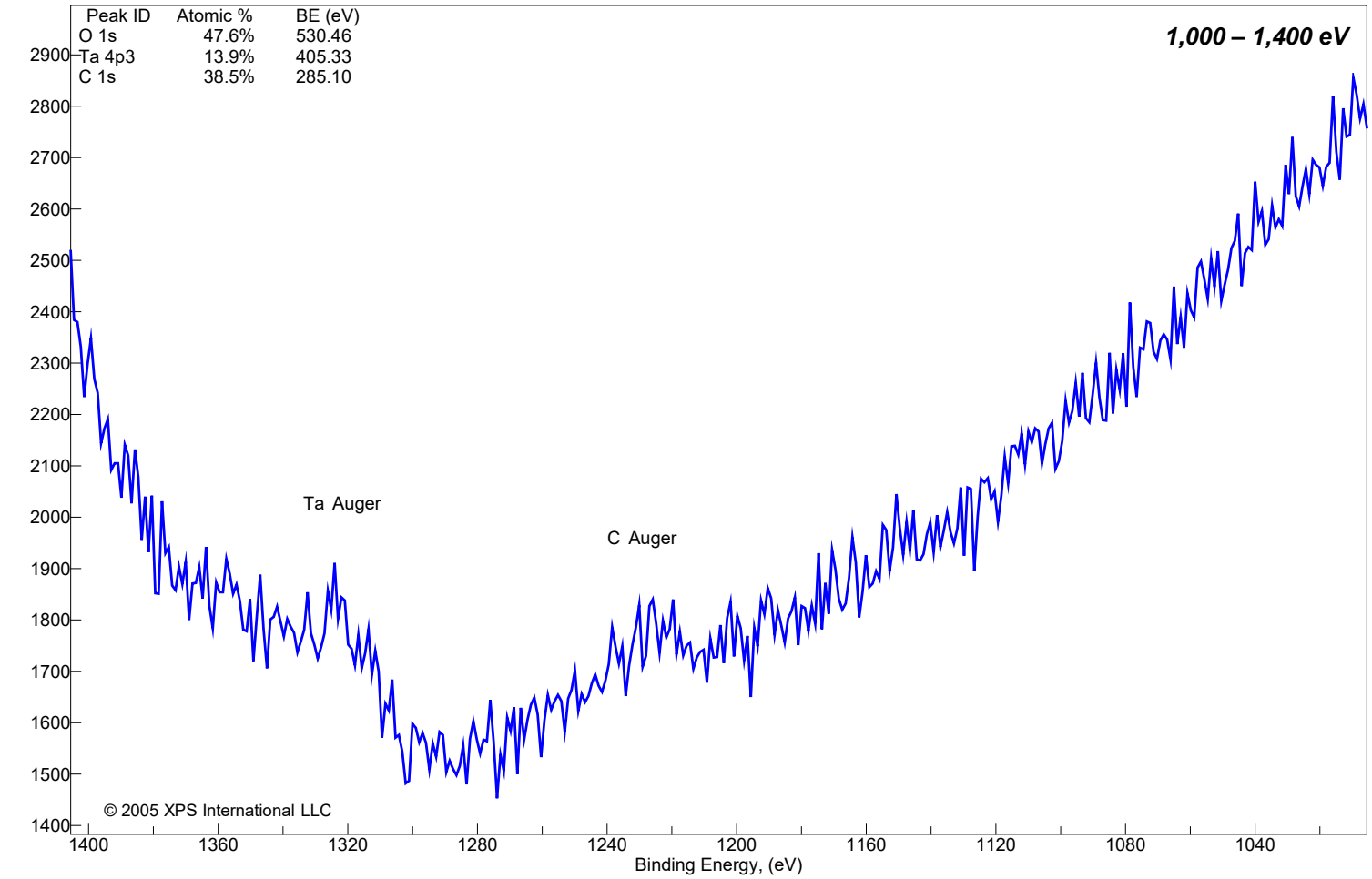


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Ta_2O_5

Tantalum (V) Oxide (FW = 441.90)

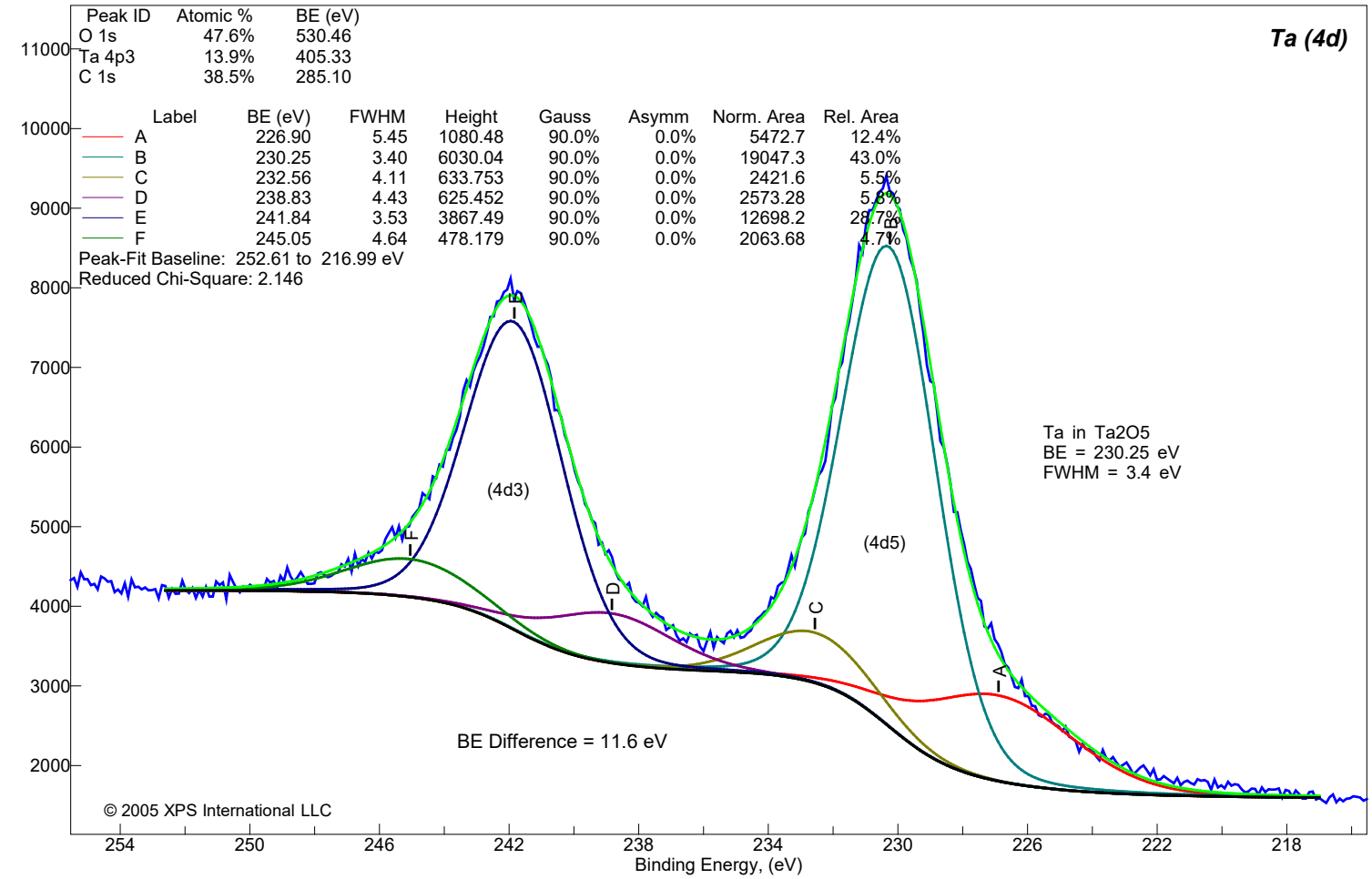
Sample Description: Ta2O5 (99.99%) Aldrich lot# 09322CV, 3mm pellet, screen, 90 deg TOA



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Tantalum (V) Oxide (FW = 441.90)

Sample Description: Ta2O5 (99.99%) Aldrich lot# 09322CV, 3mm pellet, screen, 90 deg TOA

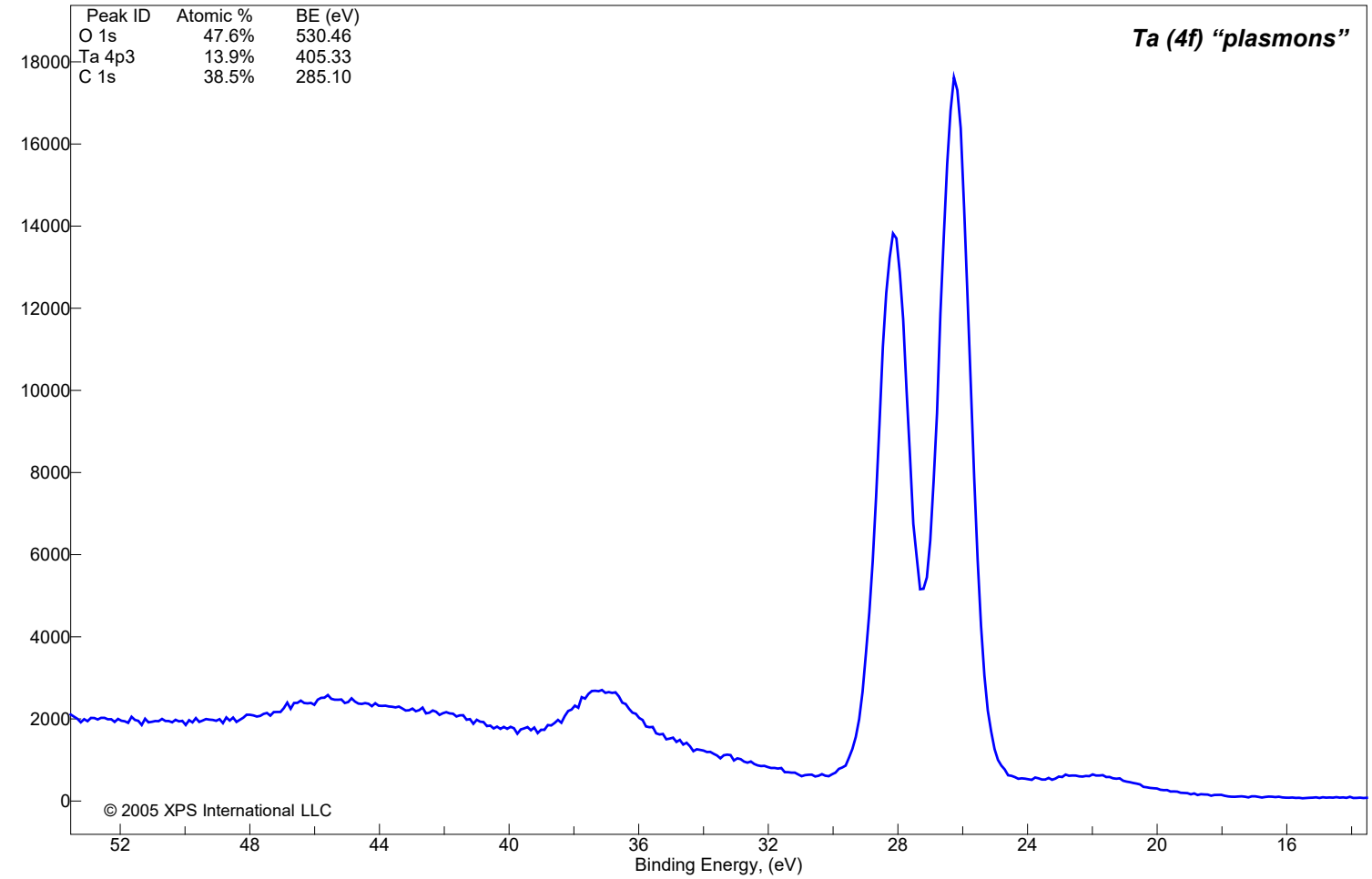


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Ta_2O_5

Tantalum (V) Oxide (FW = 441.90)

Sample Description: Ta2O5 (99.99%) Aldrich lot# 09322CV, 3mm pellet, screen, 90 deg TOA



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Tb_4O_7

Terbium Oxide (FW = 747.69)
Surface Composition Table

Description: Tb_4O_7 (99+%) from Toshiba Corp. (gift), analyzed at 90 deg TOA, mesh at 1 mm, non-conductive brown powder pressed into 3 mm pellet, mp 2340 C,

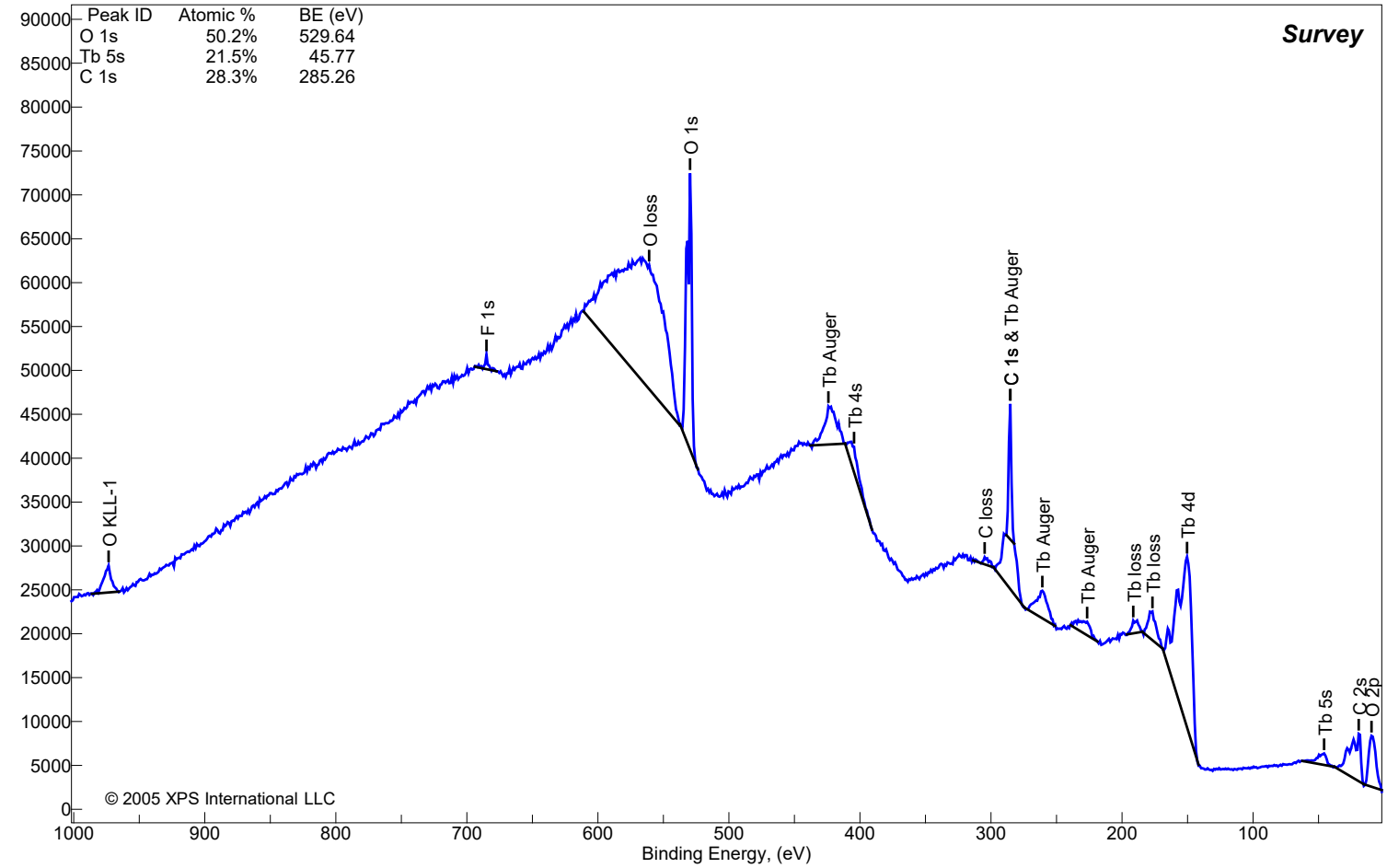
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2p	9.6	9.6	0.02	1.4	19,761	
C 2s	19.4	19.4	0.15	1.4	26,018	
Tb 5s	45.8	45.8	0.28	1.4	5,038	21.5%
Tb 4d	150.4	150.4	10.87	1.4	122,618	
Tb loss	176.8	176.8	0.00	1.4	11,535	
Tb loss	191.4	191.4	0.00	1.4	4,328	
Tb Auger	226.6	226.6	0.00	1.4	8,051	
Tb Auger	260.8	260.8	0.00	1.4	14,399	
C 1s	285.3	285.3	1.00	1.4	18,304	28.3%
C loss	304.8	304.8	0.00	1.4	1,305	
Tb 4s	404.5	404.5	1.54	1.4	11,504	
Tb Auger	424.1	424.1	0.00	1.4	23,479	
O 1s	529.6	529.6	2.93	1.4	69,396	50.2%
O loss	560.9	560.9	0.00	1.4	307,891	
F 1s	685.1	685.1	4.43	1.4	2,181	
O KLL-1	973.4	973.4	0.70	1.4	10,587	
Tb 3d5	1242.8	1242.8	49.42	1.2	11,014	

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Tb_4O_7

Terbium Oxide (FW = 747.69)

Sample Description: Tb3O7 (brown lump, crushed into powder)
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height

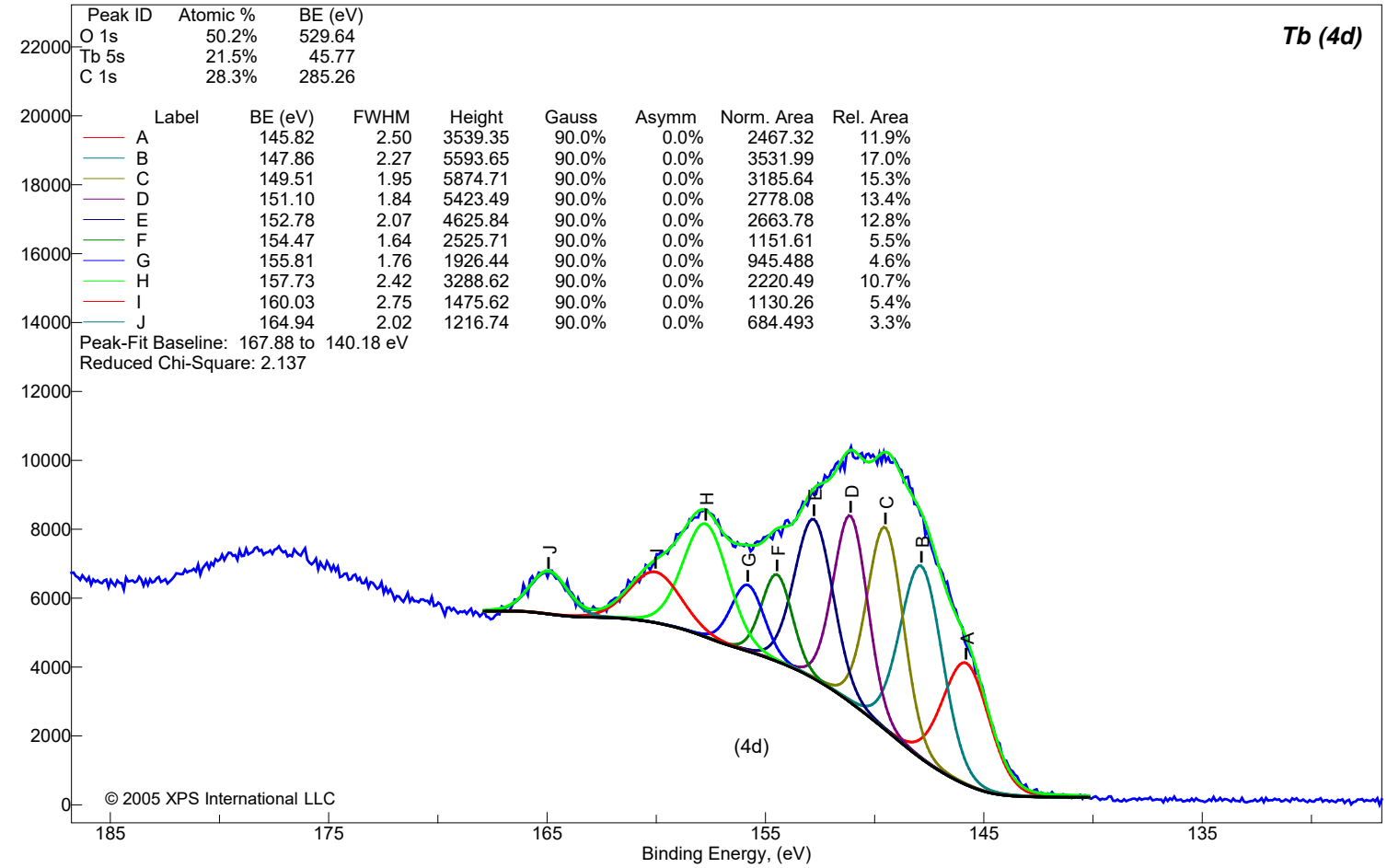


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Tb_4O_7

Terbium Oxide (FW = 747.69)

Sample Description: Tb3O7 (brown lump) 3mm plt 90 TOA mesh
mesh at <1mm

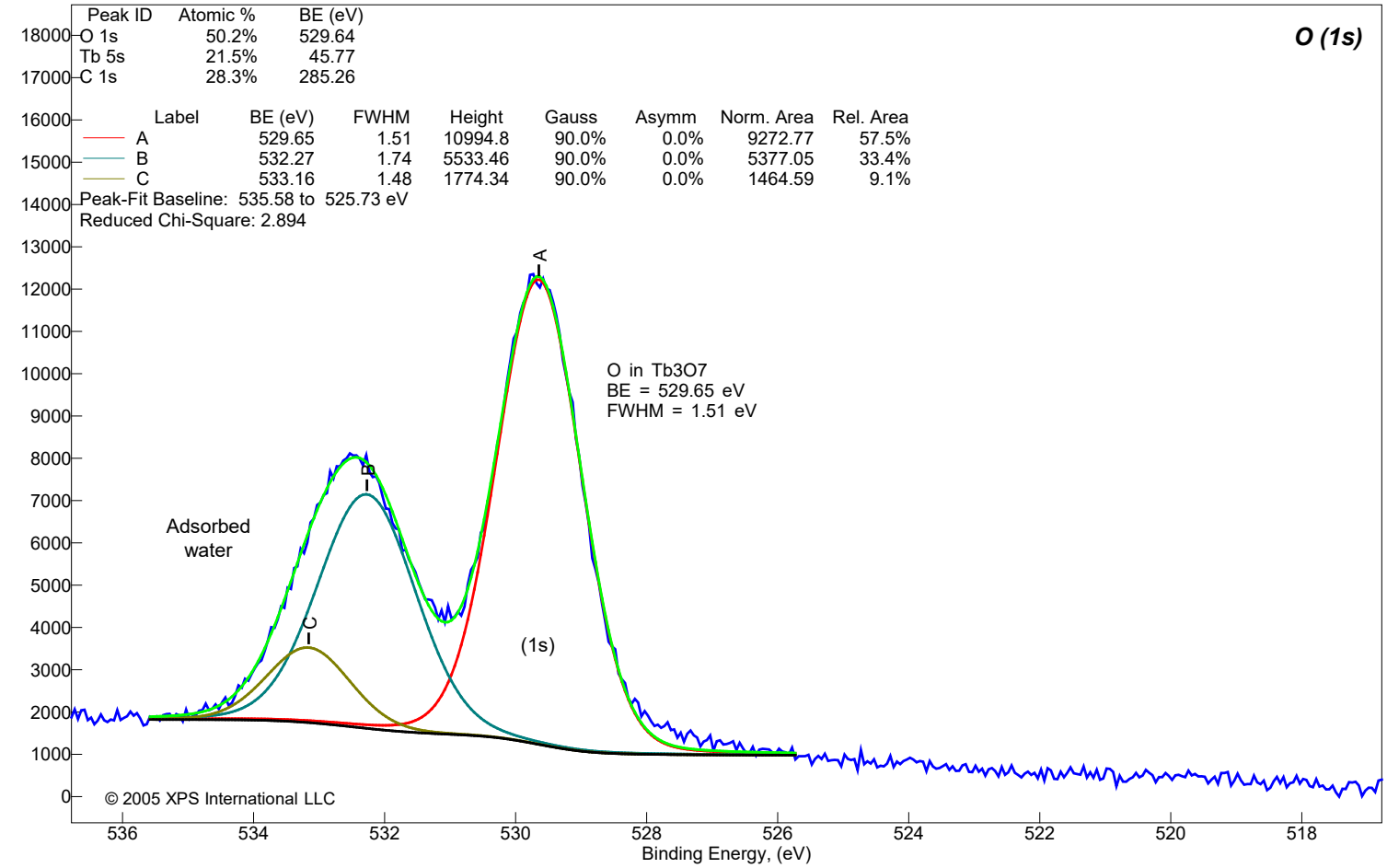


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Tb_4O_7

Terbium Oxide (FW = 747.69)

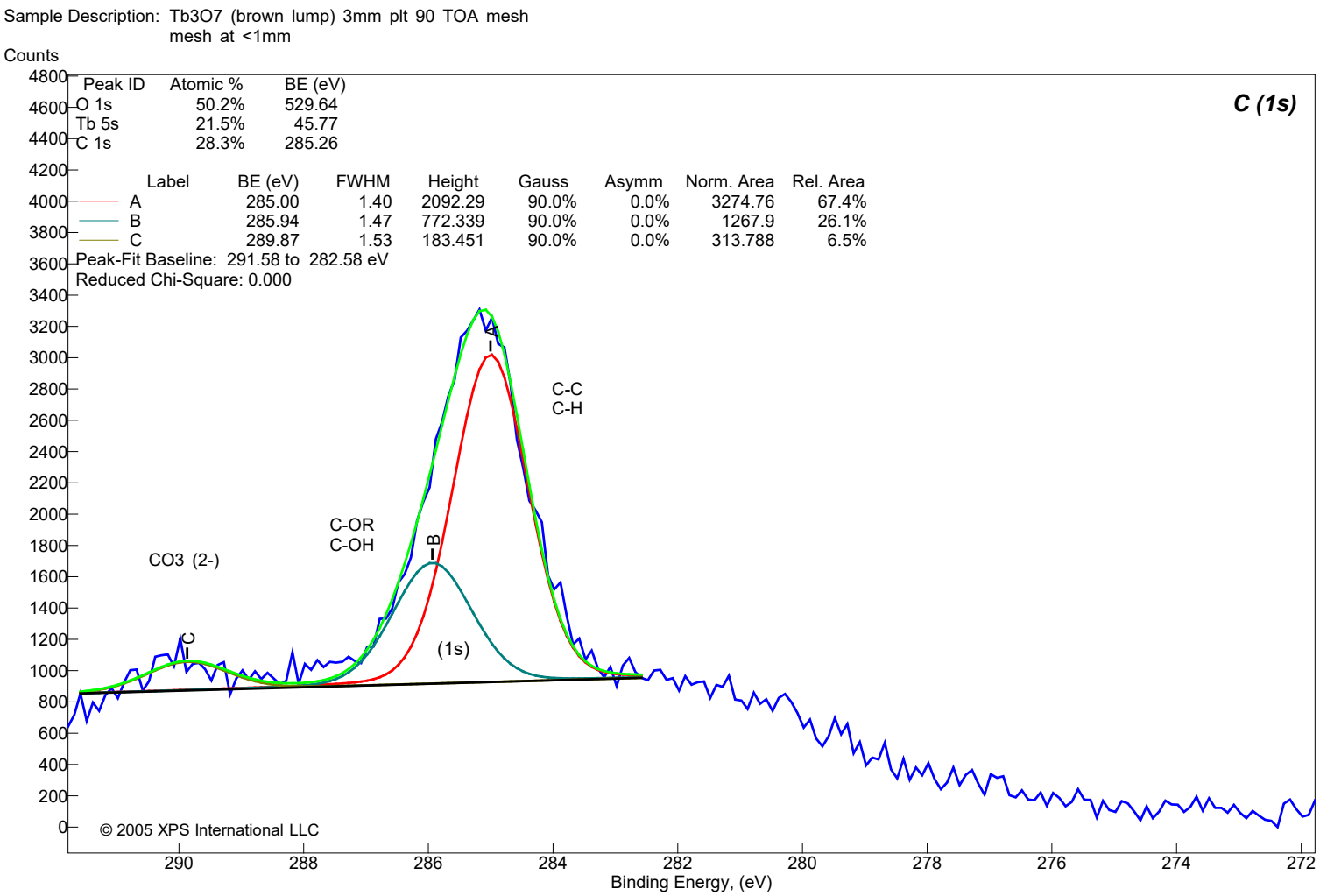
Sample Description: Tb3O7 (brown lump) 3mm plt 90 TOA mesh
mesh at <1mm



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Tb_4O_7

Terbium Oxide (FW = 747.69)

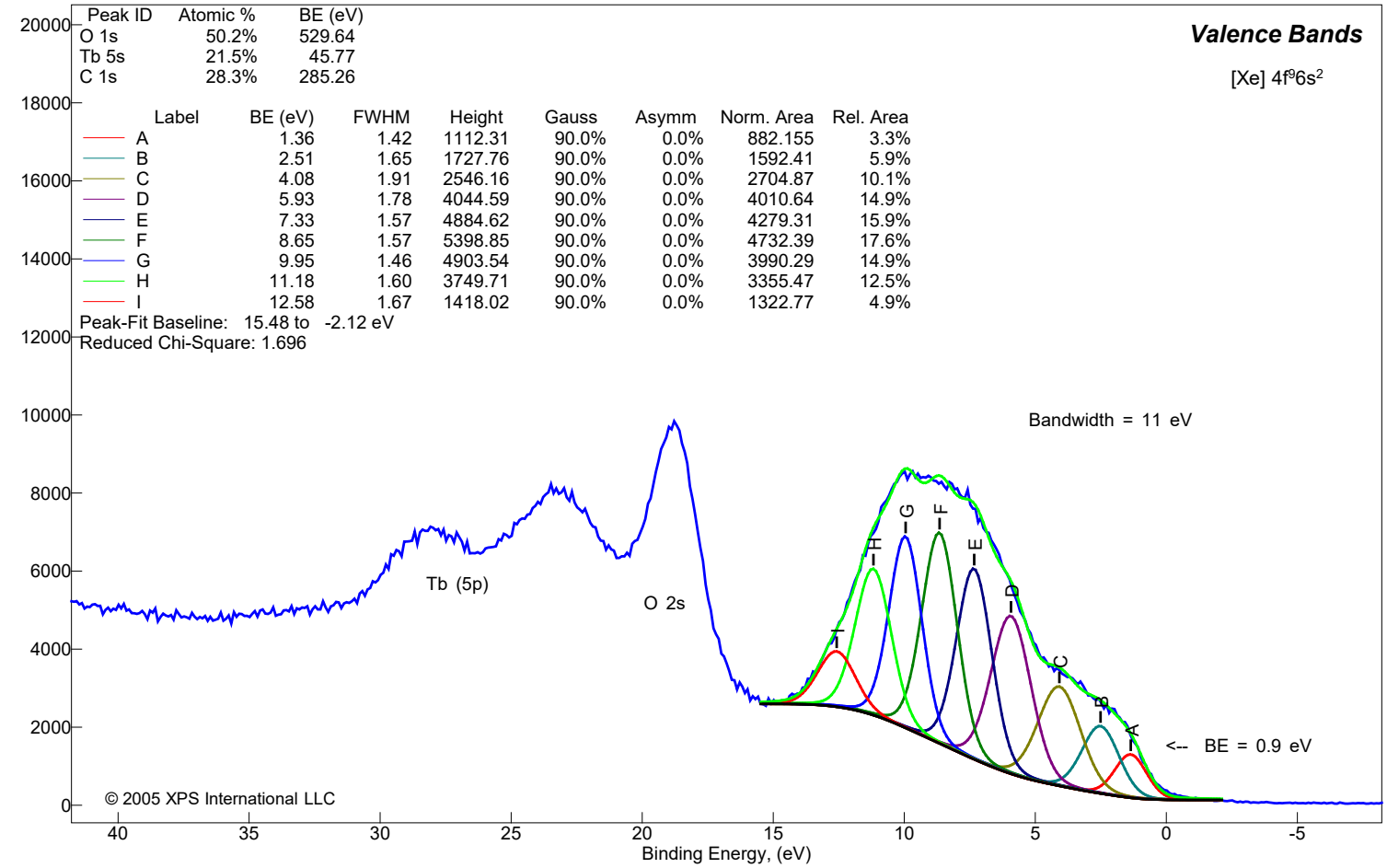


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Tb_4O_7

Terbium Oxide (FW = 747.69)

Sample Description: Tb3O7 (brown lump) 3mm plt 90 TOA mesh
mesh at <1mm

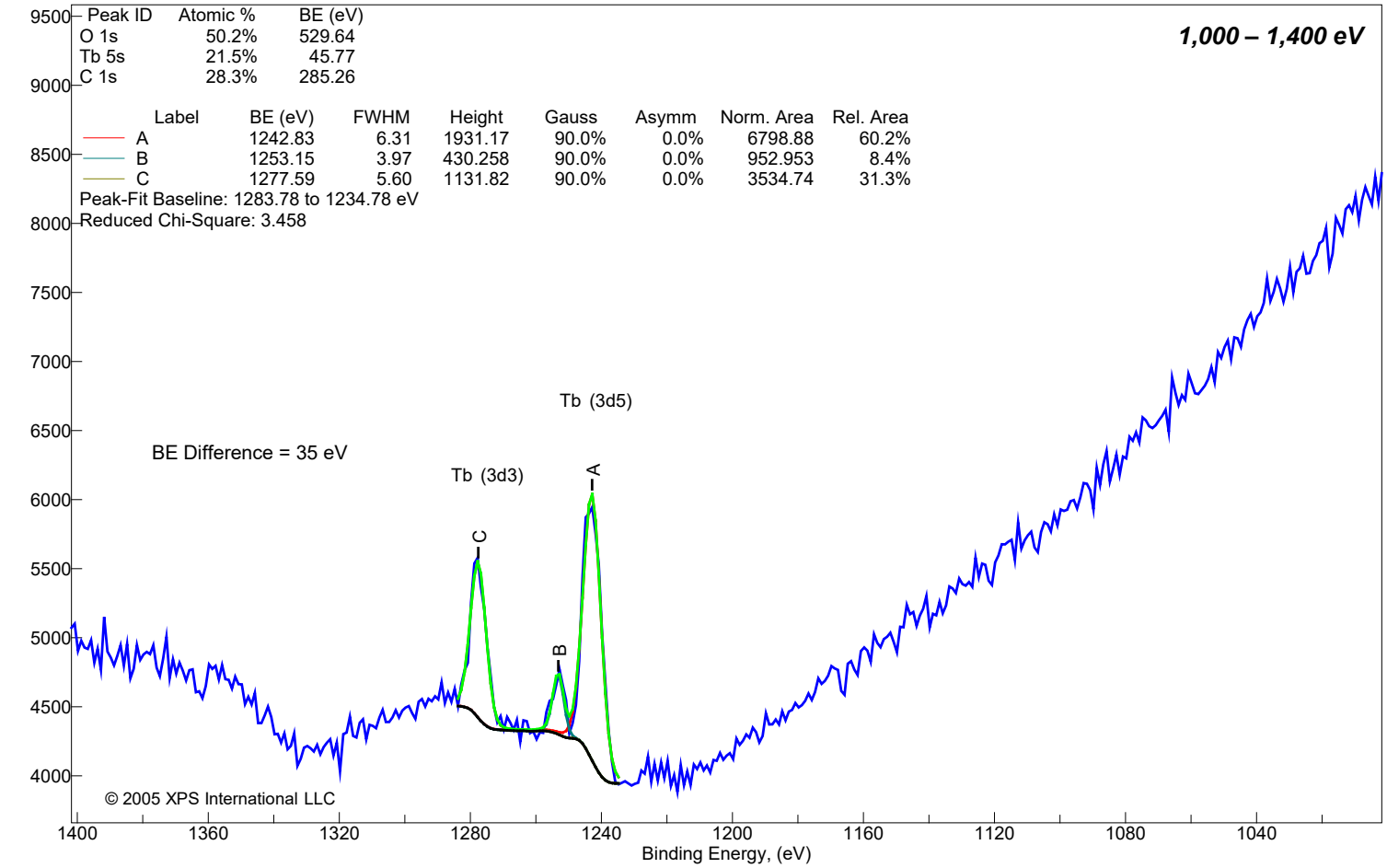


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Tb_4O_7

Terbium Oxide (FW = 747.69)

Sample Description: Tb3O7 (brown lump) 3mm plt 90 TOA mesh
mesh at <1mm



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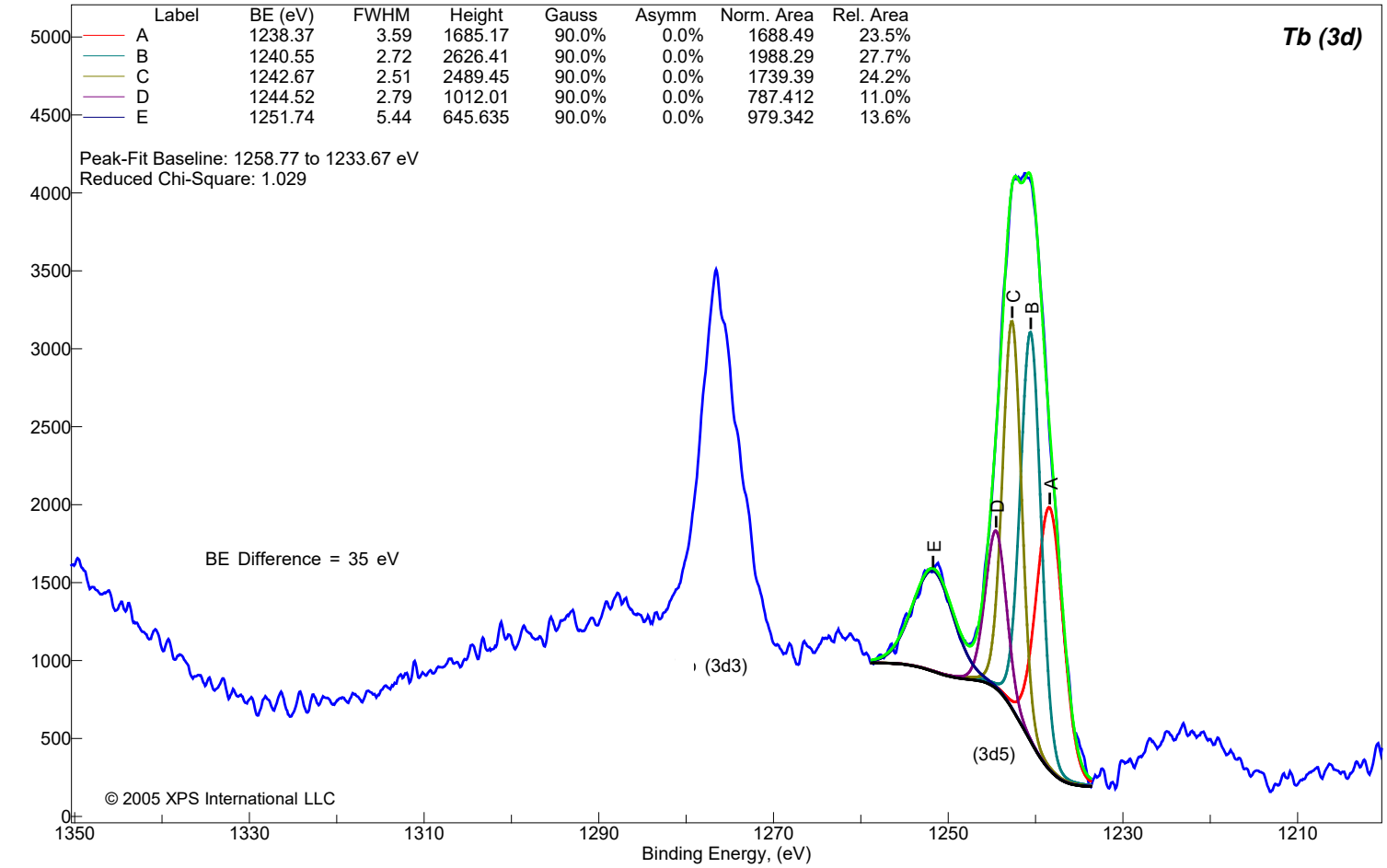
Tb_4O_7

Terbium Oxide (FW = 747.69)

Sample Description: Tb3O7 99% (gift) 3mm plt 90TOA mesh
mesh at <1mm

Counts

Label	BE (eV)	FWHM	Height	Gauss	Asymm	Norm. Area	Rel. Area
A	1238.37	3.59	1685.17	90.0%	0.0%	1688.49	23.5%
B	1240.55	2.72	2626.41	90.0%	0.0%	1988.29	27.7%
C	1242.67	2.51	2489.45	90.0%	0.0%	1739.39	24.2%
D	1244.52	2.79	1012.01	90.0%	0.0%	787.412	11.0%
E	1251.74	5.44	645.635	90.0%	0.0%	979.342	13.6%



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TeO_2

Tellurium (IV) Oxide (FW = 159.60)
Surface Composition Table

Description: TeO_2 (99.995%) from Aldrich Co. Lot# 07812JV, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white powder pressed into 3 mm pellet, mp 733 C, d 6.04, sol in NaOH, HCl

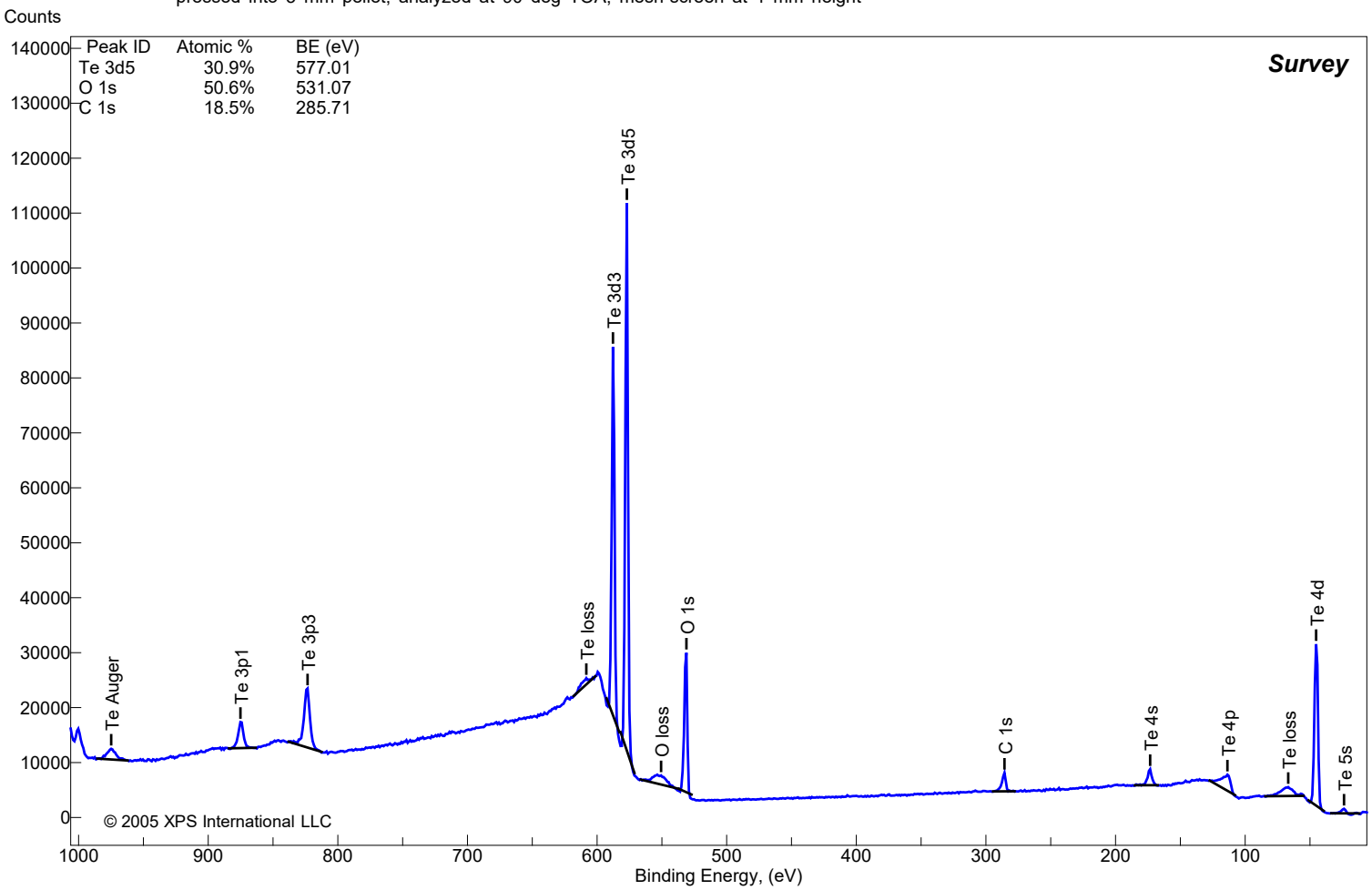
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Te 5s	23.7	23.7	0.13	1.5	4,370	
Te 4d	45.2	45.2	3.63	1.5	120,591	
Te loss	66.7	66.7	0.00	1.5	22,664	
Te 4p	113.7	113.7	3.11	1.5	31,648	
Te 4s	173.3	173.3	0.90	1.5	16,375	
C 1s	285.7	285.7	1.00	1.5	16,230	18.5%
O 1s	531.1	531.1	2.93	1.5	92,124	50.6%
O loss	550.6	550.6	0.00	1.5	29,318	
Te 3d5	577.0	577.0	18.06	1.5	321,703	30.9%
Te 3d3	587.8	587.8	12.52	1.5	225,403	
Te loss	608.3	608.3	0.00	1.5	10,314	
Te 3p3	823.3	823.3	10.21	1.5	77,163	
Te 3p1	875.2	875.2	4.92	1.5	30,489	
Te Auger	974.9	974.9	0.00	1.5	20,516	

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Tellurium (IV) Oxide (FW = 159.60)

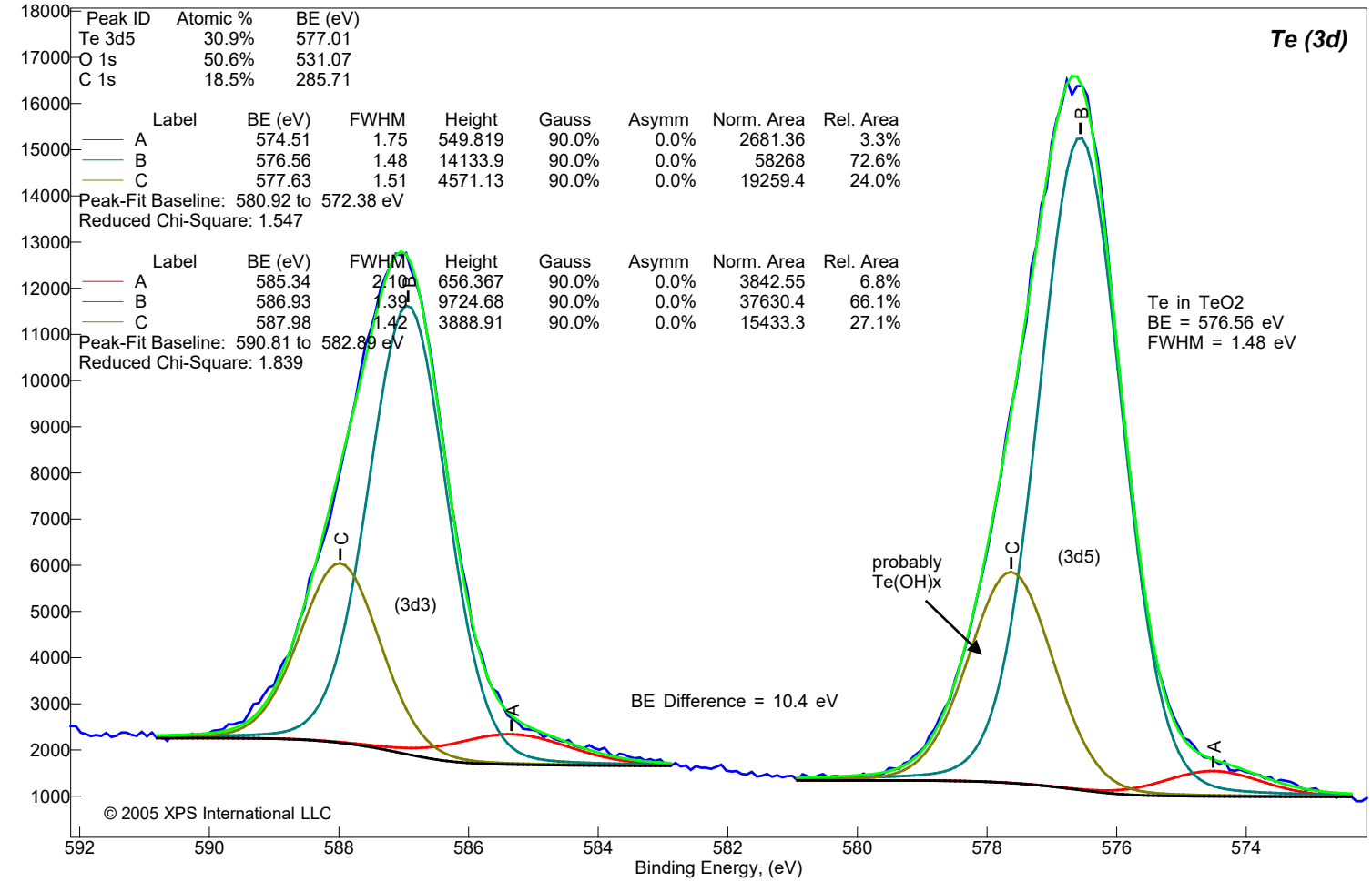
Sample Description: TeO2 (99.995%) from Aldrich lot# 07812JV
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Tellurium (IV) Oxide (FW = 159.60)

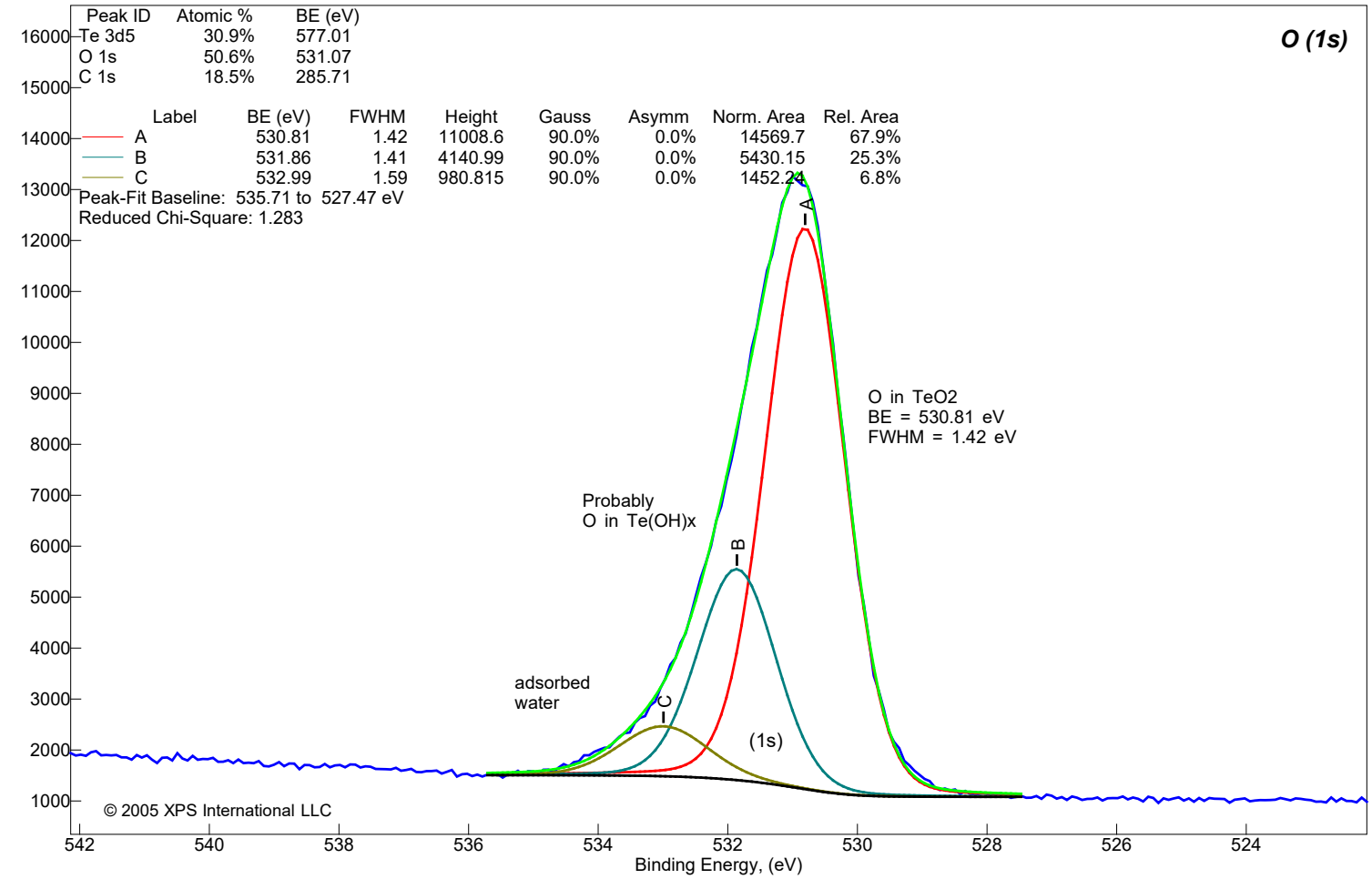
Sample Description: TeO2 (99.995%) Aldrich lot# 07812JV, 3mm pellet, screen, 90 TOA



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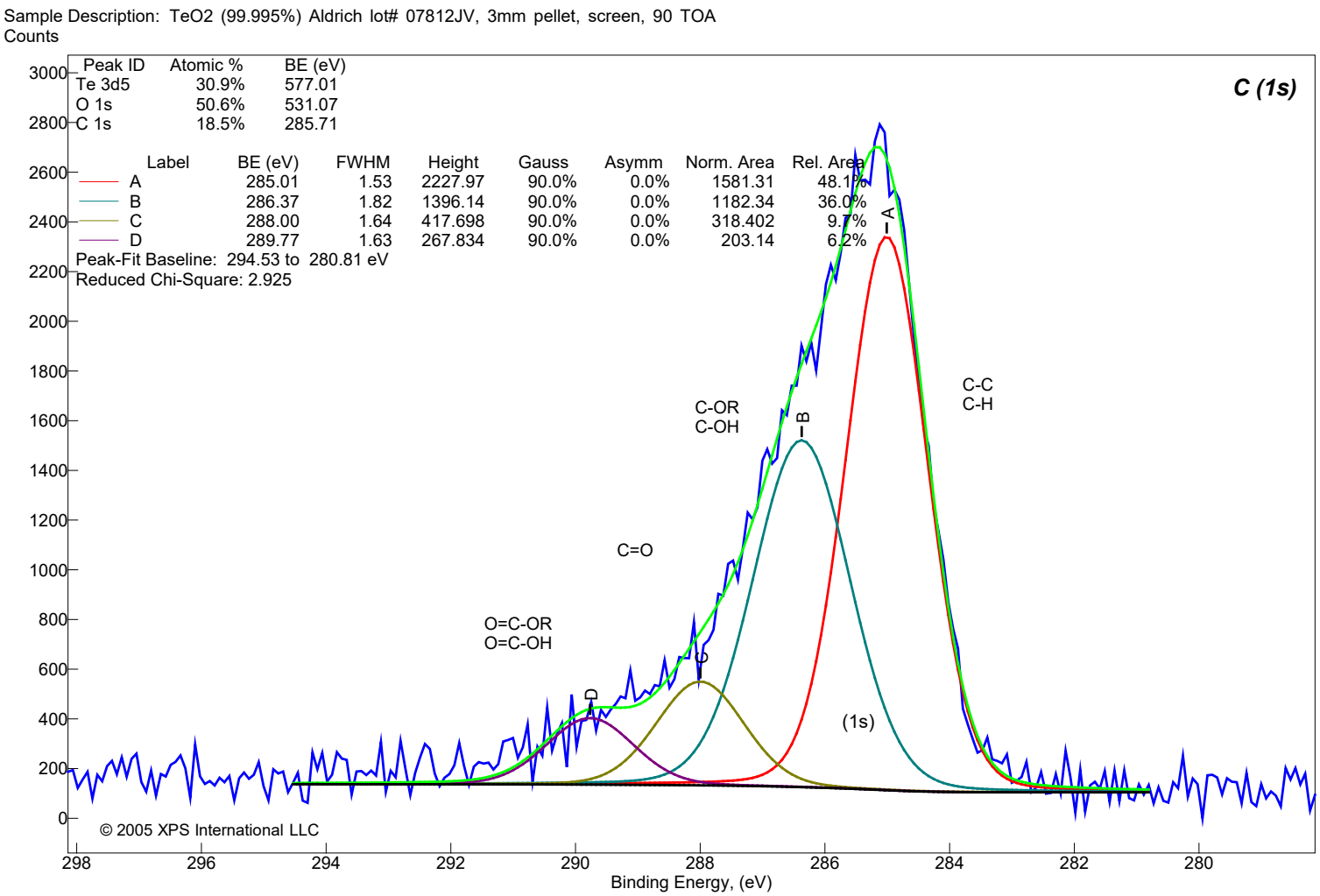
Tellurium (IV) Oxide (FW = 159.60)

Sample Description: TeO2 (99.995%) Aldrich lot# 07812JV, 3mm pellet, screen, 90 TOA



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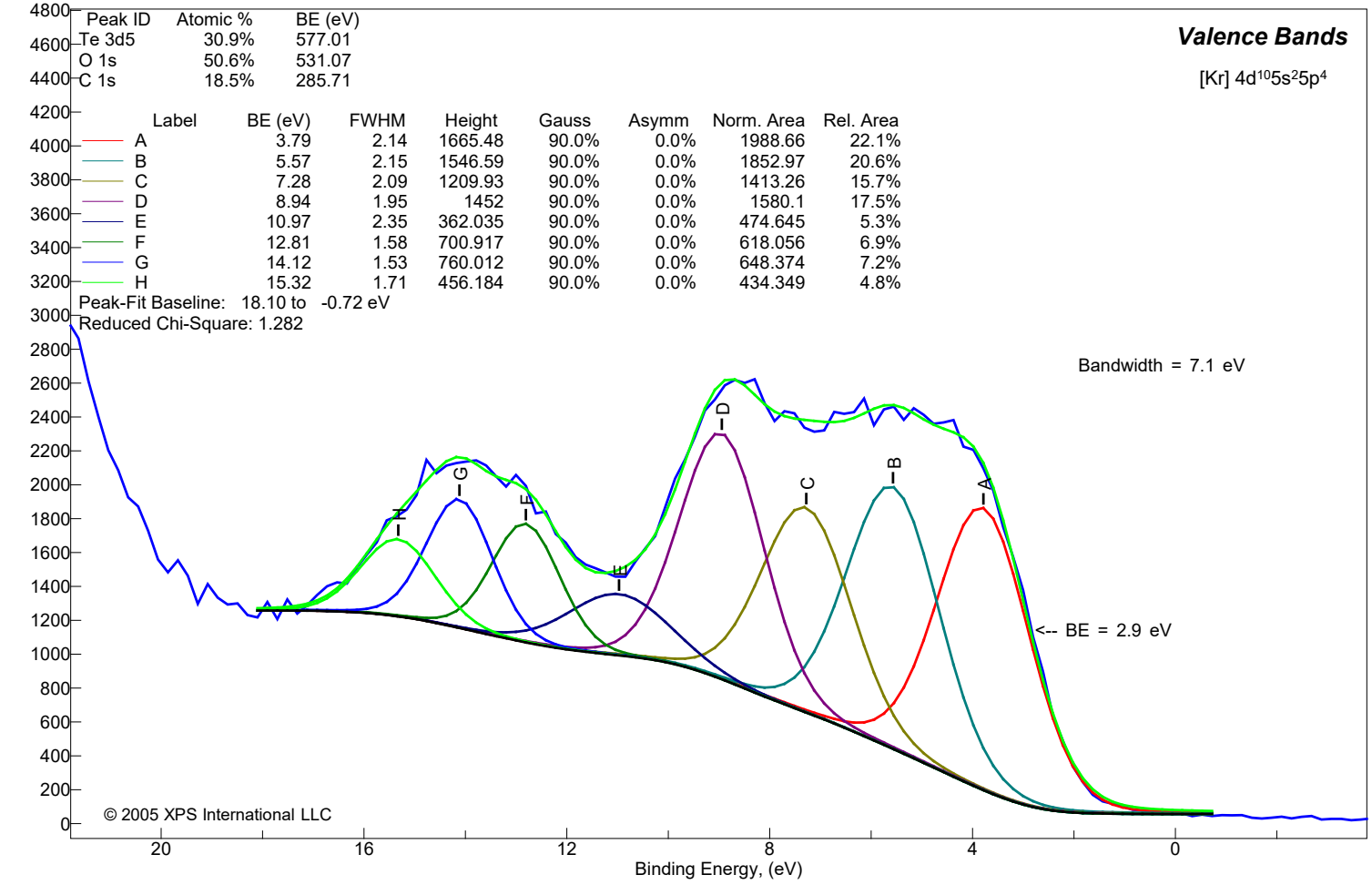
Tellurium (IV) Oxide (FW = 159.60)



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Tellurium (IV) Oxide (FW = 159.60)

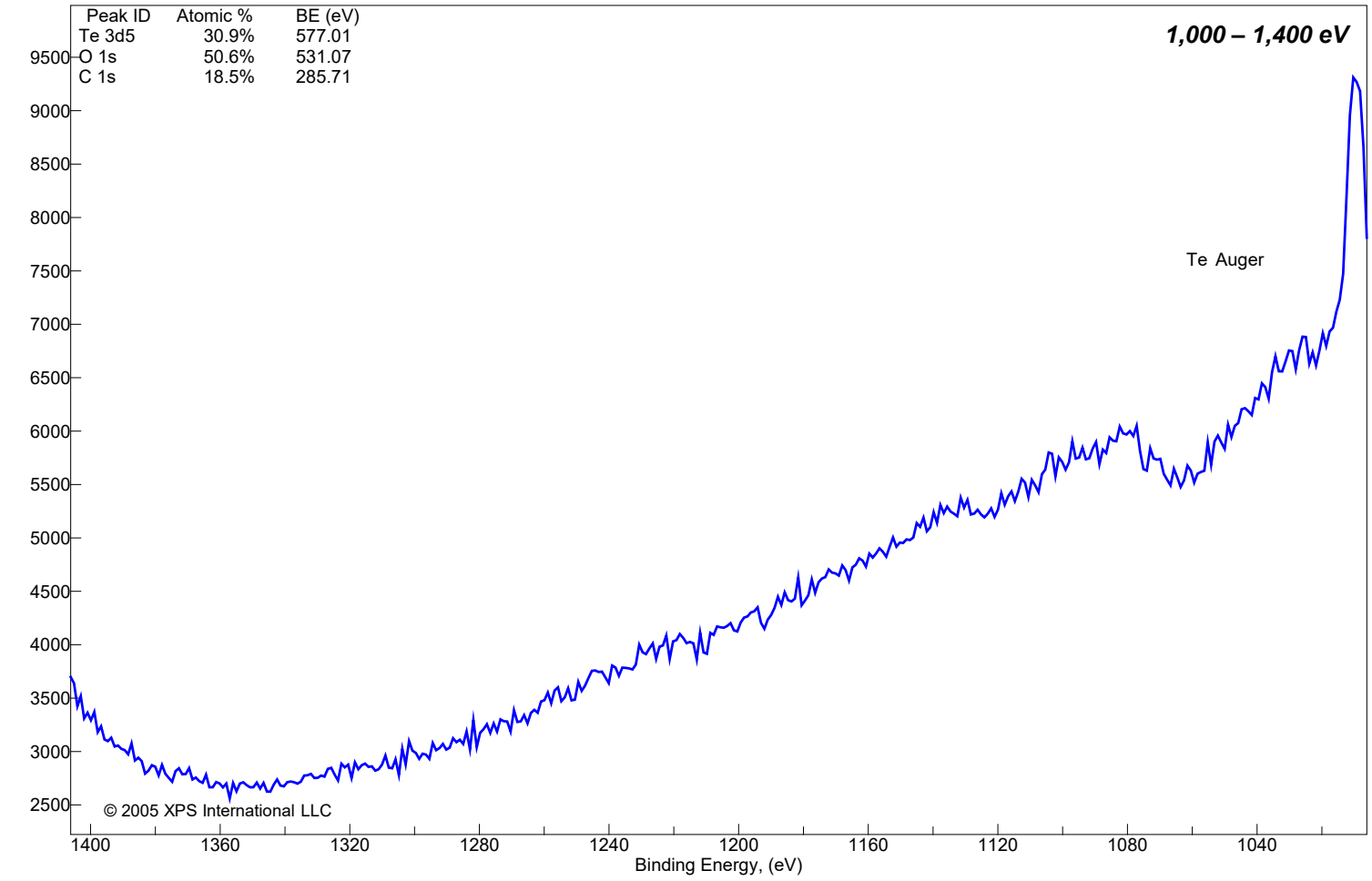
Sample Description: TeO2 (99.995%) Aldrich lot# 07812JV, 3mm pellet, screen, 90 TOA



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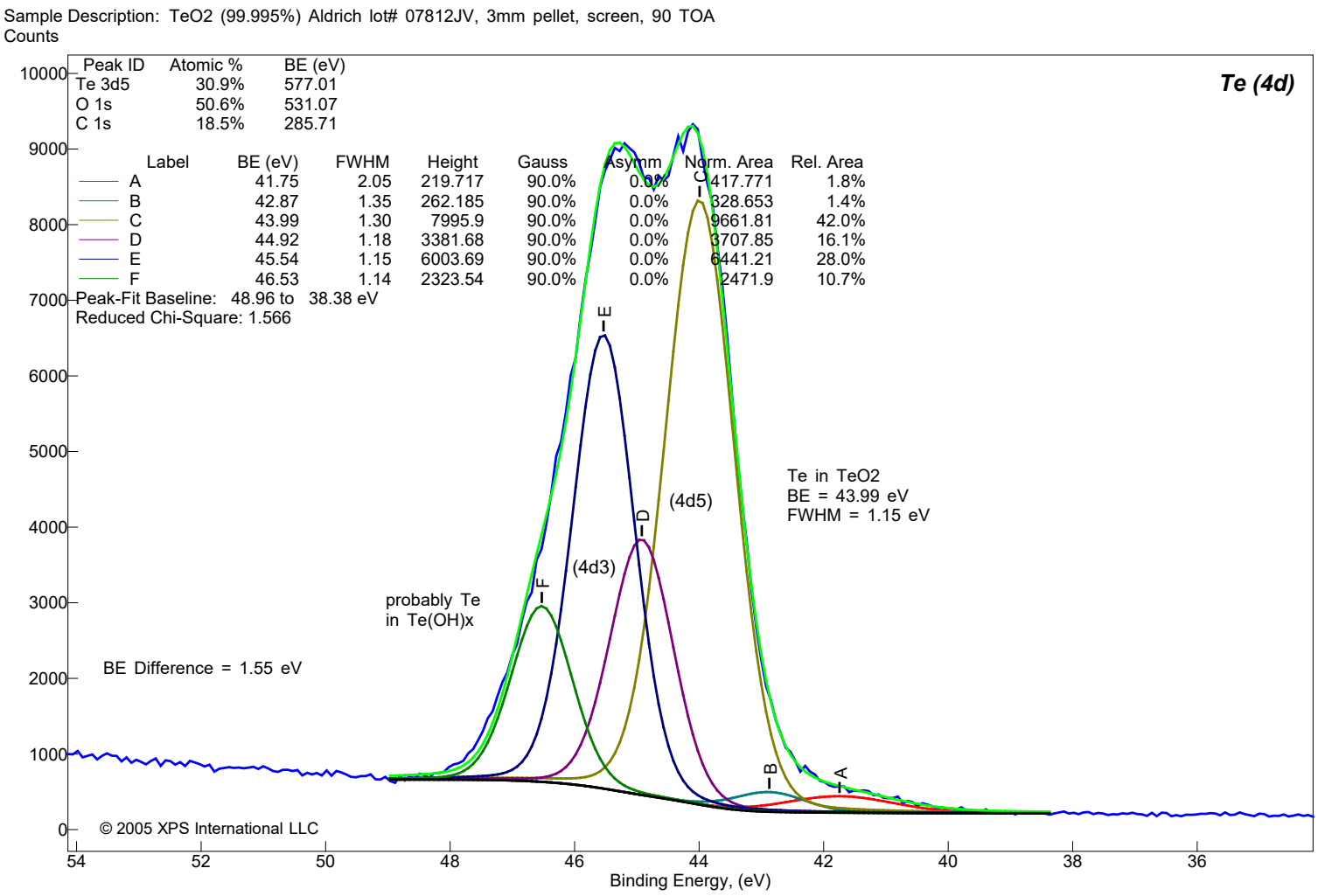
Tellurium (IV) Oxide (FW = 159.60)

Sample Description: TeO2 (99.995%) Aldrich lot# 07812JV, 3mm pellet, screen, 90 TOA



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Tellurium (IV) Oxide (FW = 159.60)



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Thorium (IV) Oxide (FW = 264.04)
Surface Composition Table

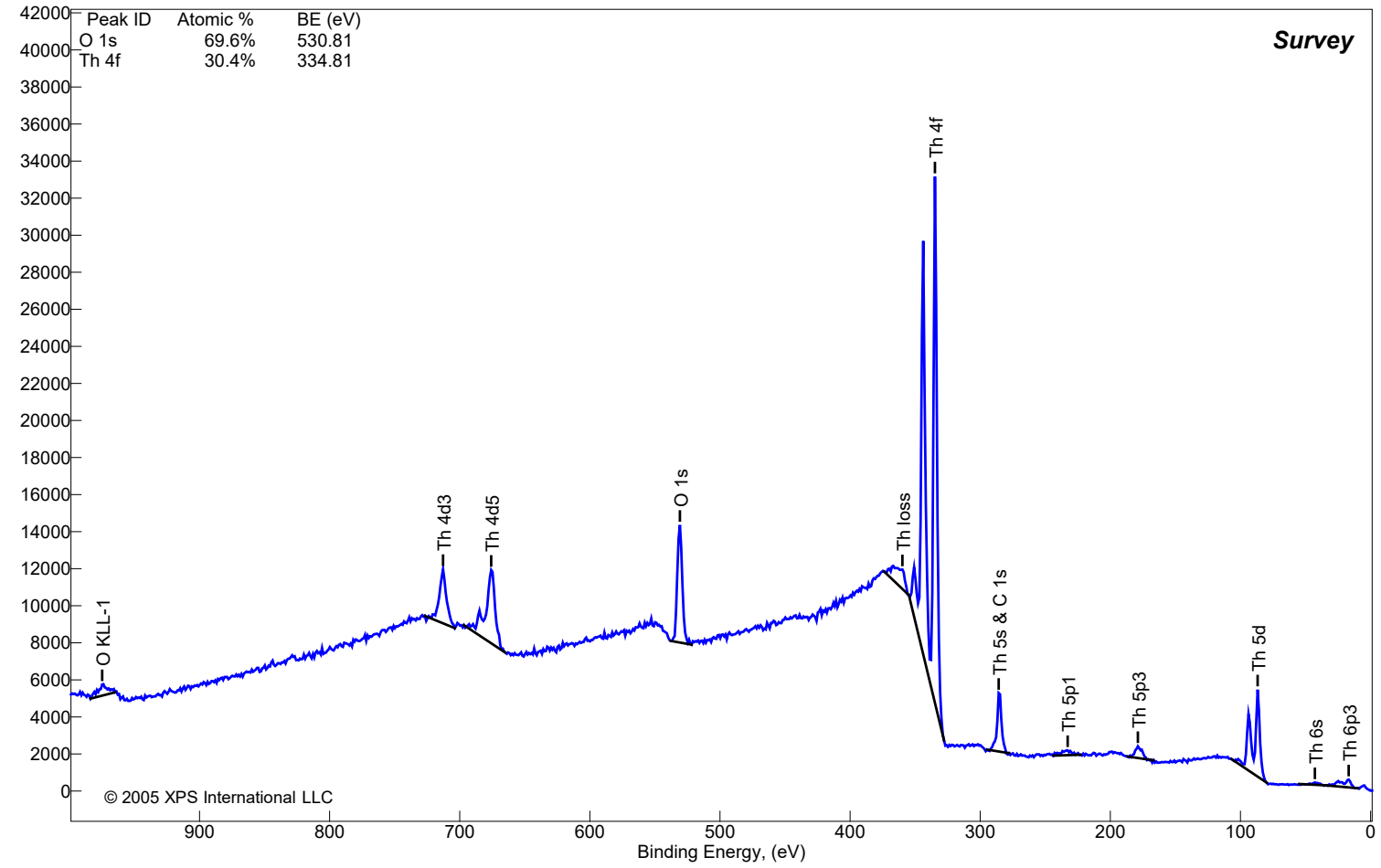
Description: ThO_2 coating on ion gauge filament, analyzed at 55 deg TOA, no mesh, non-conductive mp 3390 C, d 10.0, very slightly sol in acid

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Th 6p3	16.8	11.4	0.37	0.2	1,915	
Th 6s	42.8	37.4	0.16	0.2	343	
Th 5d	86.4	81.0	3.15	0.4	1,334	
Th 5d	86.8	81.4	5.30	0.0	14,631	
Th 5p3	178.8	173.4	2.05	0.2	1,833	
Th 5p1	232.8	227.4	0.66	0.2	1,337	
Th 5s & C 1s	285.8	280.4	0.70	0.2	6,435	
Th 4f	334.8	329.4	42.70	0.0	91,407	30.4%
Th loss	359.8	354.4	0.00	0.2	5,365	
O 1s	529.9	524.5	2.93	0.4	3,541	
O 1s	530.8	525.4	2.93	0.0	14,375	69.6%
Th 4d5	675.8	670.4	16.31	0.0	17,178	
Th 4d3	712.8	707.4	10.82	0.2	9,221	
O KLL-1	974.8	969.4	0.70	0.2	2,744	

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Thorium (IV) Oxide (FW = 264.04)

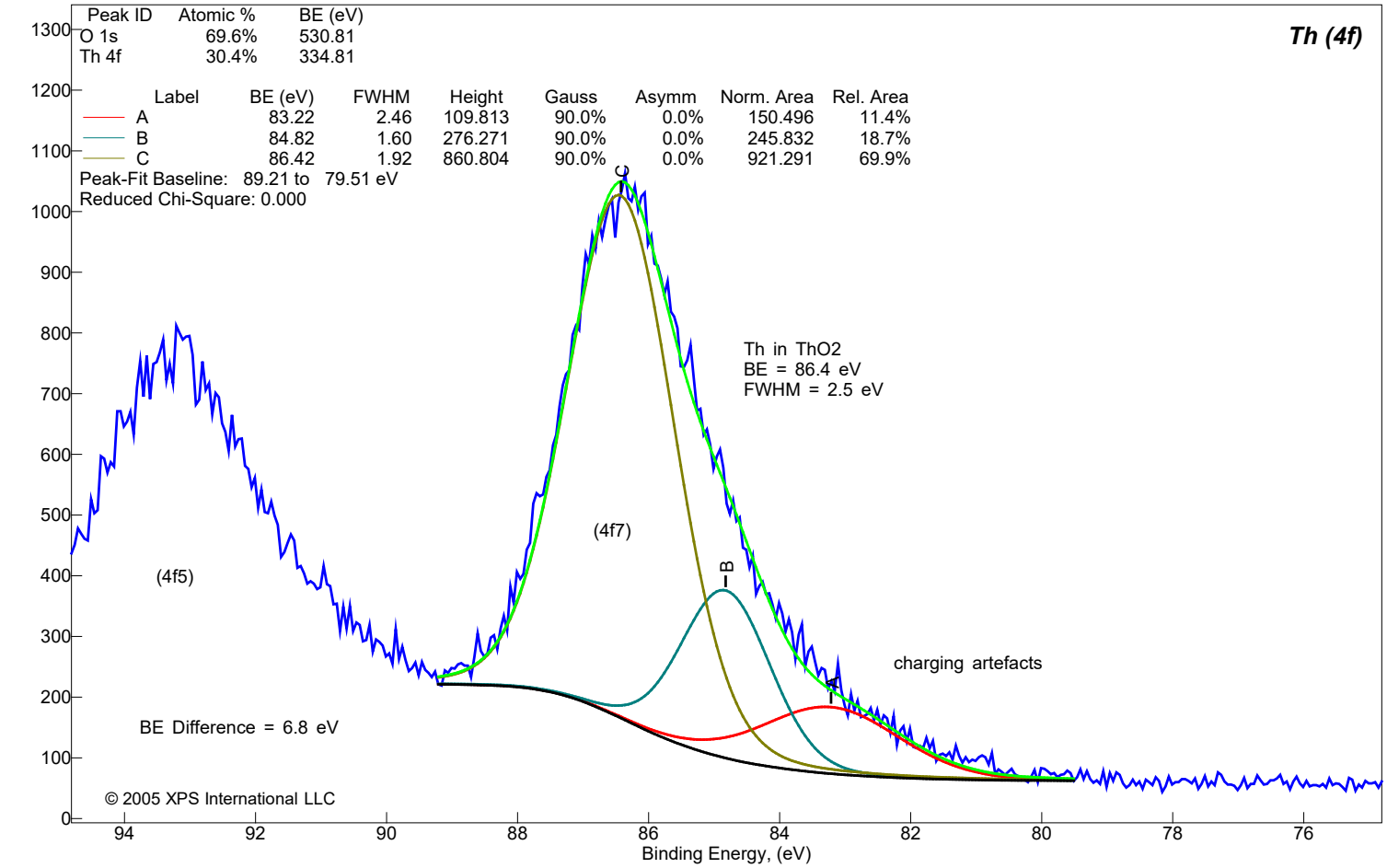
Sample Description: ThO2 coating on ion gauge filament
no mesh-screen



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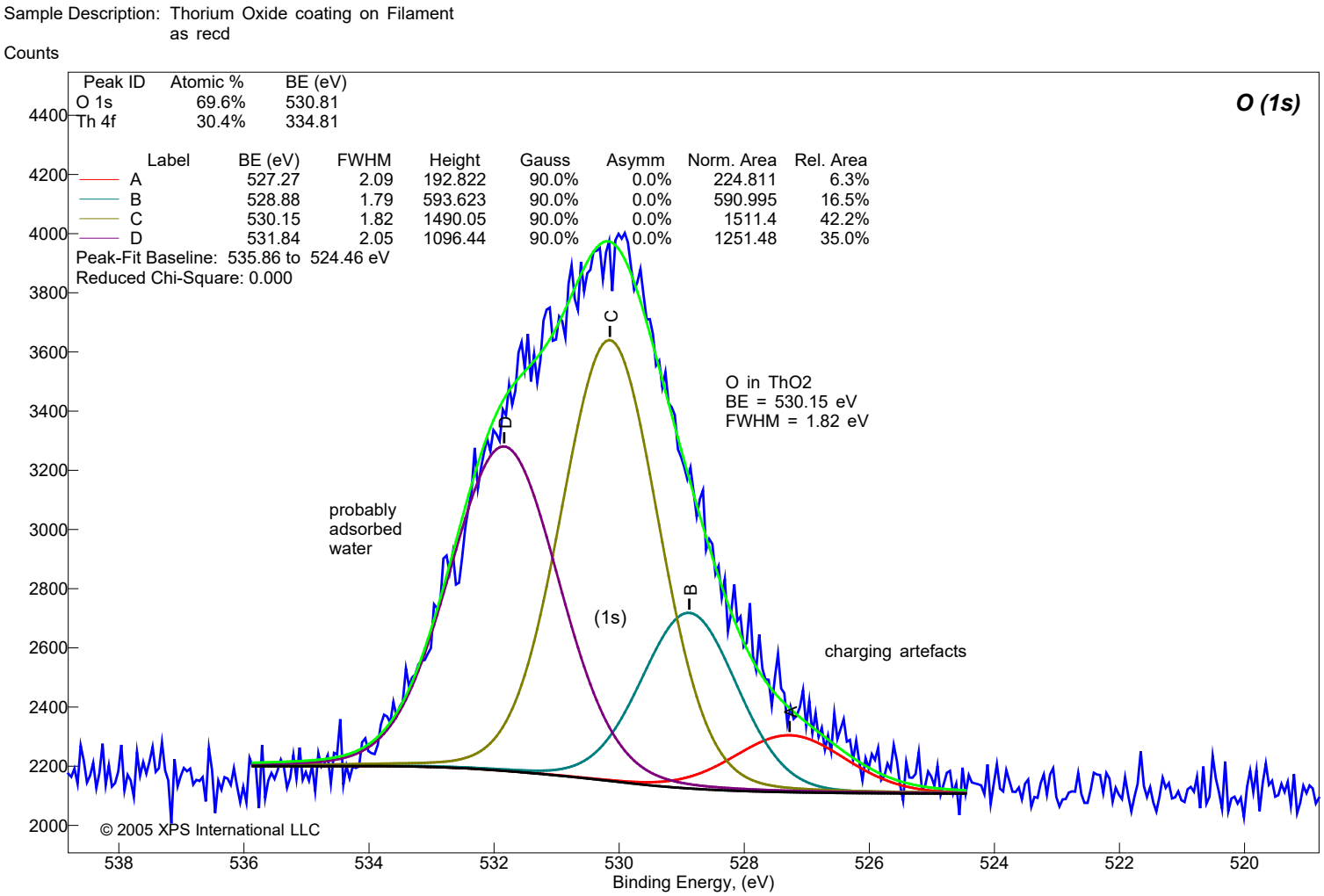
Thorium (IV) Oxide (FW = 264.04)

Sample Description: Thorium Oxide coating on Filament
as recd



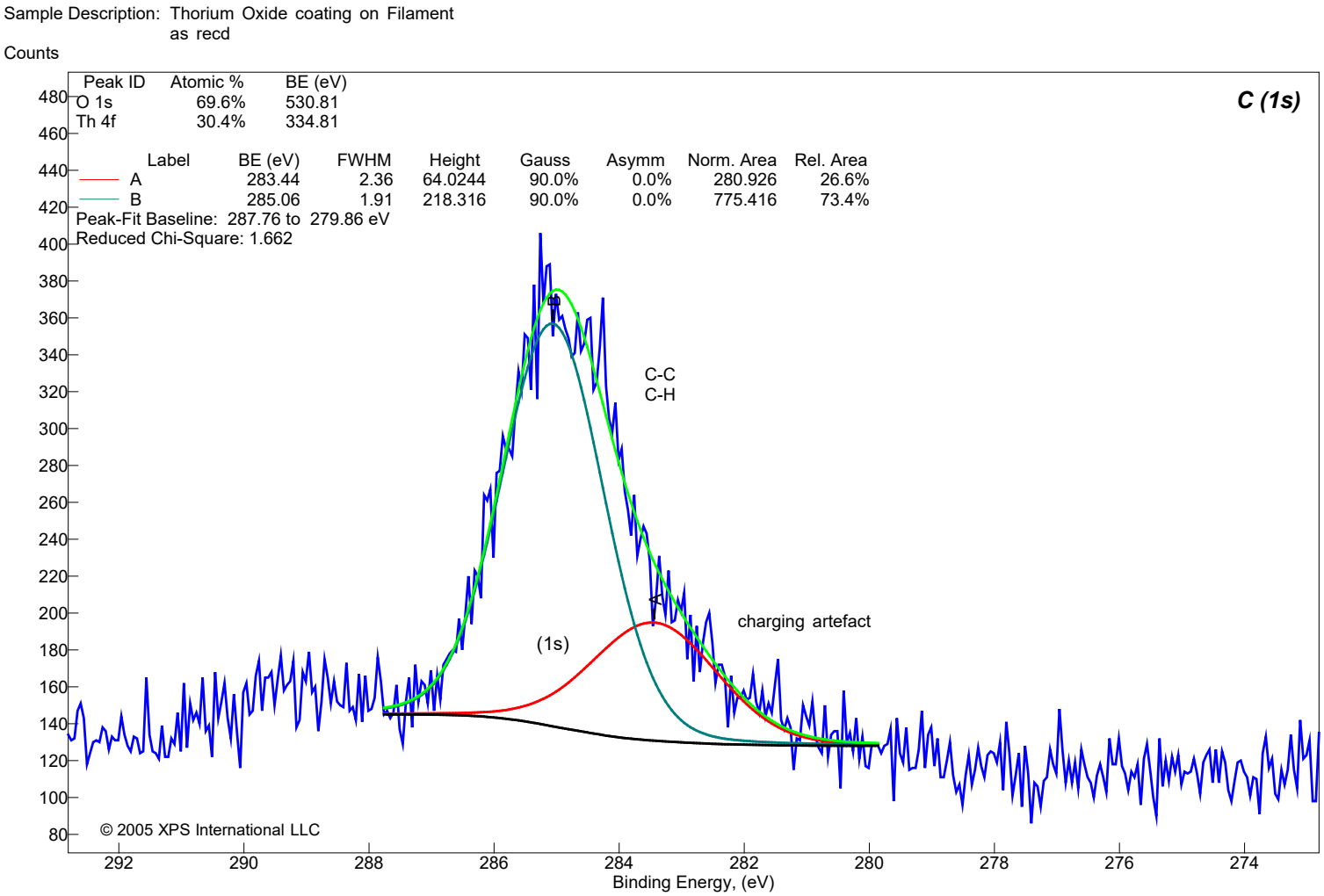
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Thorium (IV) Oxide (FW = 264.04)



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Thorium (IV) Oxide (FW = 264.04)



TiO

Titanium (II) Oxide (FW = 63.90)
Surface Composition Table

Description: TiO (99.9%) from Rare Metallics Co. Lot# 10920-30, analyzed at 90 deg TOA, mesh at 1 mm, semi-conductive gray powder pressed into 3 mm pellet, mp 1700 C, d 4.95

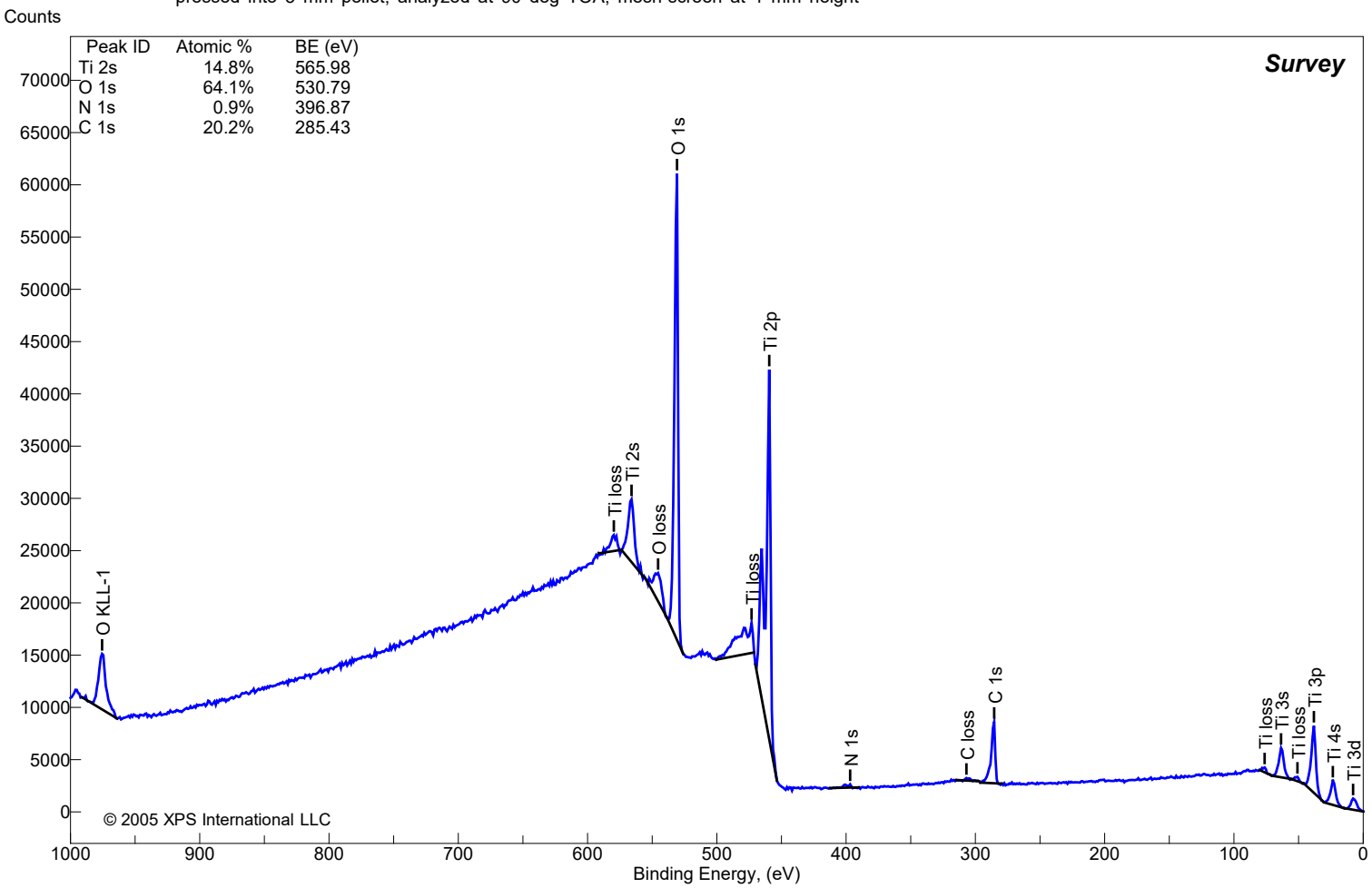
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Ti 3d	8.8	7.8	0.01	1.5	3,530	
Ti 4s	24.5	23.5	0.00	1.5	6,934	
Ti 3p	39.1	38.1	0.81	1.5	17,105	
Ti loss	51.8	50.8	0.00	1.5	861	
Ti 3s	64.5	63.5	0.47	1.5	8,190	
Ti loss	77.2	76.2	0.00	1.5	949	
C 1s	286.4	285.4	1.00	1.5	13,812	20.2%
C loss	307.9	306.9	0.00	1.5	656	
N 1s	397.9	396.9	1.80	1.5	957	0.9%
Ti 2p	460.4	459.4	7.91	1.5	101,369	
Ti loss	474.1	473.1	0.00	1.5	24,092	
O 1s	531.8	530.8	2.93	1.5	91,385	64.1%
O loss	546.5	545.5	0.00	1.5	12,230	
Ti 2s	567.0	566.0	3.24	1.5	22,046	14.8%
Ti loss	580.7	579.7	0.00	1.5	5,291	
O KLL-1	976.6	975.6	0.70	1.5	23,564	
Ti LMM-2	1089.9	1088.9	0.21	1.1	6,565	

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TiO

Titanium (II) Oxide (FW = 63.90)

Sample Description: TiO (99.9%) from Rare Metallics Corp. lot# 10920-30, semi-conductive
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height

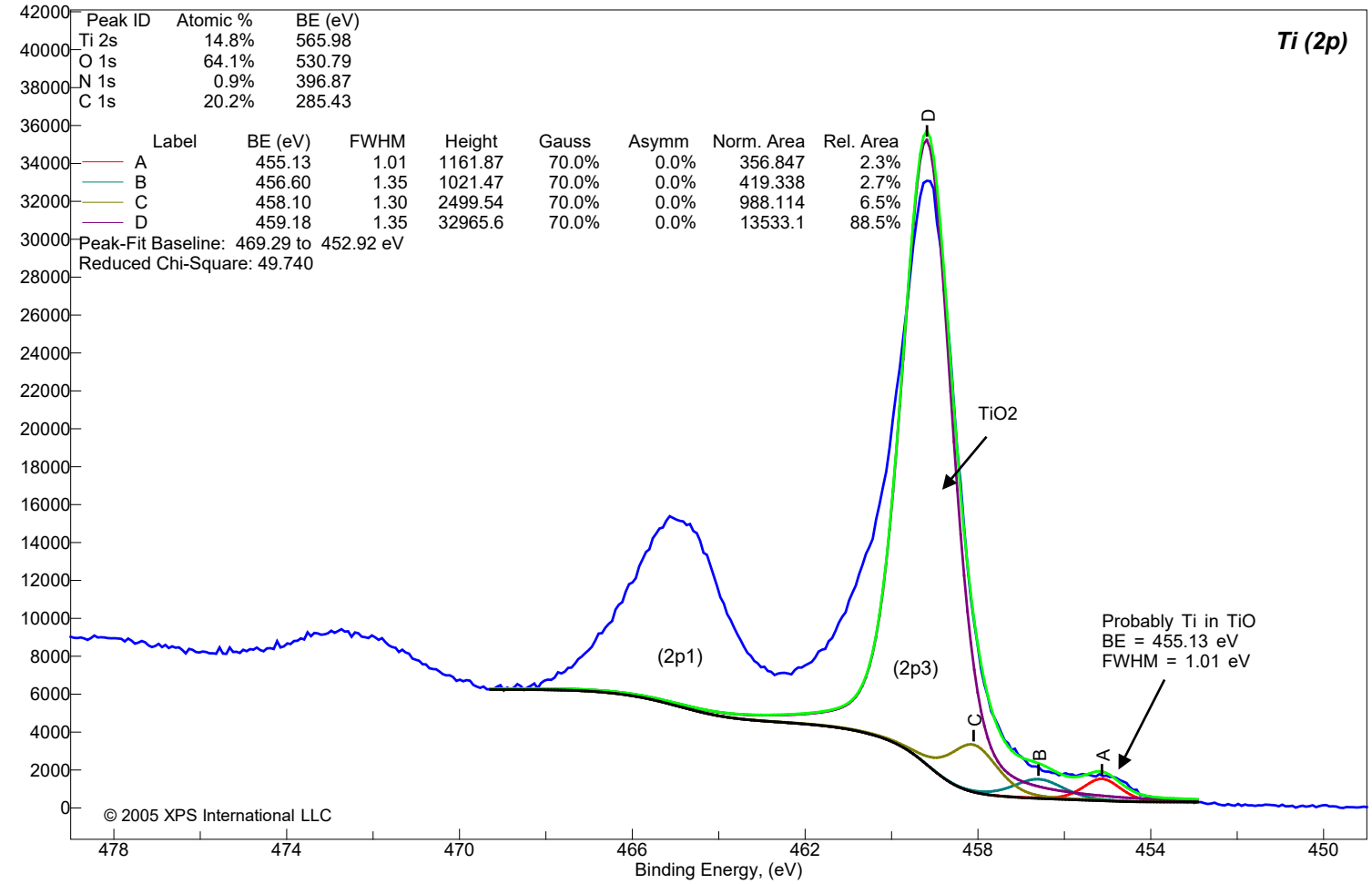


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TiO

Titanium (II) Oxide (FW = 63.90)

Sample Description: TiO (99.9%) RMC lot# 10920-30, 3mm pellet, Semi-Conductive, gray, 90 TOA

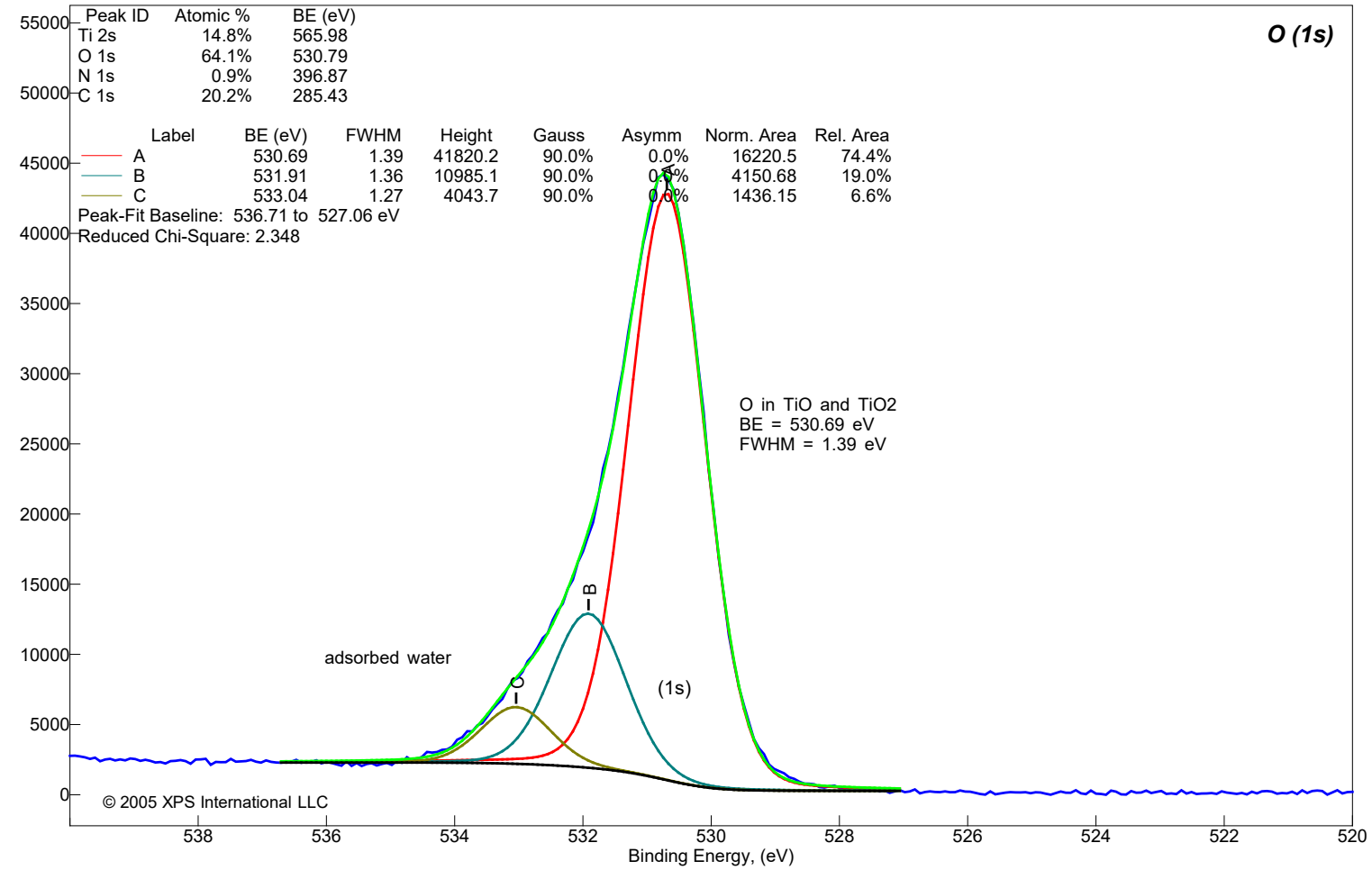


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TiO

Titanium (II) Oxide (FW = 63.90)

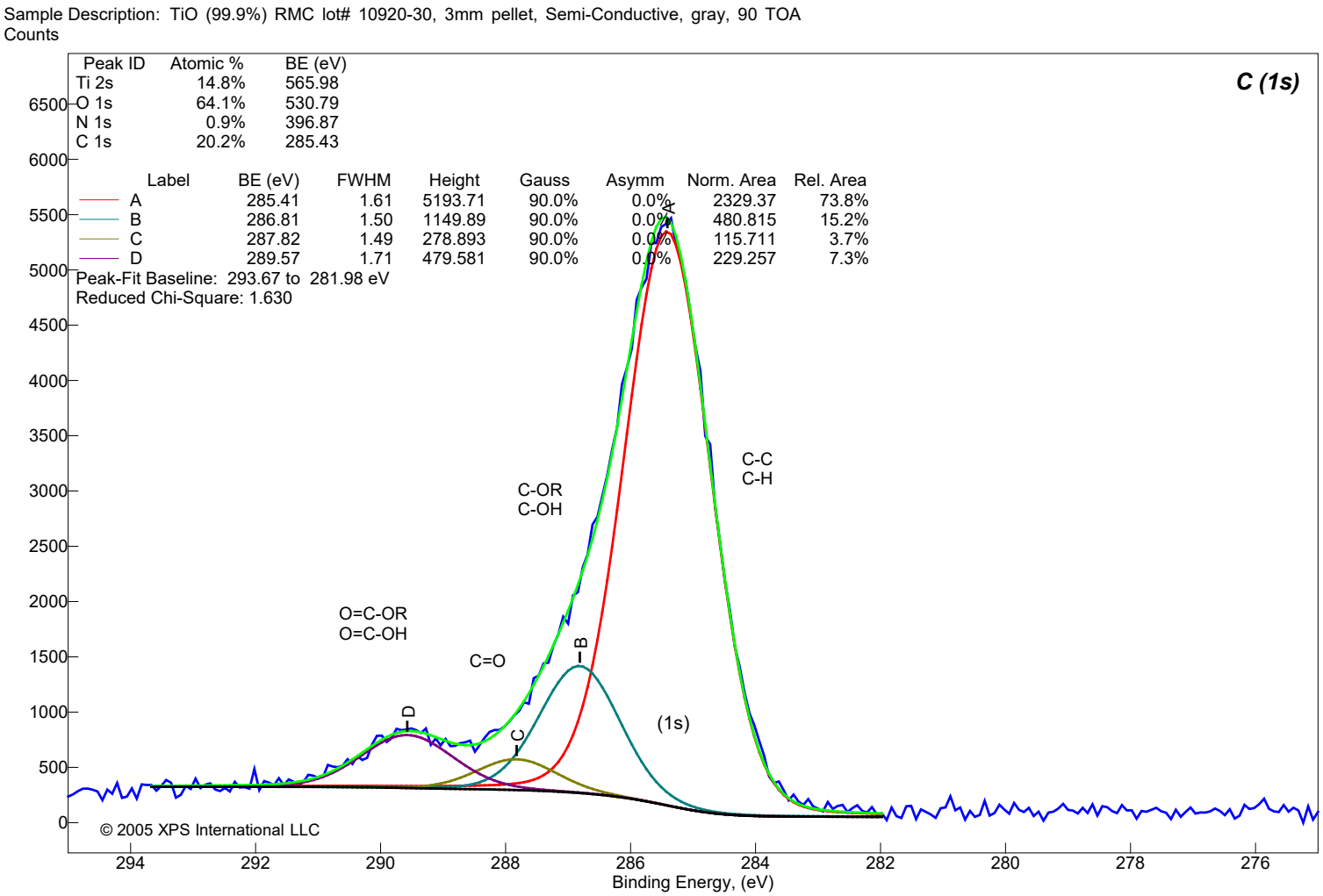
Sample Description: TiO (99.9%) RMC lot# 10920-30, 3mm pellet, Semi-Conductive, gray, 90 TOA



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Titanium (II) Oxide (FW = 63.90)

Sample Description: TiO (99.9%) RMC lot# 10920-30, 3mm pellet, Semi-Conductive, gray, 90 TOA

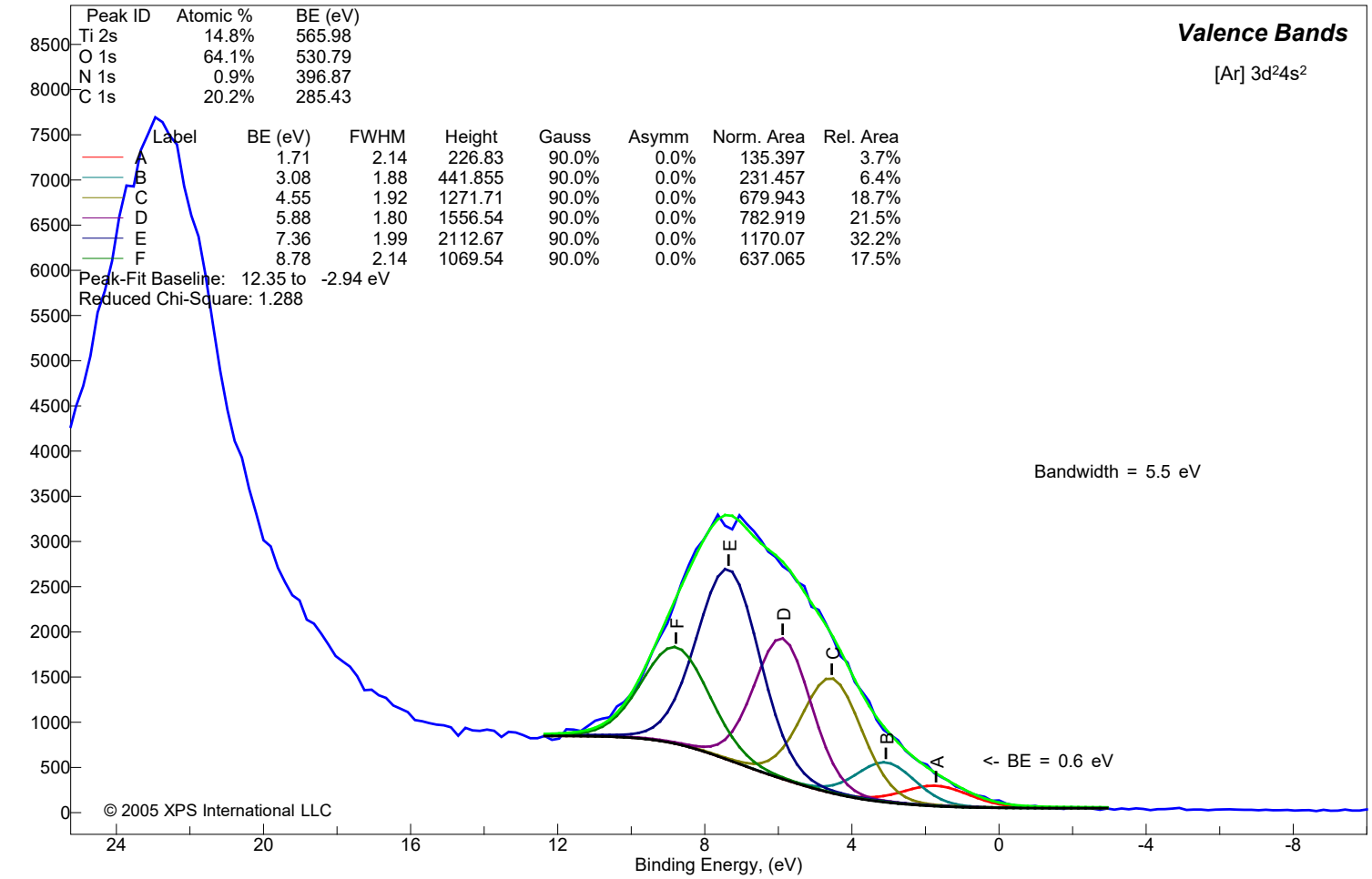


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TiO

Titanium (II) Oxide (FW = 63.90)

Sample Description: TiO (99.9%) RMC lot# 10920-30, 3mm pellet, Semi-Conductive, gray, 90 TOA

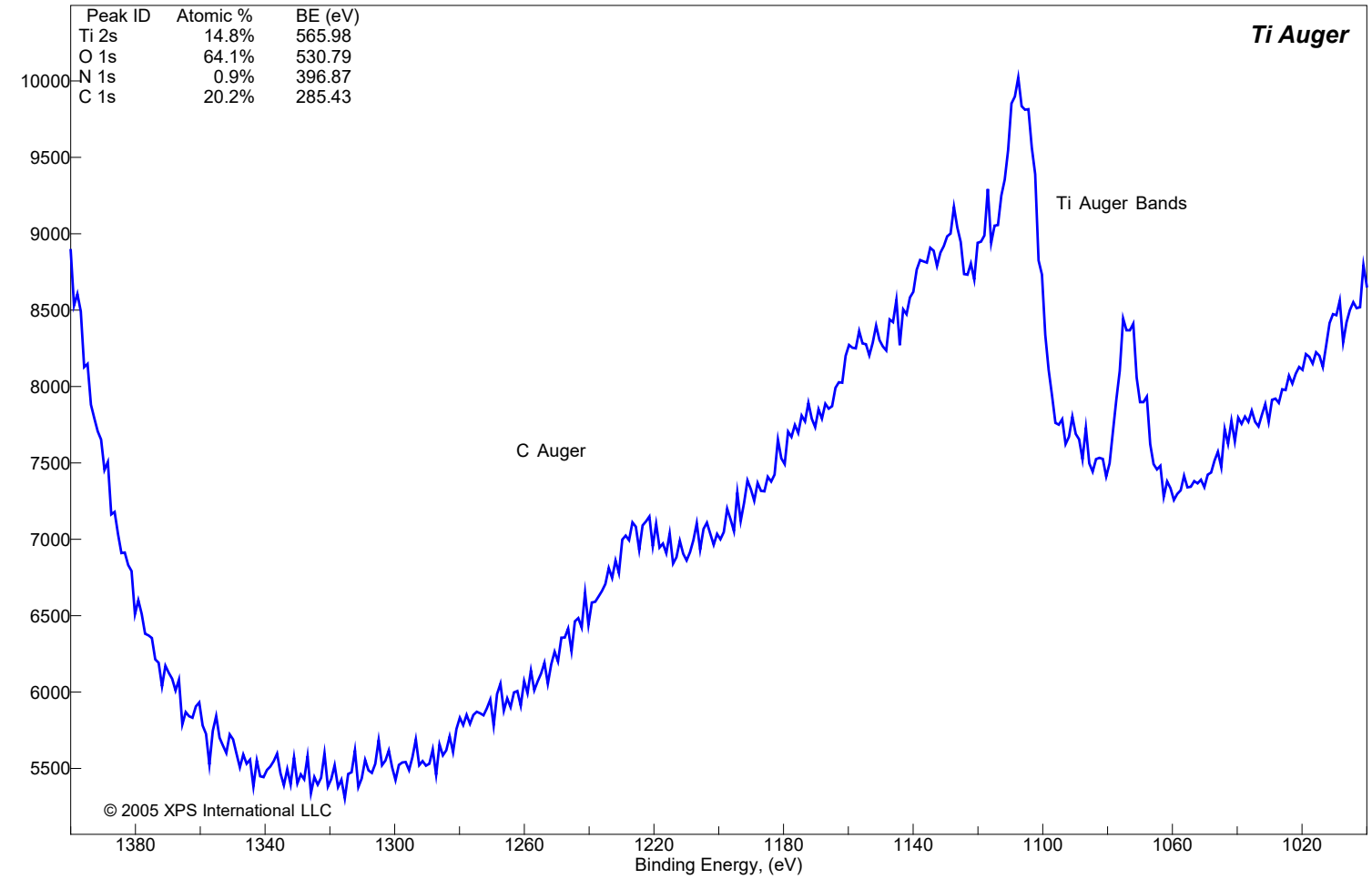


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TiO

Titanium (II) Oxide (FW = 63.90)

Sample Description: TiO (99.9%) RMC lot# 10920-30, 3mm pellet, Semi-Conductive, gray, 90 TOA



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TiO_2

Titanium (IV) Oxide (FW = 79.90)
Surface Composition Table

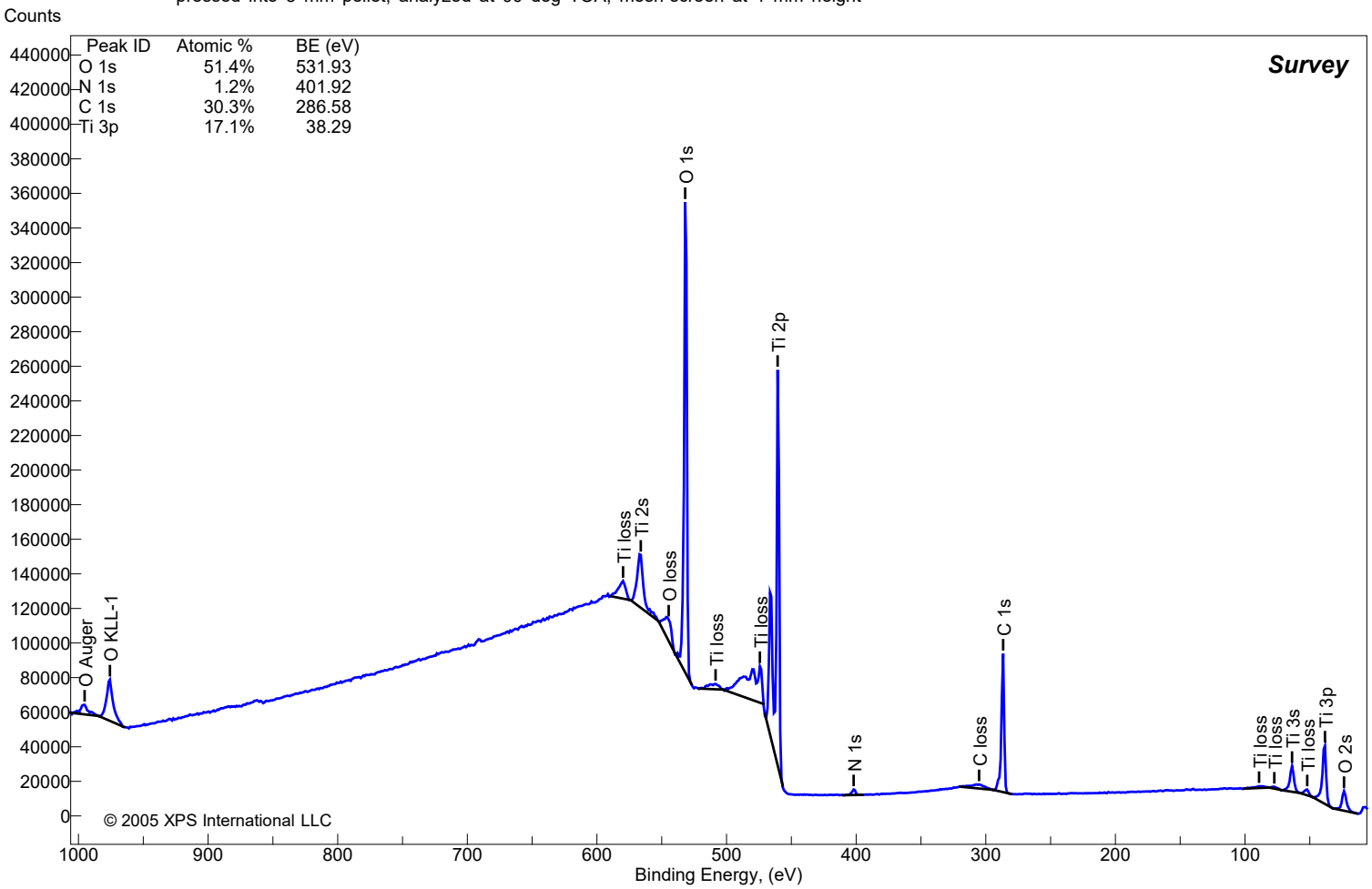
Description: TiO_2 (99.999%) from Aldrich Co. Lot# 06306MV, analyzed at 90 deg TOA, mesh at 1 mm, semi-conductive white powder pressed into 3 mm pellet, mp 1830 C, d 4.23

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	23.6	20.3	0.14	1.5	8,033	
Ti 3p	37.2	33.9	0.81	1.1	4,483	
Ti 3p	38.3	35.0	0.81	1.5	20,532	17.1%
Ti loss	52.0	48.7	0.00	1.5	2,356	
Ti 3s	63.7	60.4	0.47	1.5	9,639	
Ti loss	77.4	74.1	0.00	1.5	858	
Ti loss	89.1	85.8	0.00	1.5	1,612	
C 1s	286.6	283.3	1.00	1.5	33,752	30.3%
C loss	305.2	301.9	0.00	1.5	4,974	
N 1s	401.9	398.6	1.80	1.5	2,028	1.2%
Ti 2p	460.6	457.3	7.91	1.5	131,971	
Ti loss	474.3	471.0	0.00	1.5	51,171	
Ti loss	508.5	505.2	0.00	1.5	5,180	
O 1s	531.9	528.6	2.93	1.5	119,151	51.4%
O loss	544.6	541.3	0.00	1.5	14,849	
Ti 2s	566.1	562.8	3.24	1.5	30,616	
Ti loss	579.8	576.5	0.00	1.5	11,365	
O KLL-1	975.7	972.4	0.70	1.5	24,243	
O Auger	995.3	992.0	0.00	1.5	6,461	

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Titanium (IV) Oxide (FW = 79.90)

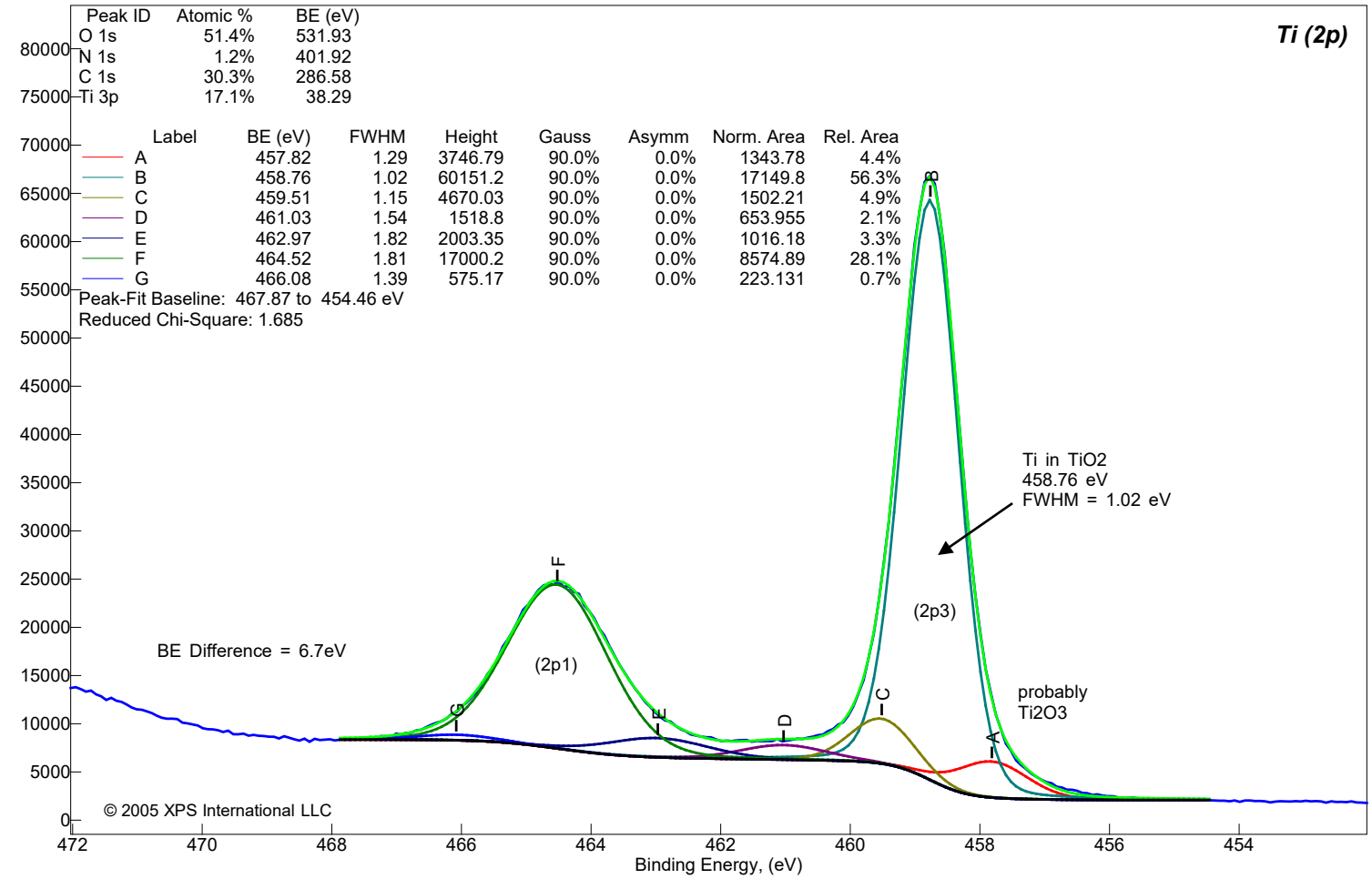
Sample Description: TiO2 (99.999%) from Aldrich lot# 06306MV, Semi-conductive
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Titanium (IV) Oxide (FW = 79.90)

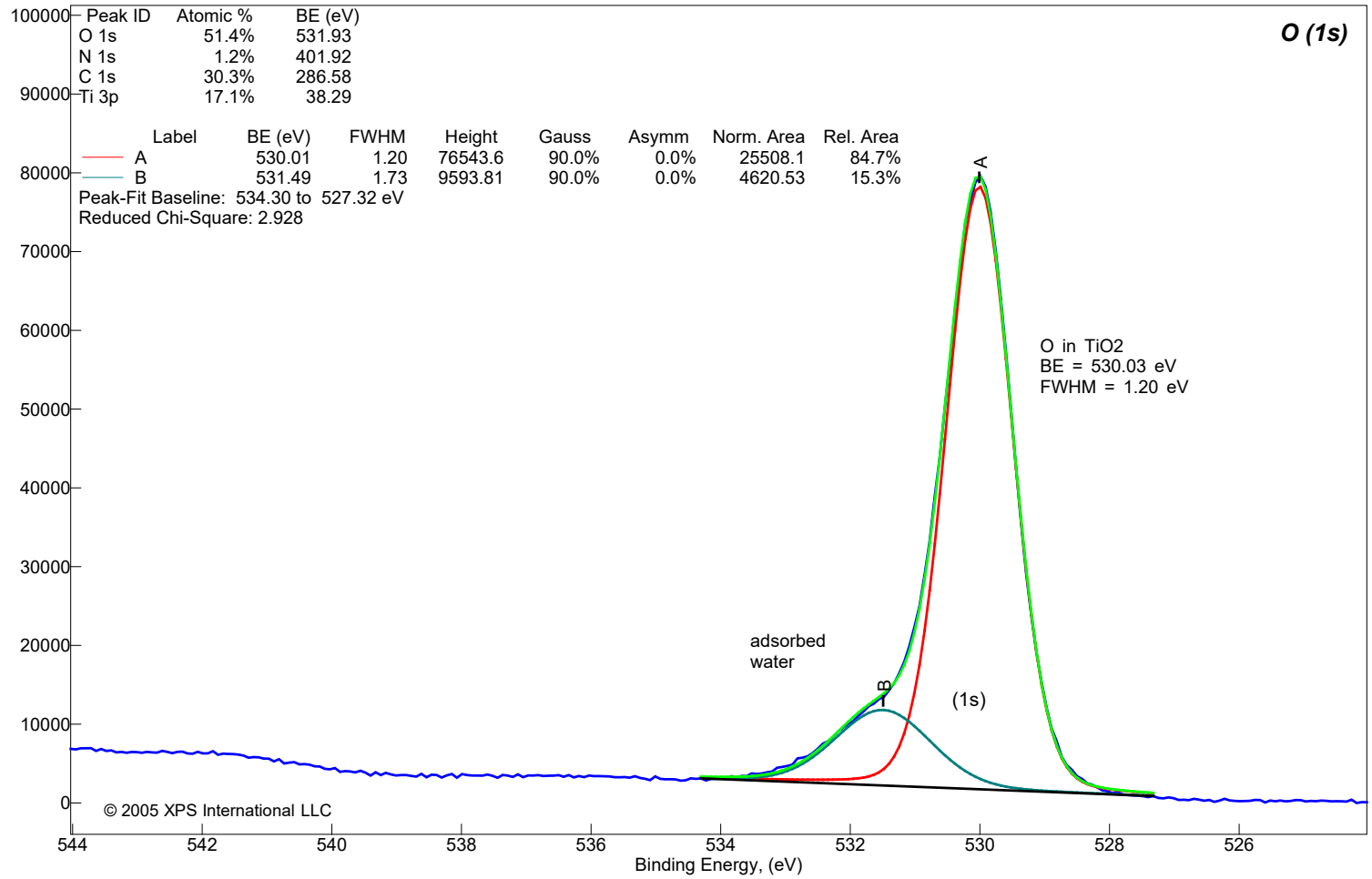
Sample Description: TiO2 (99.999%) Aldrich lot# 06306MV, 3mm pellet, Semi-conductive, 90 TOA



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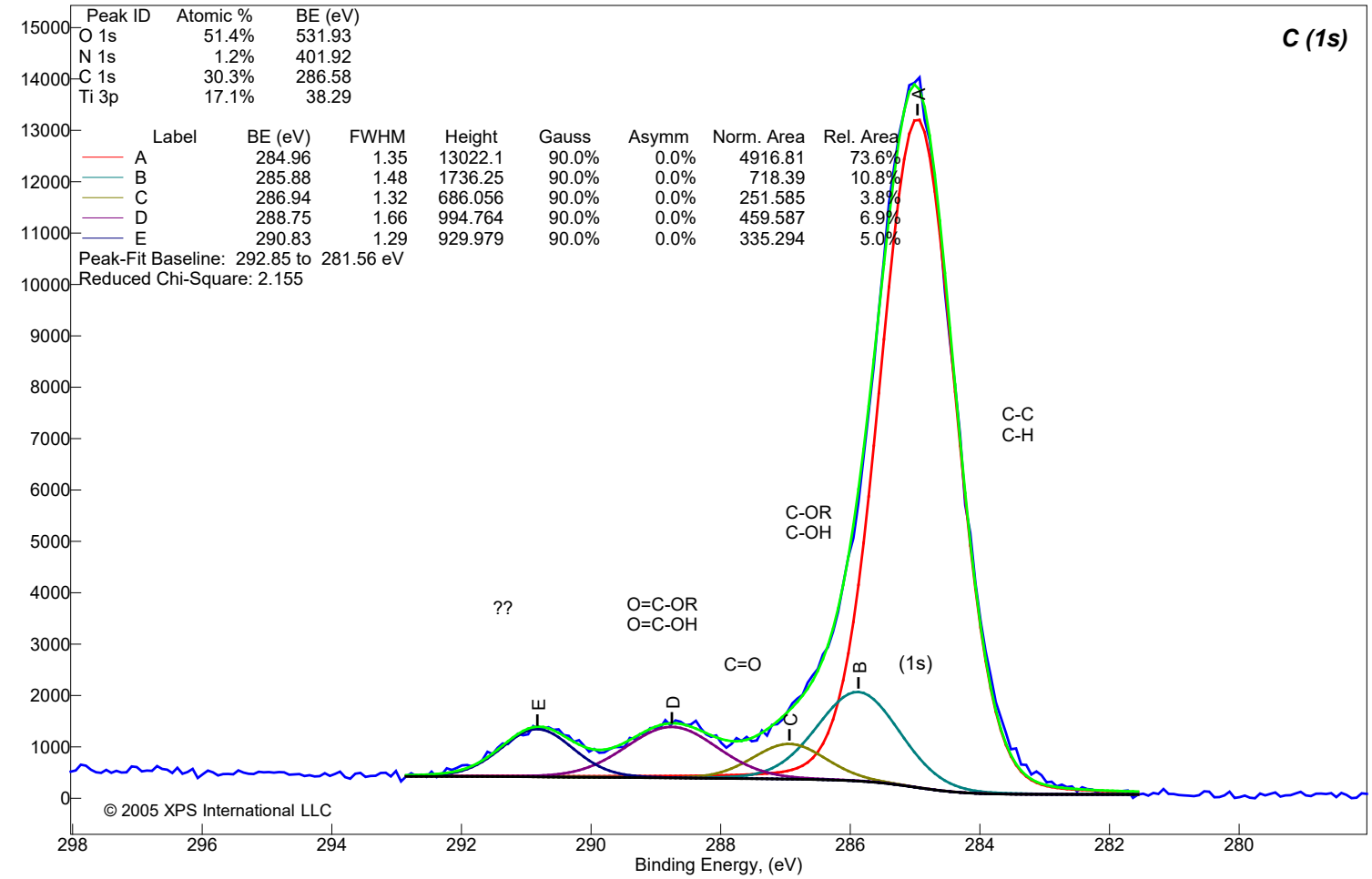
Titanium (IV) Oxide (FW = 79.90)

Sample Description: TiO2 (99.999%) Aldrich lot# 06306MV, 3mm pellet, Semi-conductive, 90 TOA



Titanium (IV) Oxide (FW = 79.90)

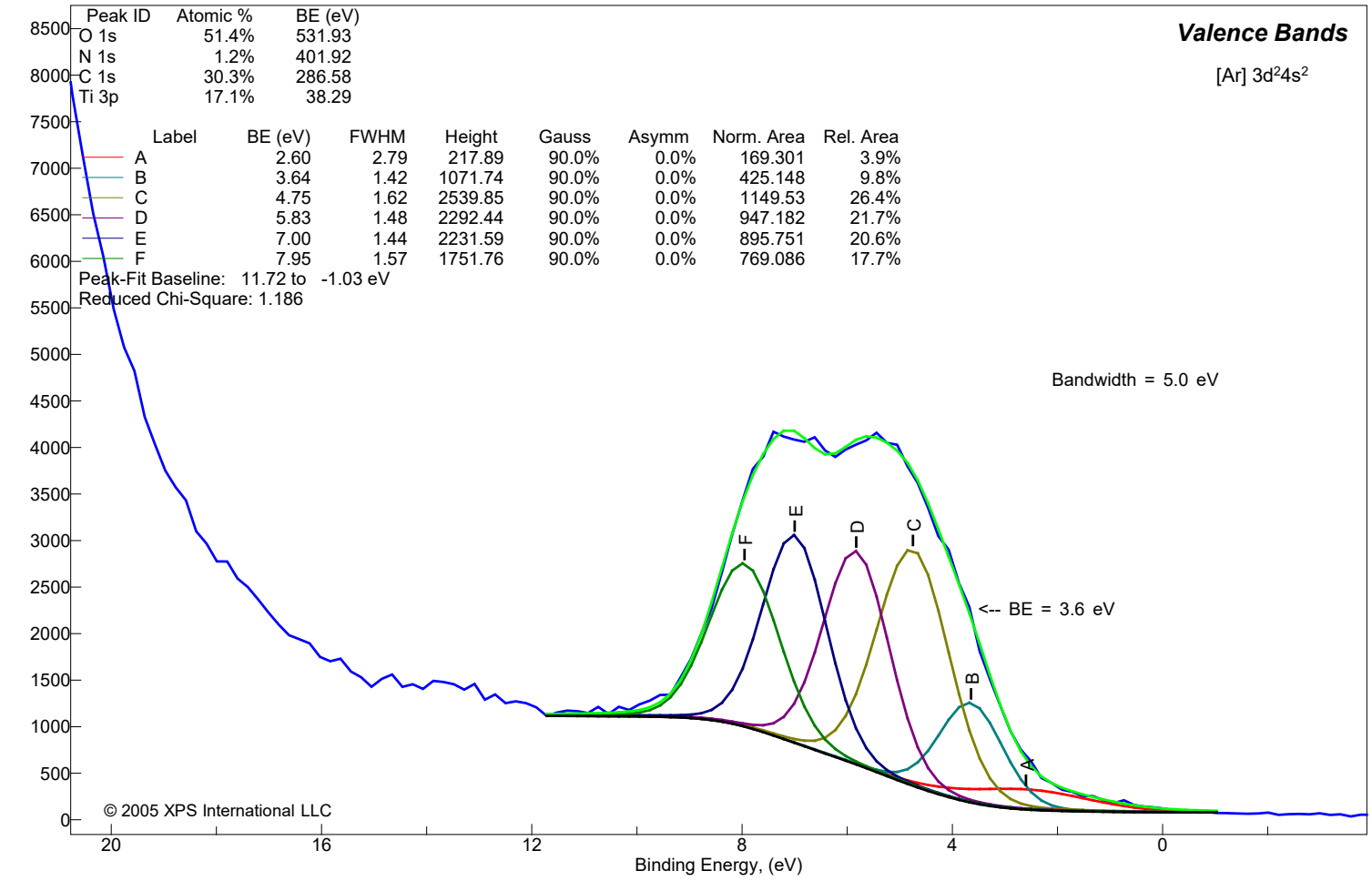
Sample Description: TiO2 (99.999%) Aldrich lot# 06306MV, 3mm pellet, Semi-conductive, 90 TOA



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Titanium (IV) Oxide (FW = 79.90)

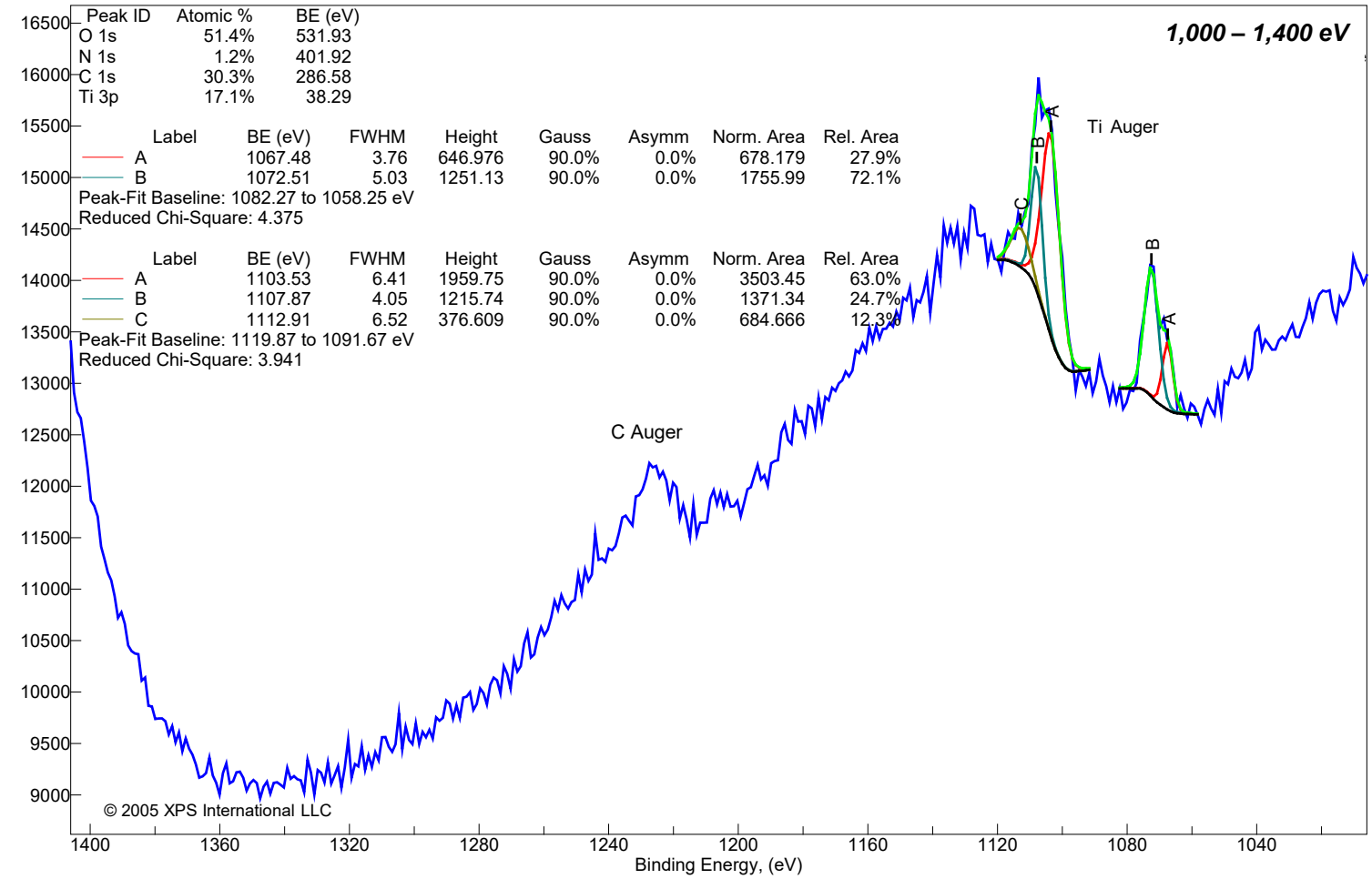
Sample Description: TiO2 (99.999%) Aldrich lot# 06306MV, 3mm pellet, Semi-conductive, 90 TOA



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Titanium (IV) Oxide (FW = 79.90)

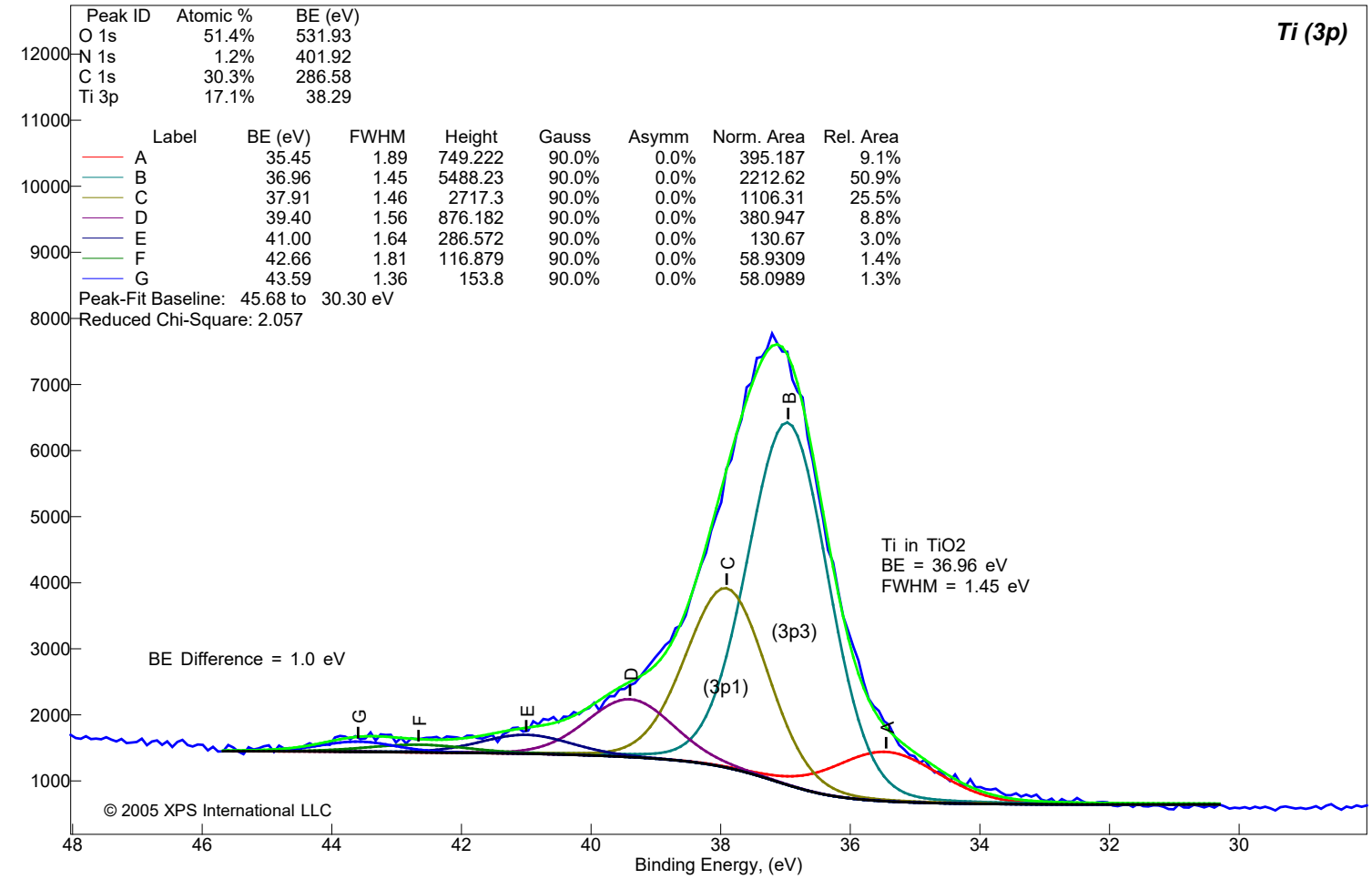
Sample Description: TiO2 (99.999%) Aldrich lot# 06306MV, 3mm pellet, Semi-conductive, 90 TOA



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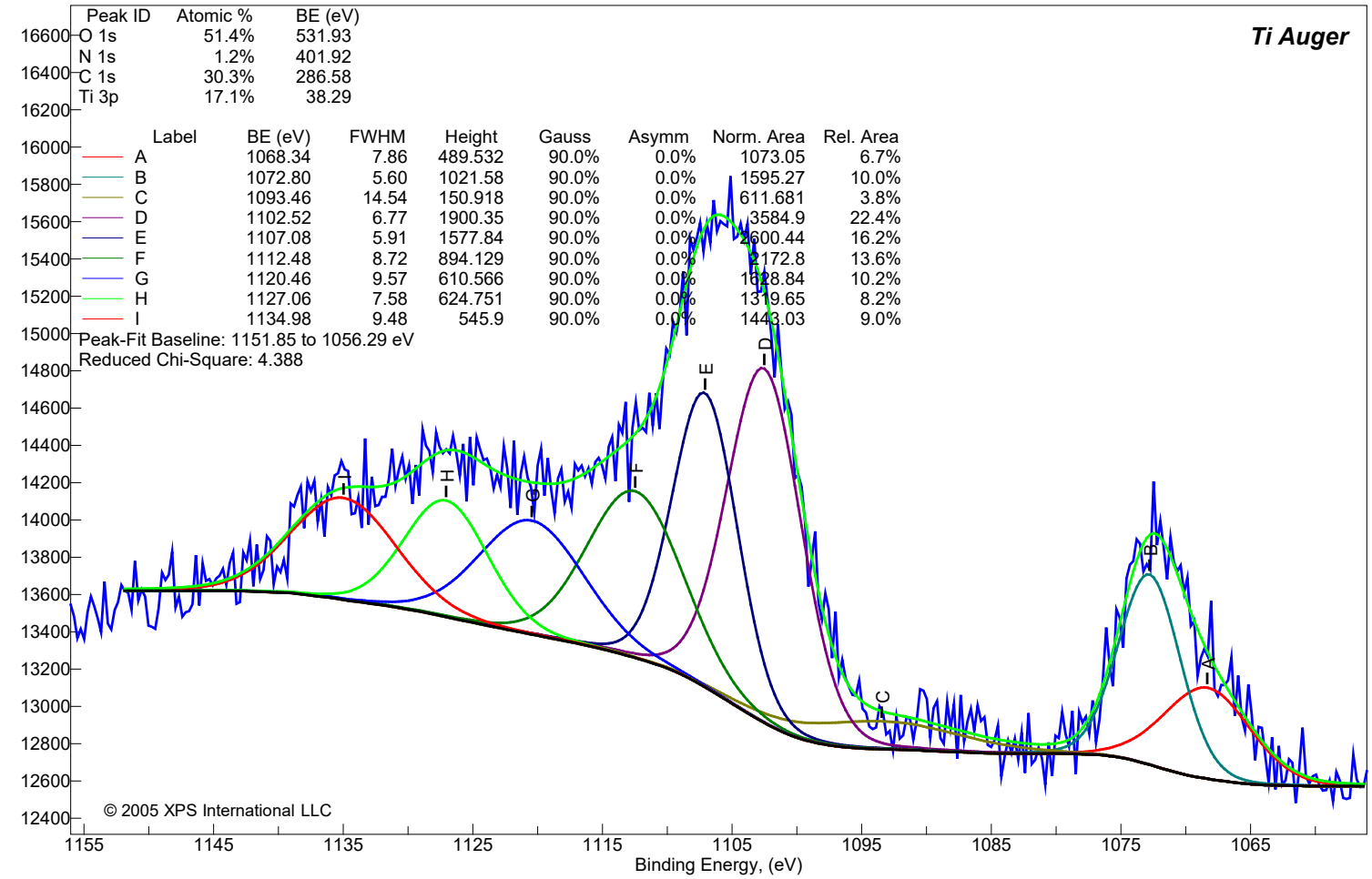
Titanium (IV) Oxide (FW = 79.90)

Sample Description: TiO2 (99.999%) Aldrich lot# 06306MV, 3mm pellet, Semi-conductive, 90 TOA



Titanium (IV) Oxide (FW = 79.90)

Sample Description: TiO2 (99.999%) Aldrich lot# 06306MV, 3mm pellet, Semi-conductive, 90 TOA



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Ti_2O_3

Titanium (III) Oxide (FW = 143.80)
Surface Composition Table

Description: Ti_2O_3 (99.99%) from Rare Metallics Co. Lot# 10920-30T, analyzed at 90 deg TOA, mesh at 1 mm, conductive black powder pressed into 3 mm pellet, mp 2130 C, d 4.6

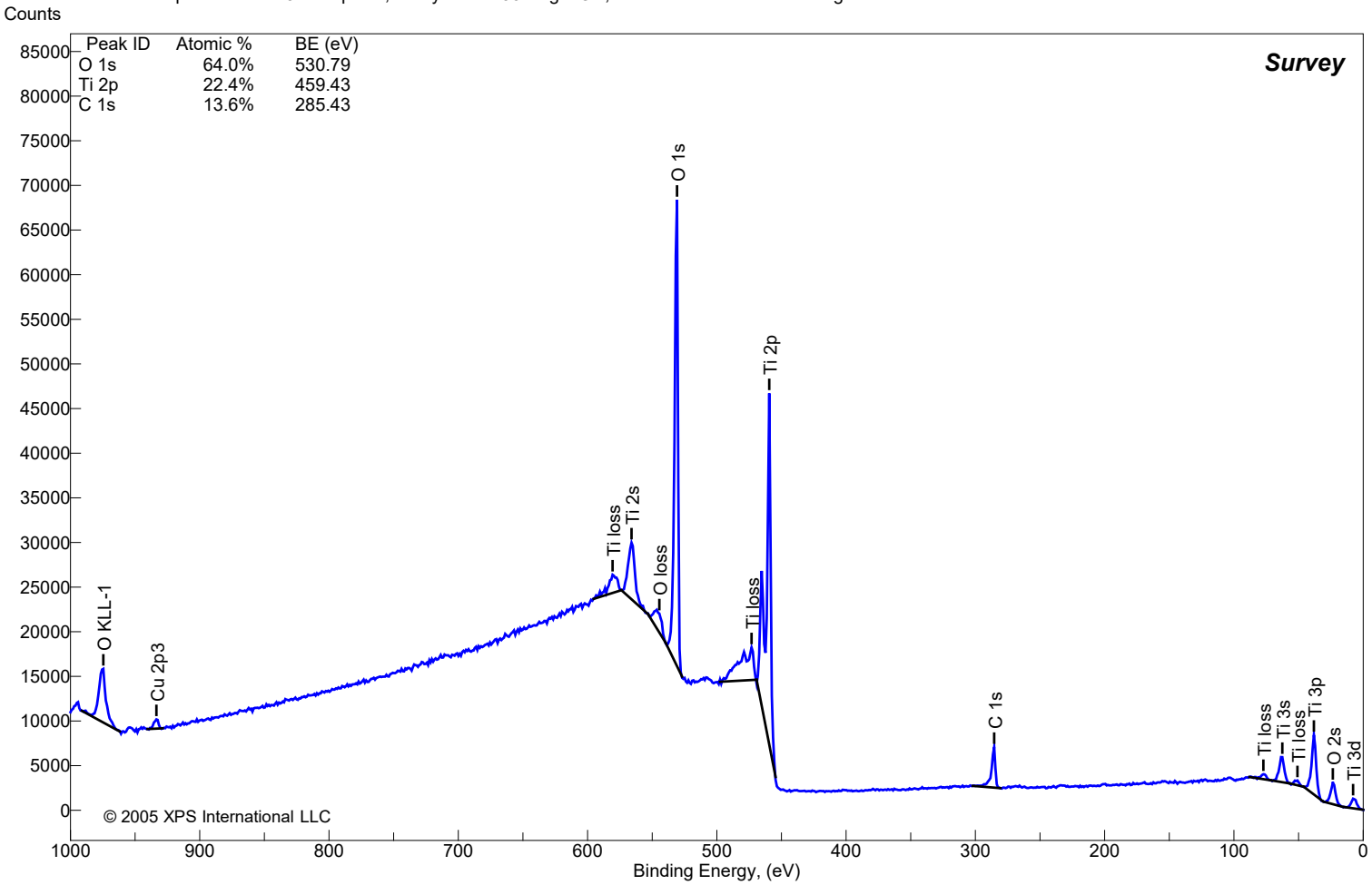
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Ti 3d	7.8	2.7	0.01	1.5	3,476	
O 2s	23.5	18.4	0.14	1.5	6,989	
Ti 3p	38.1	33.0	0.81	1.5	17,512	
Ti loss	50.8	45.7	0.00	1.5	1,290	
Ti 3s	62.6	57.5	0.47	1.5	8,074	
Ti loss	77.2	72.1	0.00	1.5	1,731	
C 1s	285.4	280.3	1.00	1.5	10,539	13.6%
C 1s	287.0	281.9	1.00	1.1	2,133	
Ti 2p	459.4	454.3	7.91	1.5	108,117	22.4%
Ti loss	473.1	468.0	0.00	1.5	30,376	
O 1s	530.8	525.7	2.93	1.5	102,991	64.0%
O loss	544.5	539.4	0.00	1.5	9,196	
Ti 2s	566.0	560.9	3.24	1.5	24,489	
Ti loss	580.6	575.5	0.00	1.5	10,292	
Cu 2p3	933.5	928.4	16.73	1.5	2,617	
O KLL-1	974.6	969.5	0.70	1.5	24,313	

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Ti_2O_3

Titanium (III) Oxide (FW = 143.80)

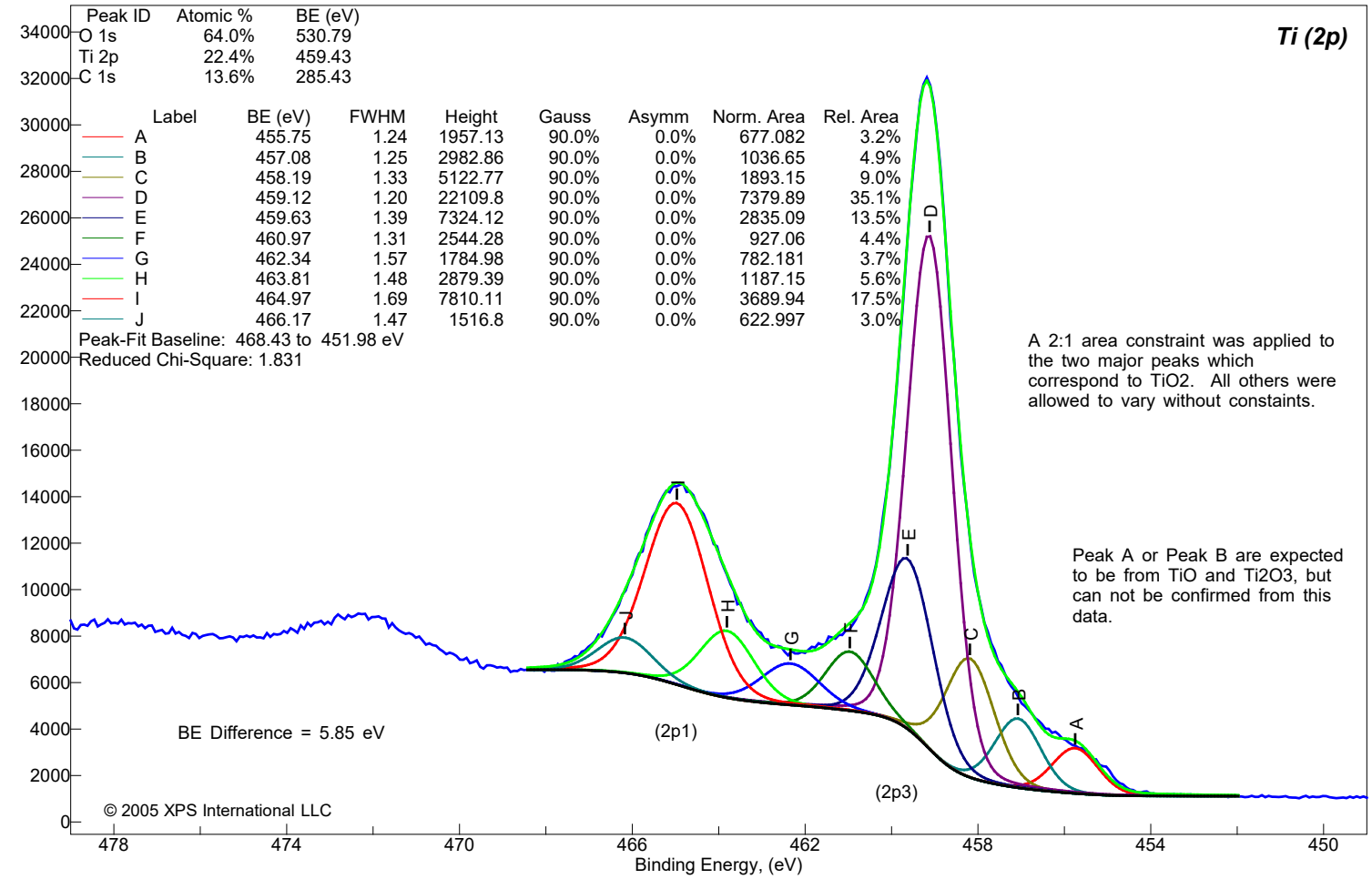
Sample Description: Ti2O3 (99.9%) from Rare Metallics Corp lot# 10920-30T, conductive pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Titanium (III) Oxide (FW = 143.80)

Sample Description: Ti2O3 (99.9%) RMC lot# 10920-30T, 3mm pellet, Conductive, black, 90 TOA

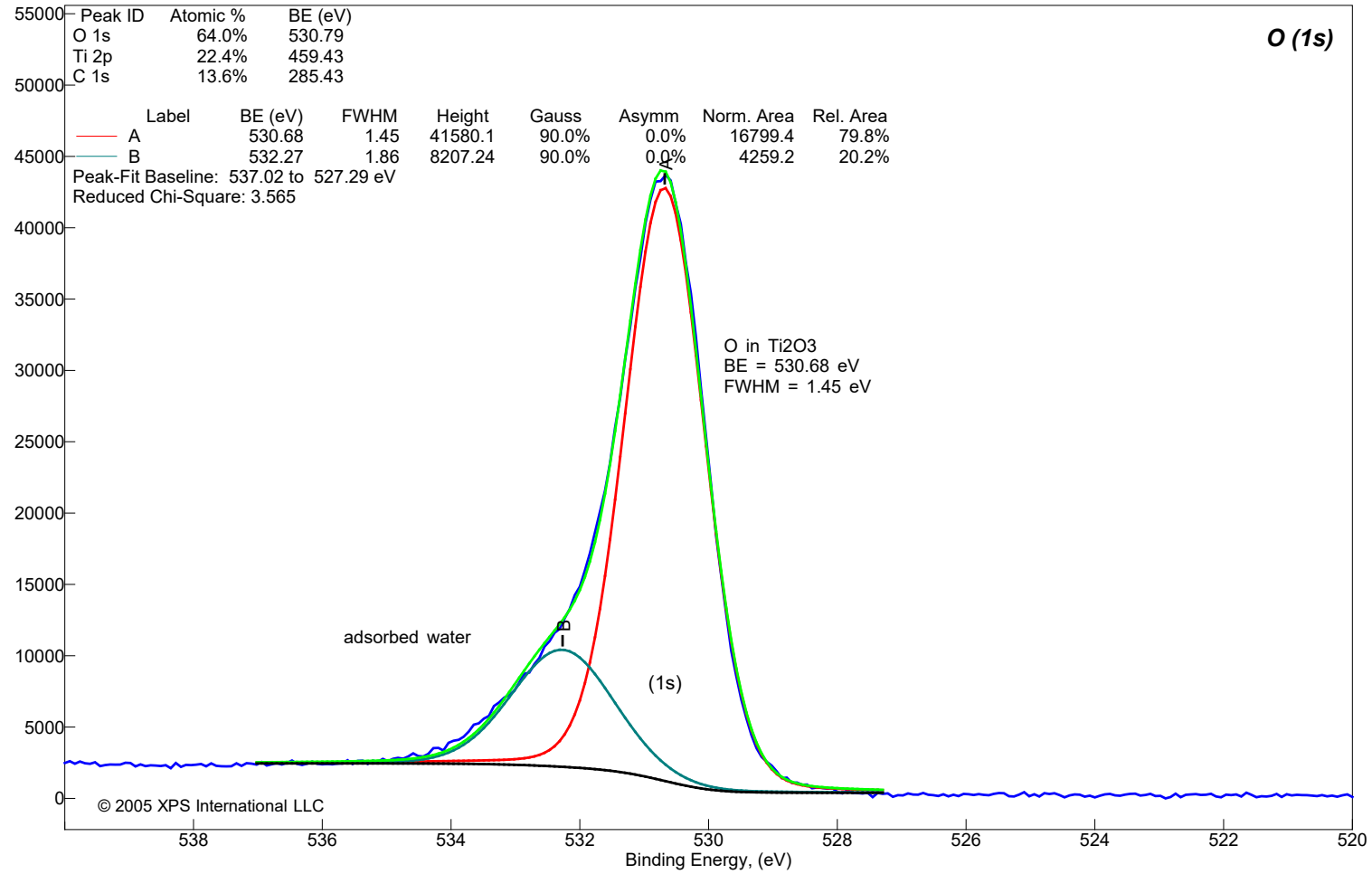


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Ti_2O_3

Titanium (III) Oxide (FW = 143.80)

Sample Description: Ti2O3 (99.9%) RMC lot# 10920-30T, 3mm pellet, Conductive, black, 90 TOA

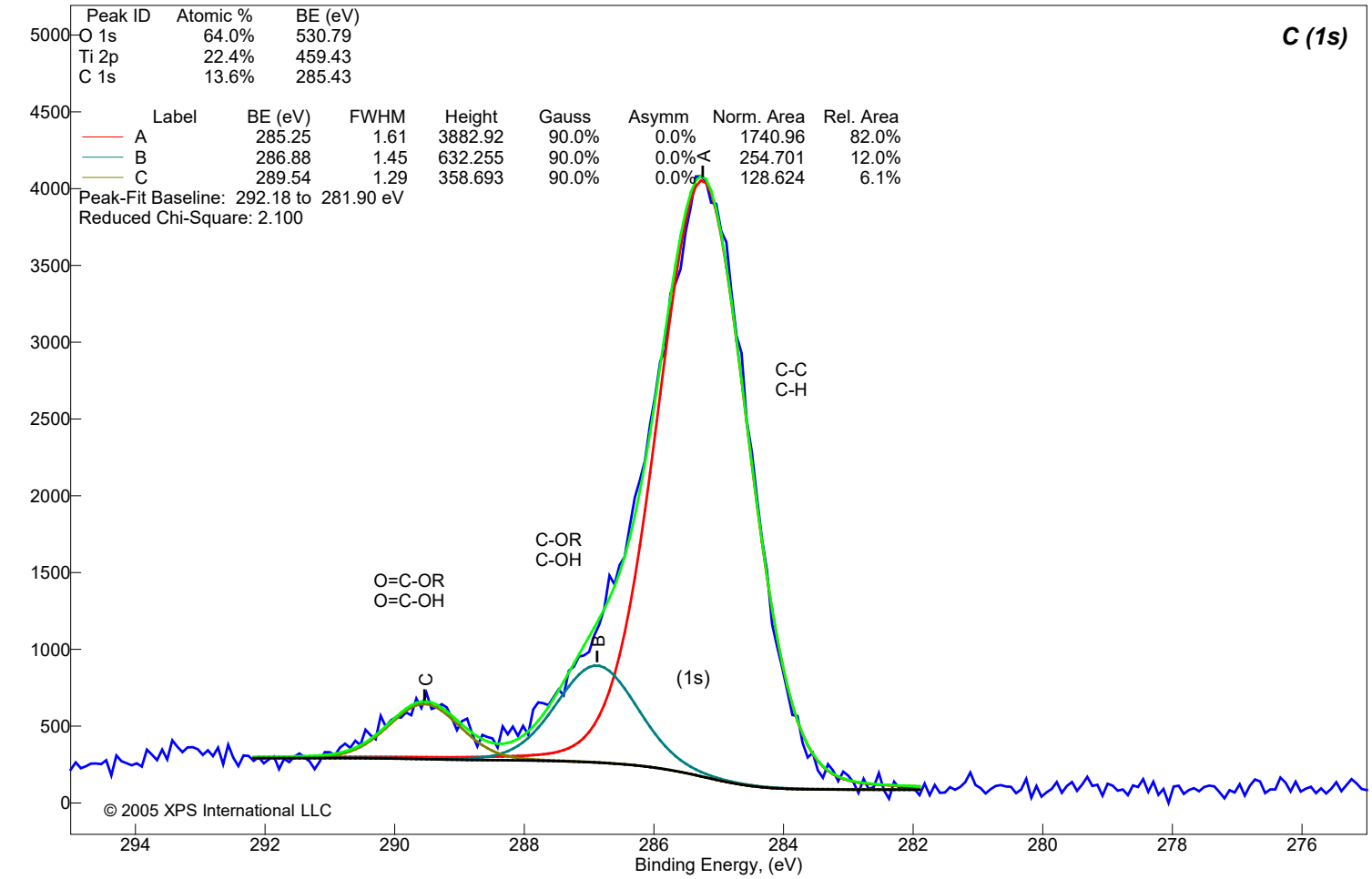


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Ti_2O_3

Titanium (III) Oxide (FW = 143.80)

Sample Description: Ti2O3 (99.9%) RMC lot# 10920-30T, 3mm pellet, Conductive, black, 90 TOA

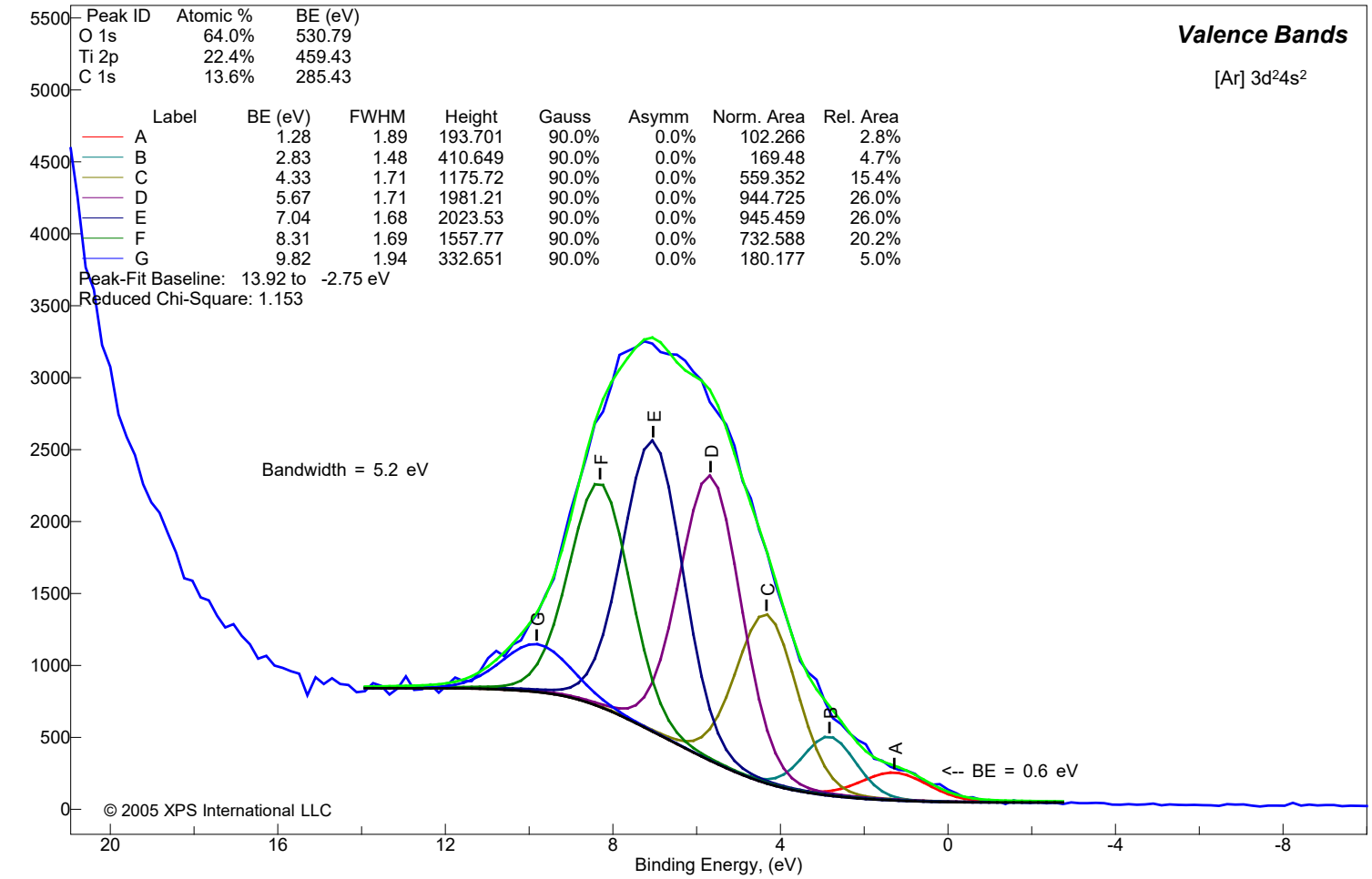


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Ti_2O_3

Titanium (III) Oxide (FW = 143.80)

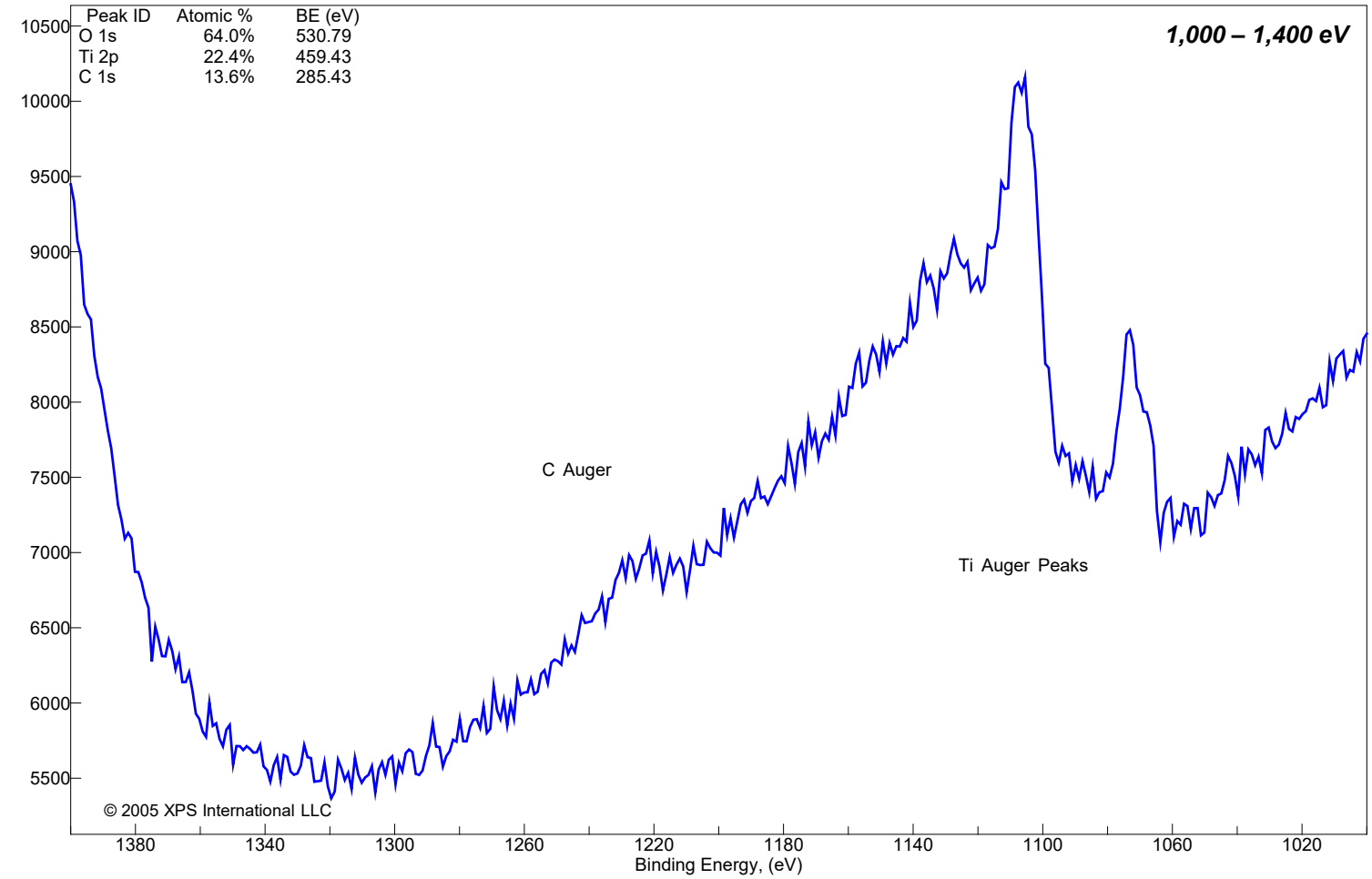
Sample Description: Ti2O3 (99.9%) RMC lot# 10920-30T, 3mm pellet, Conductive, black, 90 TOA



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Titanium (III) Oxide (FW = 143.80)

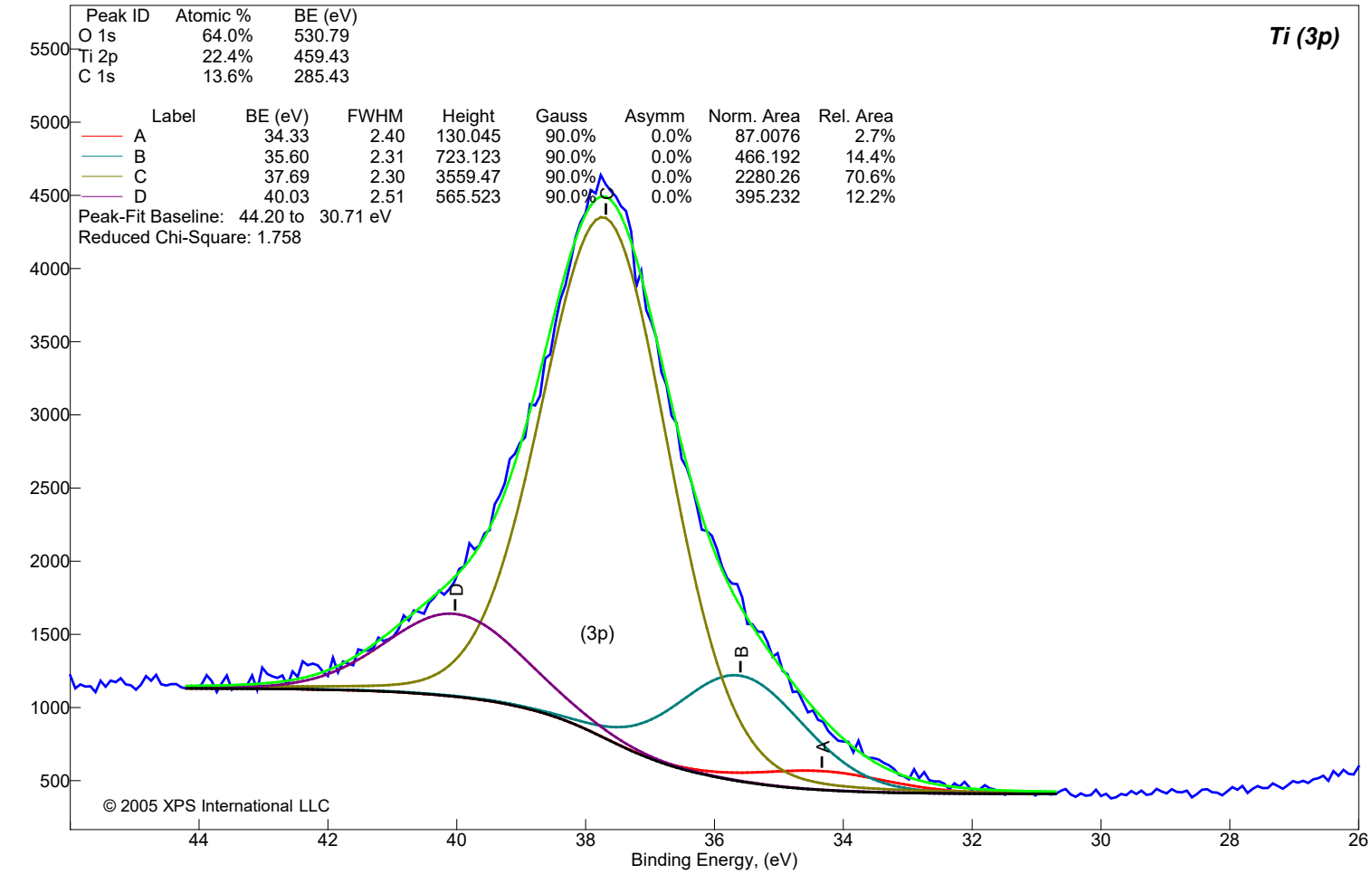
Sample Description: Ti2O3 (99.9%) RMC lot# 10920-30T, 3mm pellet, Conductive, black, 90 TOA



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Titanium (III) Oxide (FW = 143.80)

Sample Description: Ti2O3 (99.9%) RMC lot# 10920-30T, 3mm pellet, Conductive, black, 90 TOA



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Tl_2O_3

Thallium (III) Oxide (FW = 456.74)
Surface Composition Table

Description: Tl_2O_3 (99.99%) from Aldrich Co. Lot# 06128MV, analyzed at 90 deg TOA, mesh at 1 mm, conductive brown-black powder pressed into 3 mm pellet, mp 717 C, d 9.65

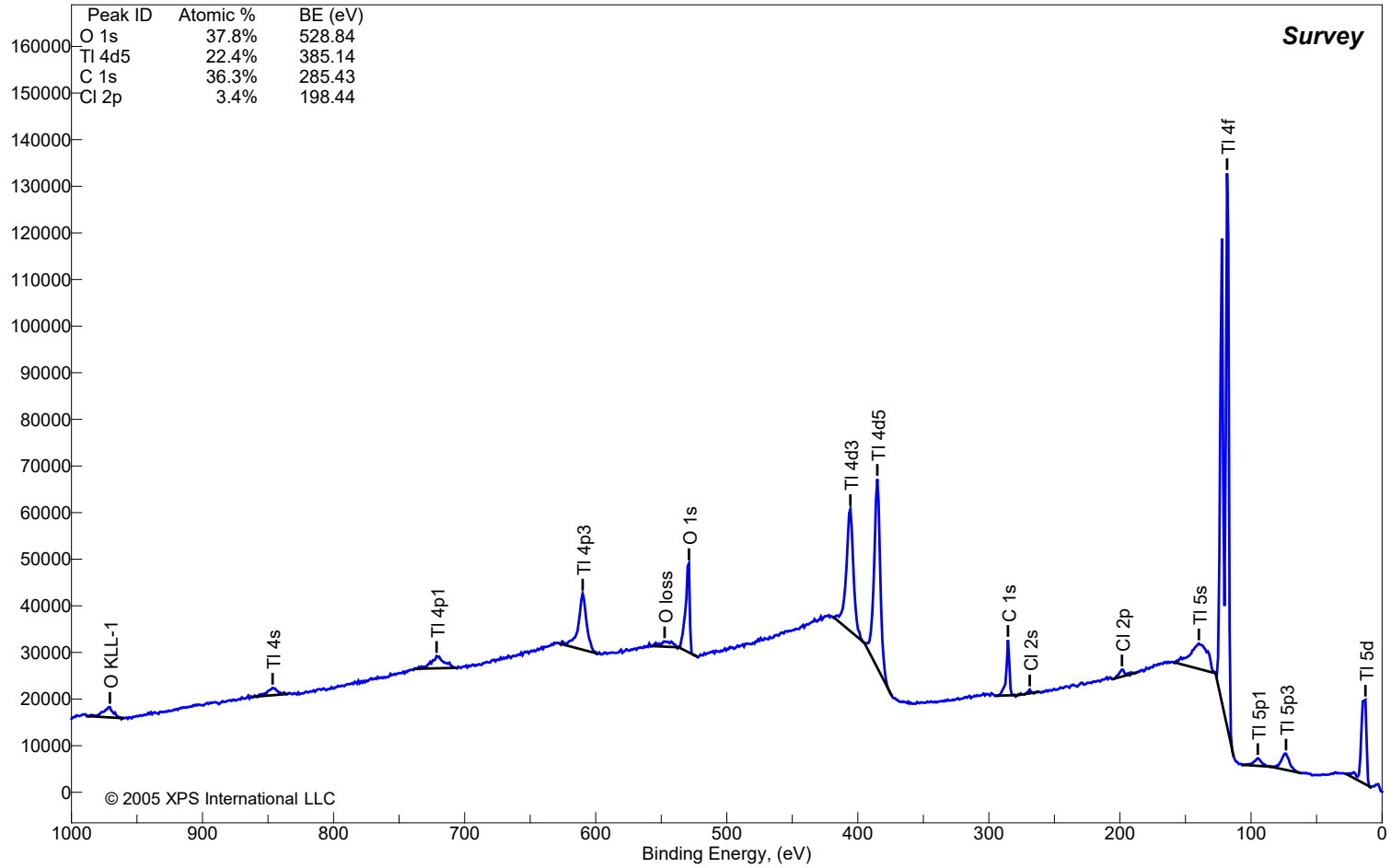
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Tl 5d	12.7	12.7	2.38	1.5	109,750	
Tl 5p3	73.3	73.3	1.25	1.5	32,773	
Tl 5p1	94.8	94.8	0.51	1.5	13,331	
Tl 4f	118.3	118.3	20.76	1.5	721,783	
Tl 5s	139.8	139.8	0.52	1.5	107,560	
Cl 2p	198.4	198.4	2.28	1.5	9,735	3.4%
Cl 2s	268.8	268.8	1.69	1.5	3,273	
C 1s	285.4	285.4	1.00	1.5	40,557	36.3%
Tl 4d5	385.1	385.1	12.60	1.5	277,279	22.4%
Tl 4d3	405.7	405.7	8.60	1.5	210,977	
O 1s	528.8	528.8	2.93	1.5	87,996	37.8%
O loss	547.4	547.4	0.00	1.5	14,830	
Tl 4p3	610.0	610.0	6.19	1.5	113,024	
Tl 4p1	721.4	721.4	2.13	1.5	36,695	
Tl 4s	846.5	846.5	1.95	1.5	20,219	
O KLL-1	970.7	970.7	0.70	1.5	22,357	

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Tl_2O_3

Thallium (III) Oxide (FW = 456.74)

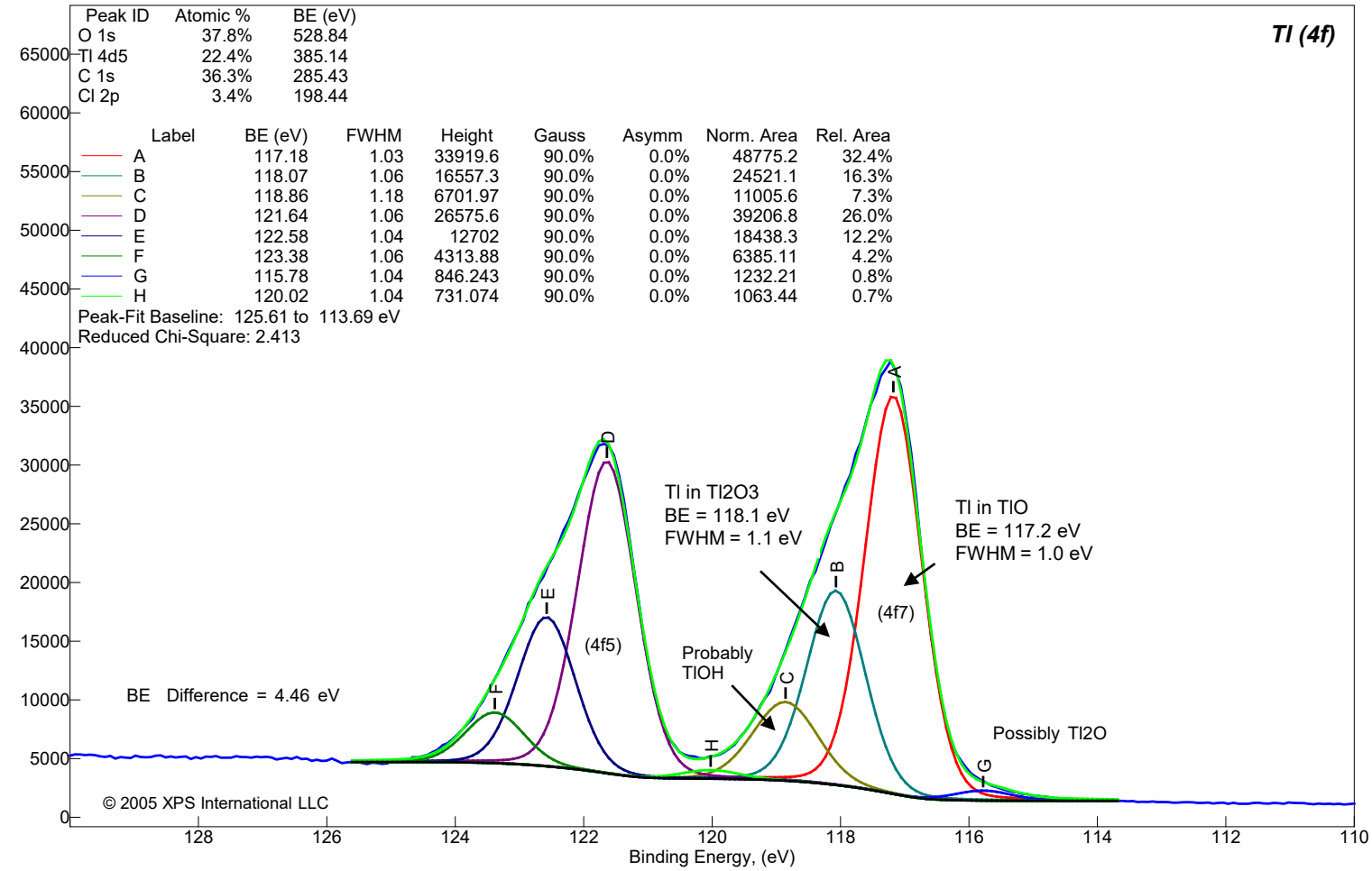
Sample Description: Tl2O3 (99.99%) from Aldrich Lot# 06128MV, conductive
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Thallium (III) Oxide (FW = 456.74)

Sample Description: Tl2O3 (99.99%) Aldrich Lot# 06128MV, 3mm pellet, CONDUCTIVE, 90 TOA

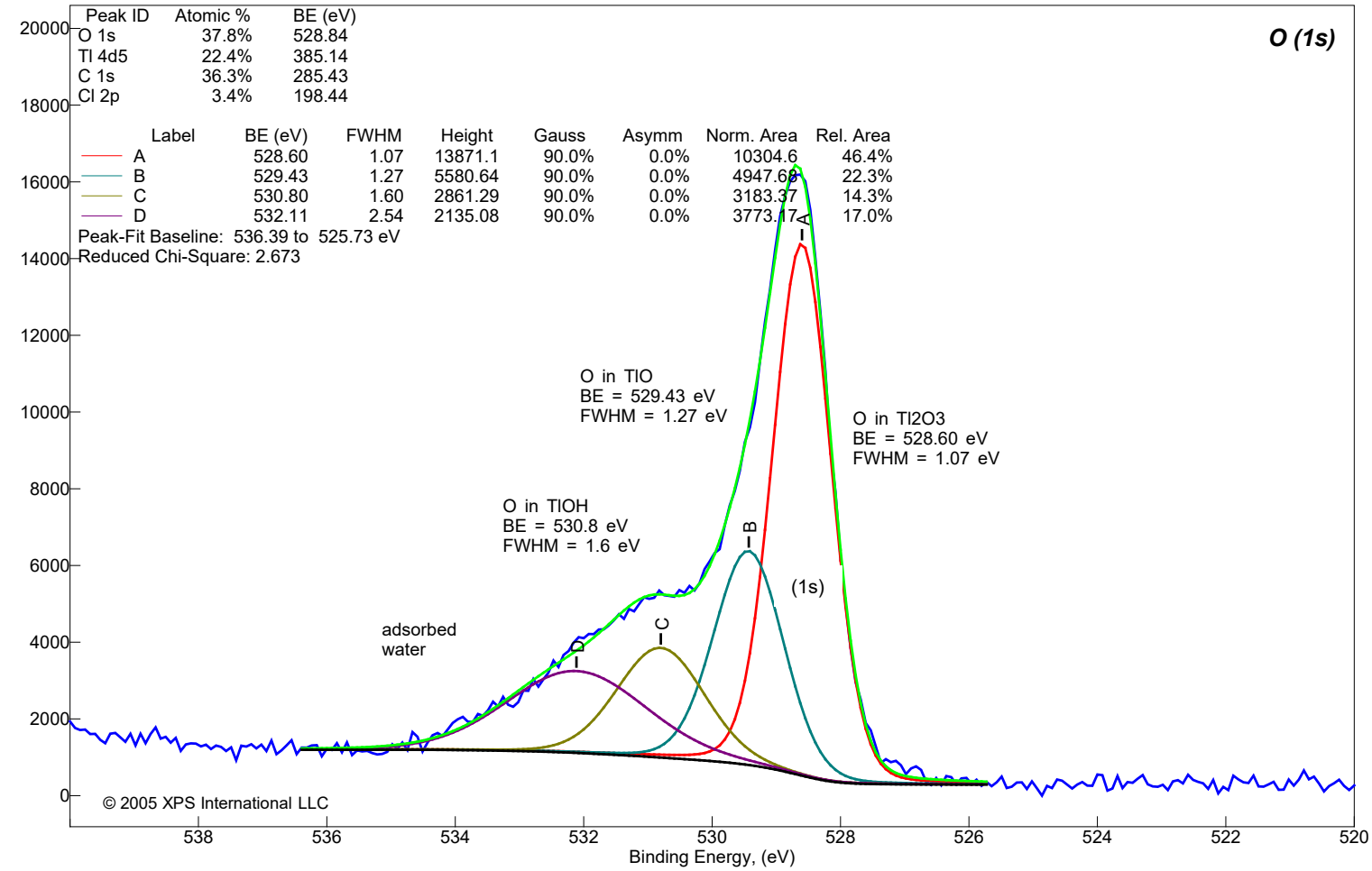


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Tl_2O_3

Thallium (III) Oxide (FW = 456.74)

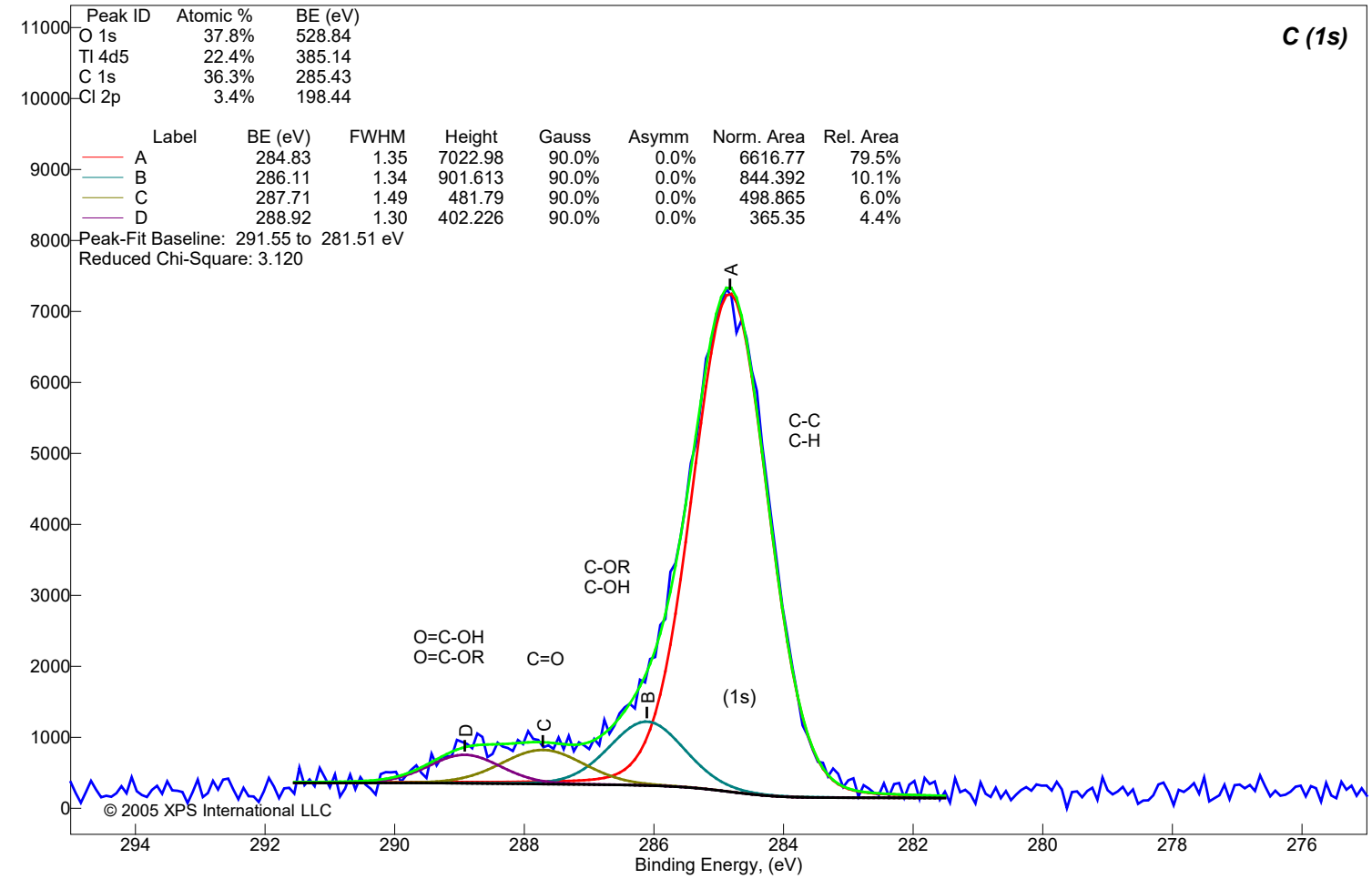
Sample Description: Tl2O3 (99.99%) Aldrich Lot# 06128MV, 3mm pellet, CONDUCTIVE, 90 TOA



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Thallium (III) Oxide (FW = 456.74)

Sample Description: Tl2O3 (99.99%) Aldrich Lot# 06128MV, 3mm pellet, CONDUCTIVE, 90 TOA

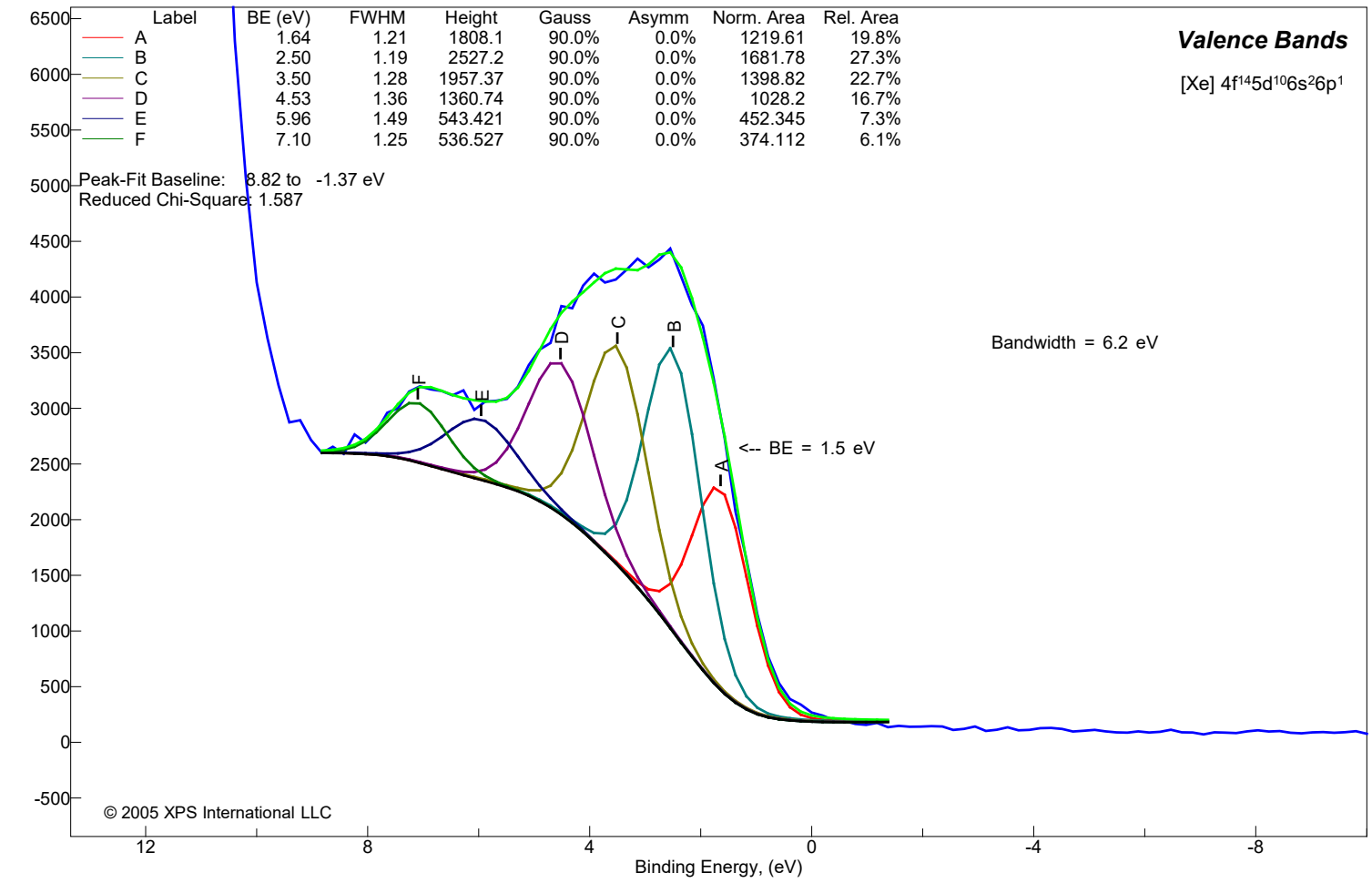


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Tl_2O_3

Thallium (III) Oxide (FW = 456.74)

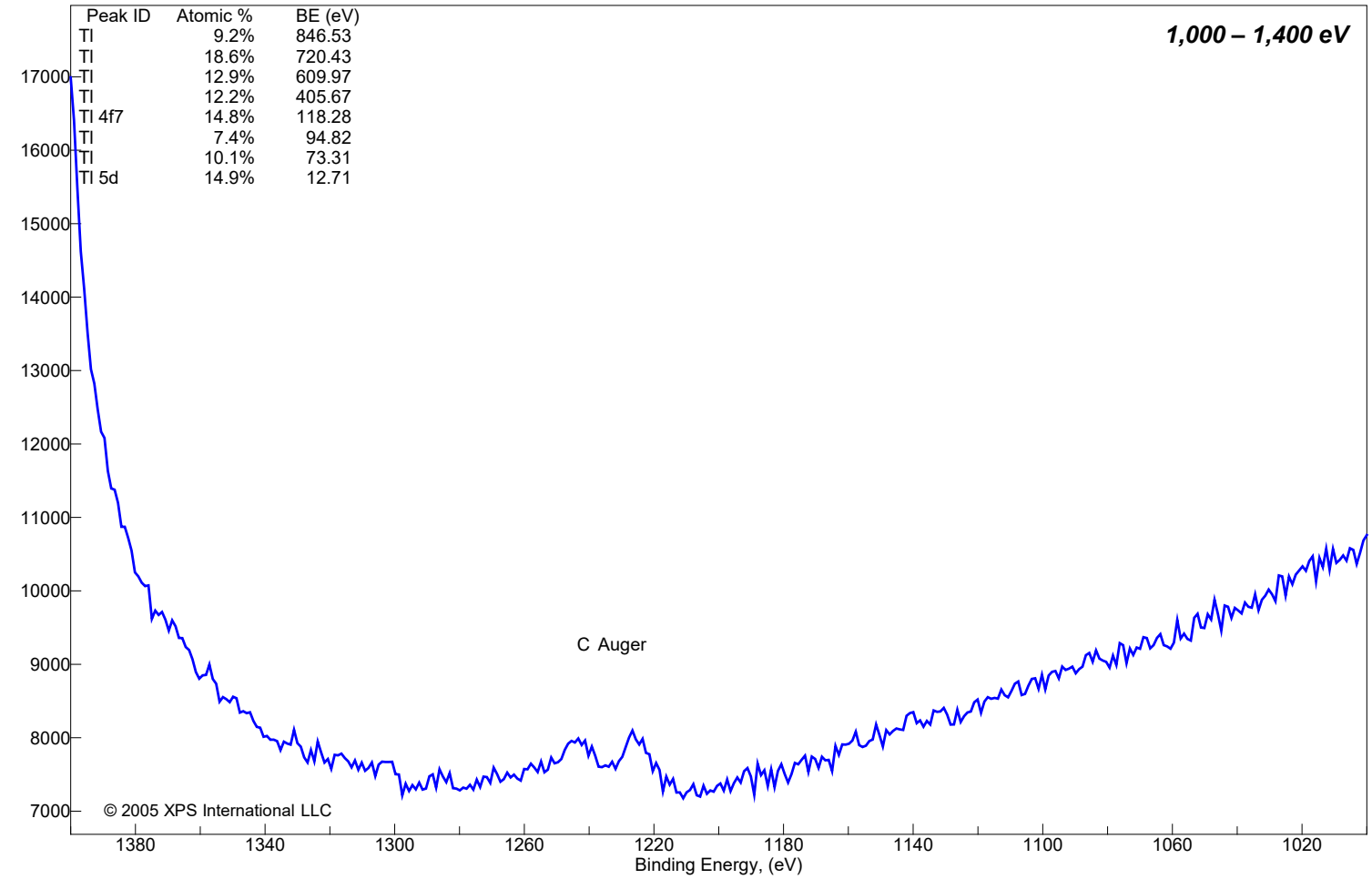
Sample Description: Tl2O3 99.99% Aldr lot# 06128MV scrn 90 TOA



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Thallium (III) Oxide (FW = 456.74)

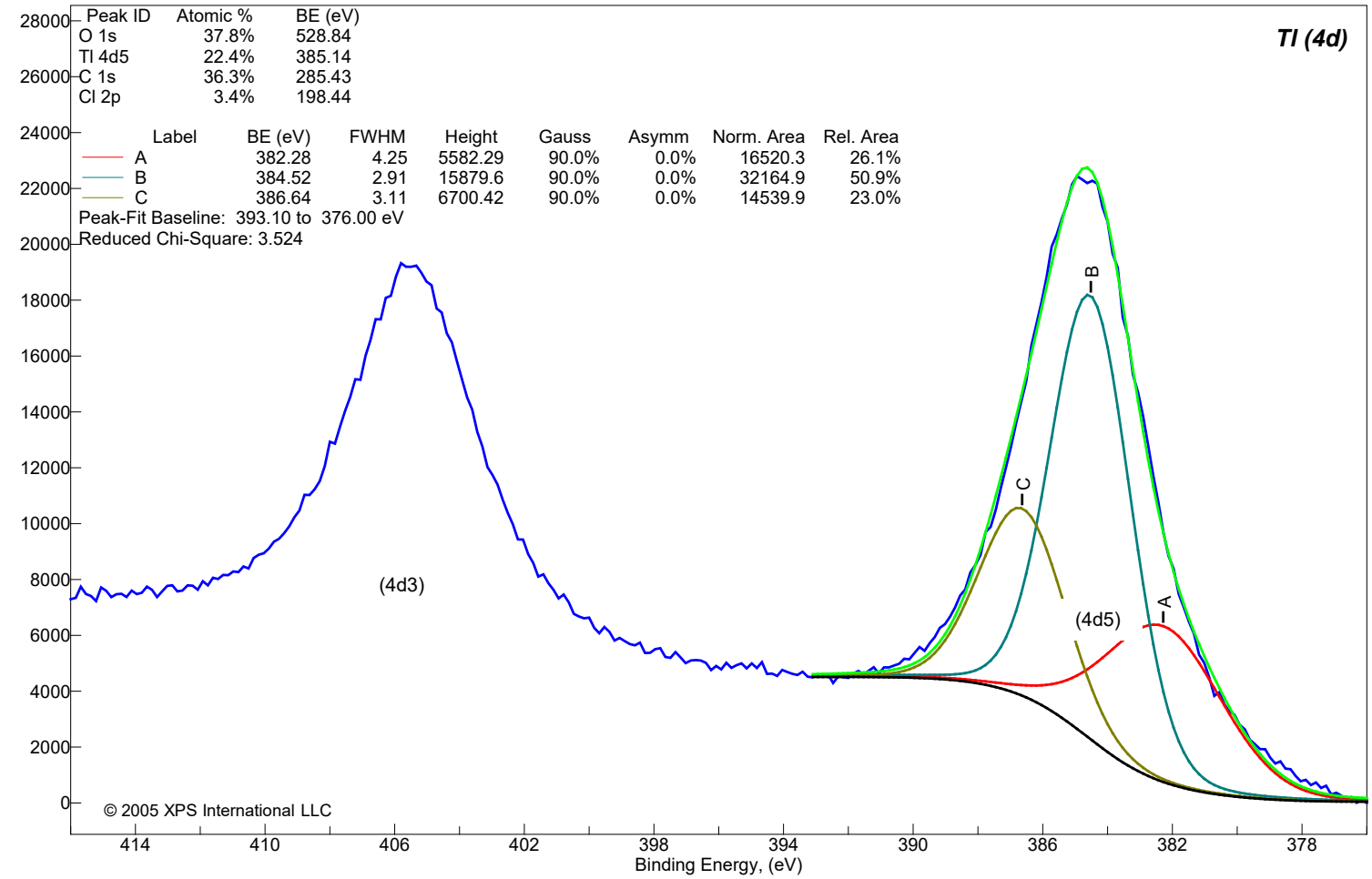
Sample Description: Tl2O3 99.99% Aldr lot# 06128MV scrn 90 TOA



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Thallium (III) Oxide (FW = 456.74)

Sample Description: Tl2O3 (99.99%) Aldrich Lot# 06128MV, 3mm pellet, CONDUCTIVE, 90 TOA



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Tm_2O_3

Thulium (III) Oxide (FW = 385.86)
Surface Composition Table

Description: Tm_2O_3 (99.99%) from Rare Metallics Co. Lot# 70202-13-3, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white powder pressed into 3 mm pellet, mp 2425 C, very hygroscopic

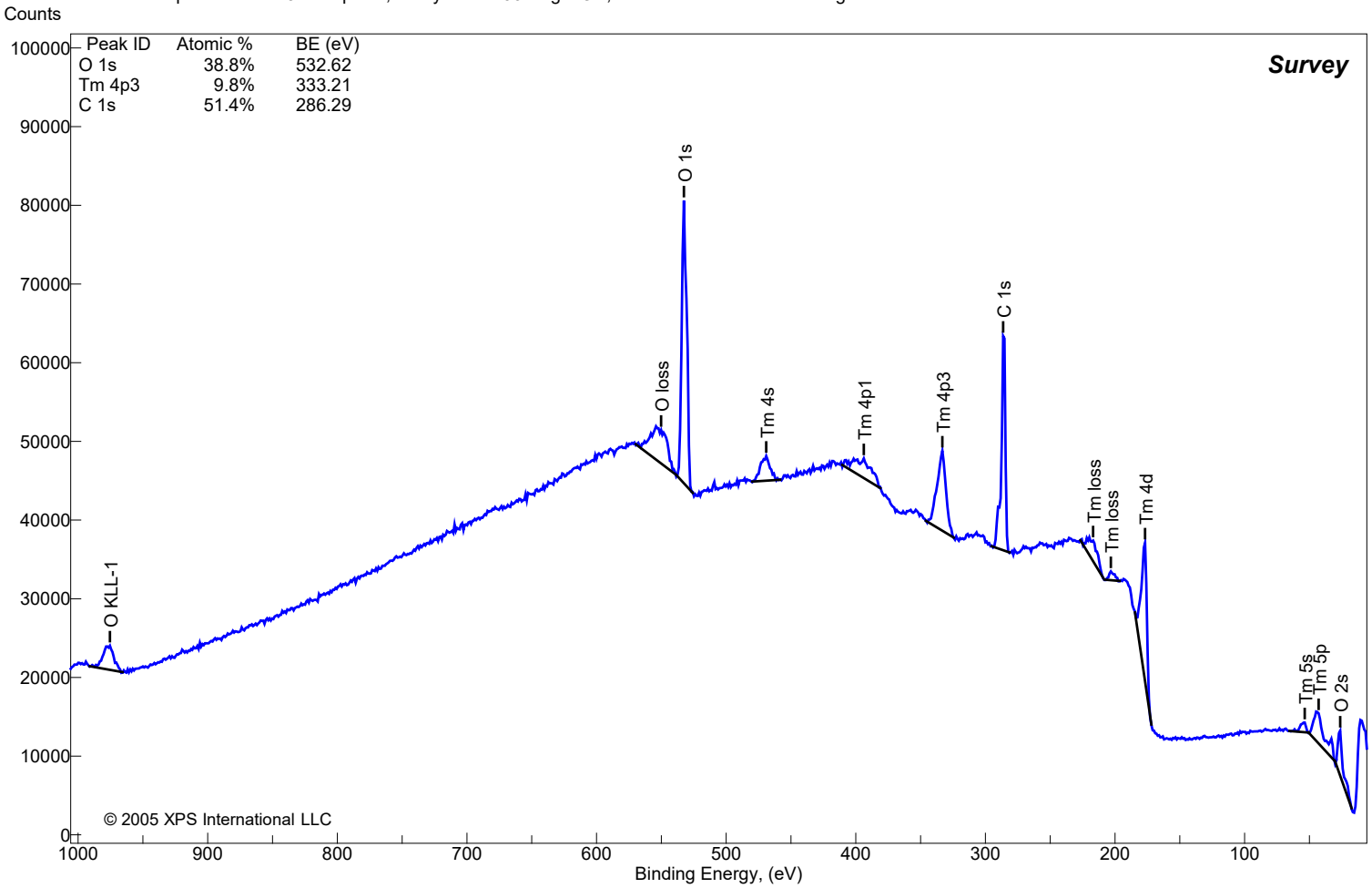
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2p	8.8	4.7	0.02	1.4	27,365	
O 2s	26.3	22.2	0.14	1.4	7,039	
Tm 5p	42.9	38.8	0.86	1.4	10,439	
Tm 5s	53.6	49.5	0.30	1.4	1,700	
Tm 4d	176.8	172.7	13.12	1.4	20,961	
Tm loss	203.2	199.1	0.00	1.4	1,500	
Tm loss	216.9	212.8	0.00	1.4	5,830	
C 1s	286.3	282.2	1.00	1.4	25,062	51.4%
Tm 4p3	333.2	329.1	4.48	1.4	20,220	9.8%
Tm 4p1	393.8	389.7	1.98	1.4	10,025	
Tm 4s	469.1	465.0	1.67	1.4	6,752	
O 1s	532.6	528.5	2.93	1.4	40,197	38.8%
O loss	550.2	546.1	0.00	1.4	17,829	
O KLL-1	975.4	971.3	0.70	1.4	7,889	

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Tm_2O_3

Thulium (III) Oxide (FW = 385.86)

Sample Description: Tm2O3 (99%) from Rare Metallics Corp. lot# 70202-13 3
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height

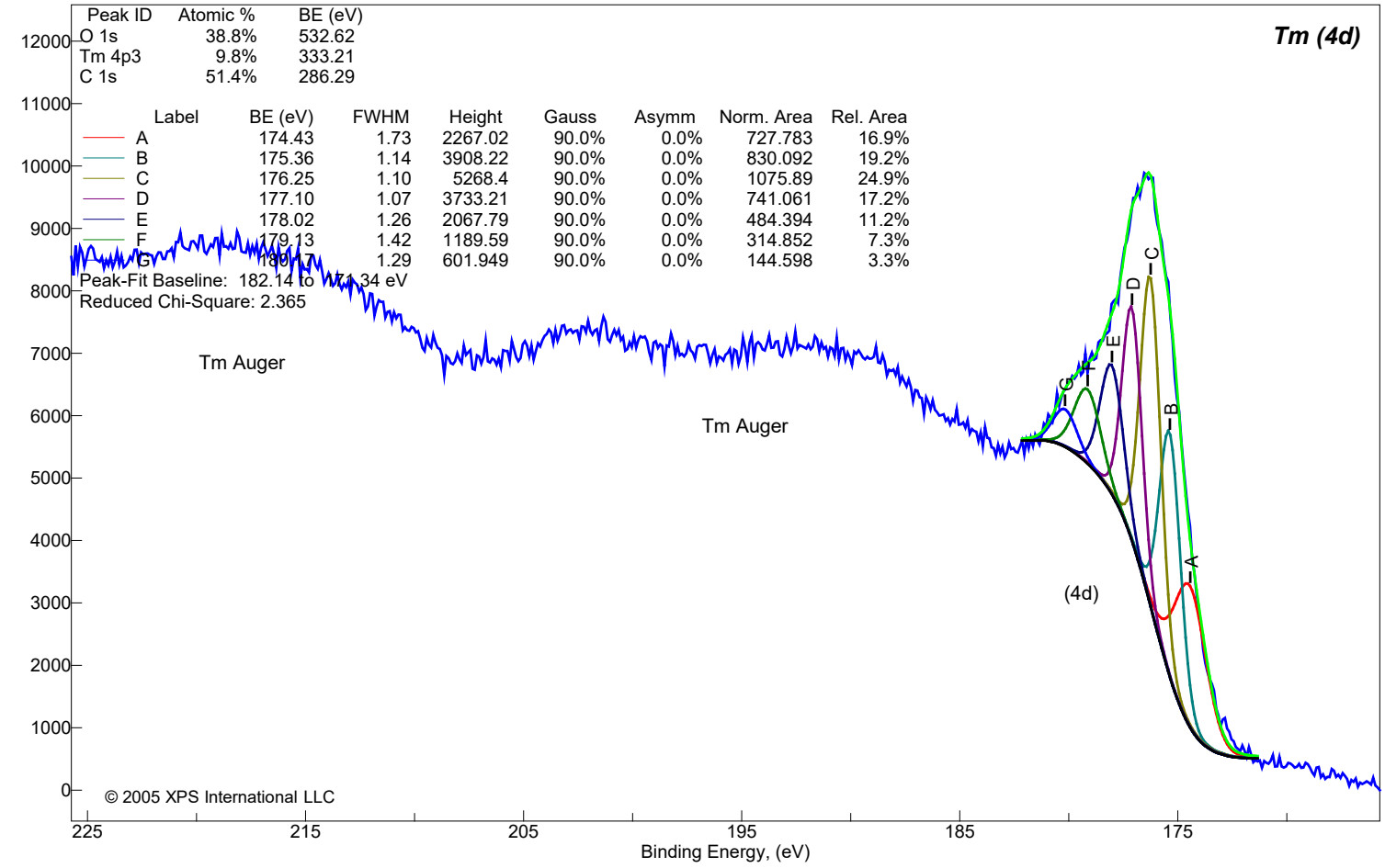


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Tm_2O_3

Thulium (III) Oxide (FW = 385.86)

Sample Description: Tm2O3 99% RMC lot# 70202-13 3mm plt 90TOA mesh
mesh at <1mm

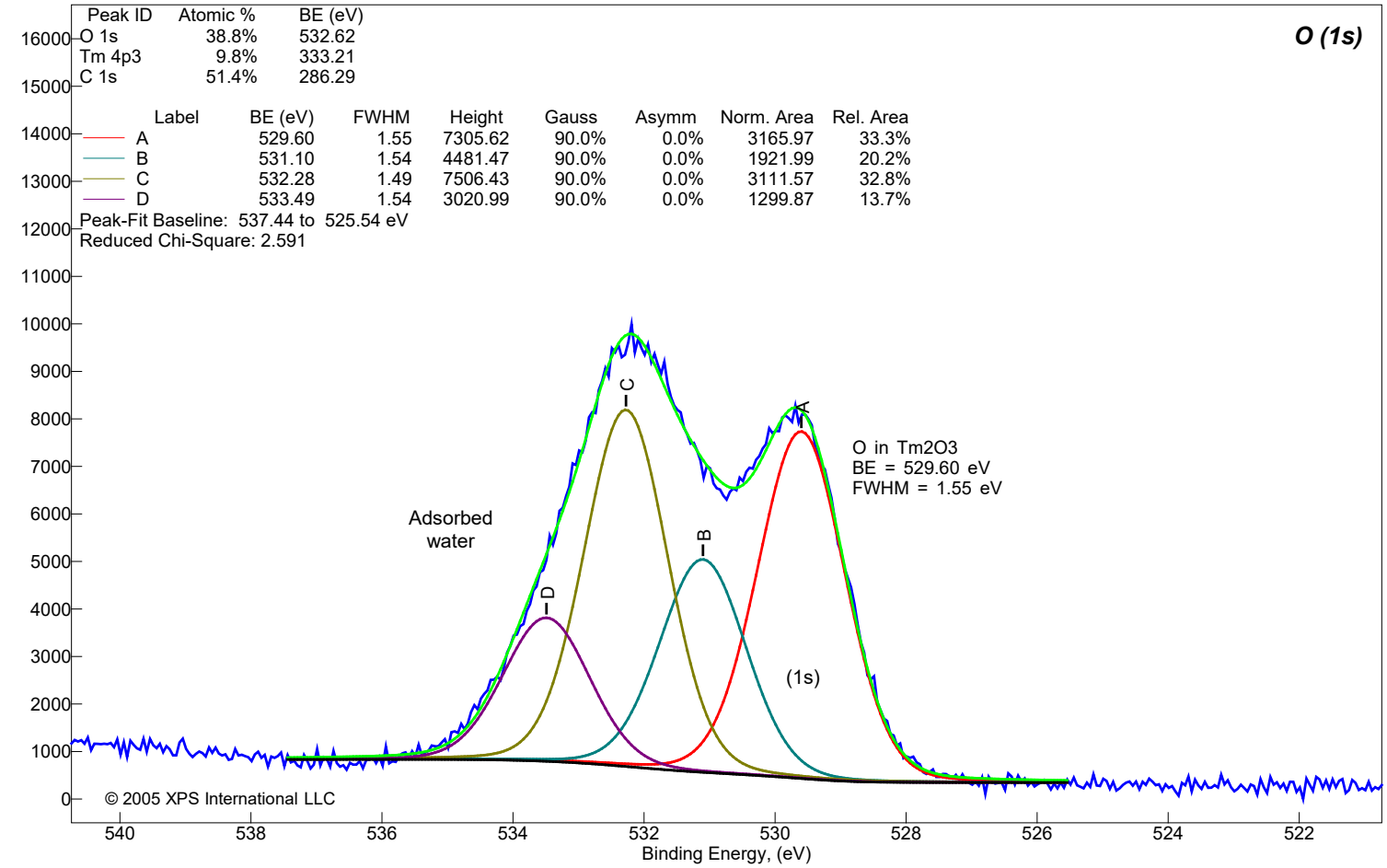


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Tm_2O_3

Thulium (III) Oxide (FW = 385.86)

Sample Description: Tm2O3 99% RMC lot# 70202-13 3mm plt 90TOA mesh
mesh at <1mm

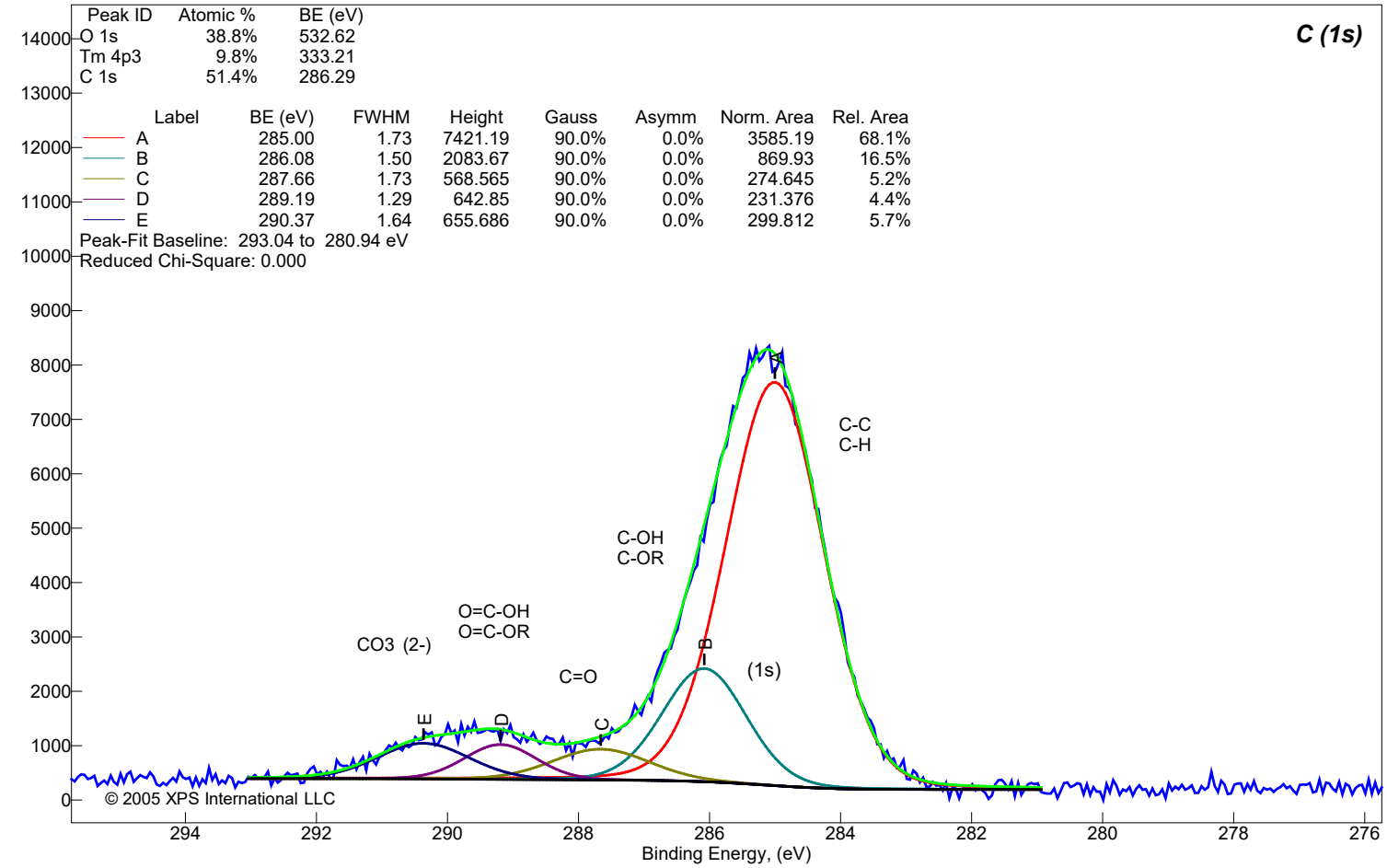


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Tm_2O_3

Thulium (III) Oxide (FW = 385.86)

Sample Description: Tm2O3 99% RMC lot# 70202-13 3mm plt 90TOA mesh
mesh at <1mm

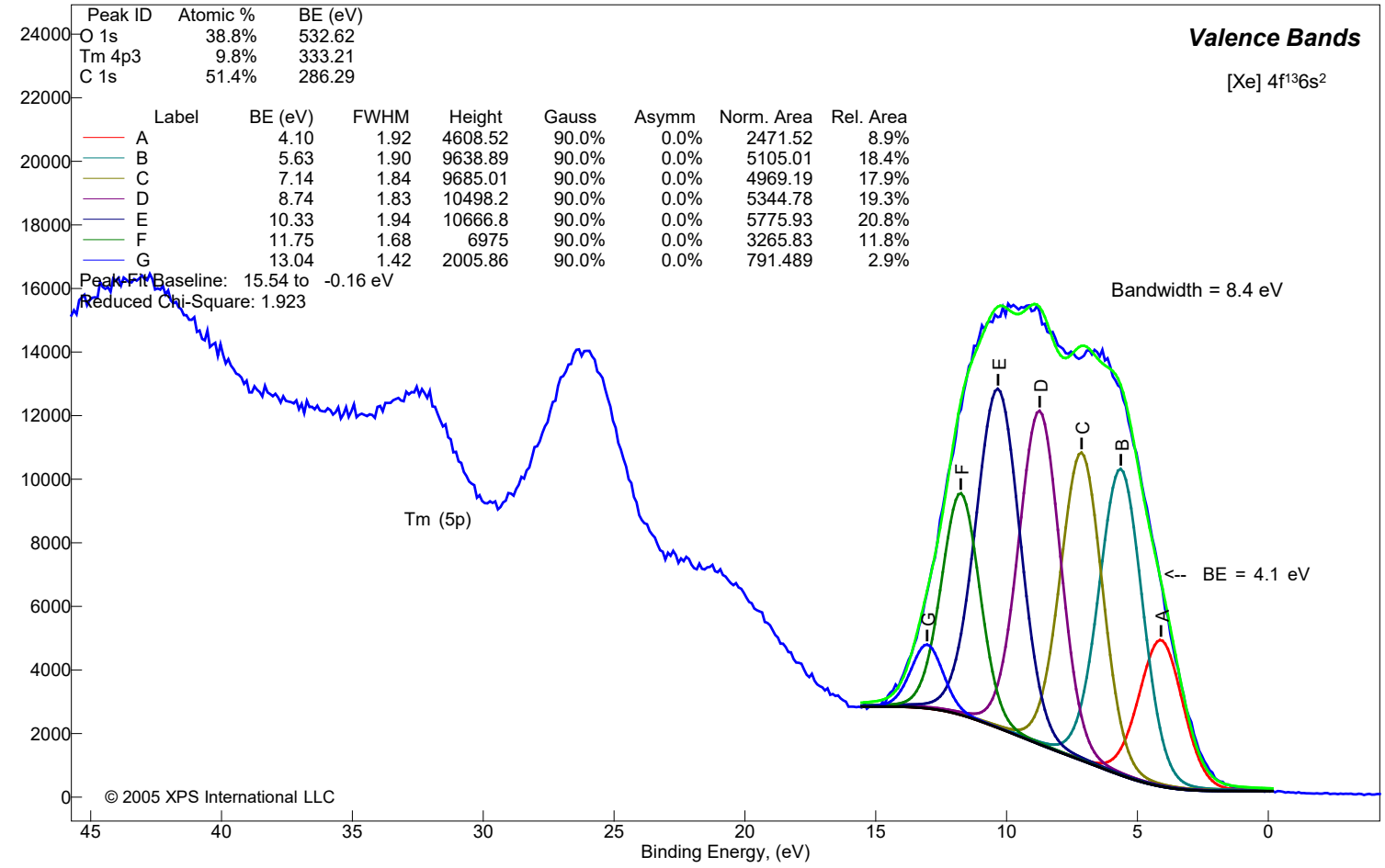


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Tm_2O_3

Thulium (III) Oxide (FW = 385.86)

Sample Description: Tm2O3 99% RMC lot# 70202-13 3mm plt 90TOA mesh
mesh at <1mm

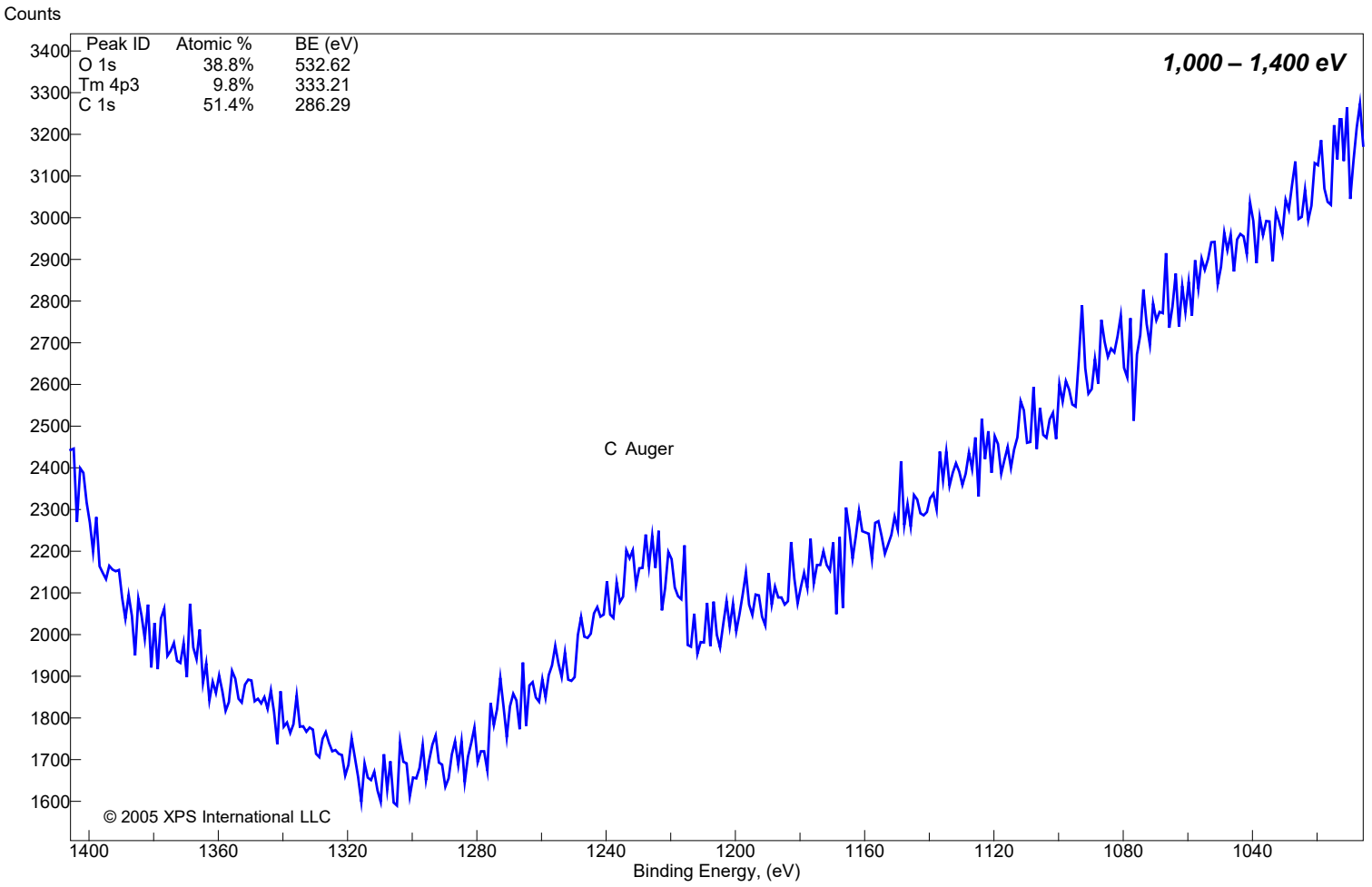


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Tm_2O_3

Thulium (III) Oxide (FW = 385.86)

Sample Description: Tm2O3 99% RMC lot# 70202-13 3mm plt 90TOA mesh
mesh at <1mm



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VO_2

Vanadium (IV) Oxide (FW = 82.94)
Surface Composition Table

Description: VO_2 (99.9%) from Aldrich Co. Lot# 05310AY, analyzed at 90 deg TOA, mesh at 1 mm, conductive blue powder pressed into 3 mm pellet, mp 1967 C, d 4.34, sol in acid

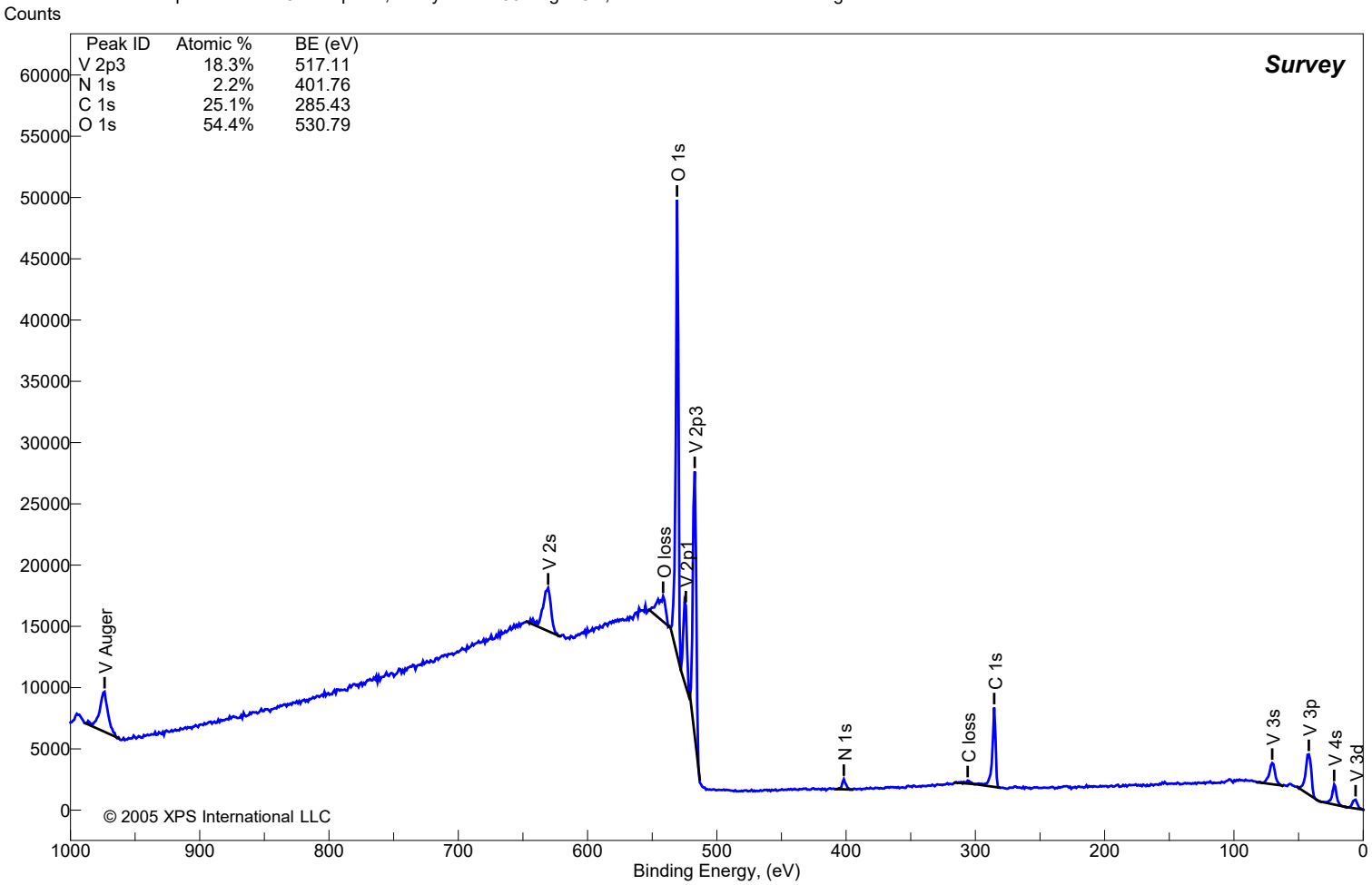
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
V 3d	5.9	5.9	0.03	1.4	2,028	
V 4s	22.5	22.5	0.00	1.4	4,001	
V 3p	42.0	42.0	1.00	1.4	10,346	
V 3s	70.4	70.4	0.54	1.4	6,245	
C 1s	285.4	285.4	1.00	1.4	12,353	25.1%
C loss	306.0	306.0	0.00	1.4	737	
N 1s	401.8	401.8	1.80	1.4	1,667	2.2%
V 2p	516.8	516.8	9.66	1.0	2,571	
V 2p3	517.1	517.1	6.37	1.4	42,582	18.3%
V 2p1	523.9	523.9	3.29	1.4	13,973	
O 1s	530.8	530.8	2.93	1.4	56,916	54.4%
O loss	541.5	541.5	0.00	1.4	8,691	
V 2s	630.5	630.5	3.57	1.4	16,161	
V Auger	973.6	973.6	0.00	1.4	15,242	

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Vanadium (IV) Oxide (FW = 82.94)

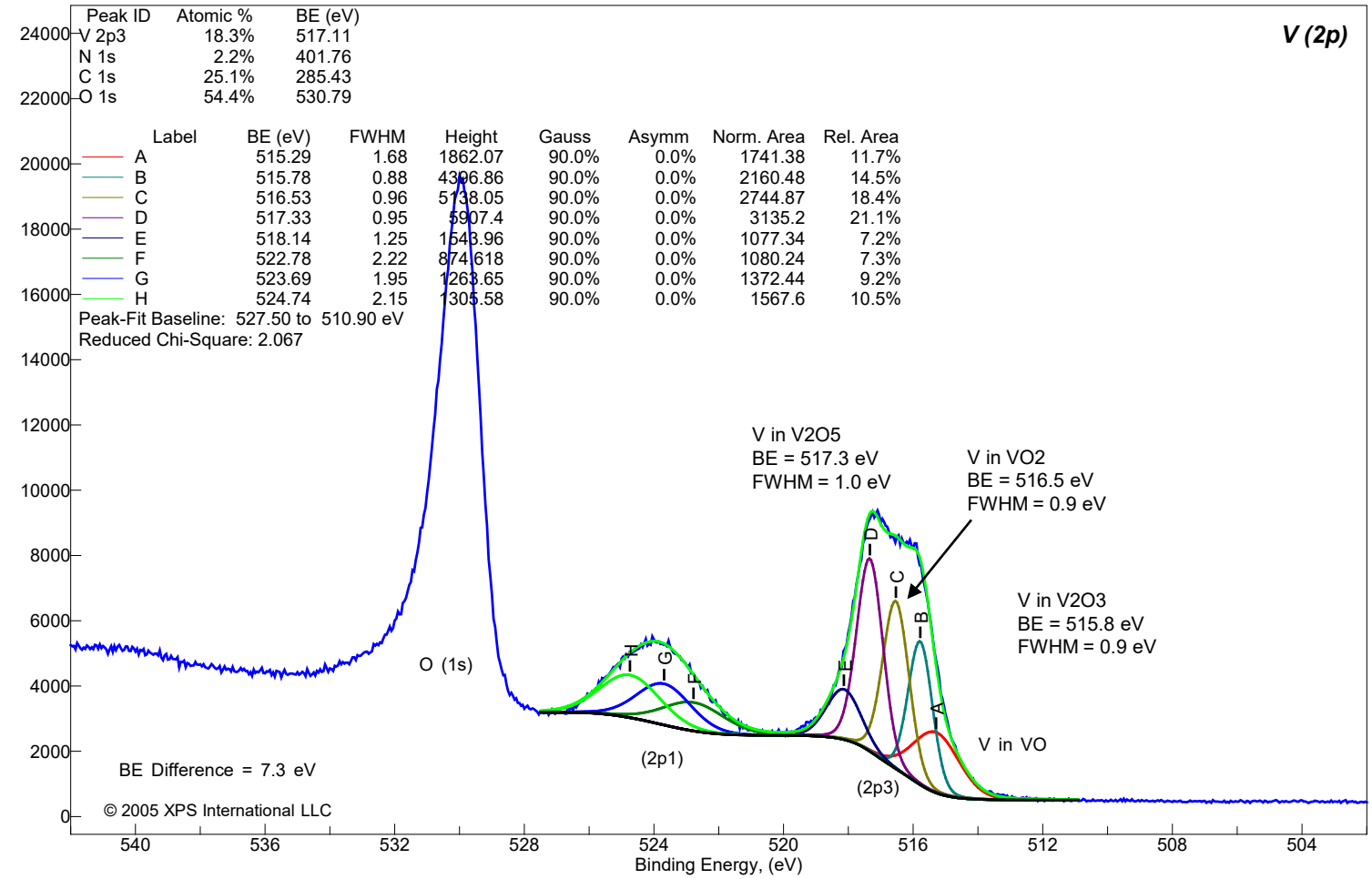
Sample Description: VO2 (99.9%) from Aldrich lot# 05310AY, conductive
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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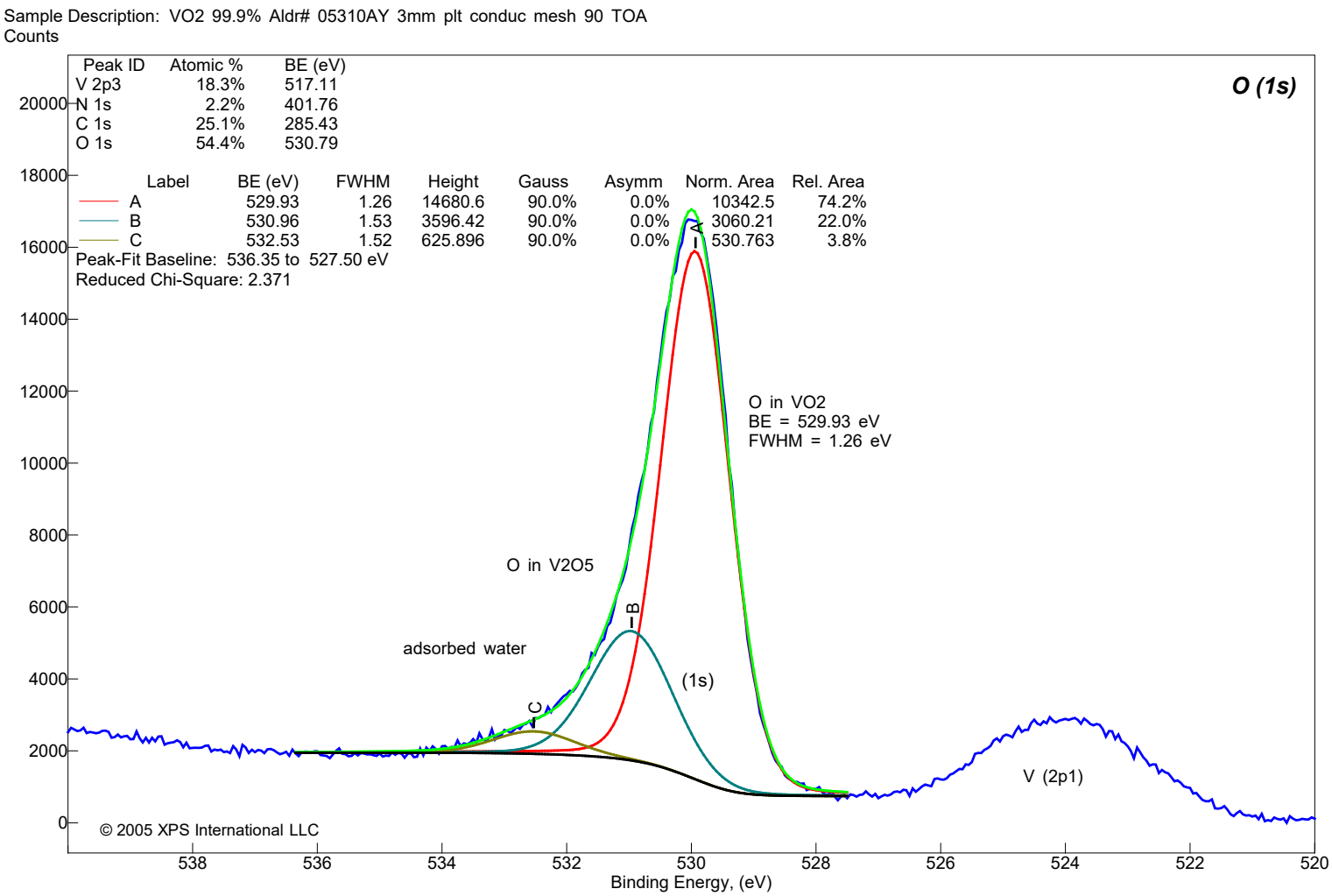
Vanadium (IV) Oxide (FW = 82.94)

Sample Description: VO2 99.9% Aldr# 05310AY 3mm plt conduc mesh 90 TOA



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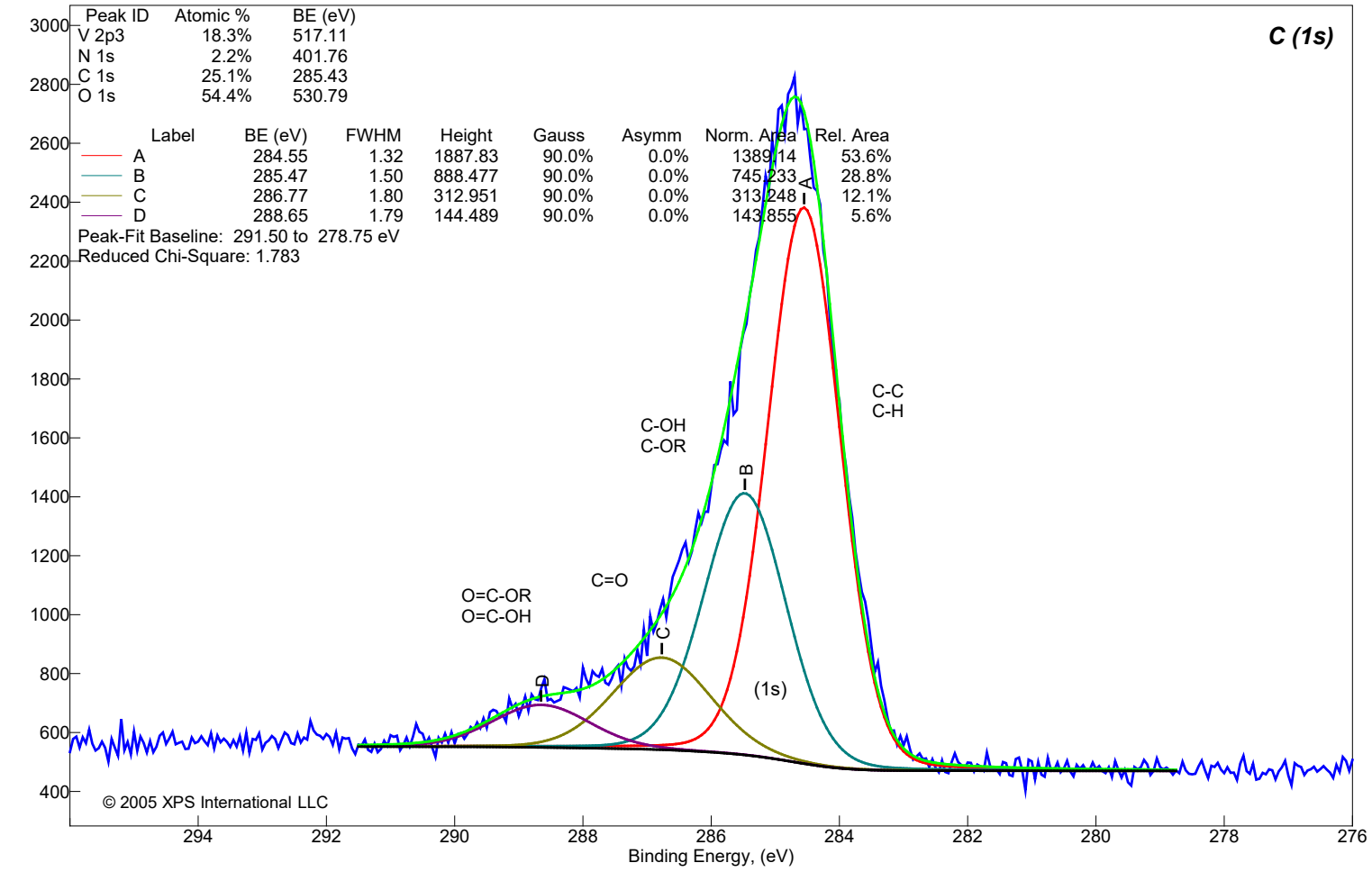
Vanadium (IV) Oxide (FW = 82.94)



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Vanadium (IV) Oxide (FW = 82.94)

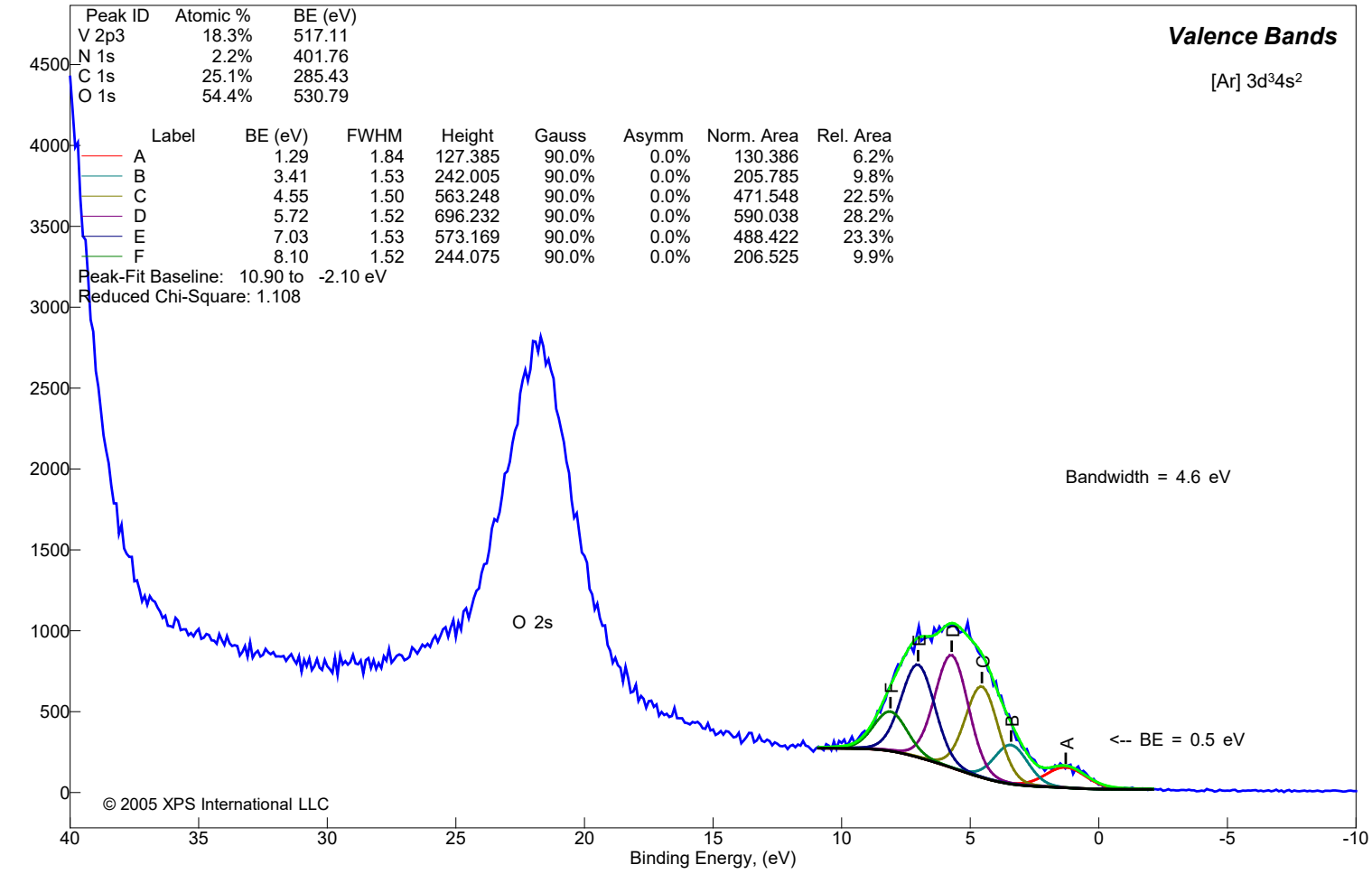
Sample Description: VO2 99.9% Aldr# 05310AY 3mm plt conduc mesh 90 TOA



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Vanadium (IV) Oxide (FW = 82.94)

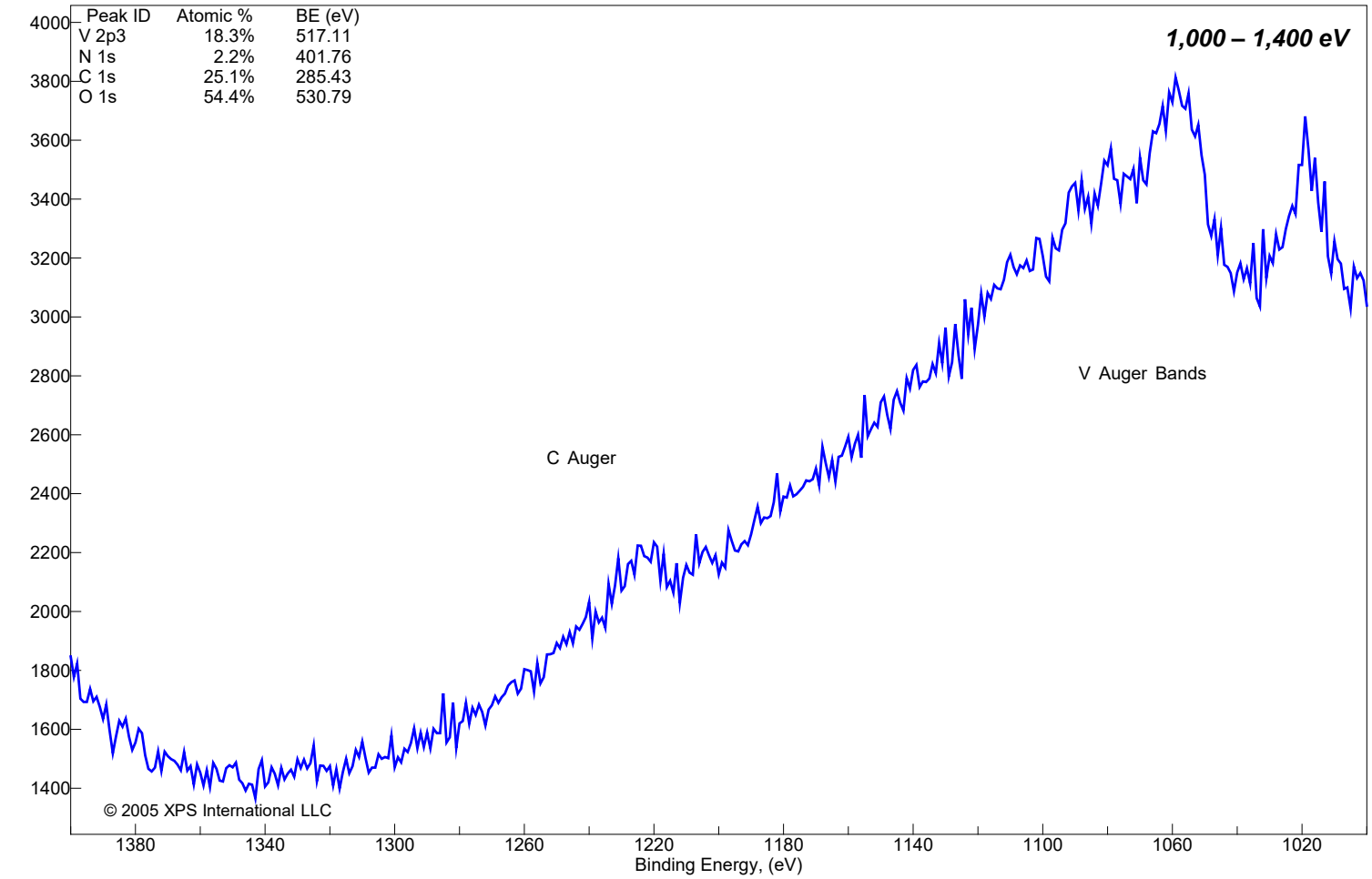
Sample Description: VO2 99.9% Aldr# 05310AY 3mm plt conduc mesh 90 TOA



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Vanadium (IV) Oxide (FW = 82.94)

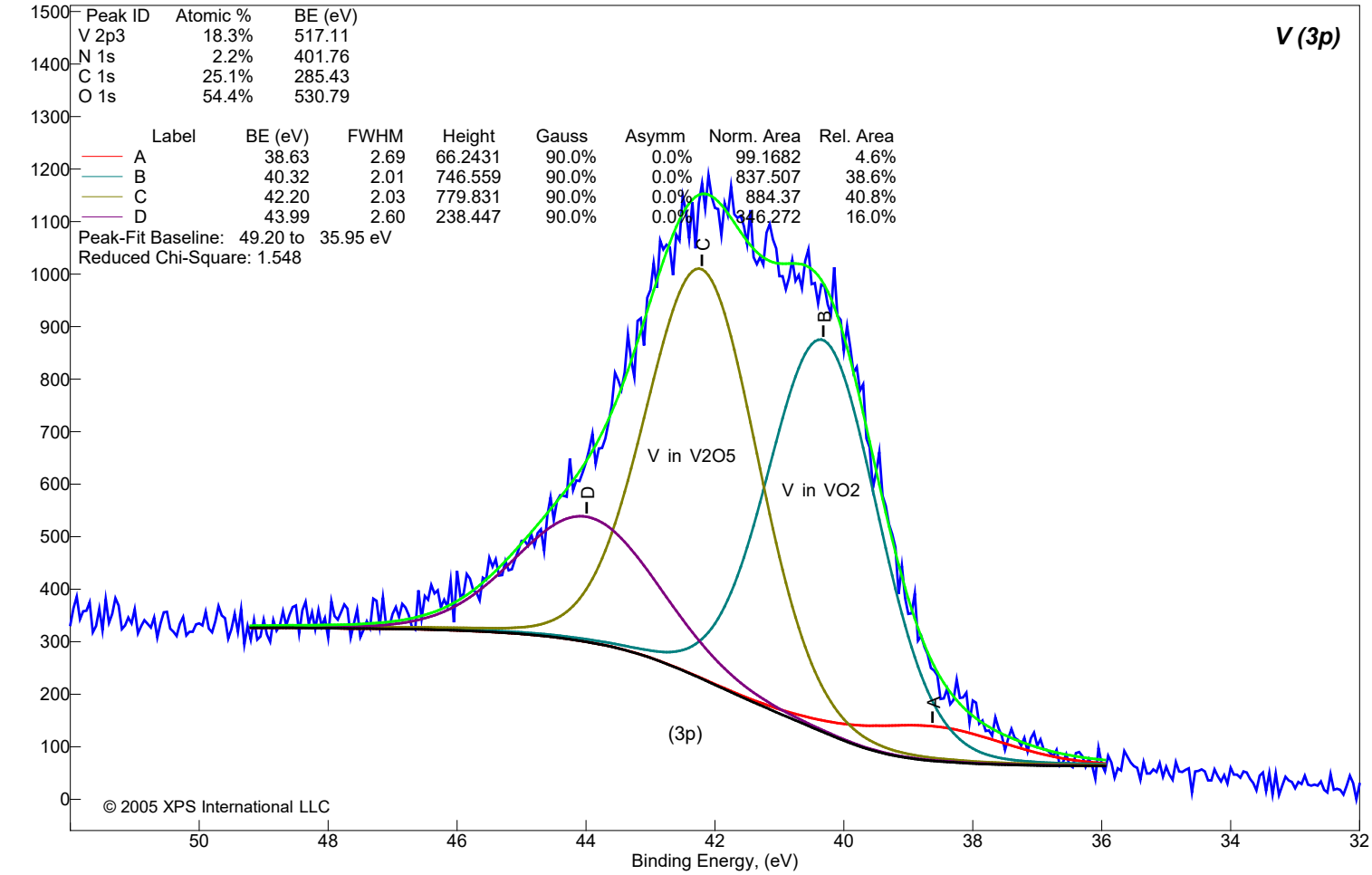
Sample Description: VO2 99.9% Aldr# 05310AY 3mm plt conduc mesh 90 TOA



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Vanadium (IV) Oxide (FW = 82.94)

Sample Description: VO2 99.9% Aldr# 05310AY 3mm plt conduc mesh 90 TOA



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V_2O_3

Vanadium (III) Oxide (FW = 149.88)
Surface Composition Table

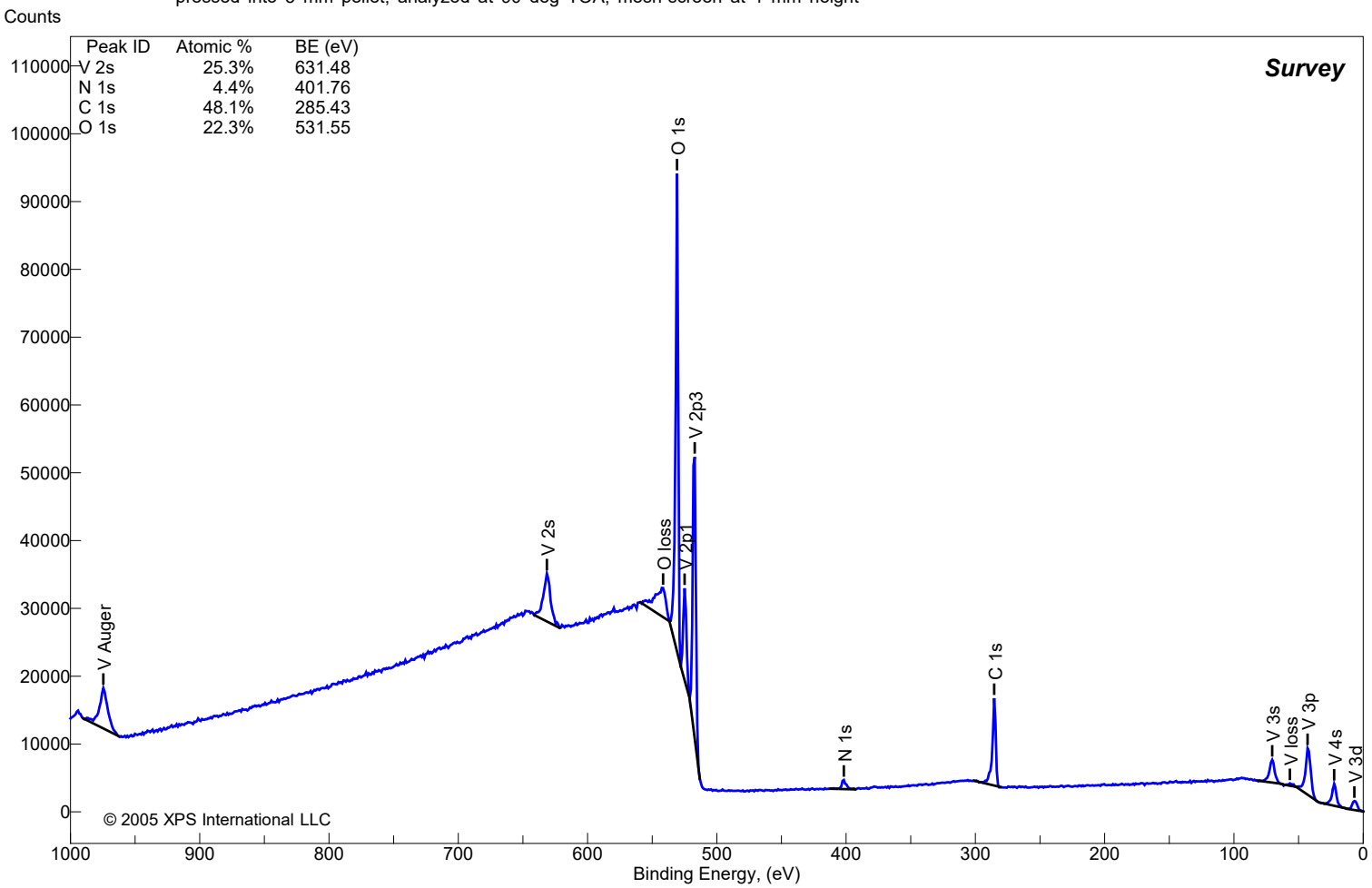
Description: V_2O_3 (99%) from Aldrich Co. Lot# 04304DP, analyzed at 90 deg TOA, mesh at 1 mm, conductive black powder pressed into 3 mm pellet, mp 1940 C, d 4.87, sol in acid

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
V 3d	7.8	6.8	0.03	1.4	3,852	
V 4s	23.5	22.5	0.00	1.4	8,469	
V 3p	44.0	43.0	1.00	1.4	21,133	
V loss	57.7	56.7	0.00	1.4	954	
V 3s	71.4	70.4	0.54	1.4	10,236	
C 1s	286.4	285.4	1.00	1.4	25,394	48.1%
N 1s	402.8	401.8	1.80	1.4	3,586	4.4%
V 2p3	518.1	517.1	6.37	1.4	75,850	
V 2p1	525.9	524.9	3.29	1.4	25,354	
O 1s	532.6	531.6	2.93	1.4	25,007	22.3%
O loss	542.5	541.5	0.00	1.4	26,002	
V 2s	632.5	631.5	3.57	1.4	29,651	25.3%
V Auger	975.6	974.6	0.00	1.4	29,386	

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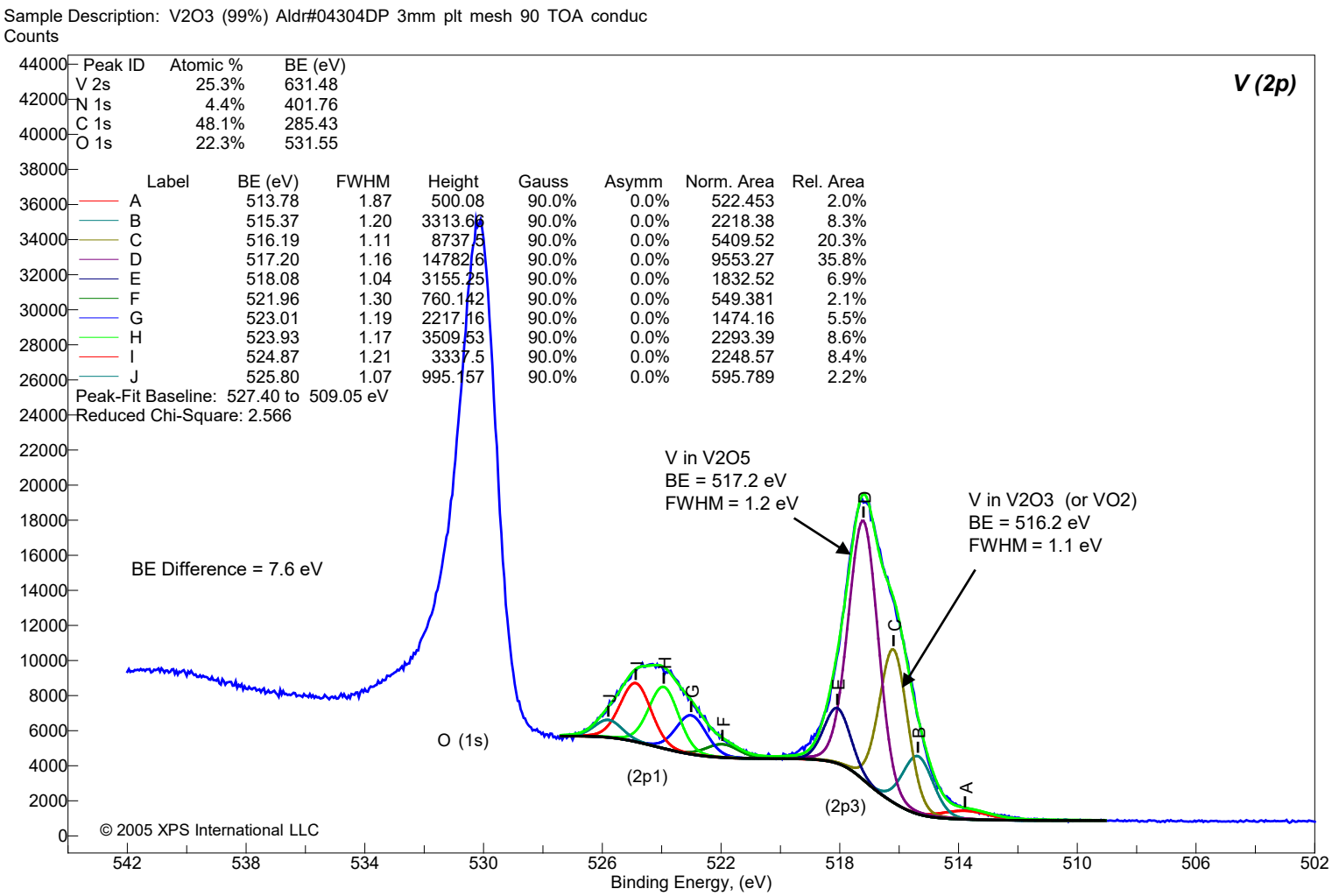
Vanadium (III) Oxide (FW = 149.88)

Sample Description: V2O3 (99%) from Aldrich lot# 04304DP, conductive
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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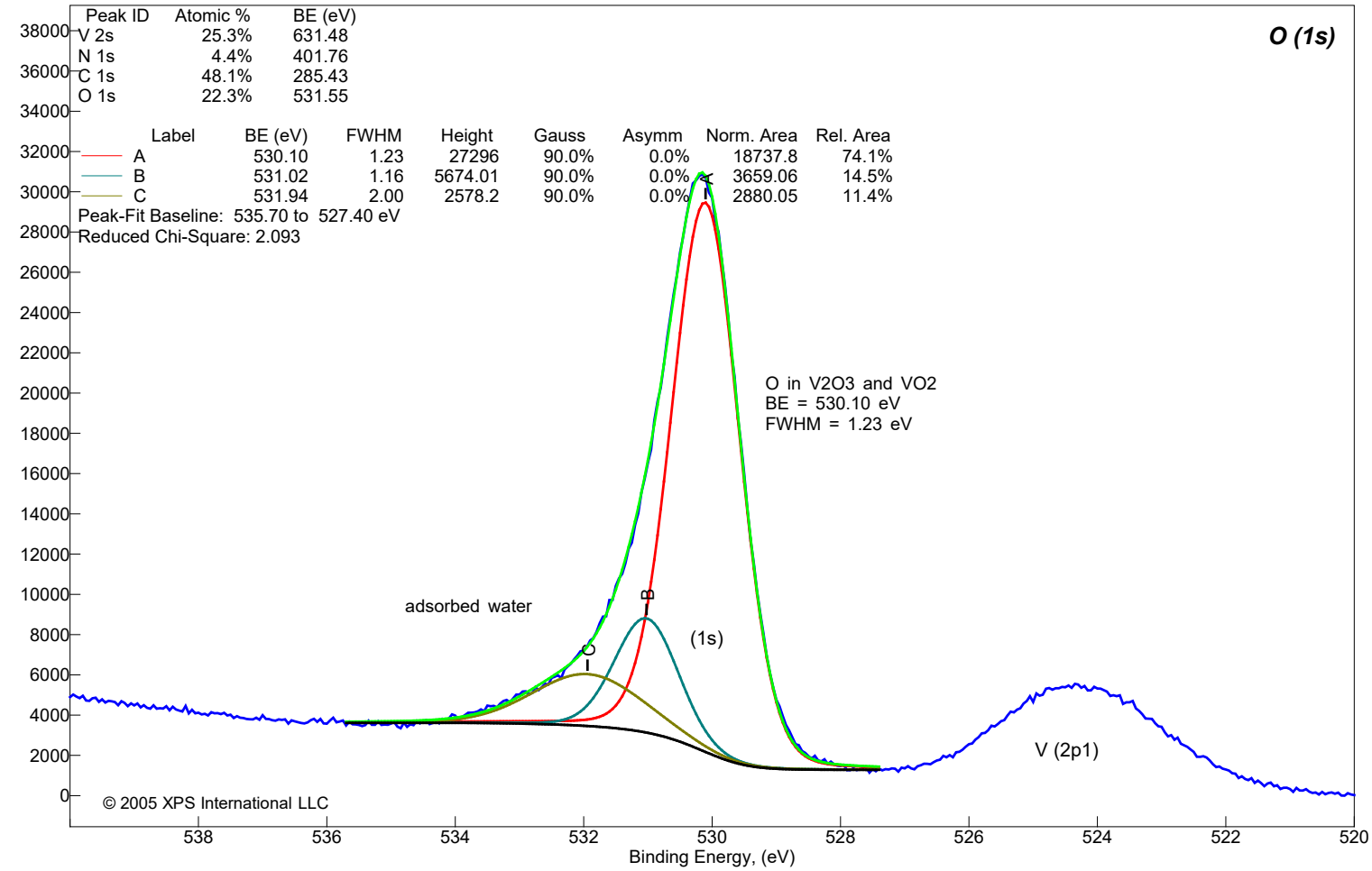
Vanadium (III) Oxide (FW = 149.88)



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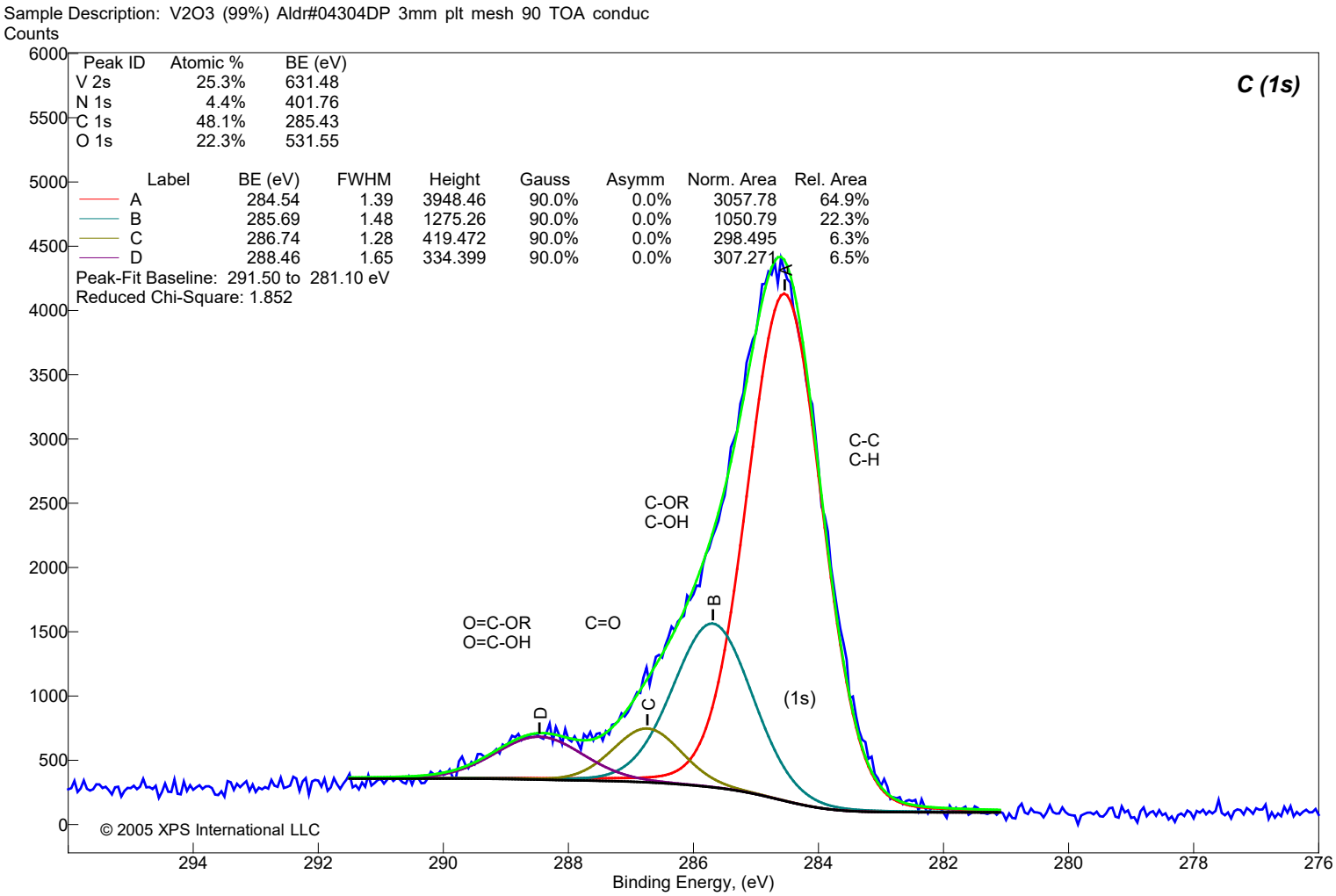
Vanadium (III) Oxide (FW = 149.88)

Sample Description: V2O3 (99%) Aldr#04304DP 3mm plt mesh 90 TOA conduc



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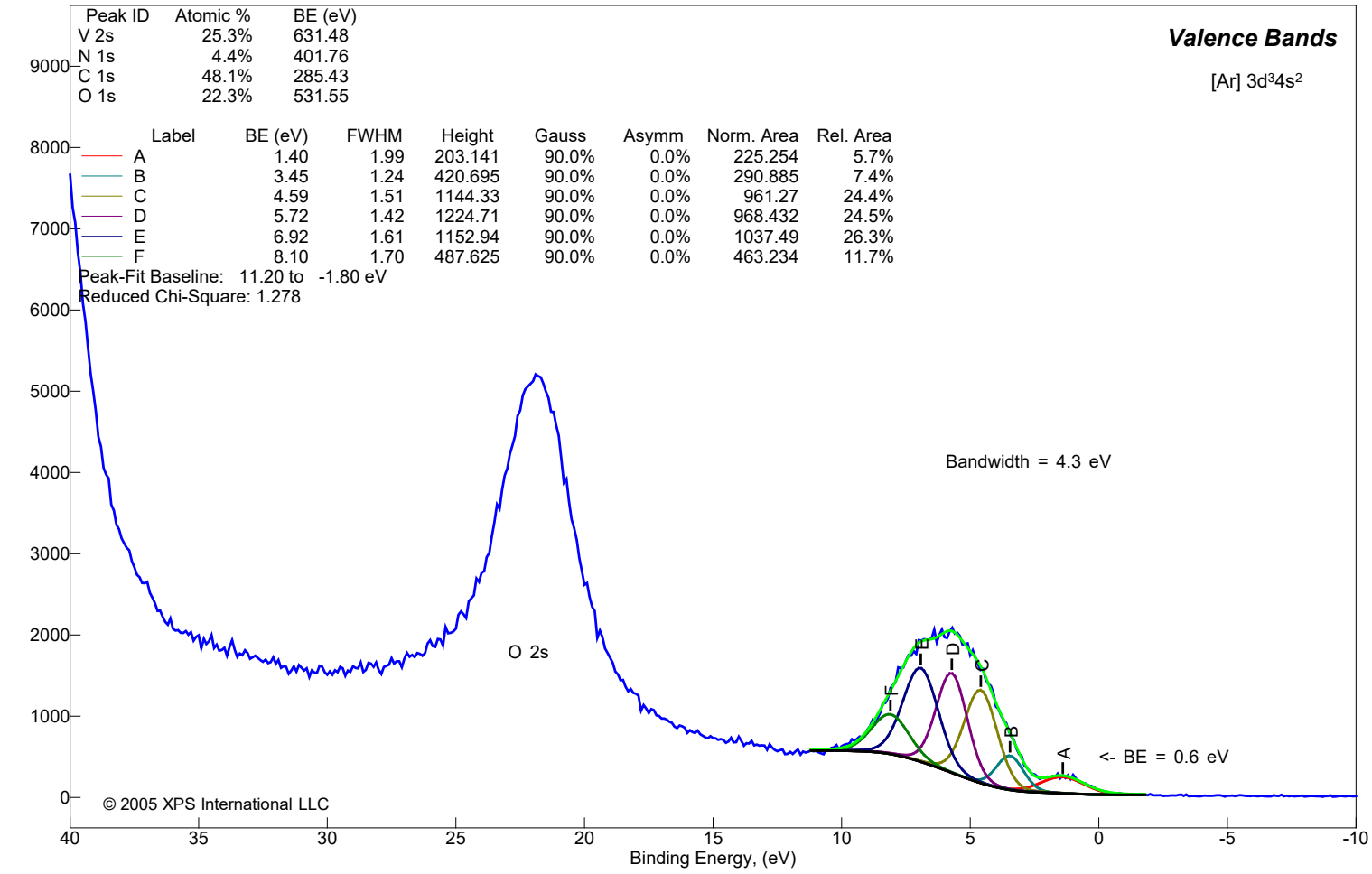
Vanadium (III) Oxide (FW = 149.88)



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Vanadium (III) Oxide (FW = 149.88)

Sample Description: V2O3 (99%) Aldr#04304DP 3mm plt mesh 90 TOA conduc

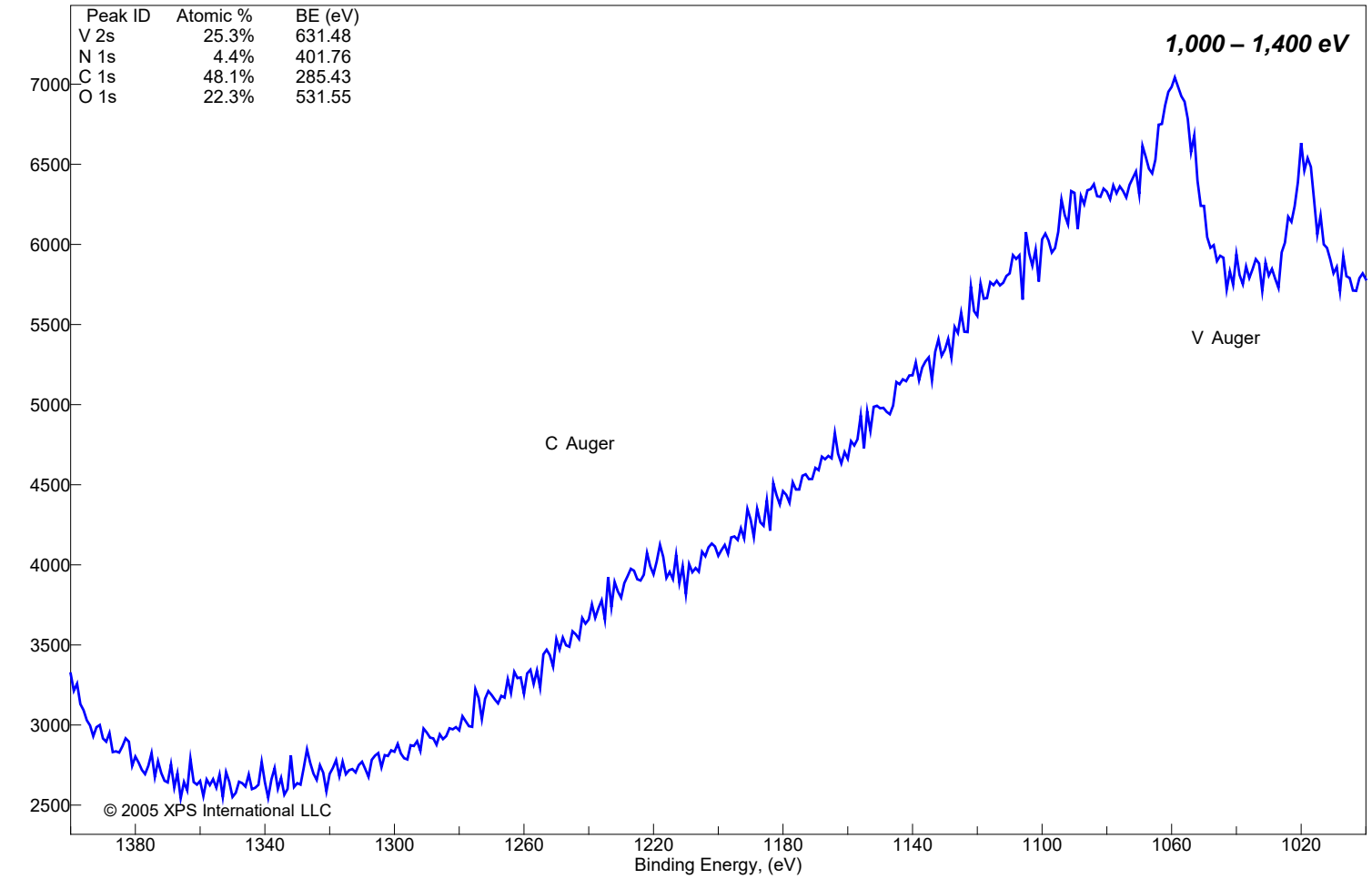


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V_2O_3

Vanadium (III) Oxide (FW = 149.88)

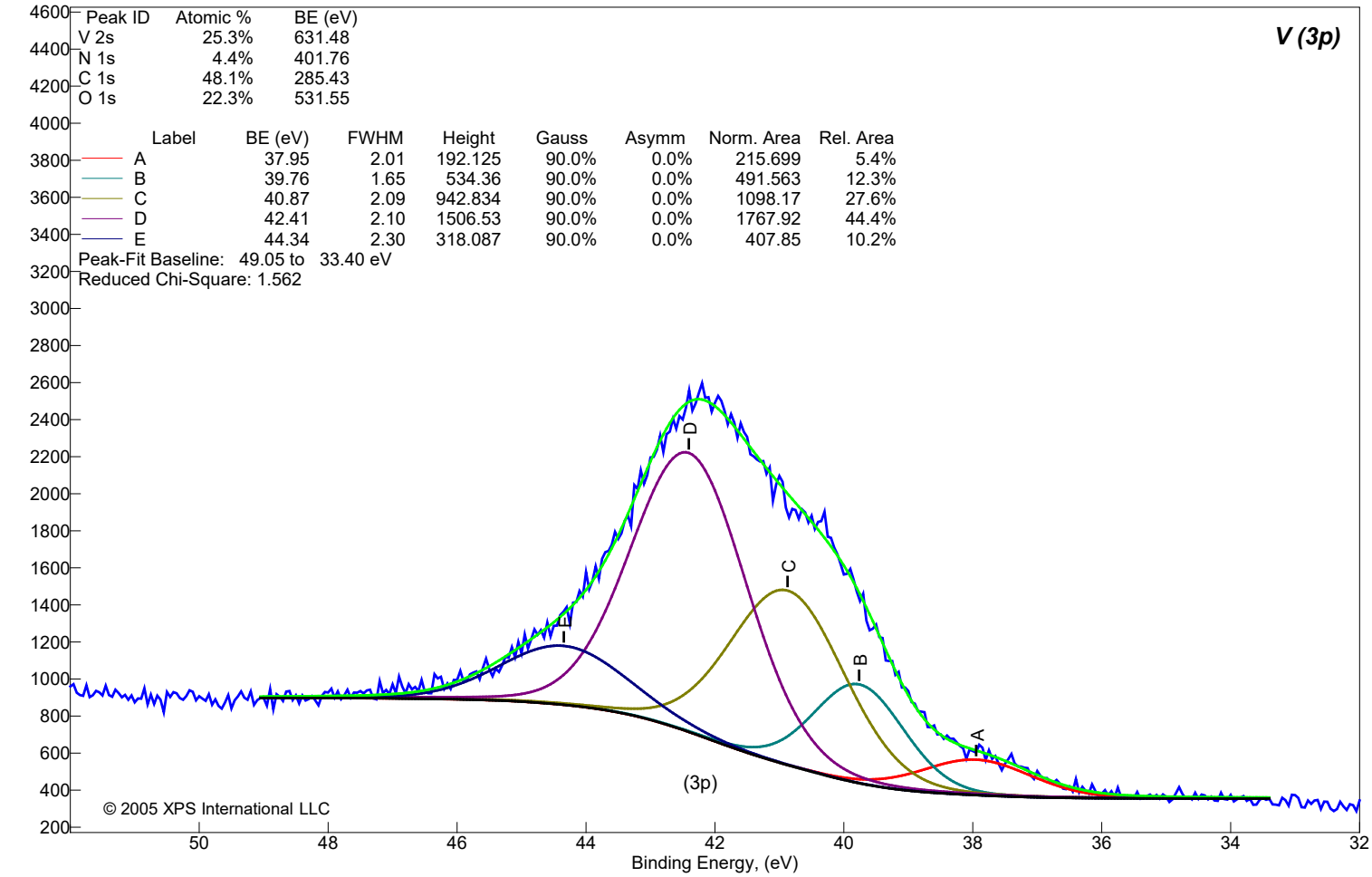
Sample Description: V2O3 (99%) Aldr#04304DP 3mm plt mesh 90 TOA conduc



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Vanadium (III) Oxide (FW = 149.88)

Sample Description: V2O3 (99%) Aldr#04304DP 3mm plt mesh 90 TOA conduc

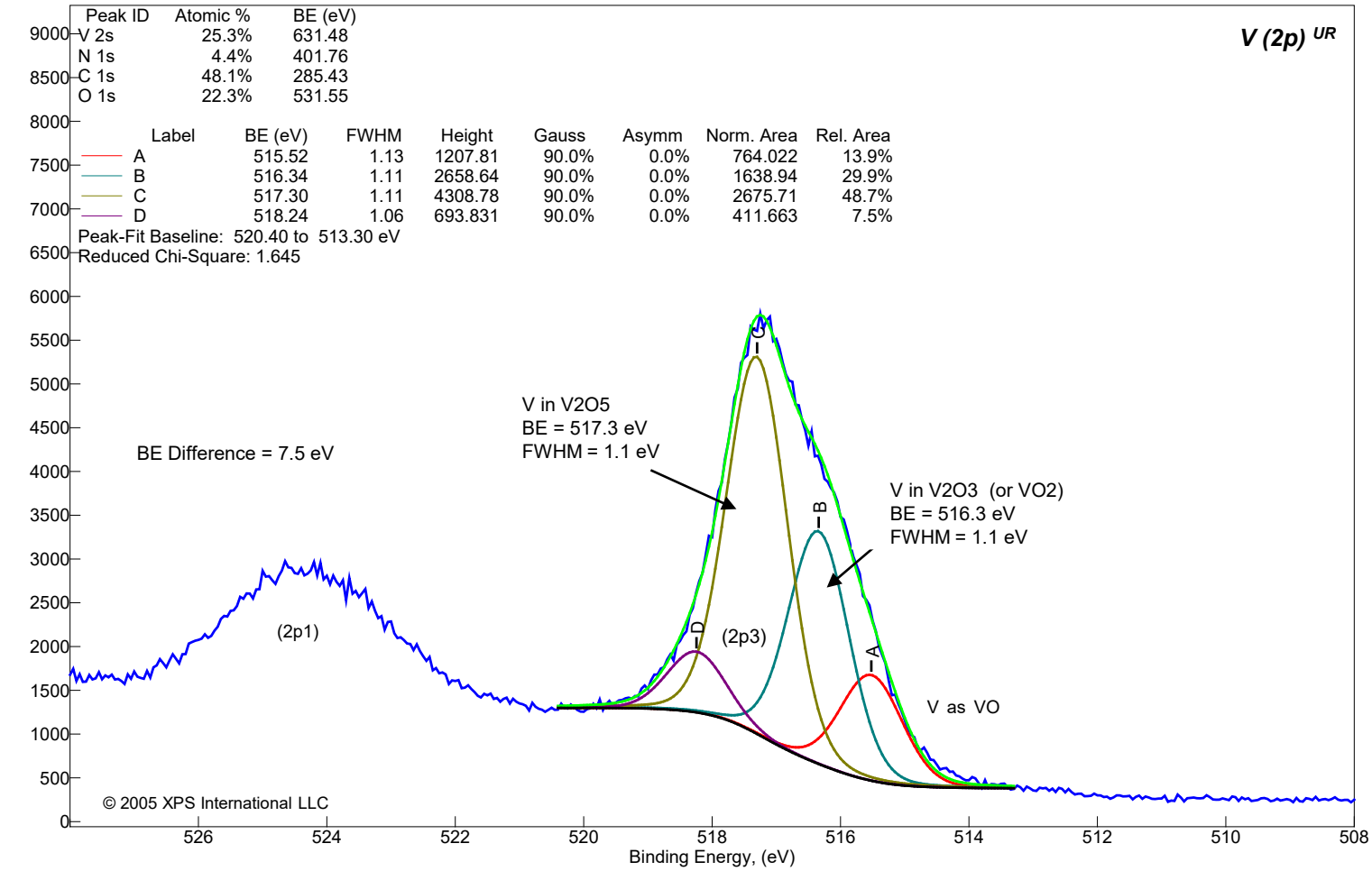


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V_2O_3

Vanadium (III) Oxide (FW = 149.88)

Sample Description: V2O3 (99%) Aldr#04304DP 3mm plt mesh 90 TOA conduc



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V_2O_5

Vanadium (V) Oxide (FW = 181.88)
Surface Composition Table

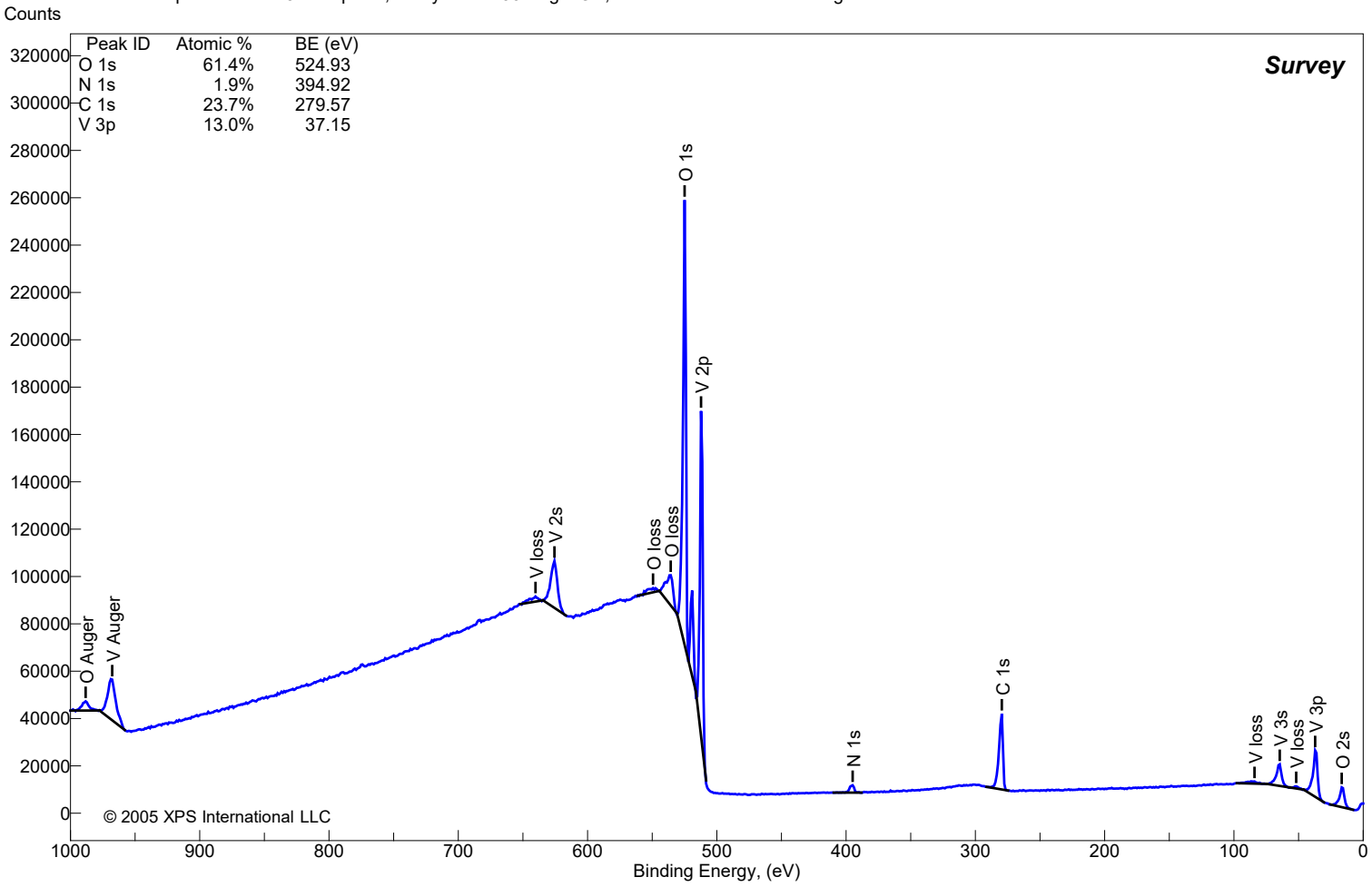
Description: V_2O_5 (99.99%) from Aldrich Co. Lot# 02330EW, analyzed at 90 deg TOA, mesh at 1 mm, conductive red-brown powder pressed into 3 mm pellet, mp 690 C, d 3.35, sol in water

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2s	22.0	16.6	0.14	1.5	9,697	
V 3p	42.5	37.1	1.00	1.5	21,134	13.0%
V loss	57.2	51.8	0.00	1.5	714	
V 3s	69.9	64.5	0.54	1.5	10,905	
V loss	89.5	84.1	0.00	1.5	1,982	
C 1s	285.0	279.6	1.00	1.5	29,230	23.7%
N 1s	400.3	394.9	1.80	1.5	3,559	1.9%
V 2p	517.6	512.2	9.66	1.5	92,761	
O 1s	530.3	524.9	2.93	1.5	158,000	61.4%
O loss	541.1	535.7	0.00	1.5	21,814	
O loss	554.8	549.4	0.00	1.5	3,650	
V 2s	631.0	625.6	3.57	1.5	30,567	
V loss	645.7	640.3	0.00	1.5	3,753	
V Auger	973.1	967.7	0.00	1.5	32,826	
O Auger	993.7	988.3	0.00	1.5	6,223	

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Vanadium (V) Oxide (FW = 181.88)

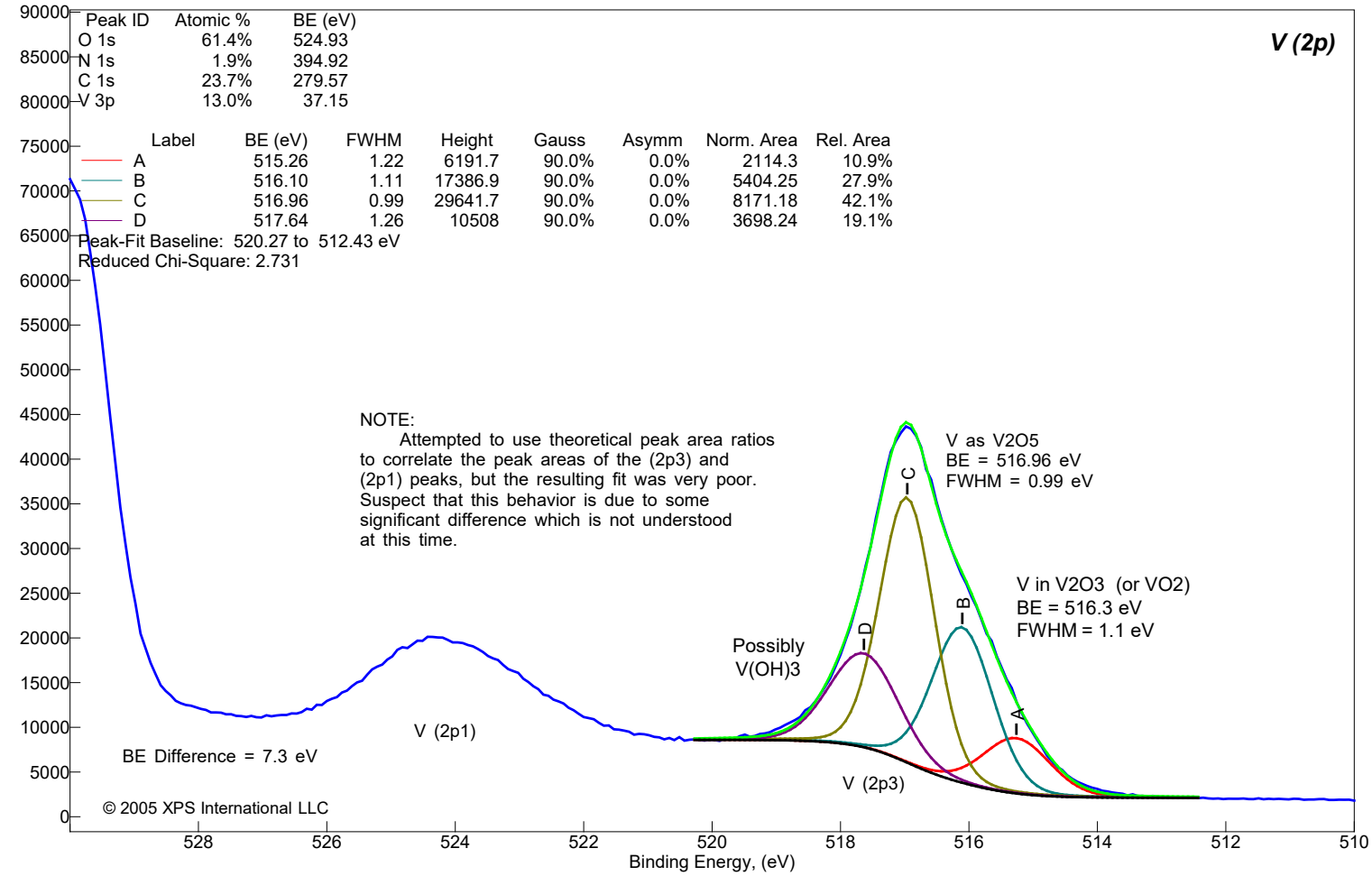
Sample Description: V2O5 (99.99%) from Aldrich lot# 02330EW, conductive
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Vanadium (V) Oxide (FW = 181.88)

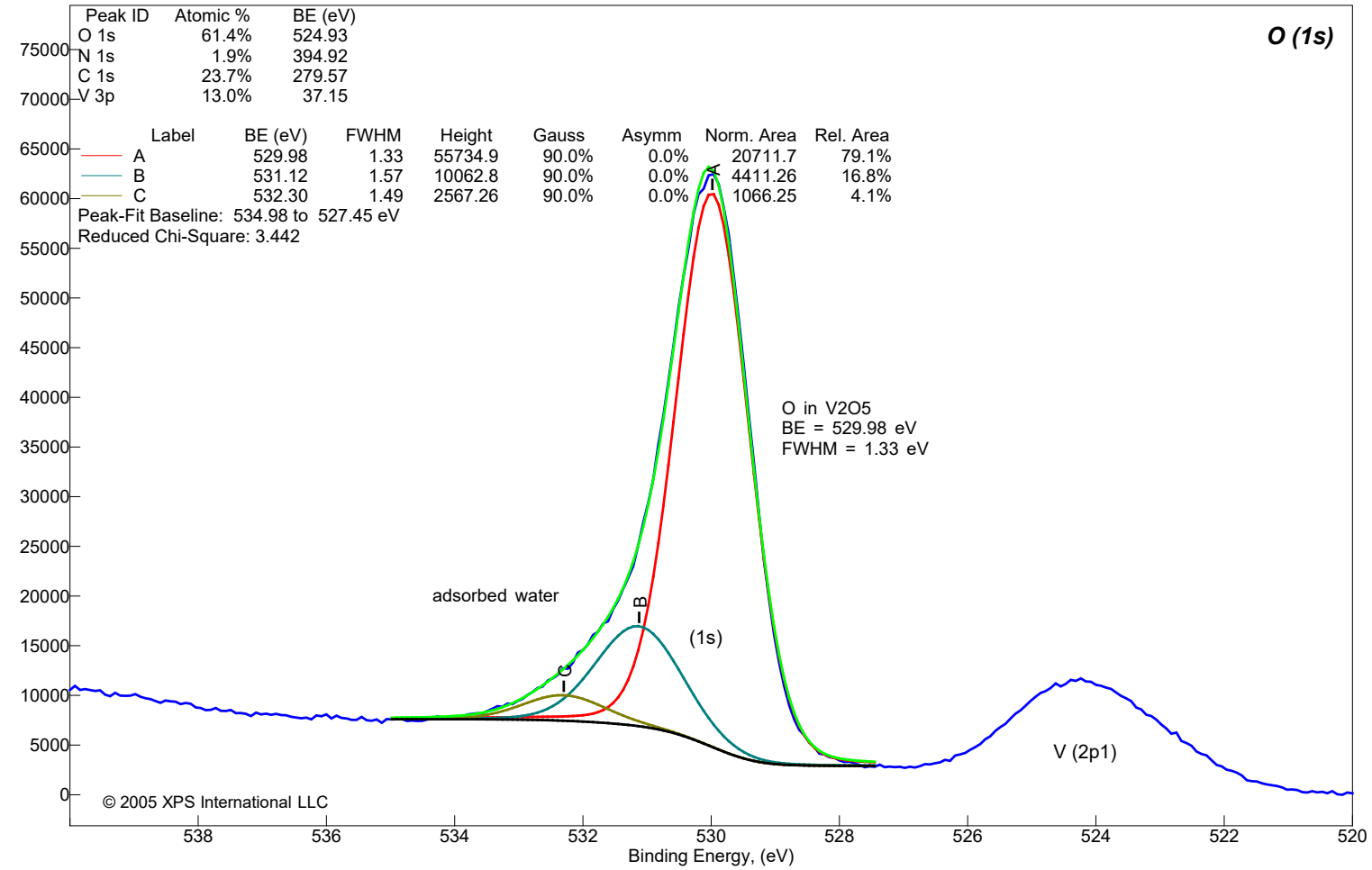
Sample Description: V2O5 (99.99%) Aldrich Lot# 02330EW, 3mm pellet, CONDUCTIVE, 90 TOA



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Vanadium (V) Oxide (FW = 181.88)

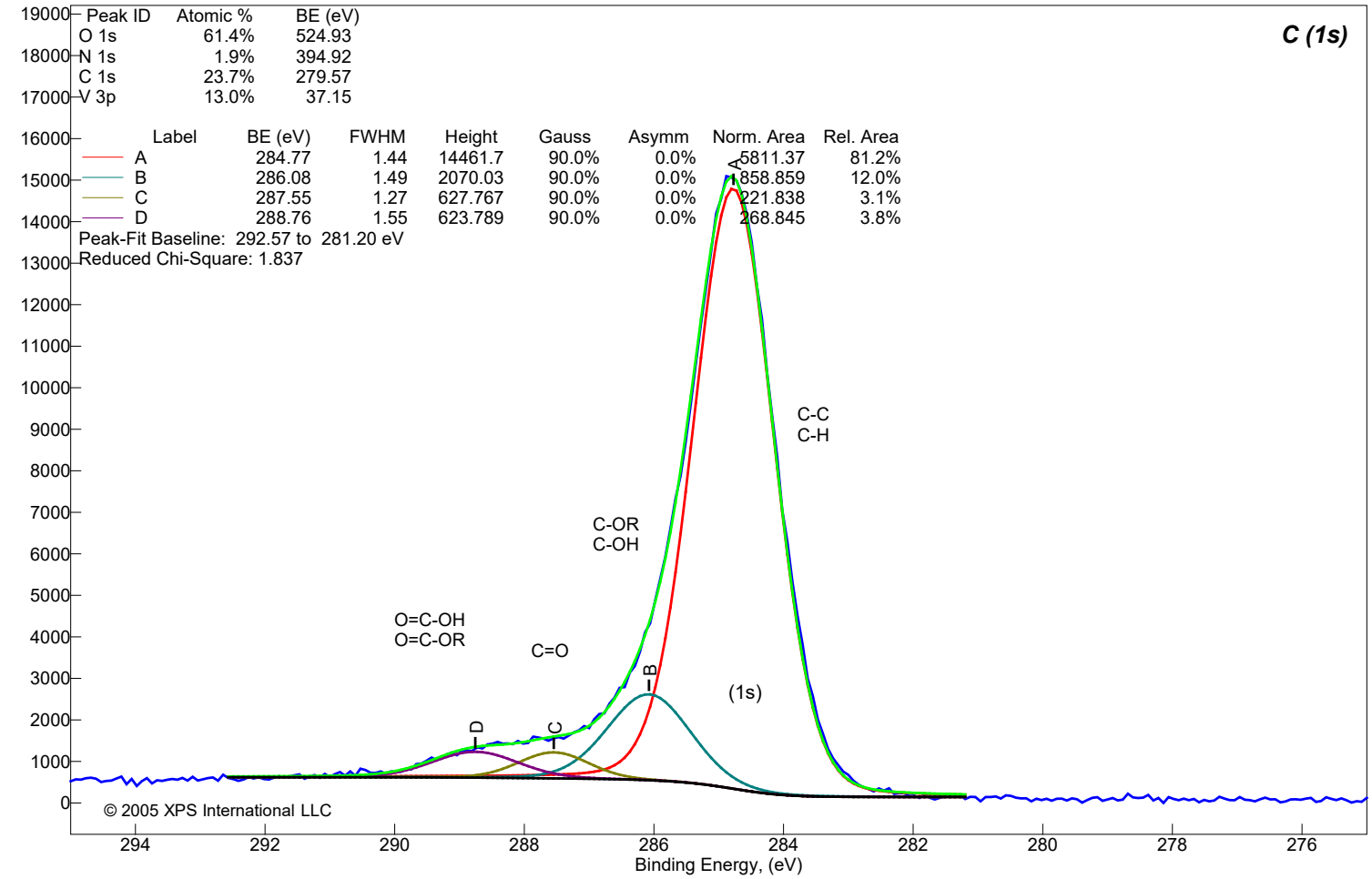
Sample Description: V2O5 (99.99%) Aldrich Lot# 02330EW, 3mm pellet, CONDUCTIVE, 90 TOA



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Vanadium (V) Oxide (FW = 181.88)

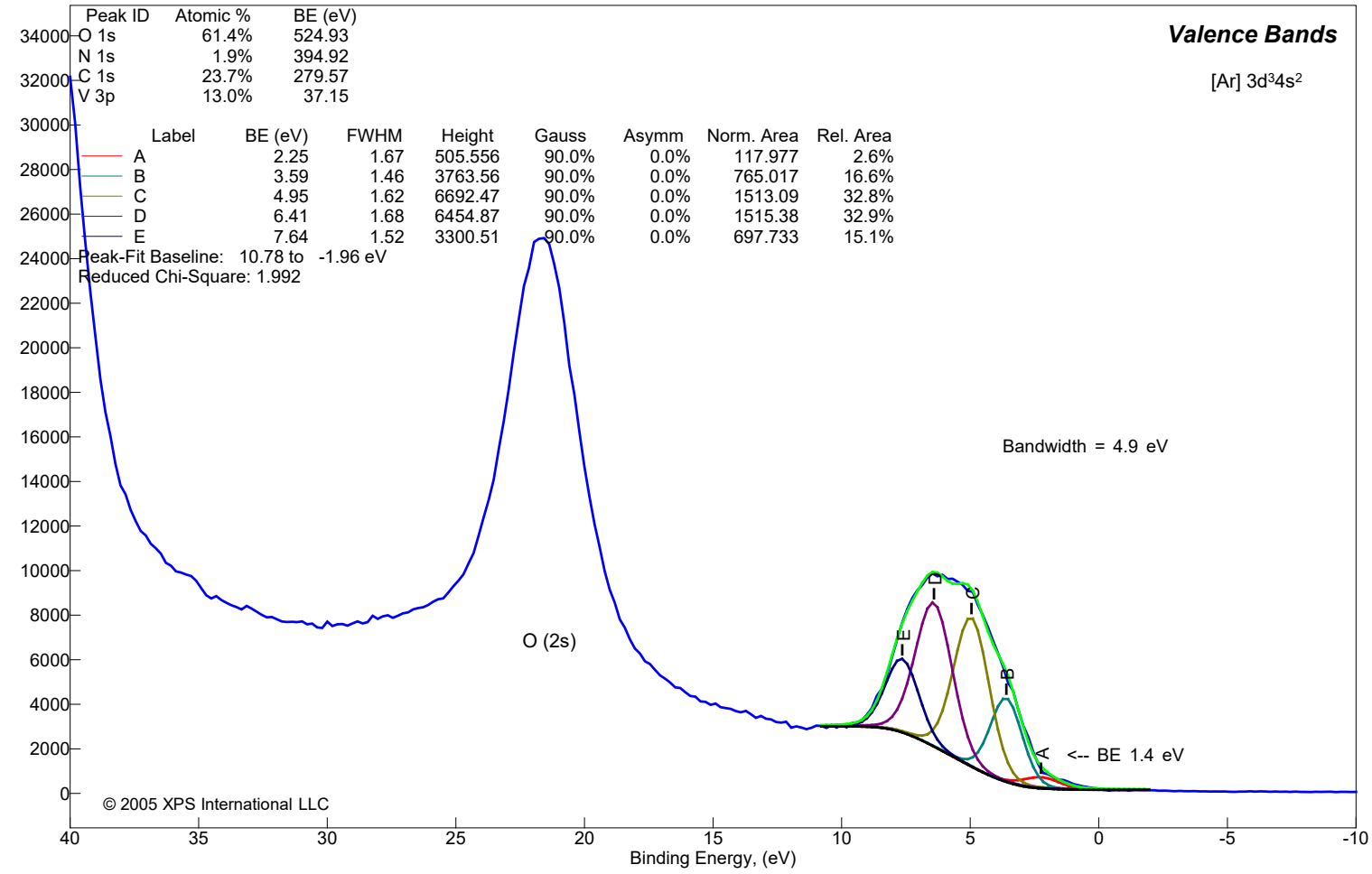
Sample Description: V2O5 (99.99%) Aldrich Lot# 02330EW, 3mm pellet, CONDUCTIVE, 90 TOA



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Vanadium (V) Oxide (FW = 181.88)

Sample Description: V2O5 (99.99%) Aldrich Lot# 02330EW, 3mm pellet, CONDUCTIVE, 90 TOA

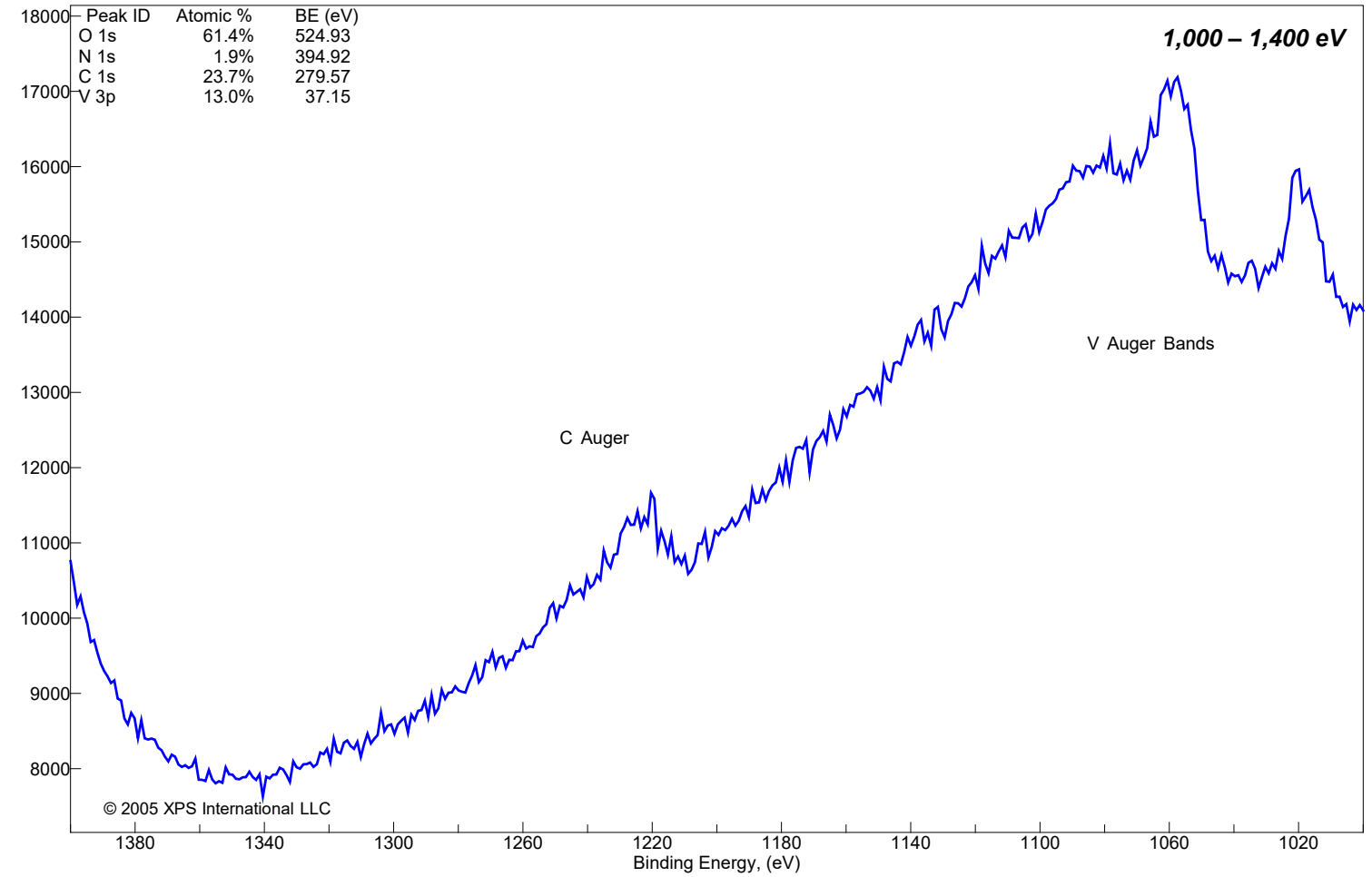


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V_2O_5

Vanadium (V) Oxide (FW = 181.88)

Sample Description: V2O5 (99.99%) Aldrich Lot# 02330EW, 3mm pellet, CONDUCTIVE, 90 TOA

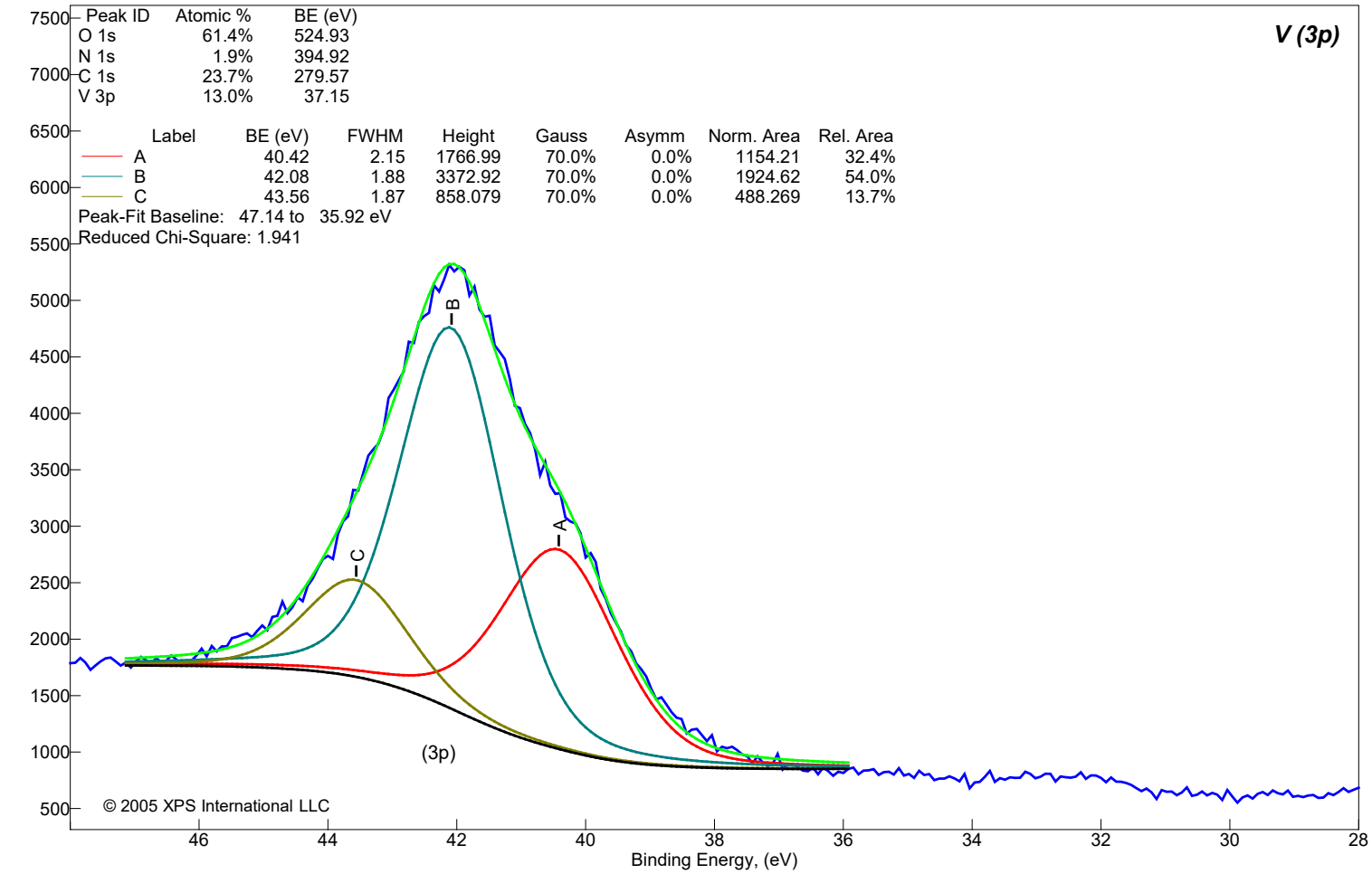


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V_2O_5

Vanadium (V) Oxide (FW = 181.88)

Sample Description: V2O5 (99.99%) Aldrich Lot# 02330EW, 3mm pellet, CONDUCTIVE, 90 TOA



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Tungsten (VI) Oxide (FW = 228.95)
Surface Composition Table

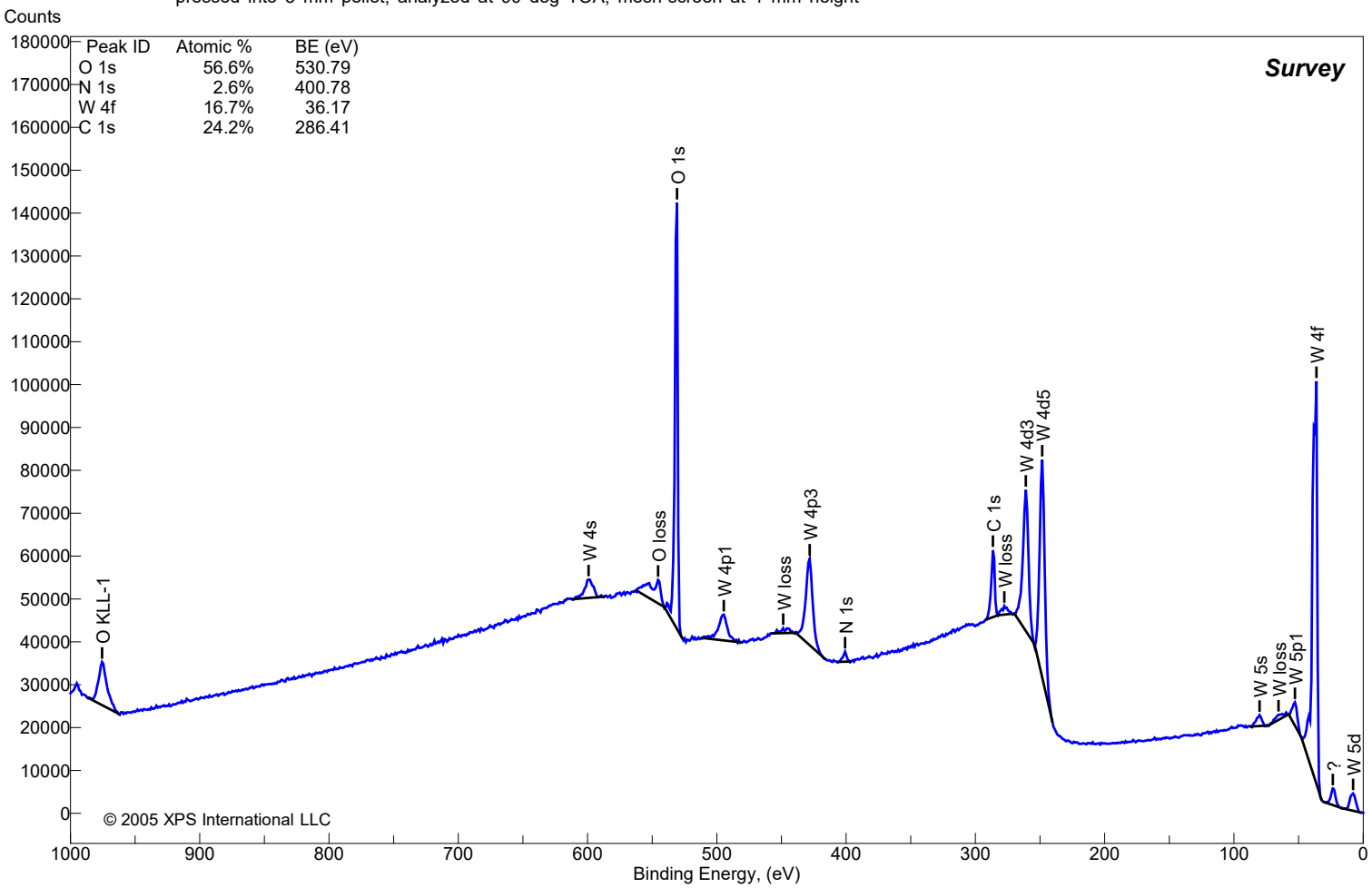
Description: WO_3 (99.995%) from Aldrich Co. Lot# 00107KM, analyzed at 90 deg TOA, mesh at 1 mm, conductive yellow powder pressed into 3 mm pellet, mp 1473 C, d 7.16, sol in alkali

Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
W 5d	7.8	7.8	0.43	1.0	5,328	
W 4f	36.2	36.2	9.80	1.0	101,270	16.7%
W 5p	52.8	52.8	0.37	1.0	6,183	
W loss	65.5	65.5	0.00	1.0	2,391	
W 5s	80.2	80.2	0.38	1.0	2,884	
W 4d5	248.3	248.3	9.65	1.0	60,169	
W 4d3	261.0	261.0	6.68	1.0	43,606	
W loss	277.6	277.6	0.00	1.0	2,673	
C 1s	286.4	286.4	1.00	1.0	12,413	24.2%
N 1s	400.8	400.8	1.80	1.0	2,142	2.6%
W 4p3	428.2	428.2	5.16	1.0	31,740	
W loss	448.7	448.7	0.00	1.0	1,778	
W 4p1	494.6	494.6	2.10	1.0	13,291	
O 1s	530.8	530.8	2.93	1.0	67,864	56.6%
O loss	545.5	545.5	0.00	1.0	14,990	
W 4s	599.2	599.2	1.81	1.0	8,827	
O KLL-1	975.6	975.6	0.70	1.0	20,315	

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Tungsten (VI) Oxide (FW = 228.95)

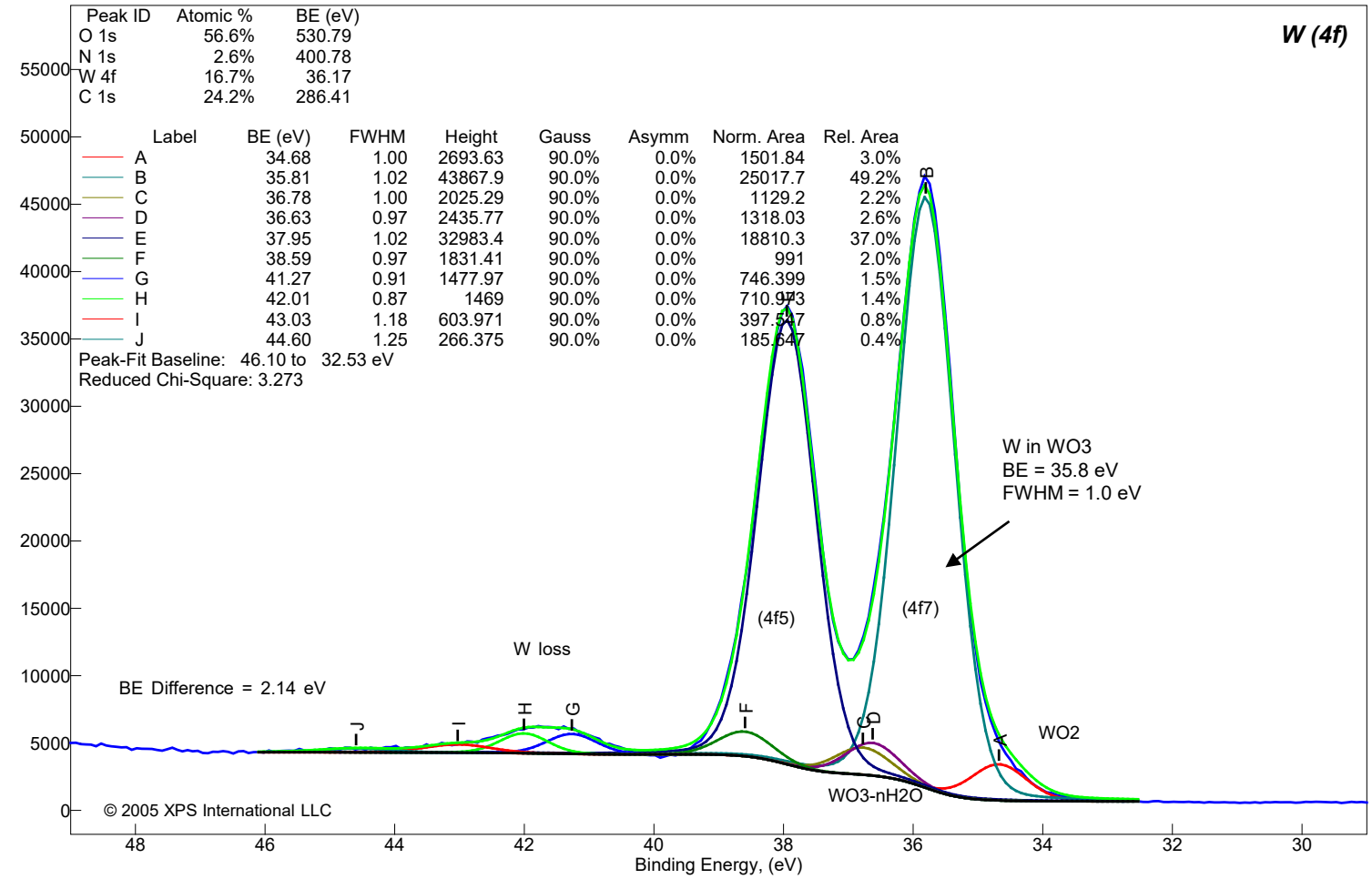
Sample Description: WO3 (99.995%) from Aldrich Lot# 00107KM JV,
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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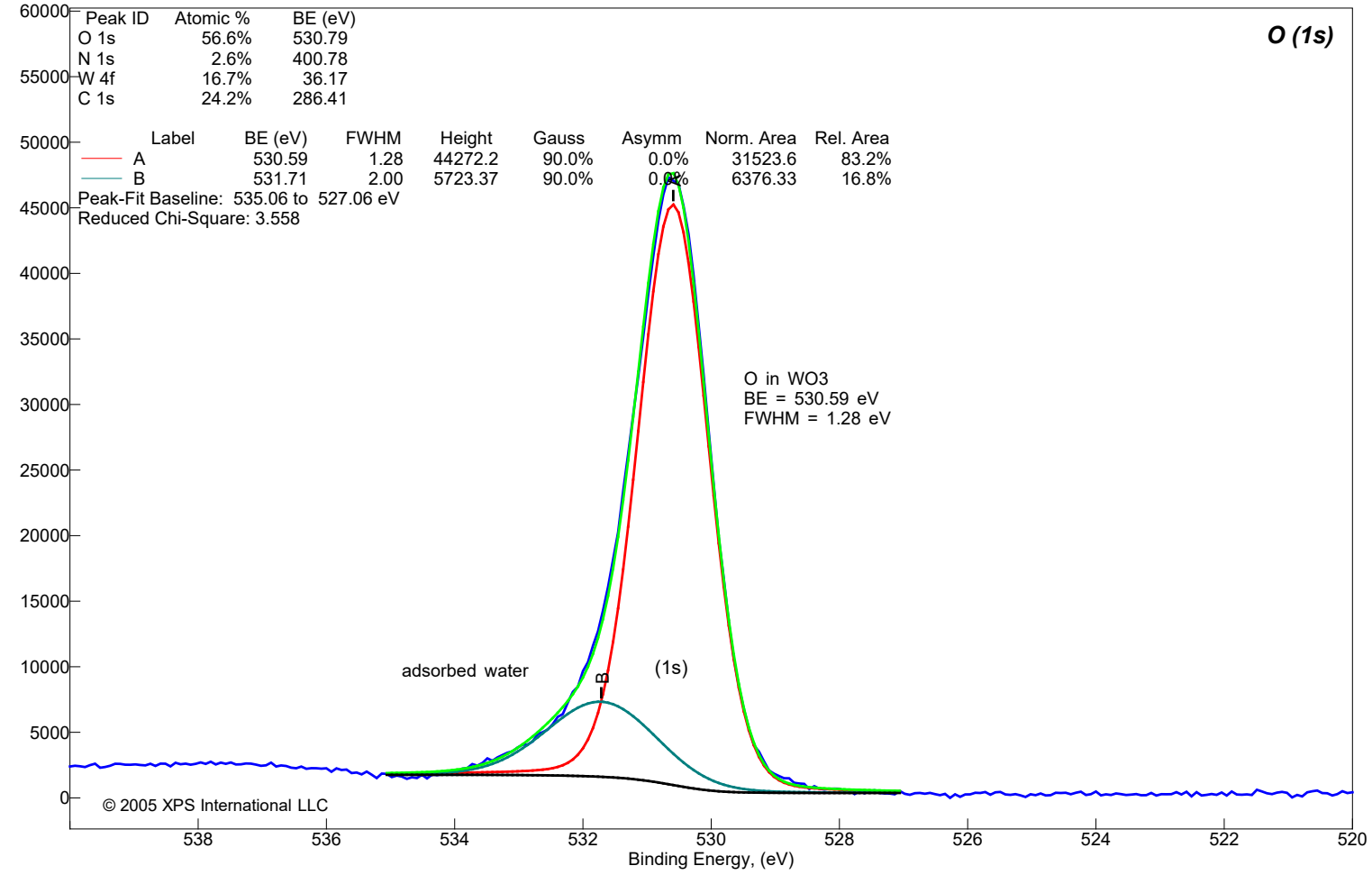
Tungsten (VI) Oxide (FW = 228.95)

Sample Description: WO3 (99.995%) Aldrich Lot# 00107KM JV, 3mm pellet, screen, 90 TOA



Tungsten (VI) Oxide (FW = 228.95)

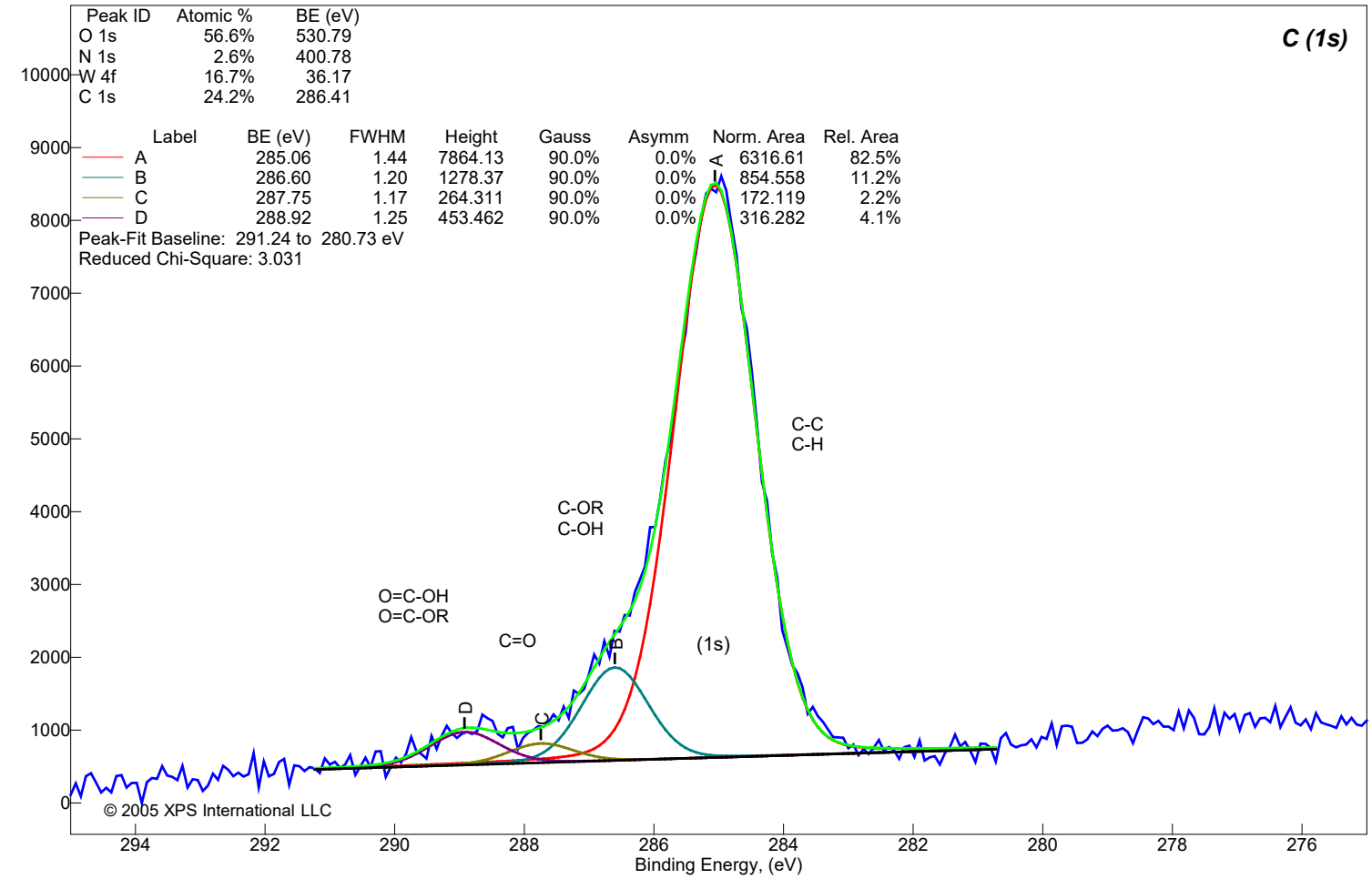
Sample Description: WO3 (99.995%) Aldrich Lot# 00107KM JV, 3mm pellet, screen, 90 TOA



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Tungsten (VI) Oxide (FW = 228.95)

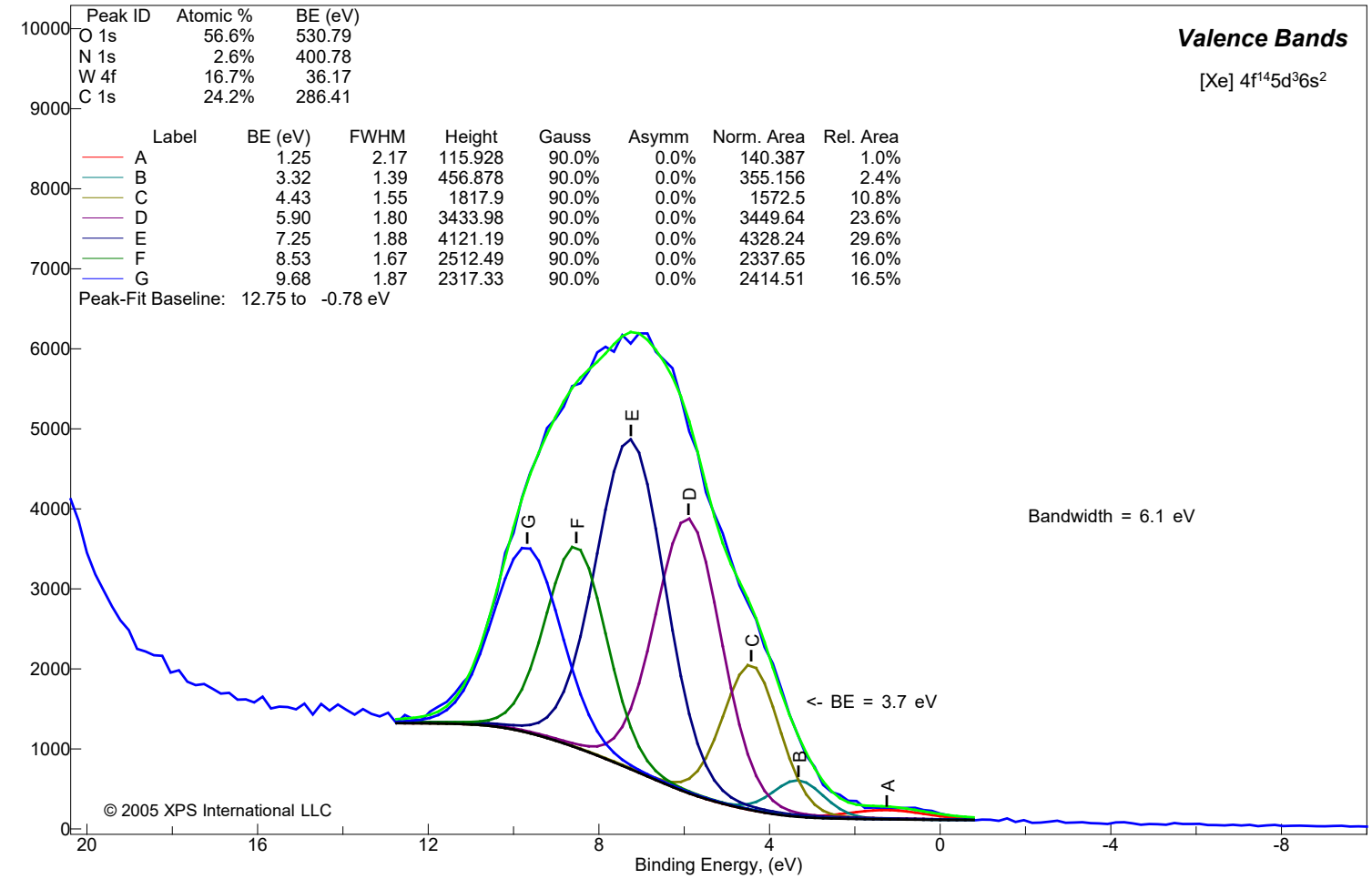
Sample Description: WO3 (99.995%) Aldrich Lot# 00107KM JV, 3mm pellet, screen, 90 TOA



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Tungsten (VI) Oxide (FW = 228.95)

Sample Description: WO3 (99.995%) Aldrich Lot# 00107KM JV, 3mm pellet, screen, 90 TOA



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Y_2O_3

Yttrium (III) Oxide (FW = 225.82)
Surface Composition Table

Description: Y_2O_3 (99.9%) from Rare Metallics Co. Lot# 71208-13, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white powder pressed into 3 mm pellet, mp 2410 C, d 5.01, sol in acid

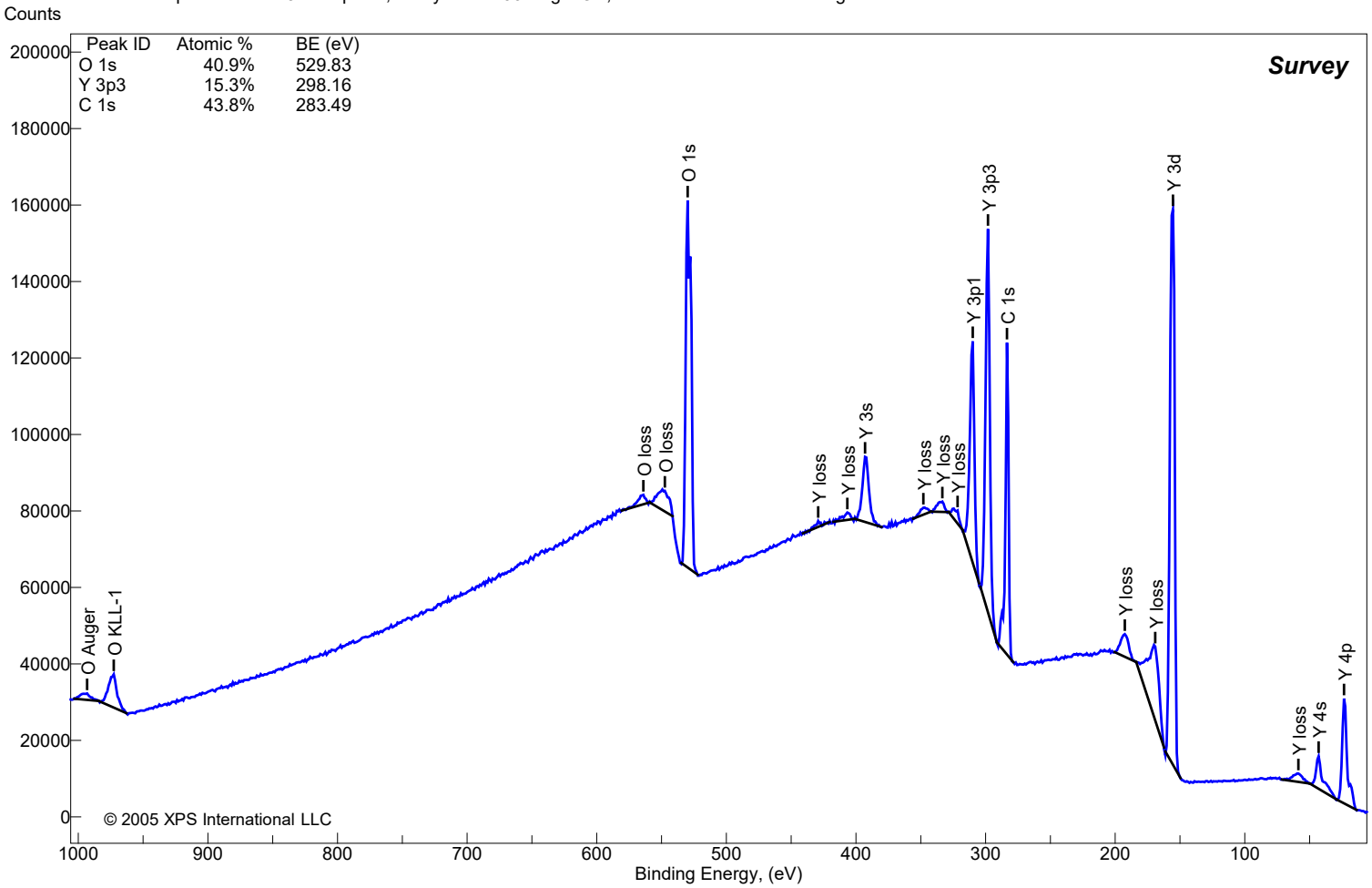
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Y 4p	25.0	23.5	0.09	1.5	31,860	
Y 4s	44.5	43.0	0.33	1.5	13,470	
Y loss	60.2	58.7	0.00	1.5	5,254	
Y 3d	156.9	155.4	5.98	1.5	157,934	
Y loss	170.6	169.1	0.00	1.5	49,940	
Y loss	194.1	192.6	0.00	1.5	11,080	
C 1s	285.0	283.5	1.00	1.5	60,093	43.8%
Y 3p3	299.7	298.2	4.75	1.5	97,698	15.3%
Y 3p1	311.4	309.9	2.44	1.5	62,179	
Y loss	323.1	321.6	0.00	1.5	4,734	
Y loss	334.8	333.3	0.00	1.5	4,192	
Y loss	349.5	348.0	0.00	1.5	2,629	
Y 3s	394.5	393.0	1.98	1.5	24,800	
Y loss	408.2	406.7	0.00	1.5	1,467	
Y loss	430.6	429.1	0.00	1.5	206	
O 1s	531.3	529.8	2.93	1.5	116,257	40.9%
O loss	548.9	547.4	0.00	1.5	13,536	
O loss	565.5	564.0	0.00	1.5	3,781	
O KLL-1	974.1	972.6	0.70	1.5	16,626	
O Auger	994.7	993.2	0.00	1.5	3,389	

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Y_2O_3

Yttrium (III) Oxide (FW = 225.82)

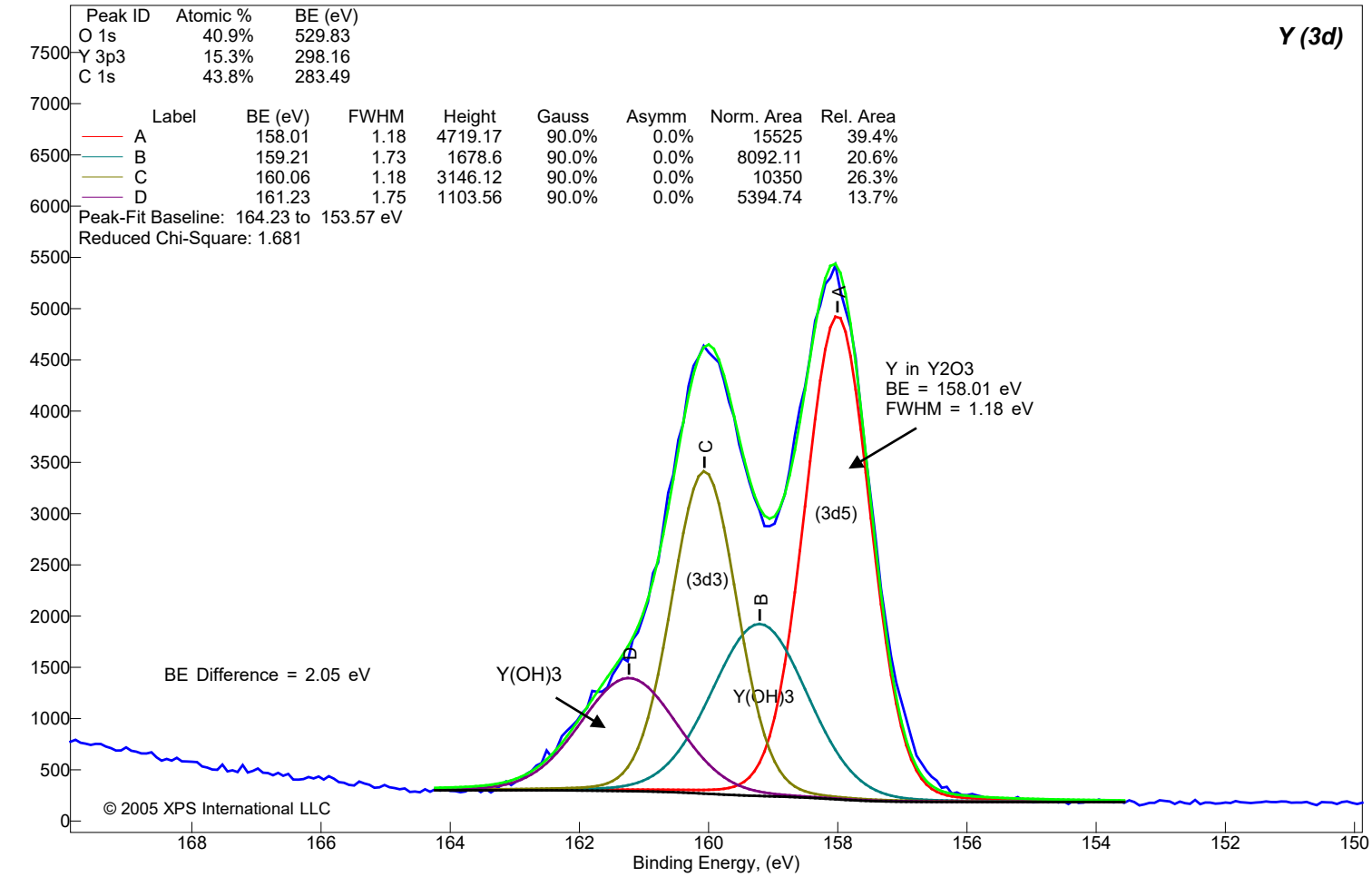
Sample Description: Y2O3 (99.9%) from Rare Metallics Corp. lot# 71208-13
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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Yttrium (III) Oxide (FW = 225.82)

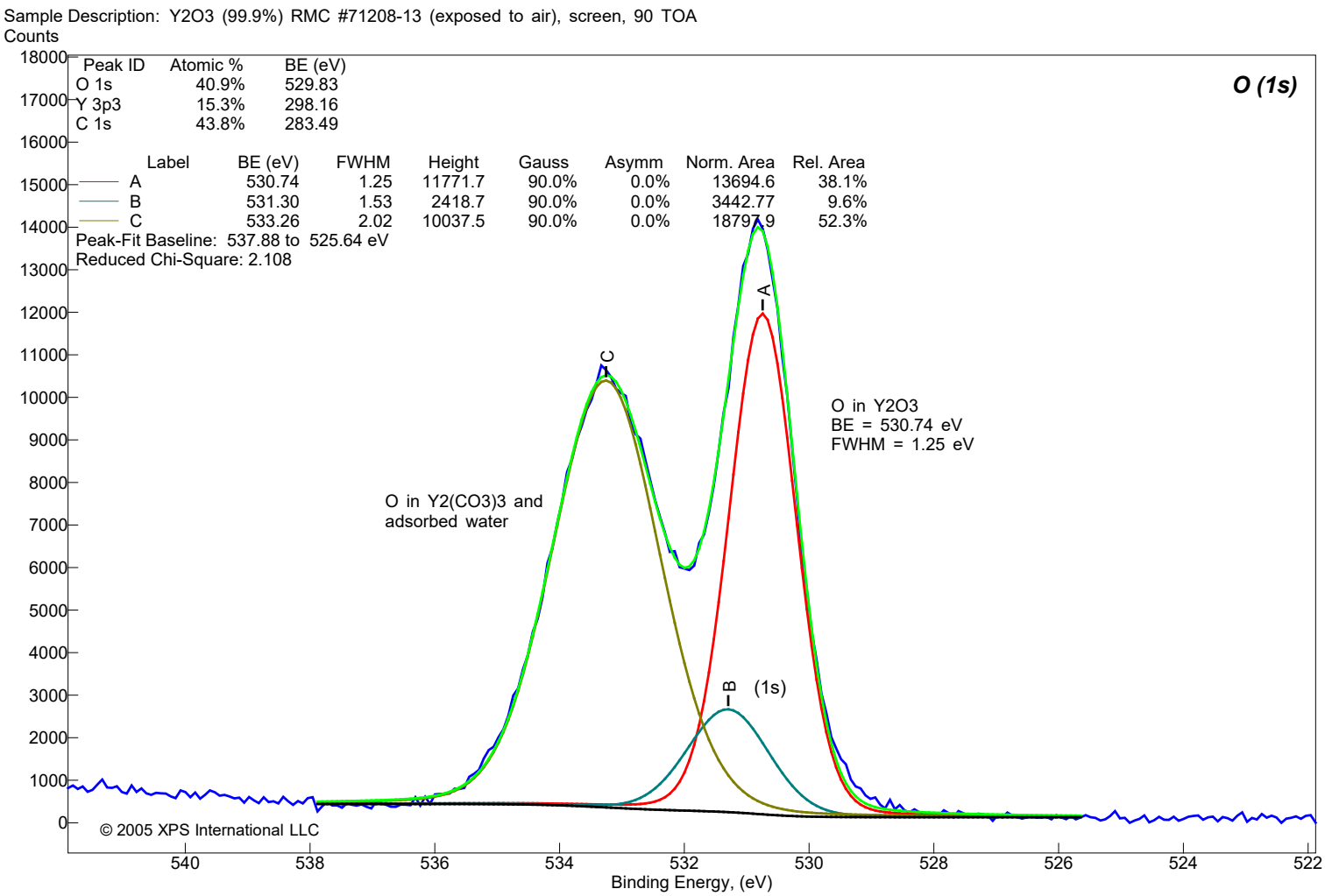
Sample Description: Y2O3 (99.9%) RMC #71208-13 (exposed to air), screen, 90 TOA



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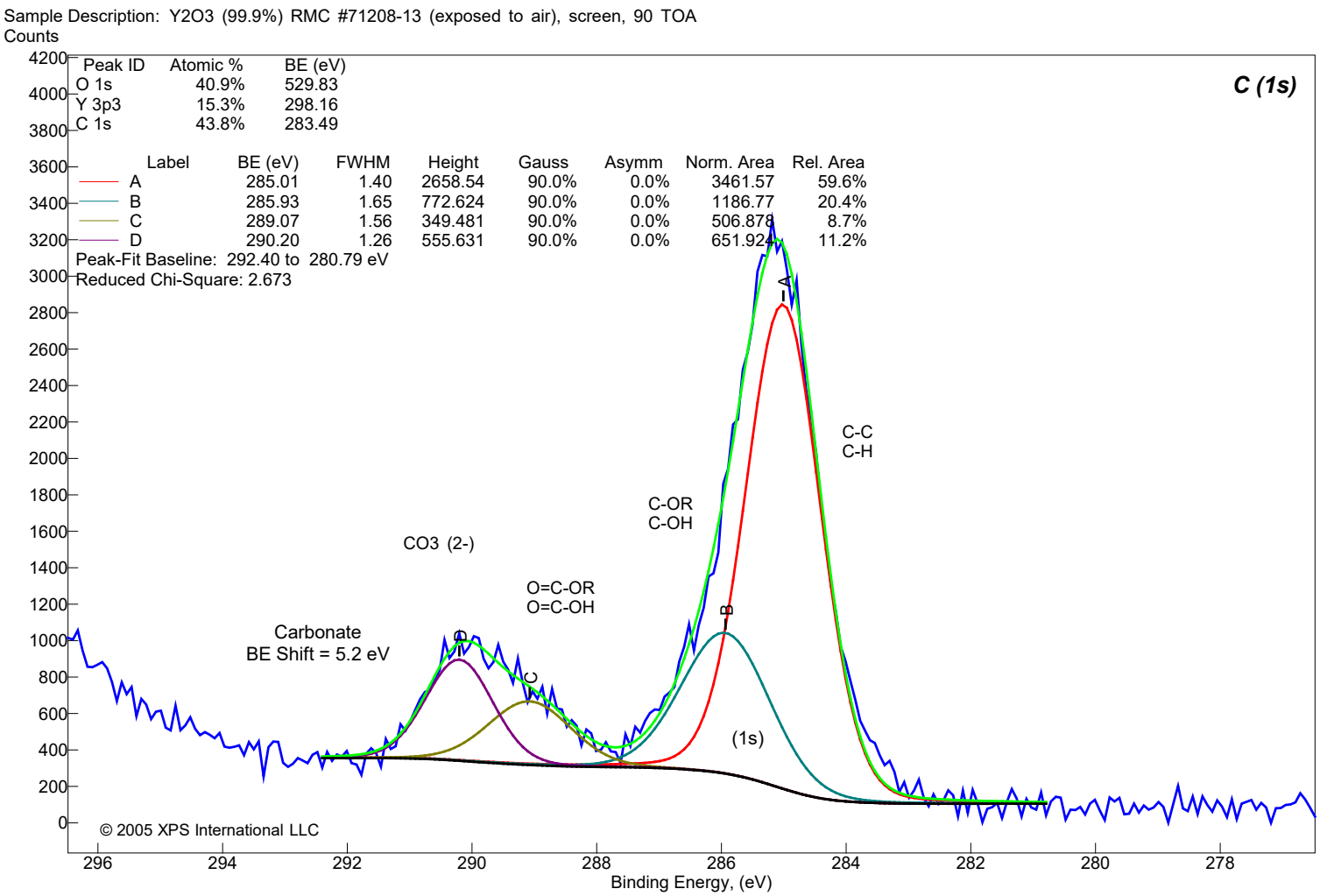
Y_2O_3

Yttrium (III) Oxide (FW = 225.82)



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Yttrium (III) Oxide (FW = 225.82)

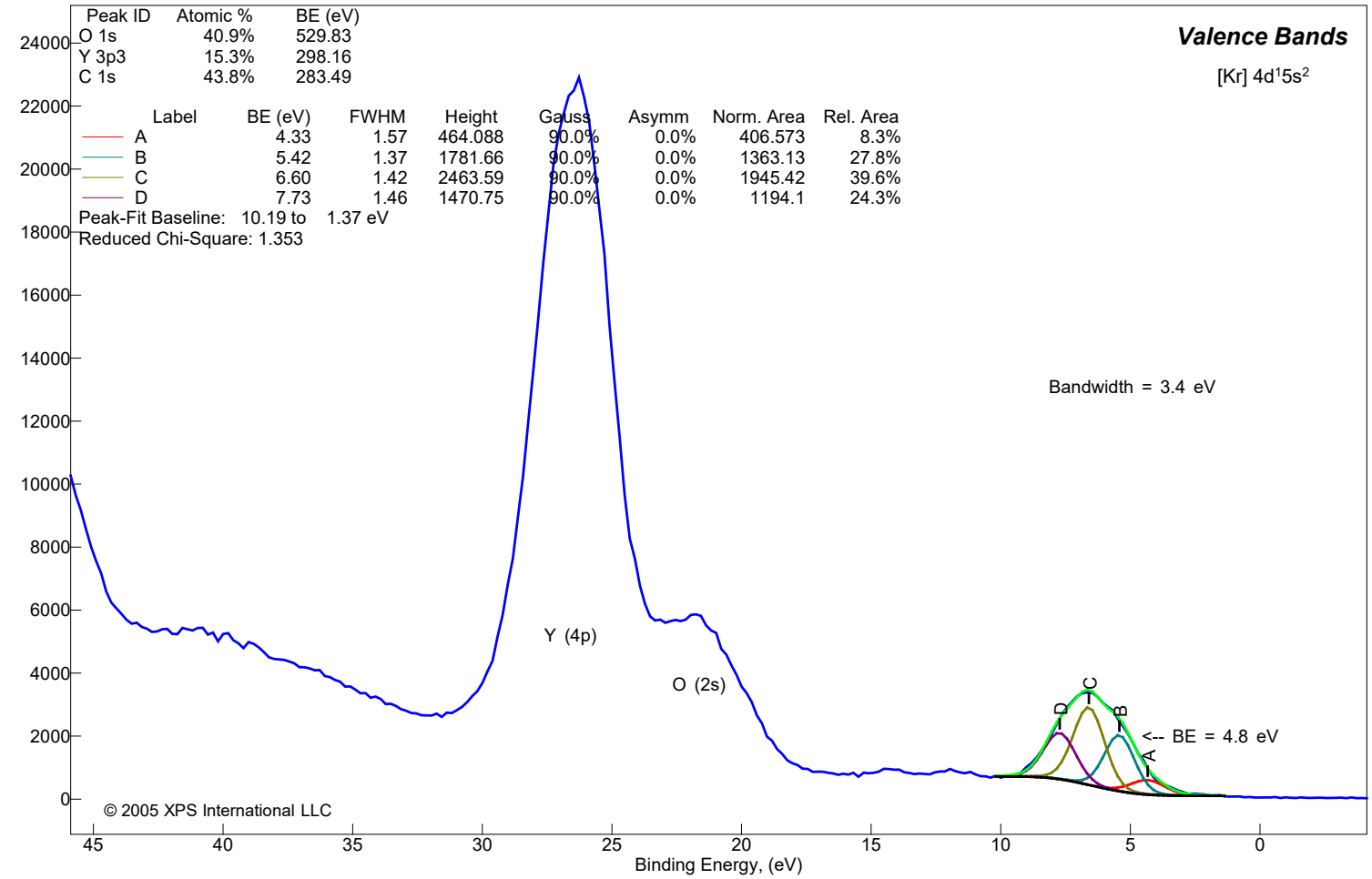


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Y_2O_3

Yttrium (III) Oxide (FW = 225.82)

Sample Description: Y2O3 (99.9%) RMC #71208-13 (exposed to air), screen, 90 TOA

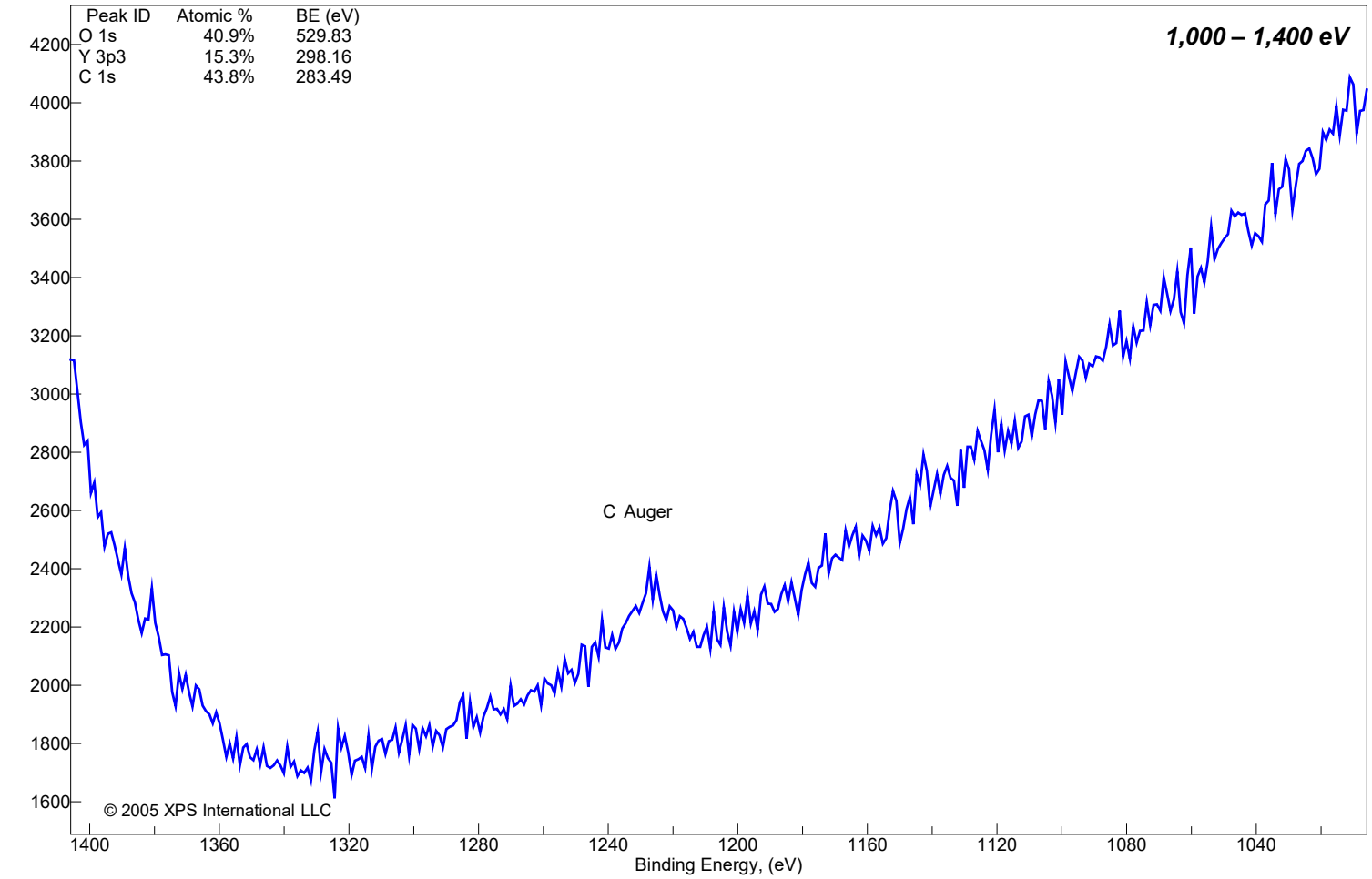


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Y_2O_3

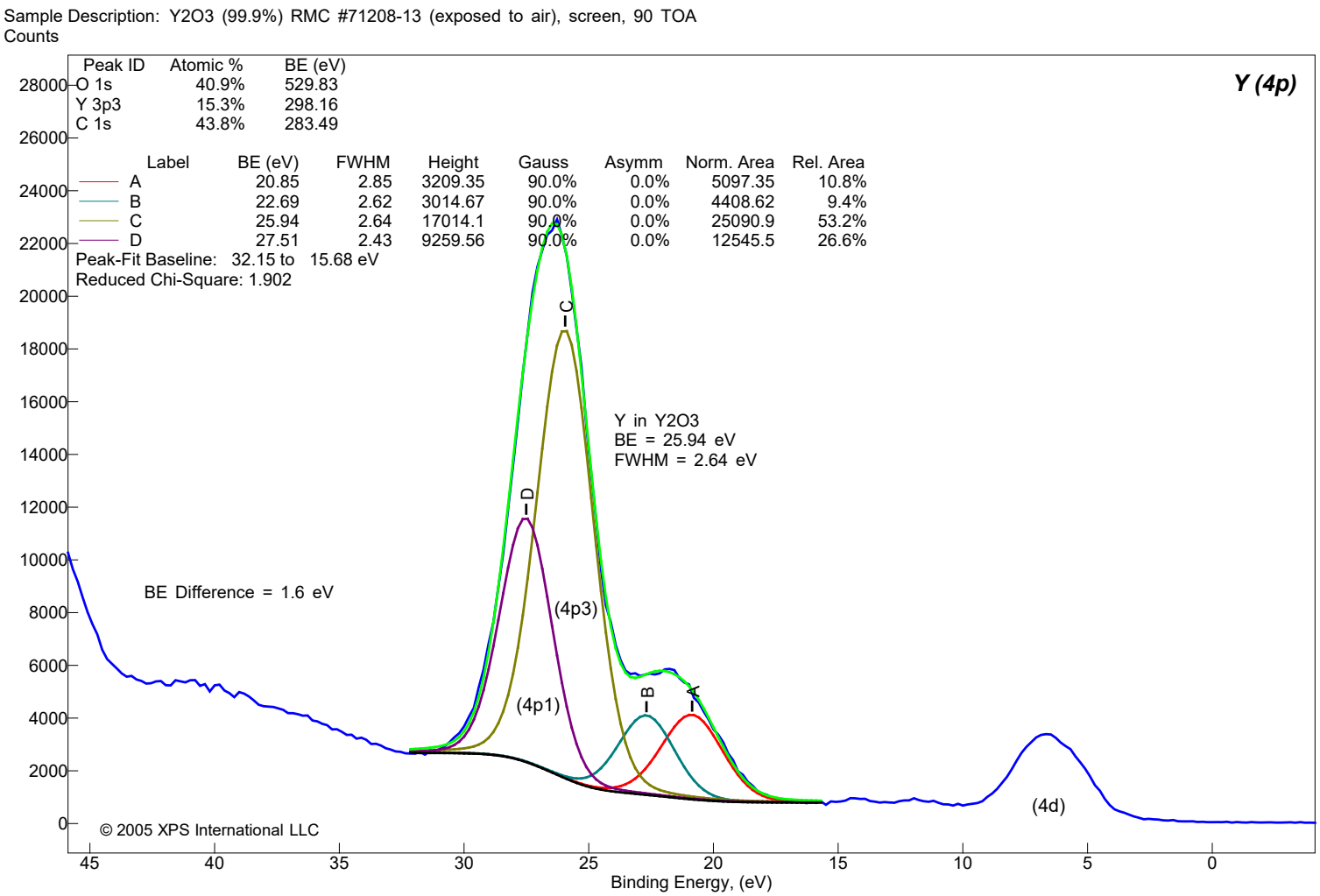
Yttrium (III) Oxide (FW = 225.82)

Sample Description: Y2O3 (99.9%) RMC #71208-13 (exposed to air), screen, 90 TOA



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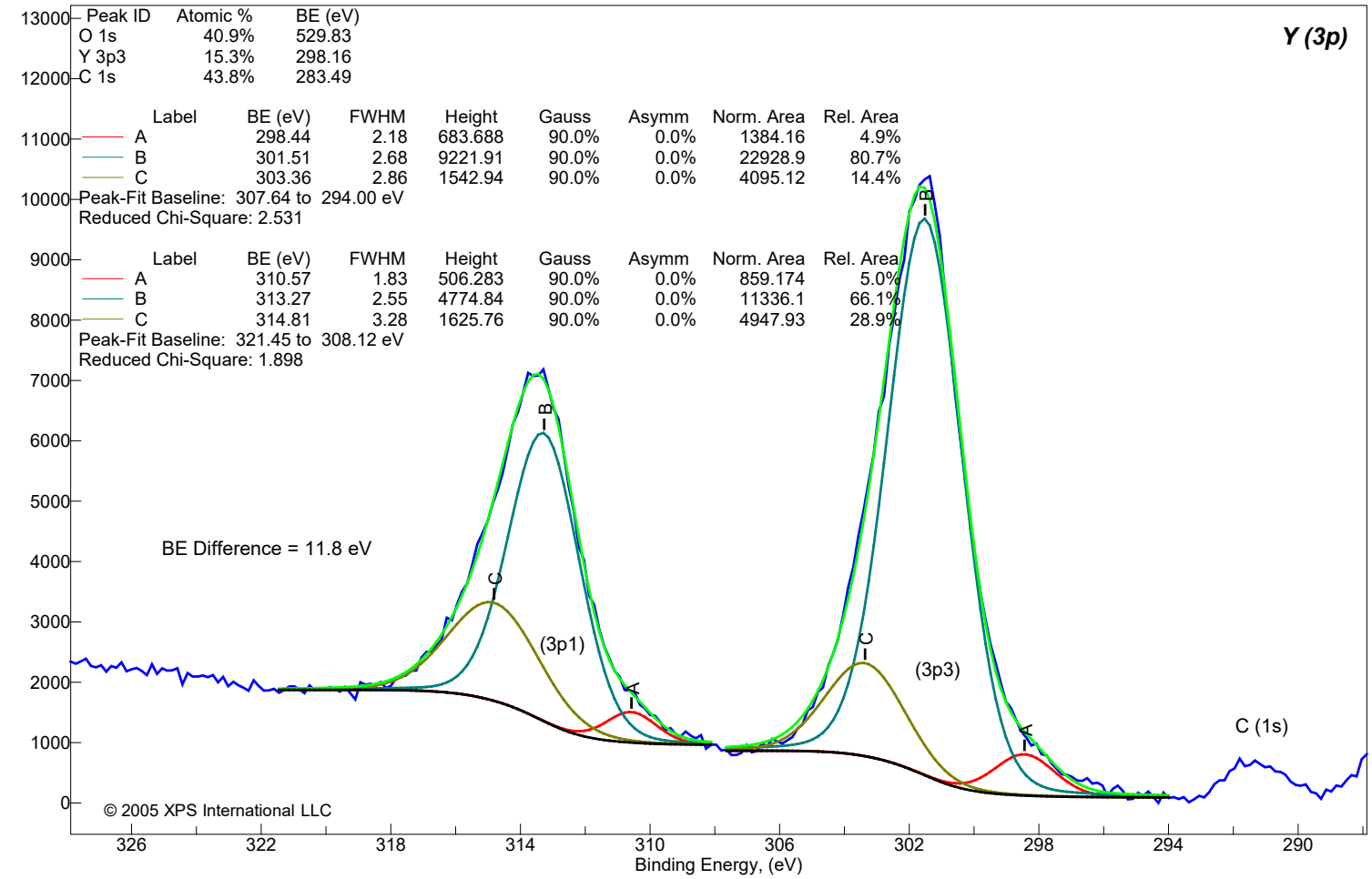
Yttrium (III) Oxide (FW = 225.82)



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Yttrium (III) Oxide (FW = 225.82)

Sample Description: Y2O3 (99.9%) RMC #71208-13 (exposed to air), screen, 90 TOA



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$Y_2(CO_3)_3$

Yttrium (III) Carbonate (FW = 357.85)
Surface Composition Table

Description: $Y_2(CO_3)_3$-nH_2O (99%) from Aldrich Co., analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white powder pressed into 3 mm pellet

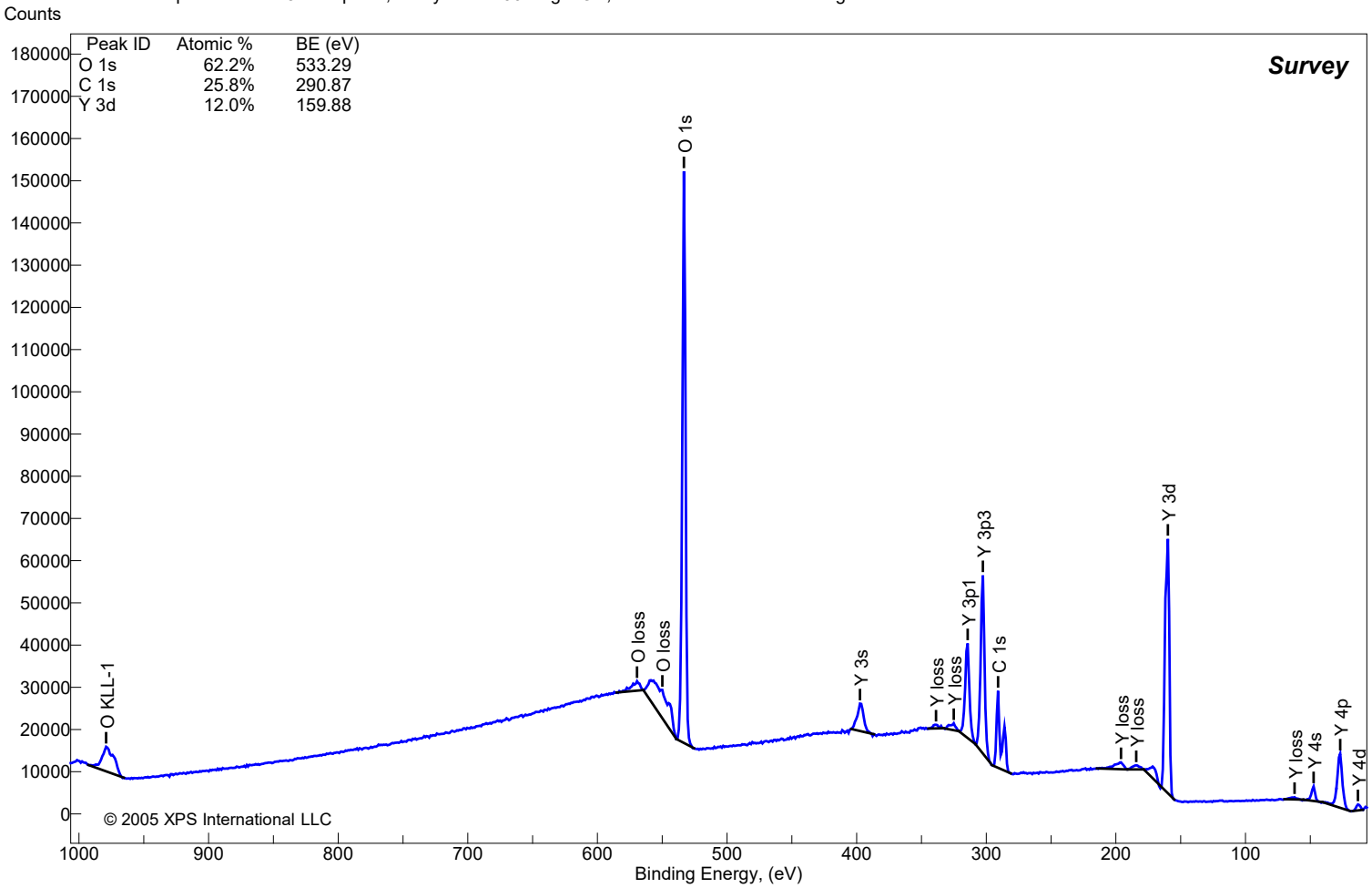
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Y 4d	8.3	13.3	0.03	1.4	1,338	
Y 4p	21.9	26.9	0.09	1.4	15,086	
Y 4s	42.5	47.5	0.33	1.4	2,758	
Y loss	57.1	62.1	0.00	1.4	688	
Y 3d	154.9	159.9	5.98	1.4	61,799	12.0%
Y loss	179.3	184.3	0.00	1.4	1,676	
Y loss	191.0	196.0	0.00	1.4	3,475	
C 1s	285.9	290.9	1.00	1.4	19,264	25.8%
Y 3p3	297.6	302.6	4.75	1.4	37,208	
Y 3p1	309.3	314.3	2.44	1.4	21,774	
Y loss	320.1	325.1	0.00	1.4	2,131	
Y loss	333.8	338.8	0.00	1.4	1,183	
Y 3s	392.4	397.4	1.98	1.4	9,521	
O 1s	528.3	533.3	2.93	1.4	99,178	62.2%
O loss	544.9	549.9	0.00	1.4	27,909	
O loss	564.5	569.5	0.00	1.4	4,134	
O KLL-1	974.0	979.0	0.70	1.4	15,649	

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$Y_2(CO_3)_3$

Yttrium (III) Carbonate (FW = 357.85)

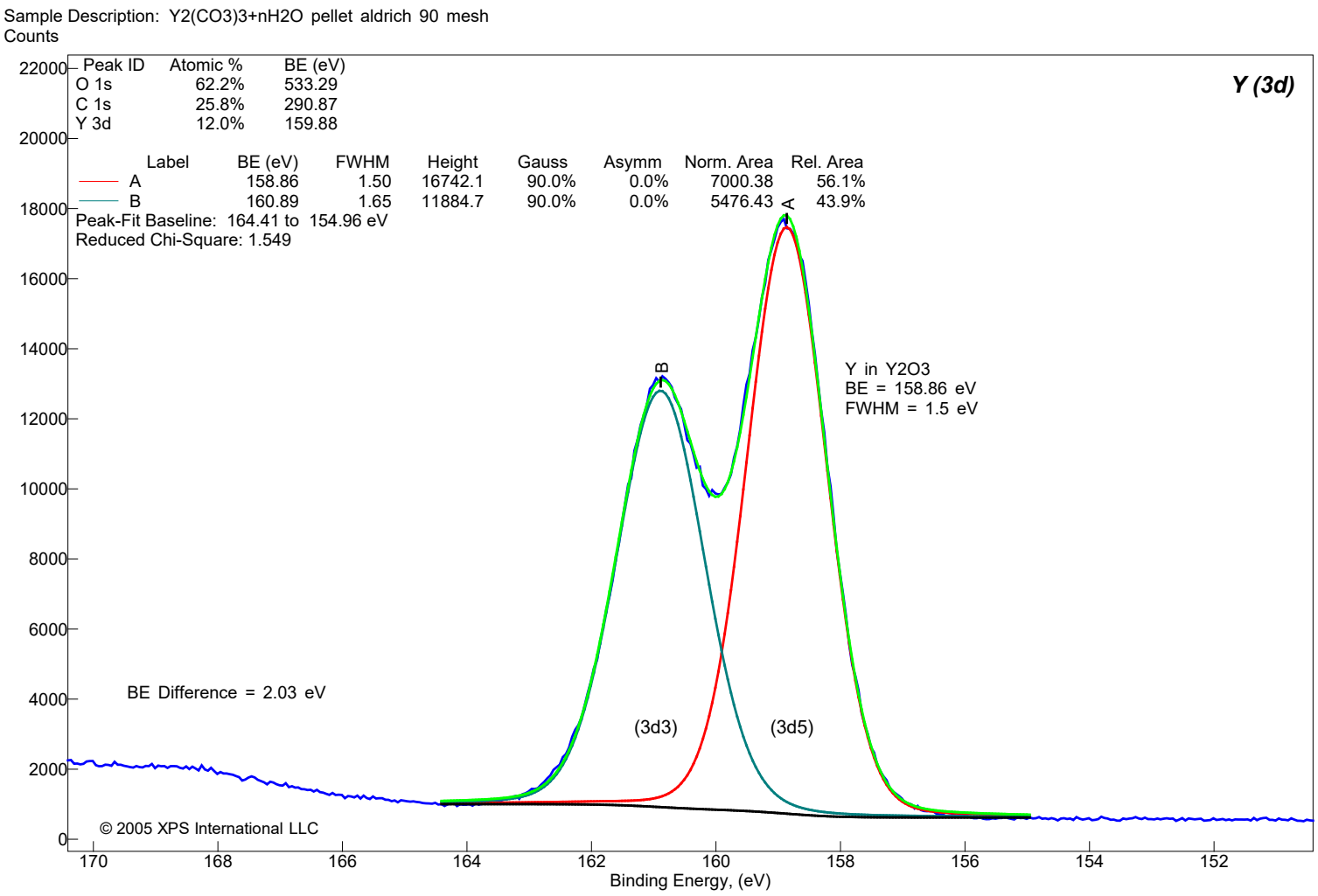
Sample Description: Y2(CO3)3+nH2O (99%) from Aldrich Chemical
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height



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$Y_2(CO_3)_3$

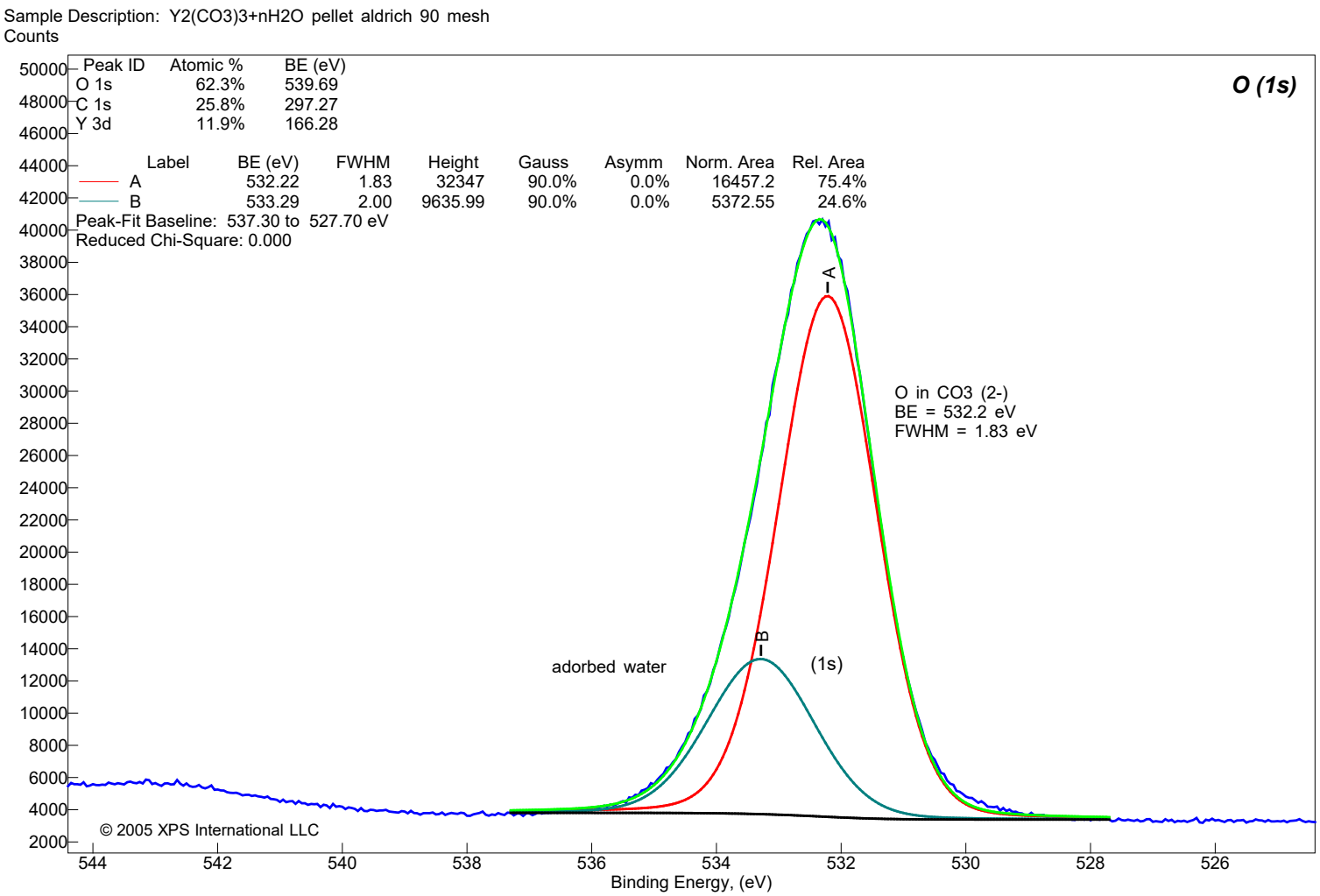
Yttrium (III) Carbonate (FW = 357.85)



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$Y_2(CO_3)_3$

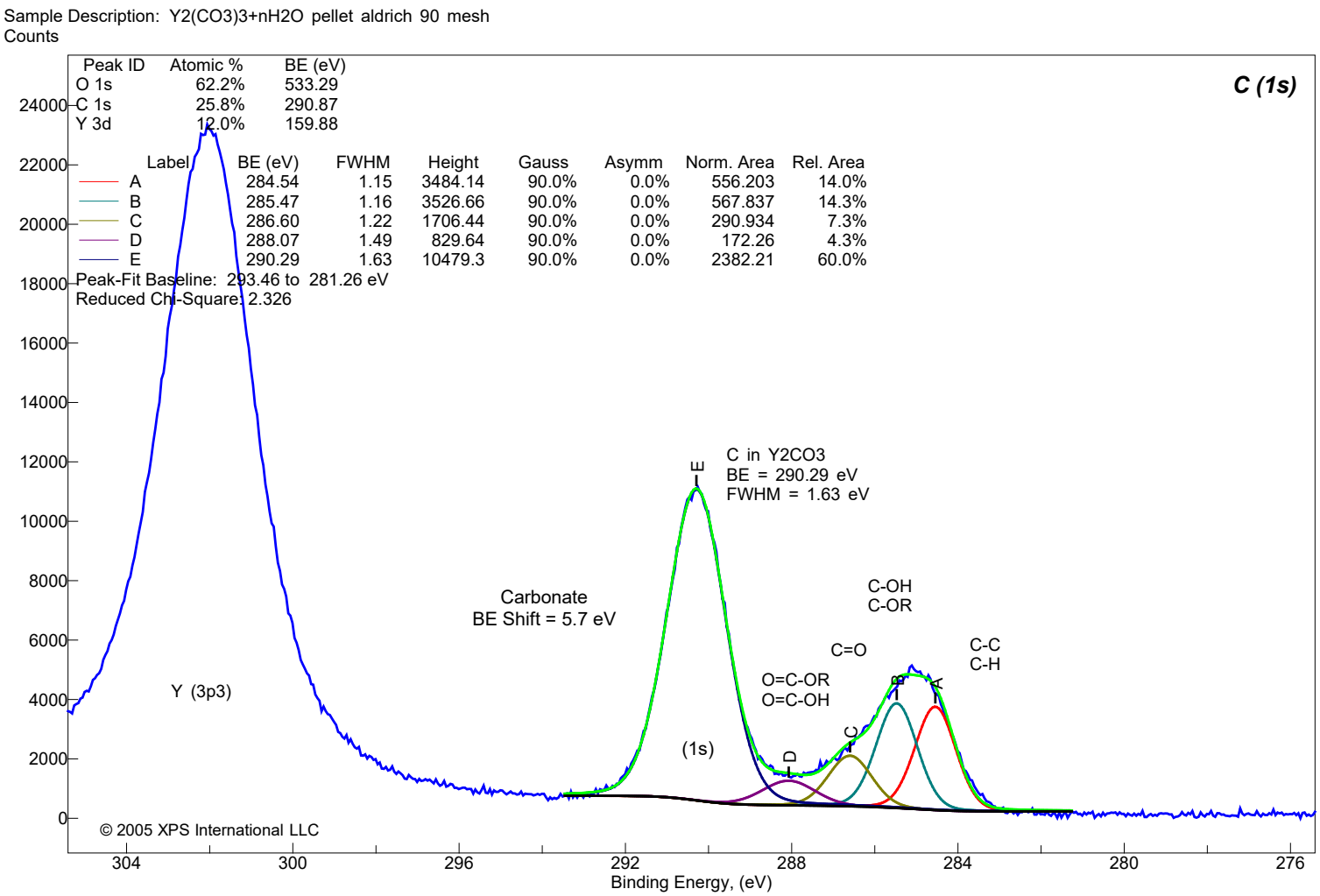
Yttrium (III) Carbonate (FW = 357.85)



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$Y_2(CO_3)_3$

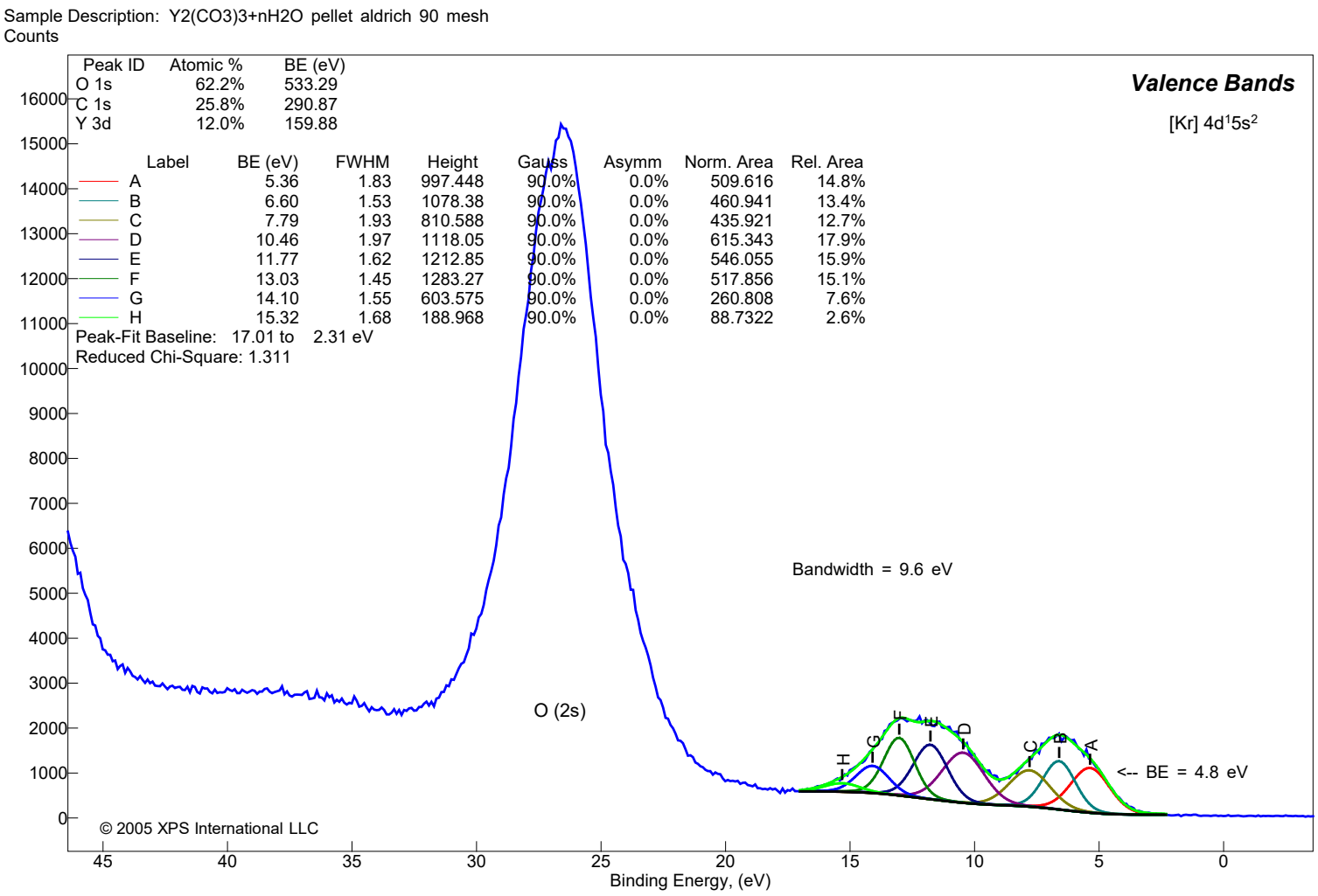
Yttrium (III) Carbonate (FW = 357.85)



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$Y_2(CO_3)_3$

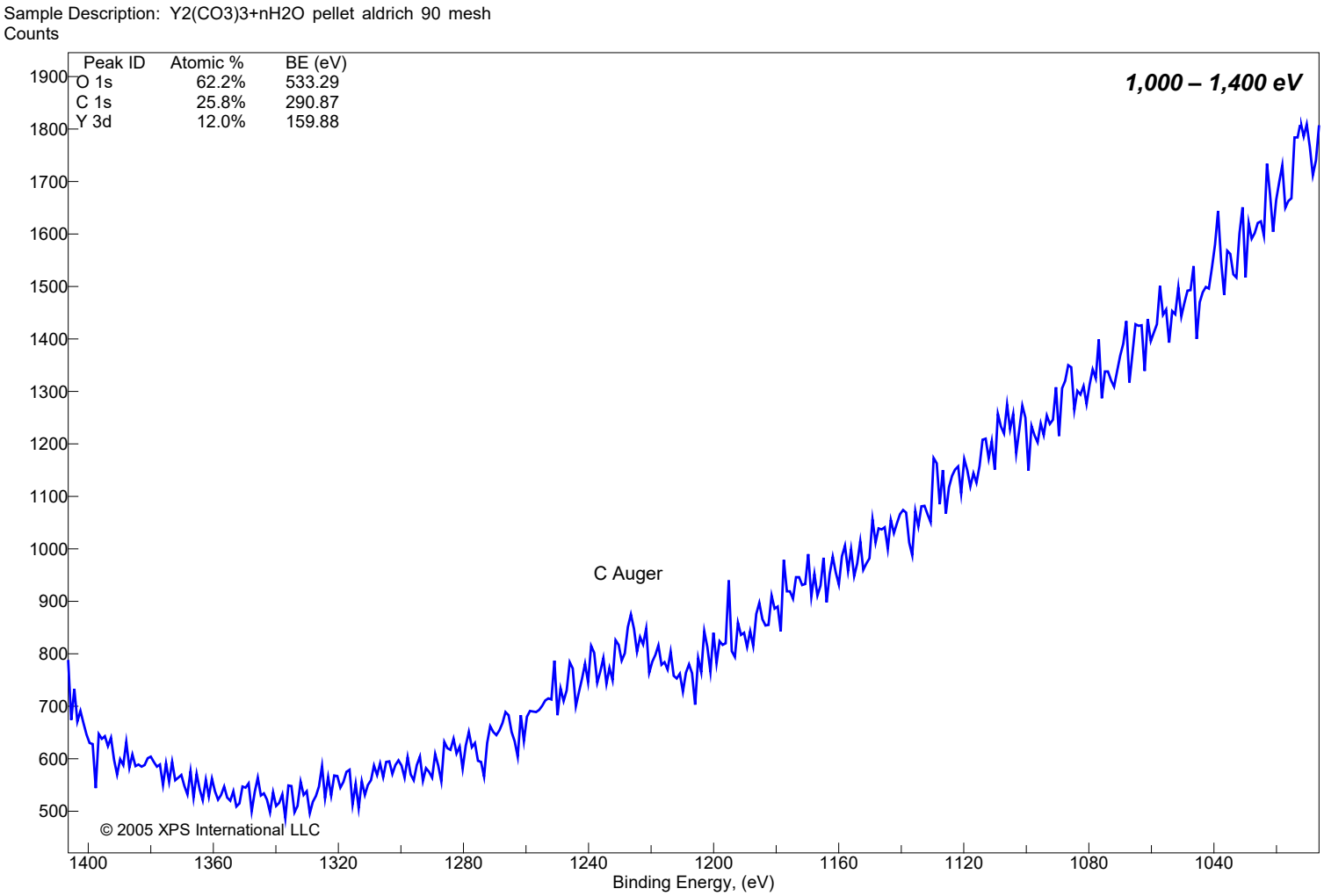
Yttrium (III) Carbonate (FW = 357.85)



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$Y_2(CO_3)_3$

Yttrium (III) Carbonate (FW = 357.85)



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Ytterbium (III) Oxide (FW = 394.08)
Surface Composition Table

Description: Yb_2O_3 (99.99%) from Aldrich Co. Lot# 05719PM, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white powder pressed into 3 mm pellet, mp 2227 C, sol in hot dil acid, very hygroscopic

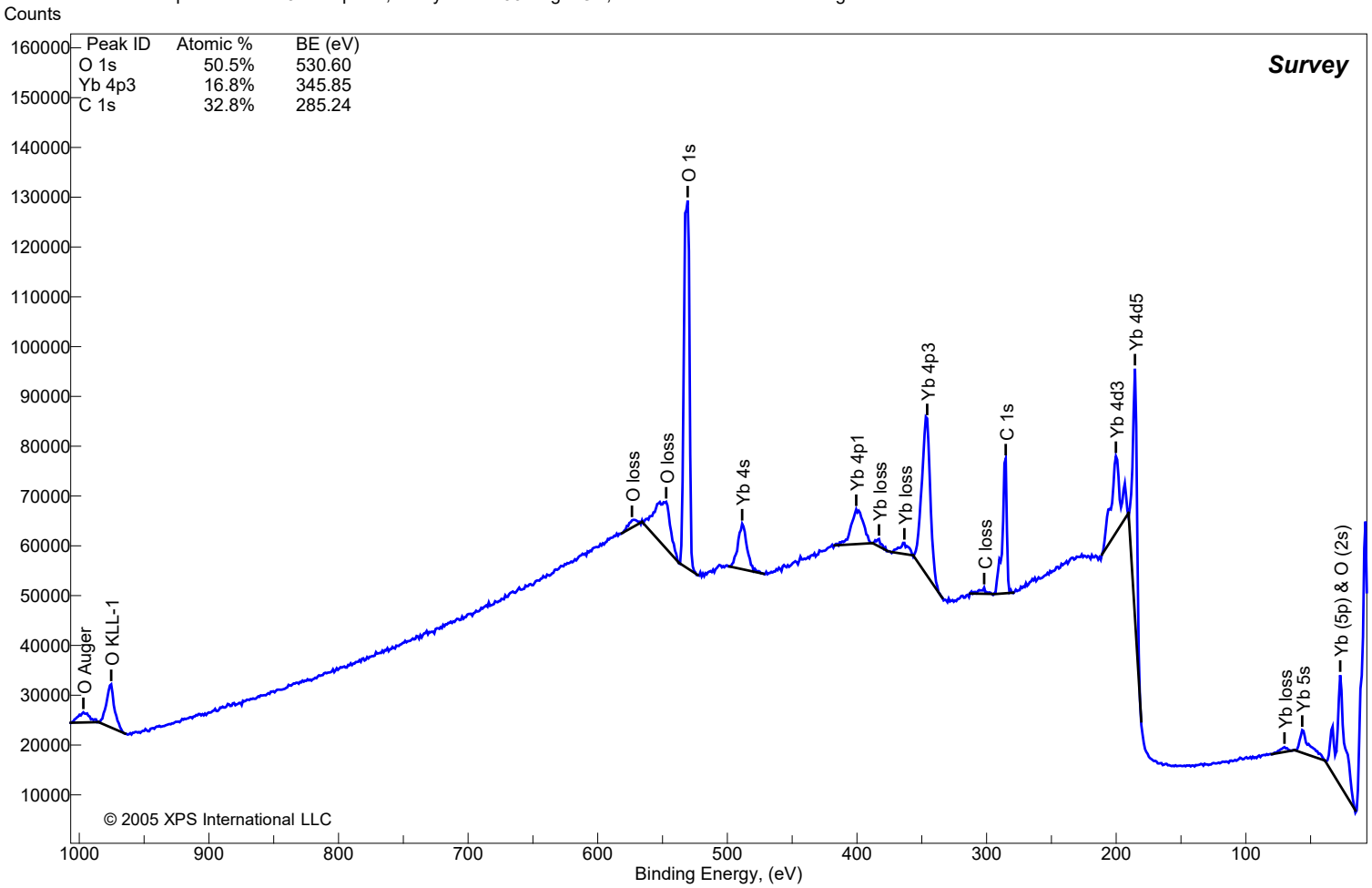
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
O 2p	7.4	2.7	0.02	1.4	81,626	
Yb (5p) & O (2s)	27.2	22.5	0.88	1.4	45,027	
Yb 5s	56.5	51.8	0.31	1.4	10,173	
Yb loss	70.2	65.5	0.00	1.4	1,720	
Yb 4d5	185.5	180.8	8.07	1.4	49,361	
Yb 4d3	200.2	195.5	5.61	1.4	34,989	
C 1s	285.2	280.5	1.00	1.4	27,955	32.8%
C loss	301.9	297.2	0.00	1.4	1,435	
Yb 4p3	345.8	341.1	4.60	1.4	61,167	16.8%
Yb loss	363.4	358.7	0.00	1.4	4,975	
Yb loss	383.0	378.3	0.00	1.4	1,788	
Yb 4p1	400.6	395.9	2.00	1.4	18,997	
Yb 4s	488.6	483.9	1.70	1.4	18,555	
O 1s	530.6	525.9	2.93	1.4	91,660	50.5%
O loss	547.2	542.5	0.00	1.4	31,163	
O loss	573.6	568.9	0.00	1.4	2,019	
O KLL-1	975.4	970.7	0.70	1.4	15,673	
O Auger	996.9	992.2	0.00	1.4	5,290	

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Yb_2O_3

Ytterbium (III) Oxide (FW = 394.08)

Sample Description: Yb2O3 (99.99%) from Aldrich lot# 05719PM
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height

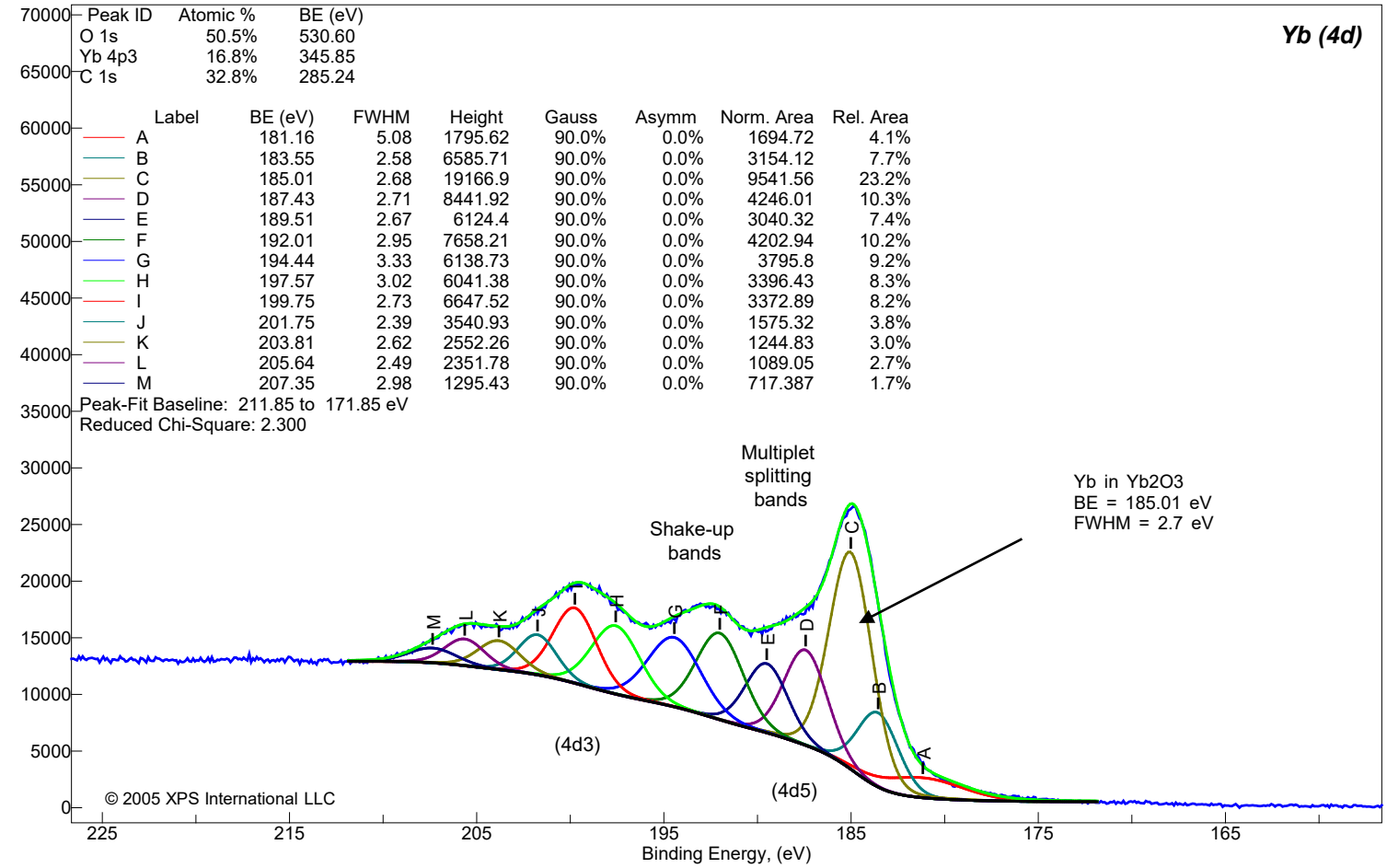


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Yb_2O_3

Ytterbium (III) Oxide (FW = 394.08)

Sample Description: Yb2O3 99.99% Aldr lot#05719PM 3mm plt 90TOA mesh
mesh at <1mm

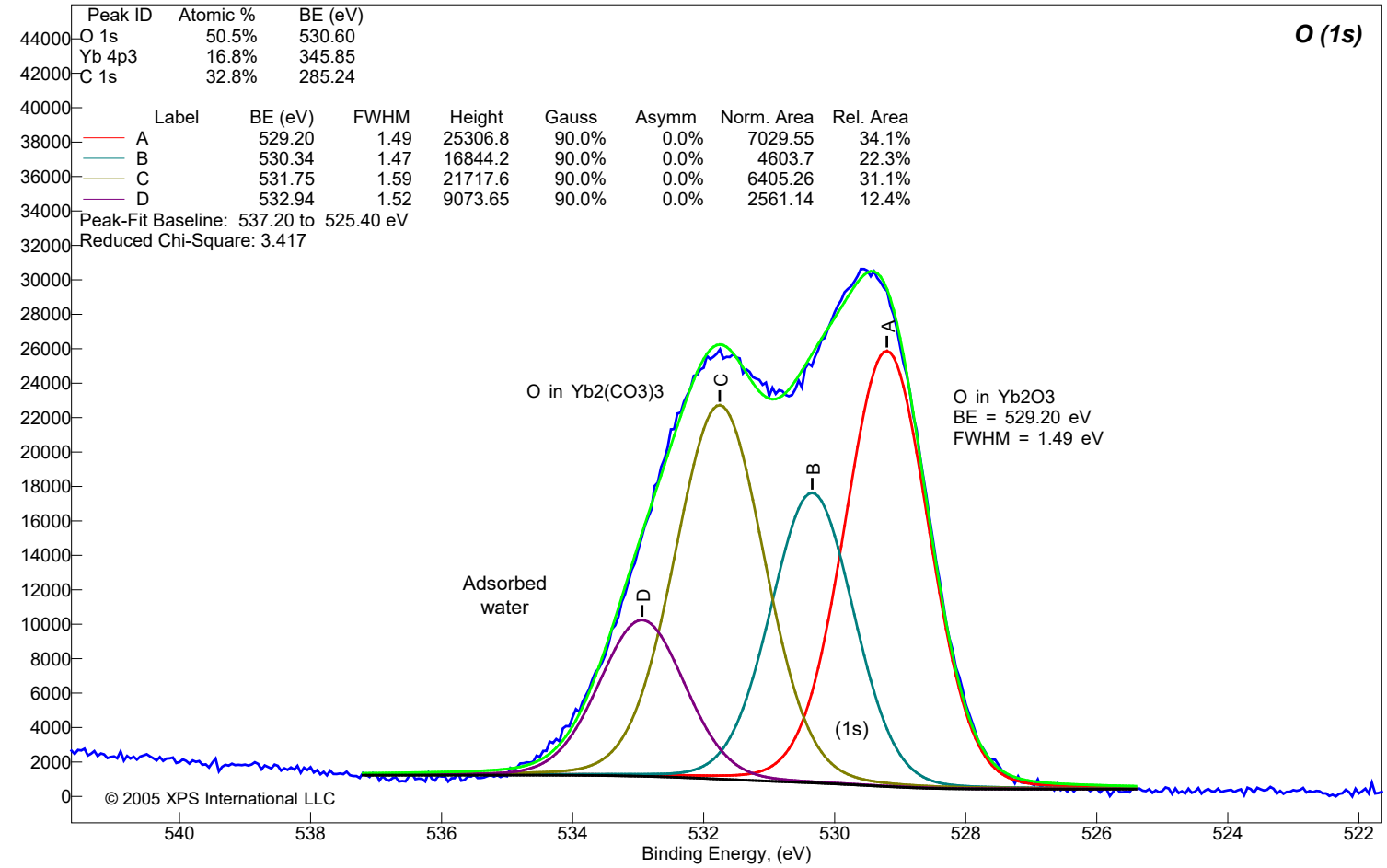


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Yb_2O_3

Ytterbium (III) Oxide (FW = 394.08)

Sample Description: Yb2O3 99.99% Aldr lot#05719PM 3mm plt 90TOA mesh
mesh at <1mm

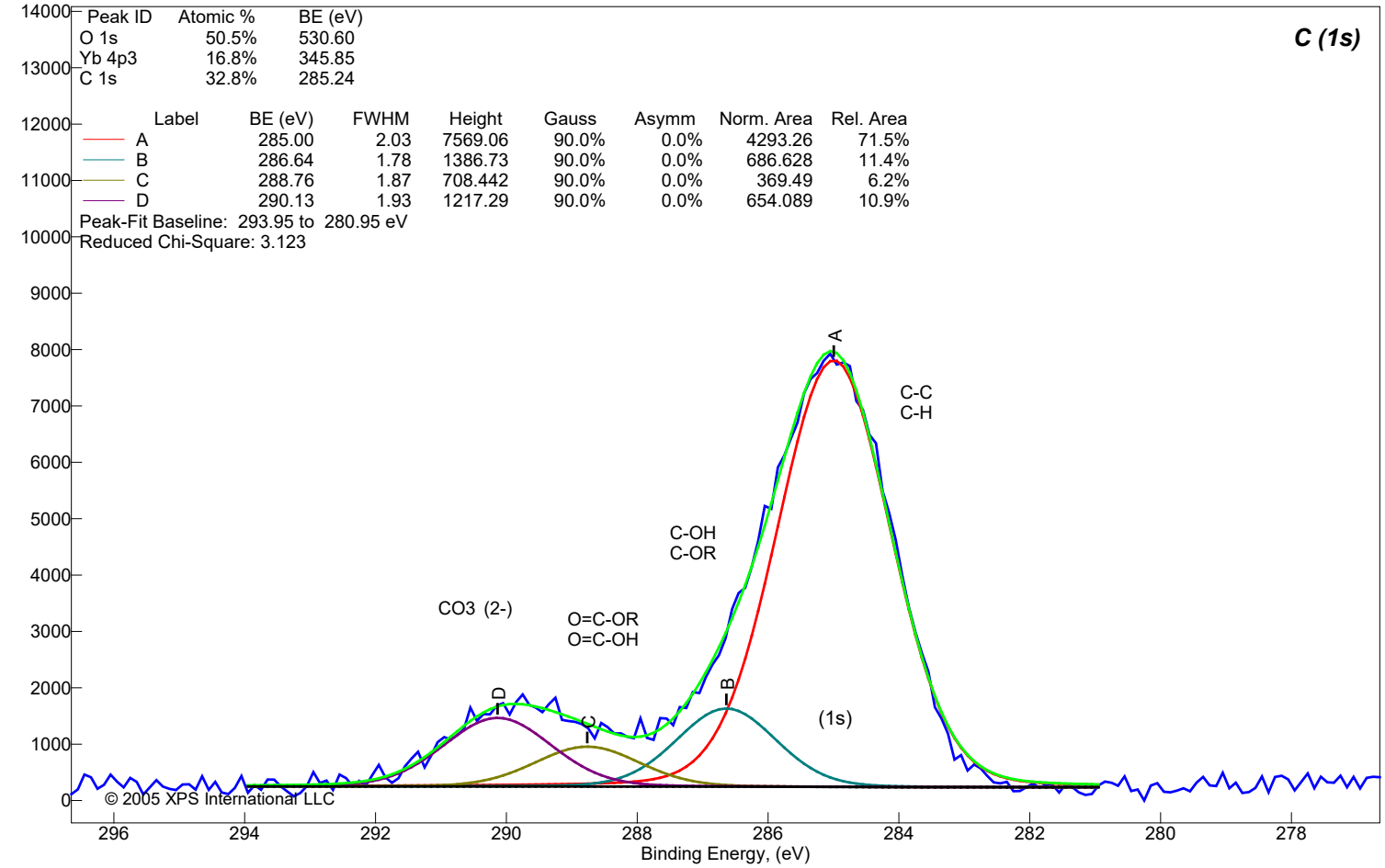


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Yb_2O_3

Ytterbium (III) Oxide (FW = 394.08)

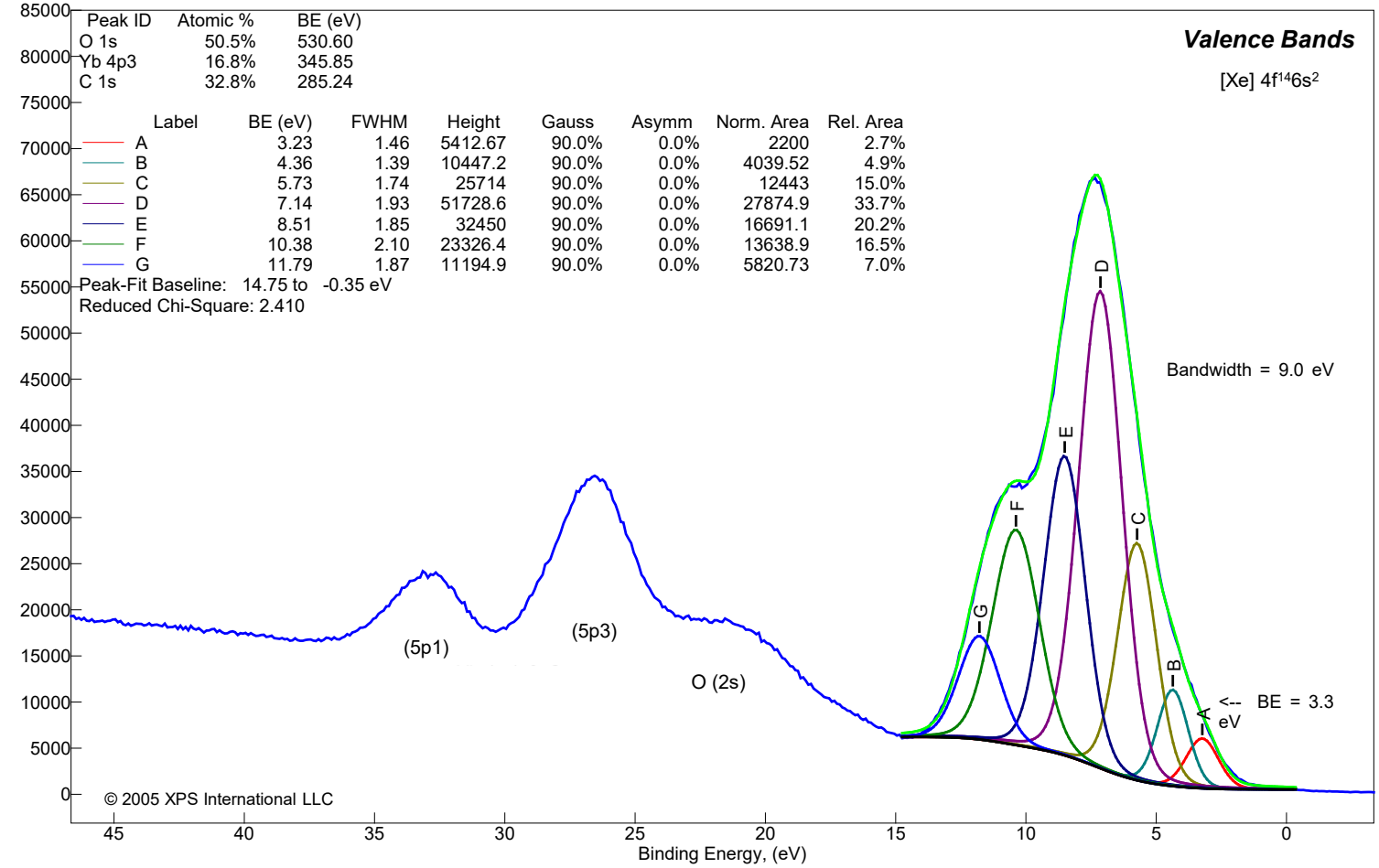
Sample Description: Yb2O3 99.99% Aldr lot#05719PM 3mm plt 90TOA mesh
mesh at <1mm



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Ytterbium (III) Oxide (FW = 394.08)

Sample Description: Yb2O3 99.99% Aldr lot#05719PM 3mm plt 90TOA mesh
mesh at <1mm

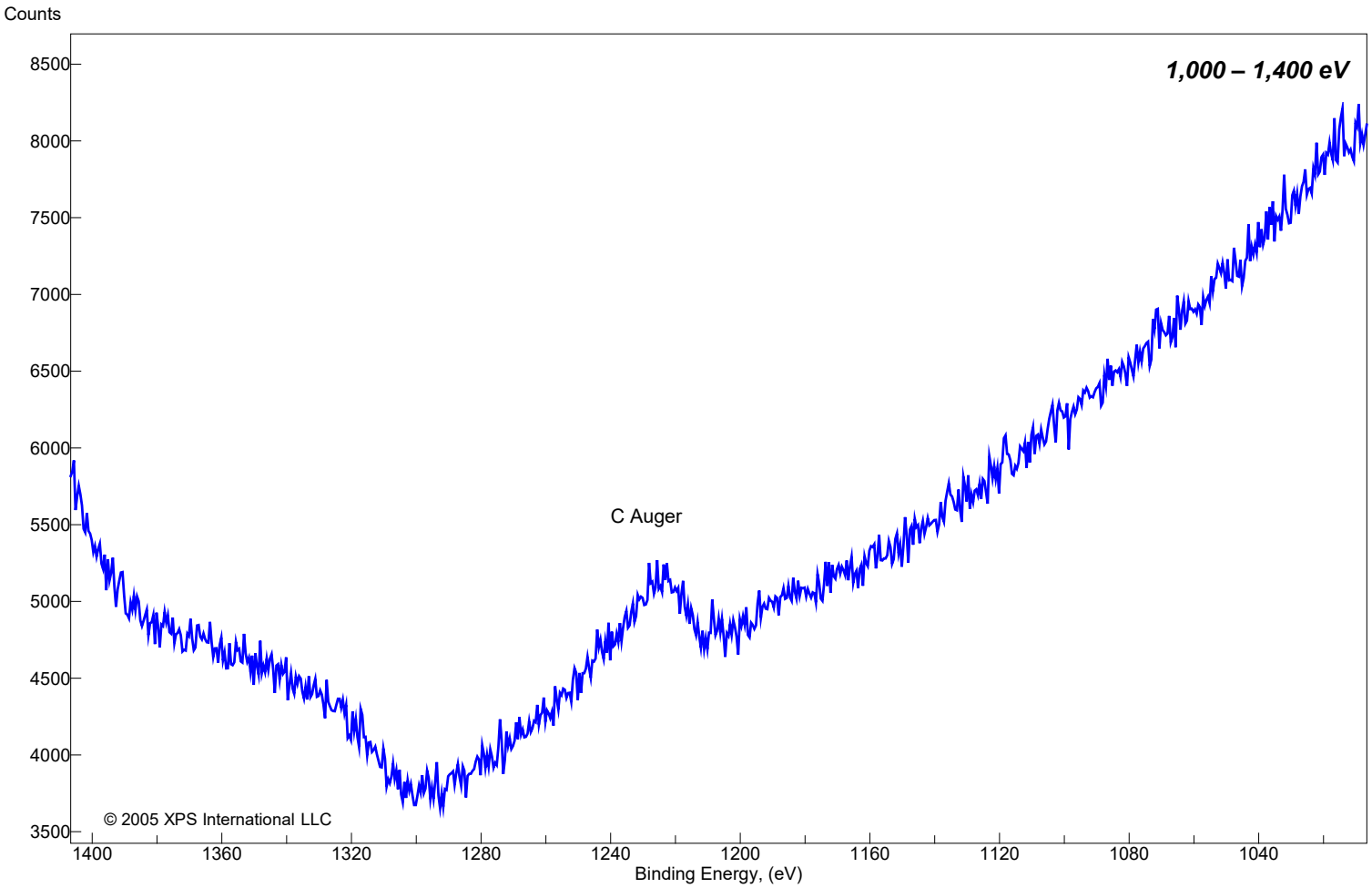


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Yb_2O_3

Ytterbium (III) Oxide (FW = 394.08)

Sample Description: Yb2O3 99.99% Aldr lot#05719PM 3mm plt 90TOA mesh
mesh at <1mm



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ZnO

Zinc (II) Oxide (FW = 81.38)
Surface Composition Table

Description: ZnO (99.999%) from Aldrich Co. Lot# 04629KV, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white powder pressed into 3 mm pellet, mp 1975 C, d 5.60, sol in dil acetic acid

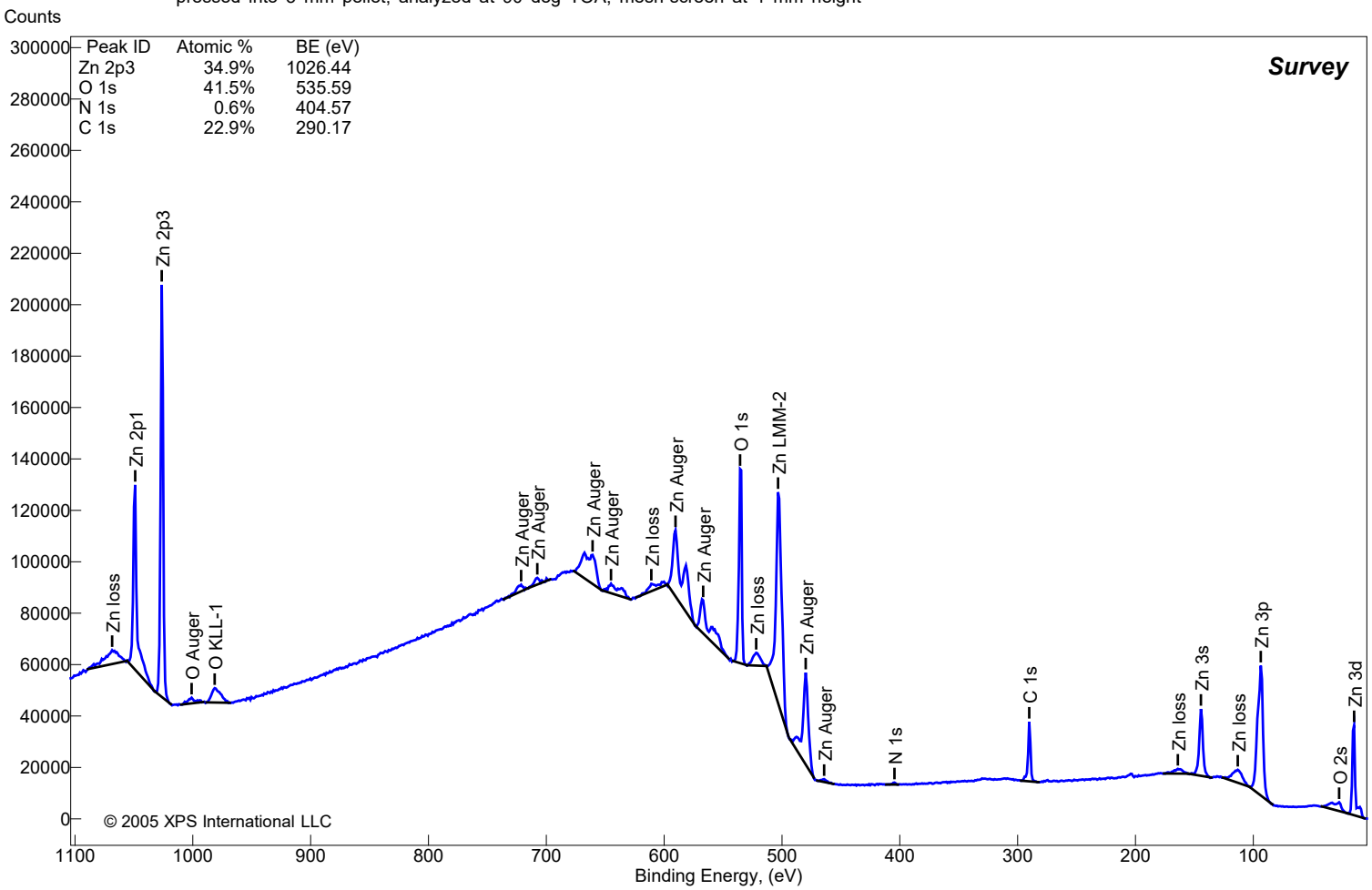
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Zn 3d	9.2	14.4	0.81	1.5	26,974	
O 2s	21.9	27.1	0.14	1.5	8,342	
Zn 3p	88.4	93.6	2.83	1.5	66,896	
Zn loss	108.0	113.2	0.00	1.5	12,224	
Zn 3s	139.3	144.5	1.04	1.5	24,230	
Zn loss	158.8	164.0	0.00	1.5	3,953	
C 1s	285.0	290.2	1.00	1.5	14,933	22.9%
N 1s	399.4	404.6	1.80	1.5	652	0.6%
Zn Auger	459.0	464.2	0.00	1.5	1,662	
Zn Auger	474.7	479.9	0.00	1.5	51,945	
Zn LMM-2	498.1	503.3	0.29	1.5	120,688	
Zn loss	516.7	521.9	0.00	1.5	10,041	
O 1s	530.4	535.6	2.93	1.5	56,357	41.5%
Zn Auger	561.7	566.9	0.00	1.5	31,035	
Zn Auger	585.1	590.3	0.00	1.5	64,302	
Zn loss	605.7	610.9	0.00	1.5	8,587	
Zn Auger	639.9	645.1	0.00	1.5	11,942	
Zn Auger	655.5	660.7	0.00	1.5	35,918	
Zn Auger	702.5	707.7	0.00	1.5	4,178	
Zn Auger	716.2	721.4	0.00	1.5	5,597	
O KLL-1	976.3	981.5	0.70	1.5	12,344	
O Auger	995.8	1001.0	0.00	1.5	3,954	
Zn 2p3	1021.2	1026.4	18.92	1.5	103,677	34.9%
Zn 2p1	1043.7	1048.9	9.80	1.5	67,553	
Zn loss	1063.3	1068.5	0.00	1.5	18,196	

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ZnO

Zinc (II) Oxide (FW = 81.38)

Sample Description: ZnO (99.999%) from Aldrich Lot# HW 04629KV
pressed into 3 mm pellet, analyzed at 90 deg TOA, mesh-screen at 1 mm height

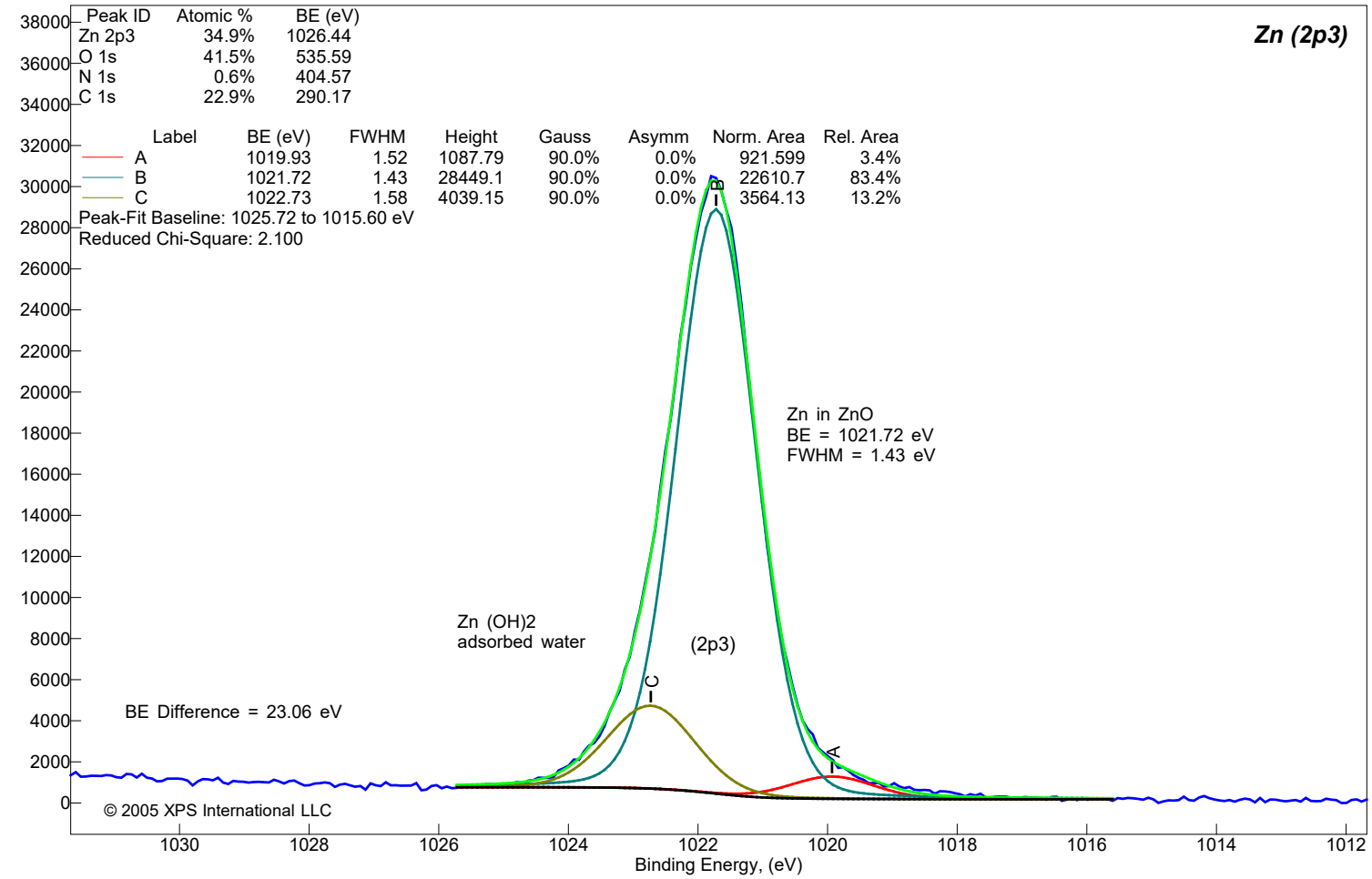


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ZnO

Zinc (II) Oxide (FW = 81.38)

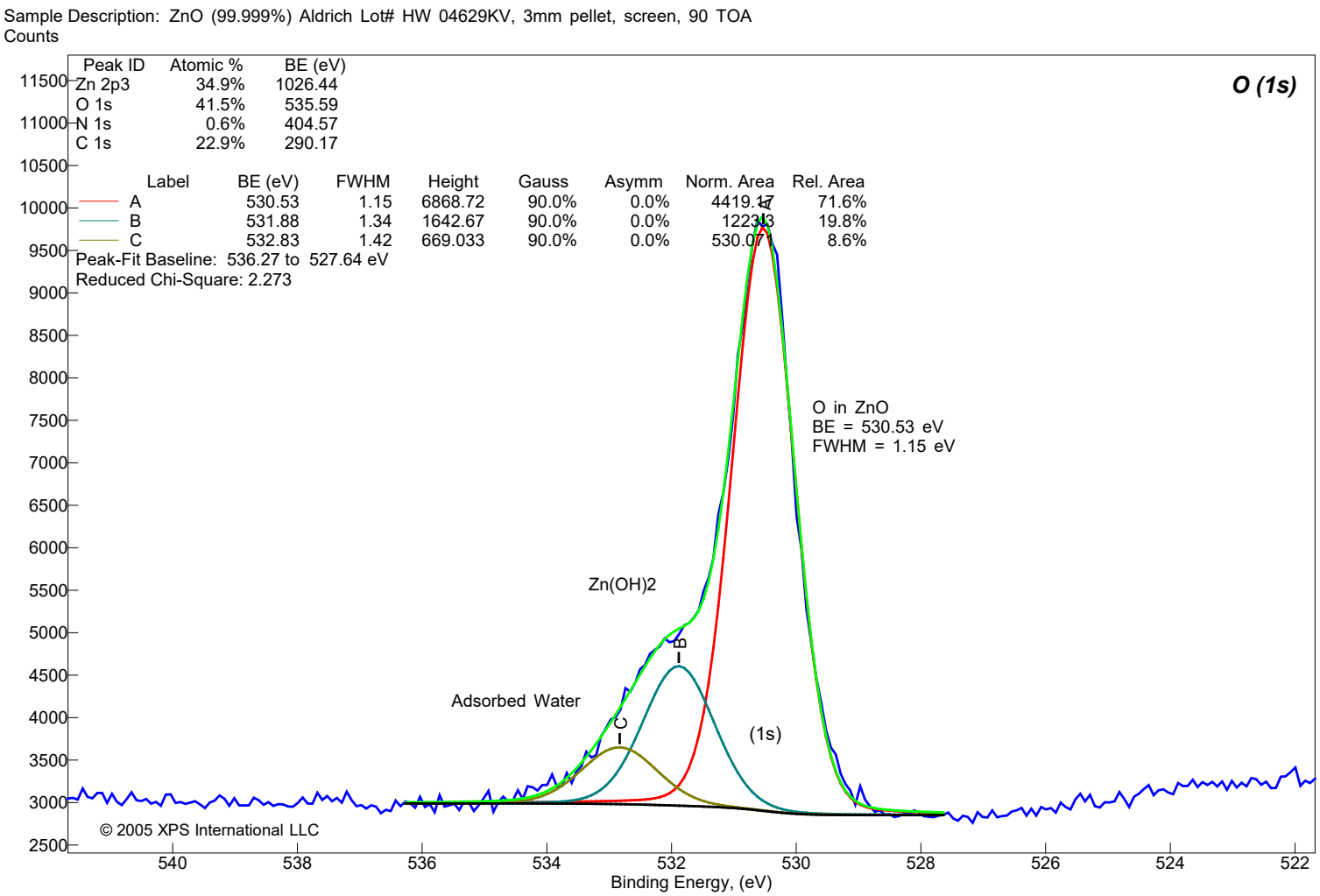
Sample Description: ZnO (99.999%) Aldrich Lot# HW 04629KV, 3mm pellet, screen, 90 TOA



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ZnO

Zinc (II) Oxide (FW = 81.38)

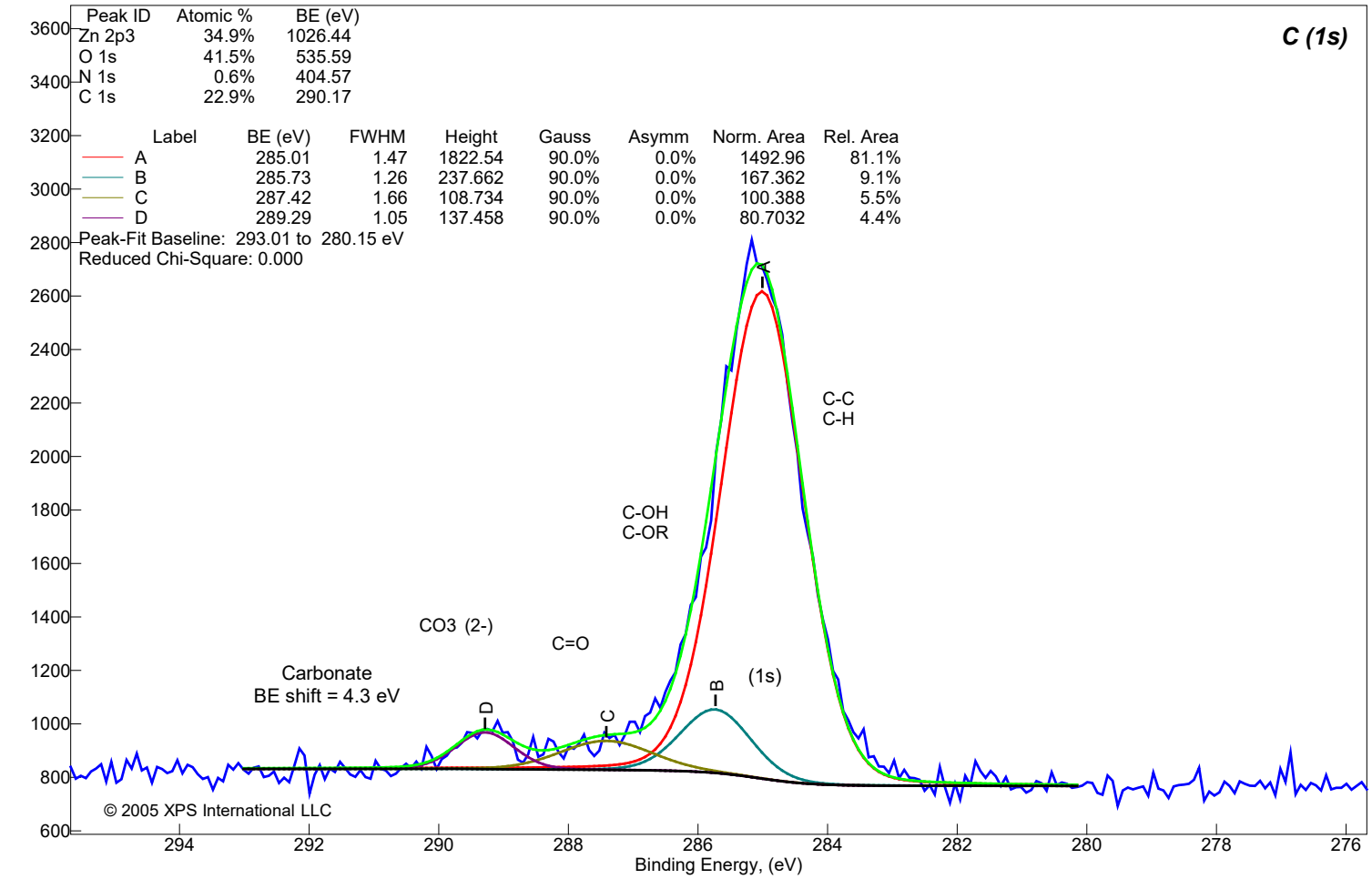


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ZnO

Zinc (II) Oxide (FW = 81.38)

Sample Description: ZnO (99.999%) Aldrich Lot# HW 04629KV, 3mm pellet, screen, 90 TOA

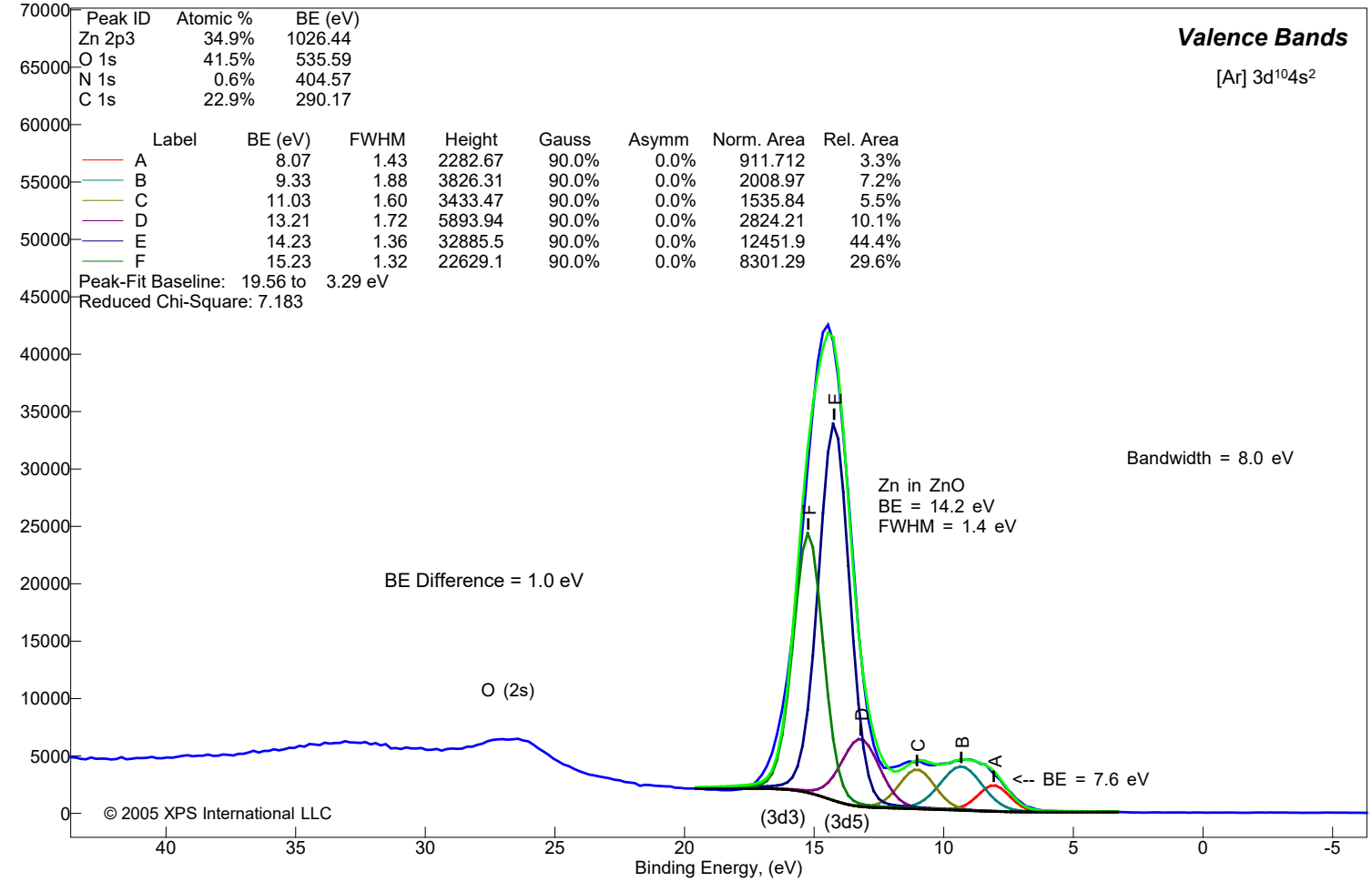


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ZnO

Zinc (II) Oxide (FW = 81.38)

Sample Description: ZnO (99.999%) Aldrich Lot# HW 04629KV, 3mm pellet, screen, 90 TOA

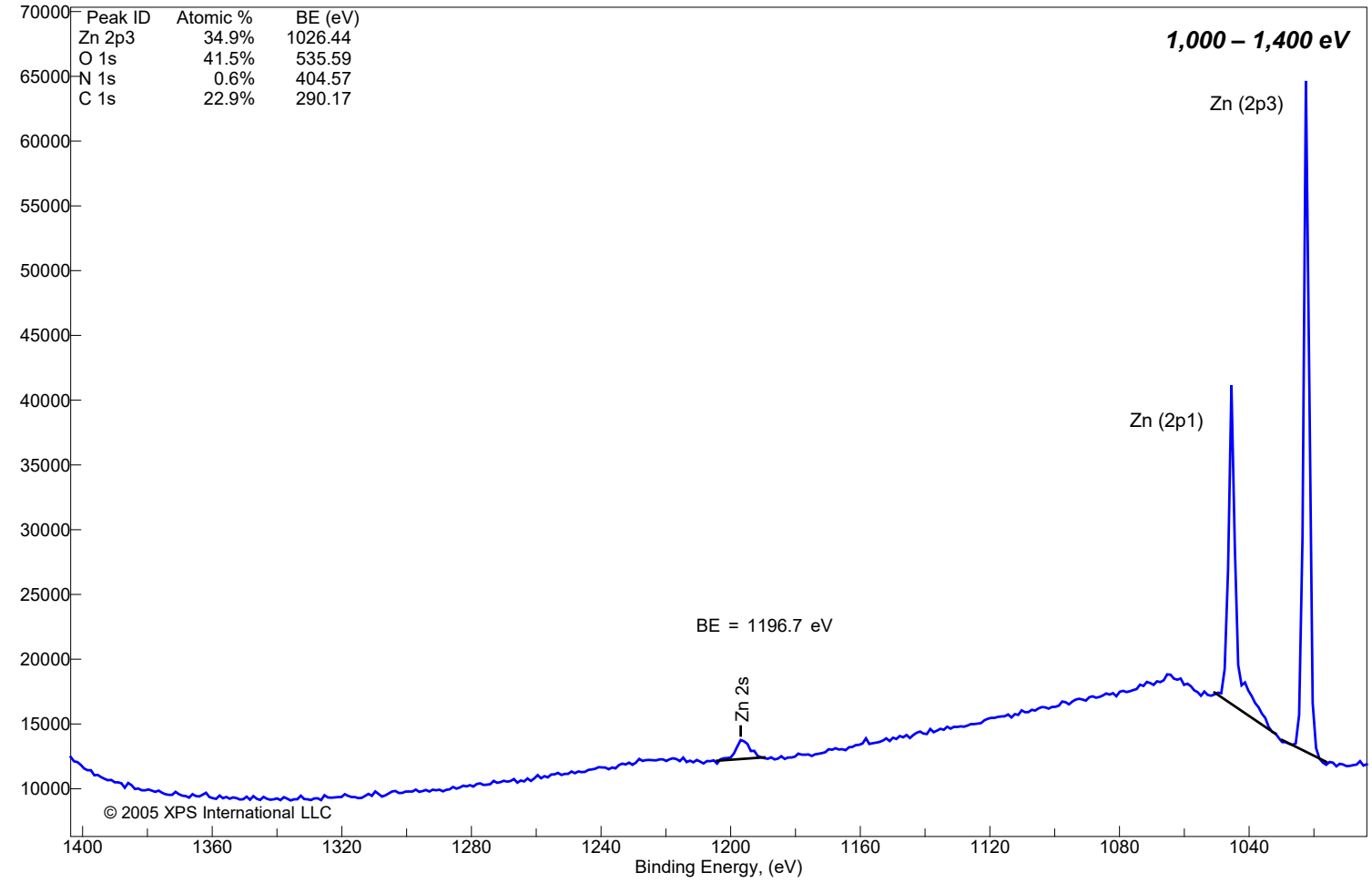


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ZnO

Zinc (II) Oxide (FW = 81.38)

Sample Description: ZnO (99.999%) Aldrich Lot# HW 04629KV, 3mm pellet, screen, 90 TOA

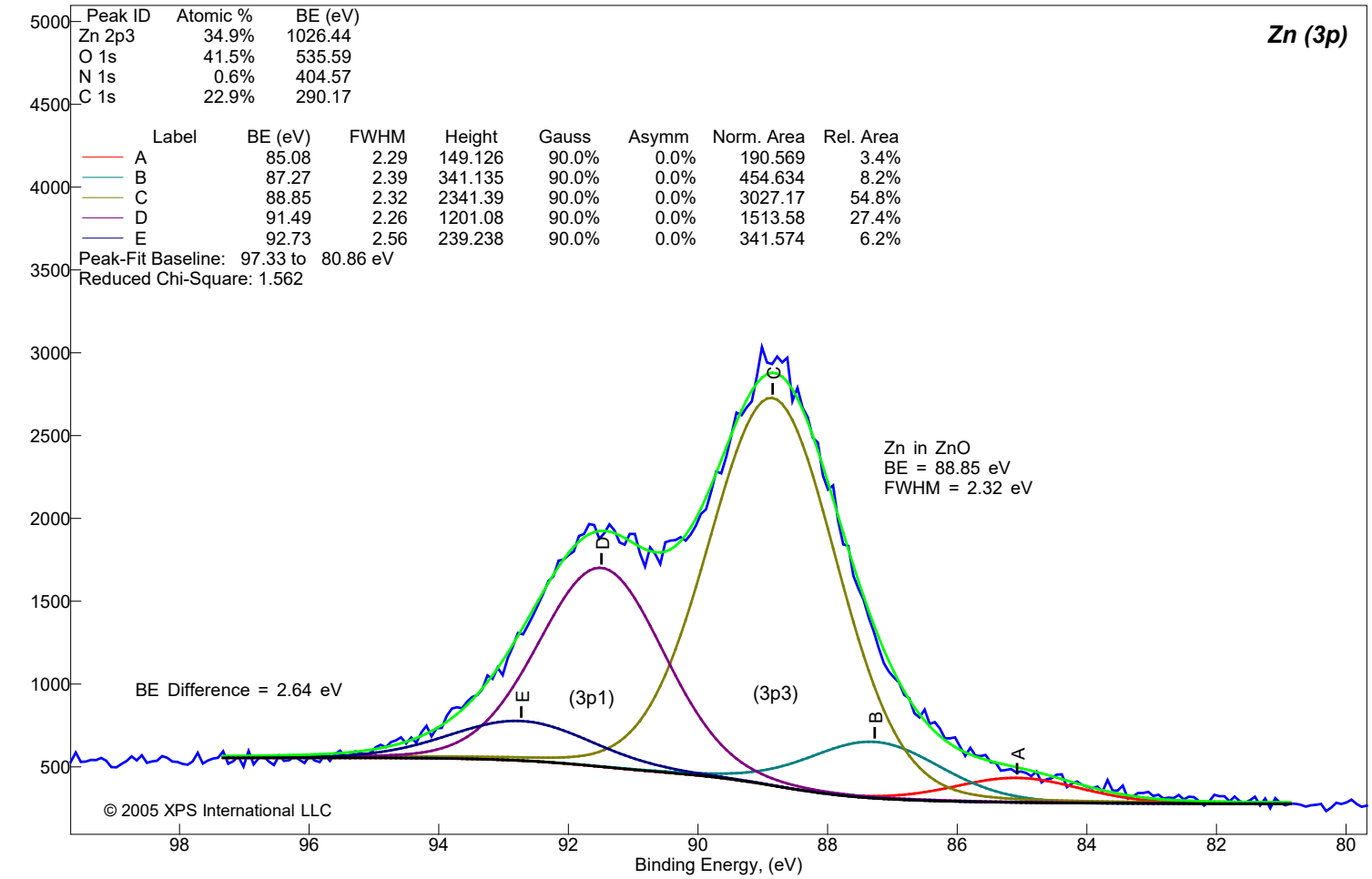


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ZnO

Zinc (II) Oxide (FW = 81.38)

Sample Description: ZnO (99.999%) Aldrich Lot# HW 04629KV, 3mm pellet, screen, 90 TOA

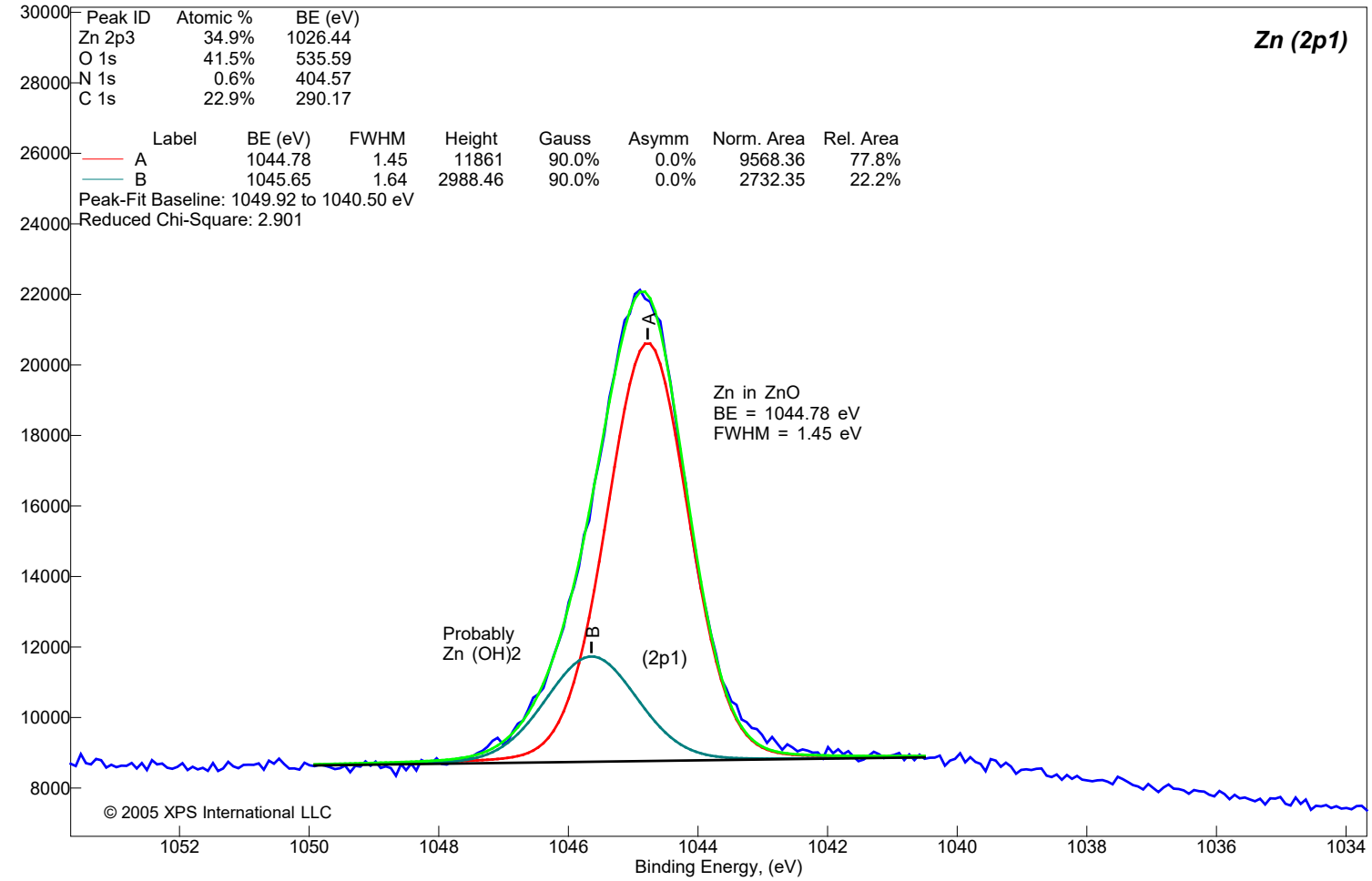


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ZnO

Zinc (II) Oxide (FW = 81.38)

Sample Description: ZnO (99.999%) Aldrich Lot# HW 04629KV, 3mm pellet, screen, 90 TOA

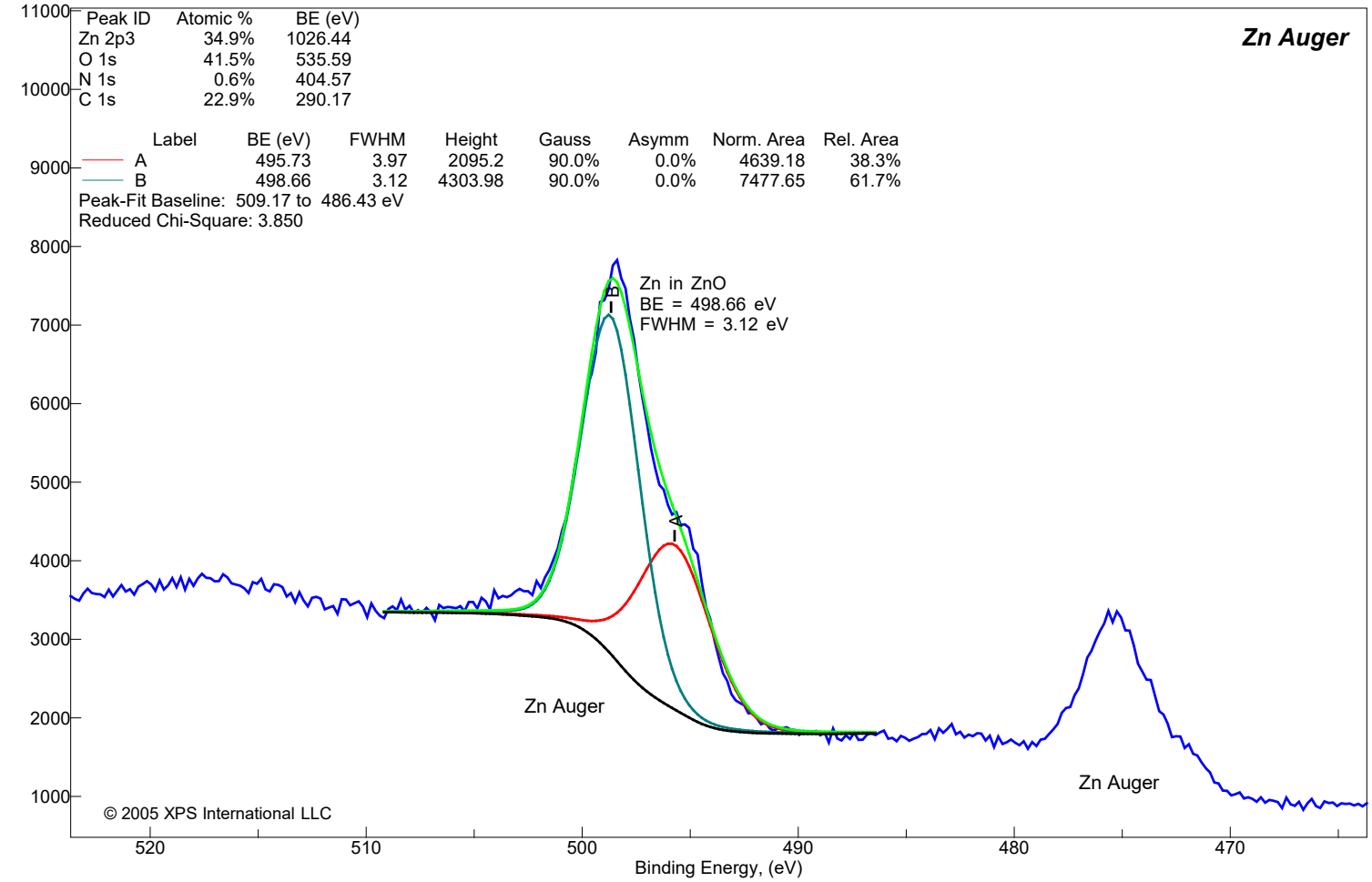


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ZnO

Zinc (II) Oxide (FW = 81.38)

Sample Description: ZnO (99.999%) Aldrich Lot# HW 04629KV, 3mm pellet, screen, 90 TOA



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ZrO_2

Zirconium (IV) Oxide (FW = 123.22)
Surface Composition Table

Description: ZrO_2 (99.9%, < 100 ppm HfO_2) from Aldrich Co. Lot# 02310BV, analyzed at 90 deg TOA, mesh at 1 mm, non-conductive white powder pressed into 3 mm pellet, mp 2700 C, d 5.89, slightly sol in HCl

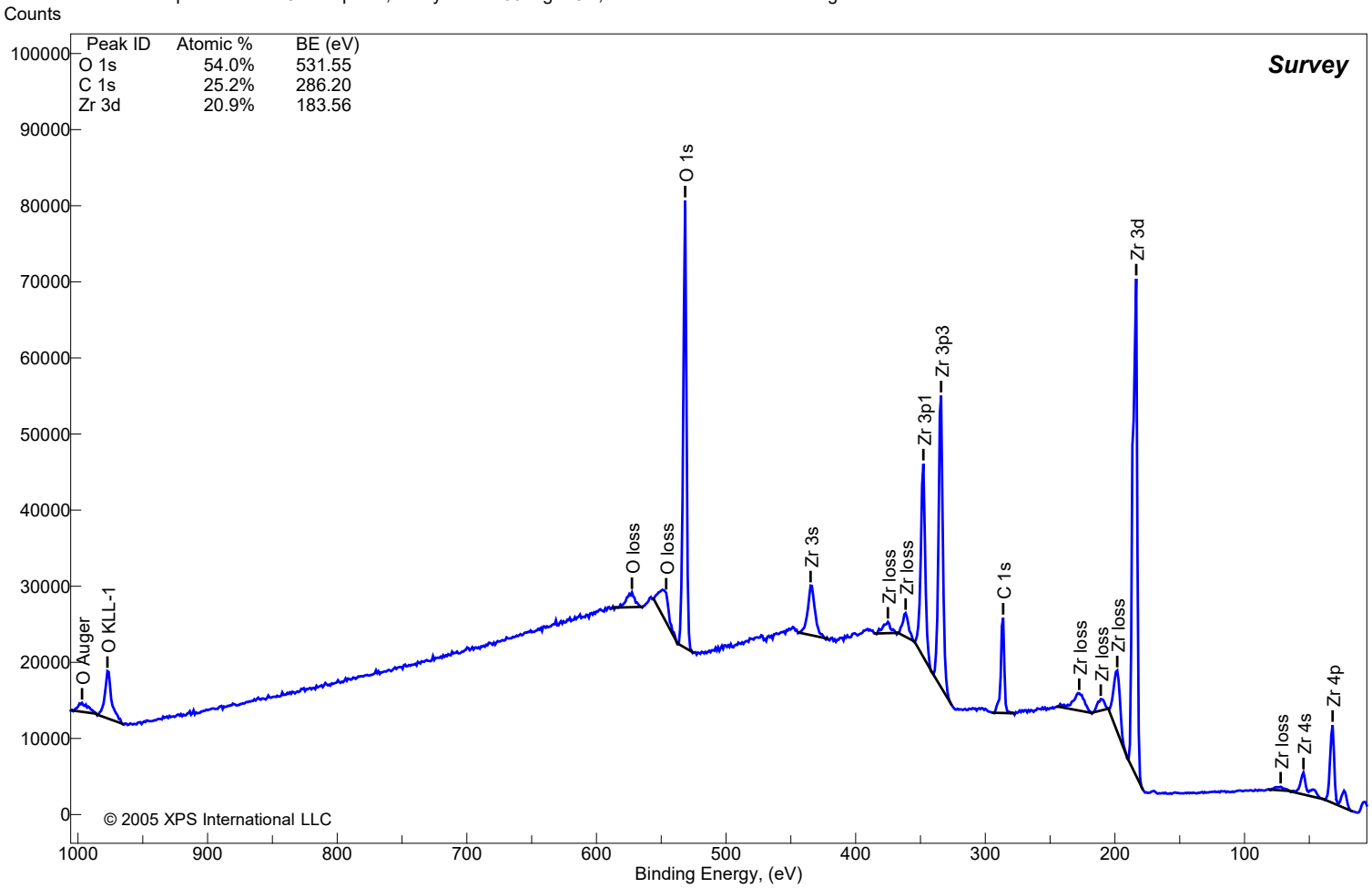
Peak ID	Corrected BE (eV)	Measured BE (eV)	Scofield RSF	RSF Exponent	Normalized Peak Area	Atomic %
Zr 4p	31.0	32.0	1.05	1.5	24,137	
Zr 4s	53.5	54.5	0.37	1.5	9,952	
Zr loss	71.1	72.1	0.00	1.5	1,739	
Zr 3d	182.6	183.6	7.04	1.5	130,138	20.9%
Zr loss	197.2	198.2	0.00	1.5	23,850	
Zr loss	209.9	210.9	0.00	1.5	4,906	
Zr loss	226.5	227.5	0.00	1.5	12,909	
C 1s	285.2	286.2	1.00	1.5	19,708	25.2%
Zr 3p3	333.1	334.1	5.14	1.5	74,274	
Zr 3p1	346.8	347.8	2.64	1.5	50,940	
Zr loss	360.5	361.5	0.00	1.5	8,457	
Zr loss	374.2	375.2	0.00	1.5	4,738	
Zr 3s	433.8	434.8	2.10	1.5	20,668	
O 1s	530.6	531.6	2.93	1.5	87,815	54.0%
O loss	545.2	546.2	0.00	1.5	17,091	
O loss	571.6	572.6	0.00	1.5	6,764	
O KLL-1	976.3	977.3	0.70	1.5	19,912	
O Auger	995.9	996.9	0.00	1.5	4,969	

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ZrO_2

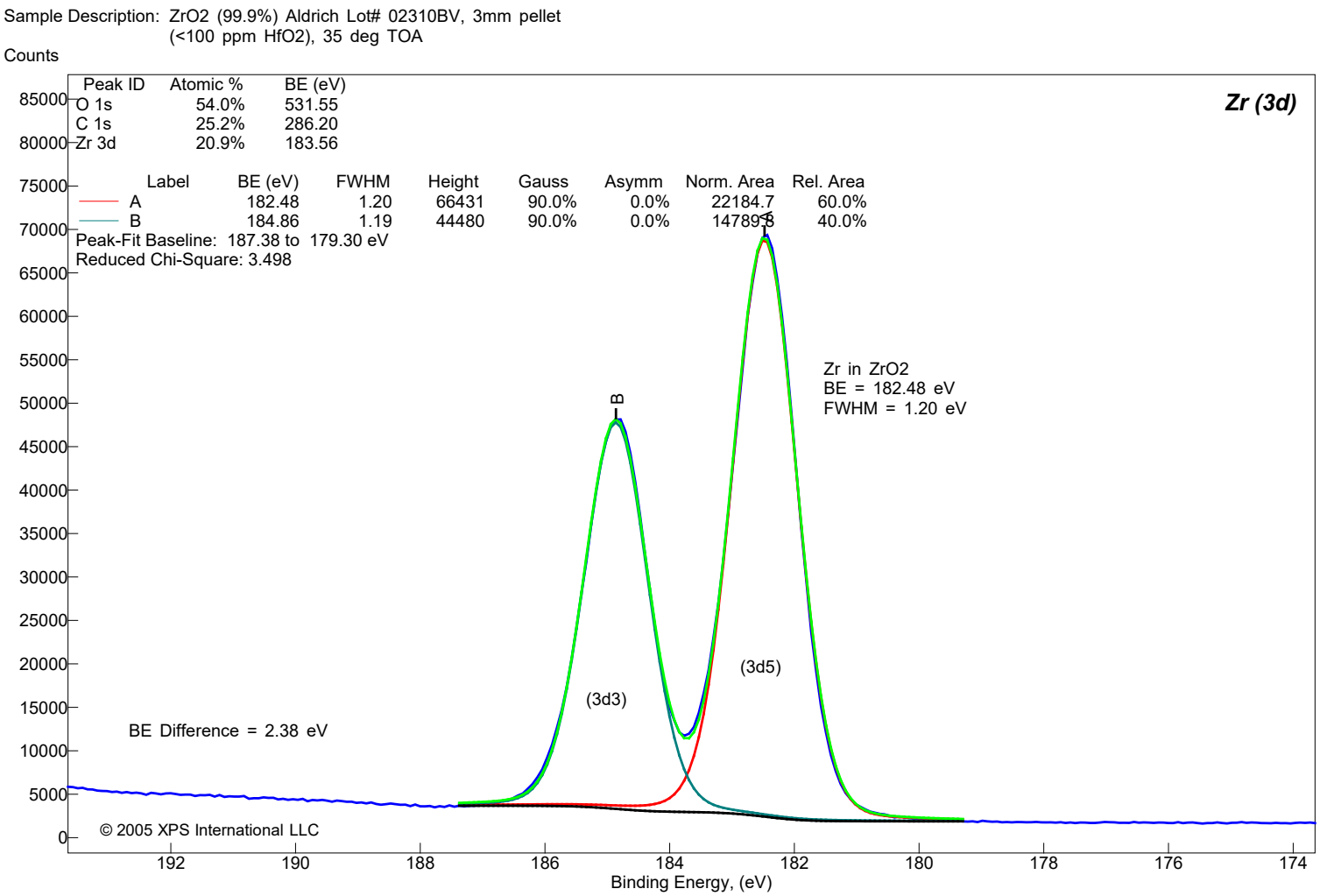
Zirconium (IV) Oxide (FW = 123.22)

Sample Description: ZrO2 (99.9%) from Aldrich Lot# 02310BV (<100 ppm HfO2), pressed into 3 mm pellet, analyzed at 35deg TOA, mesh-screen at 1 mm height



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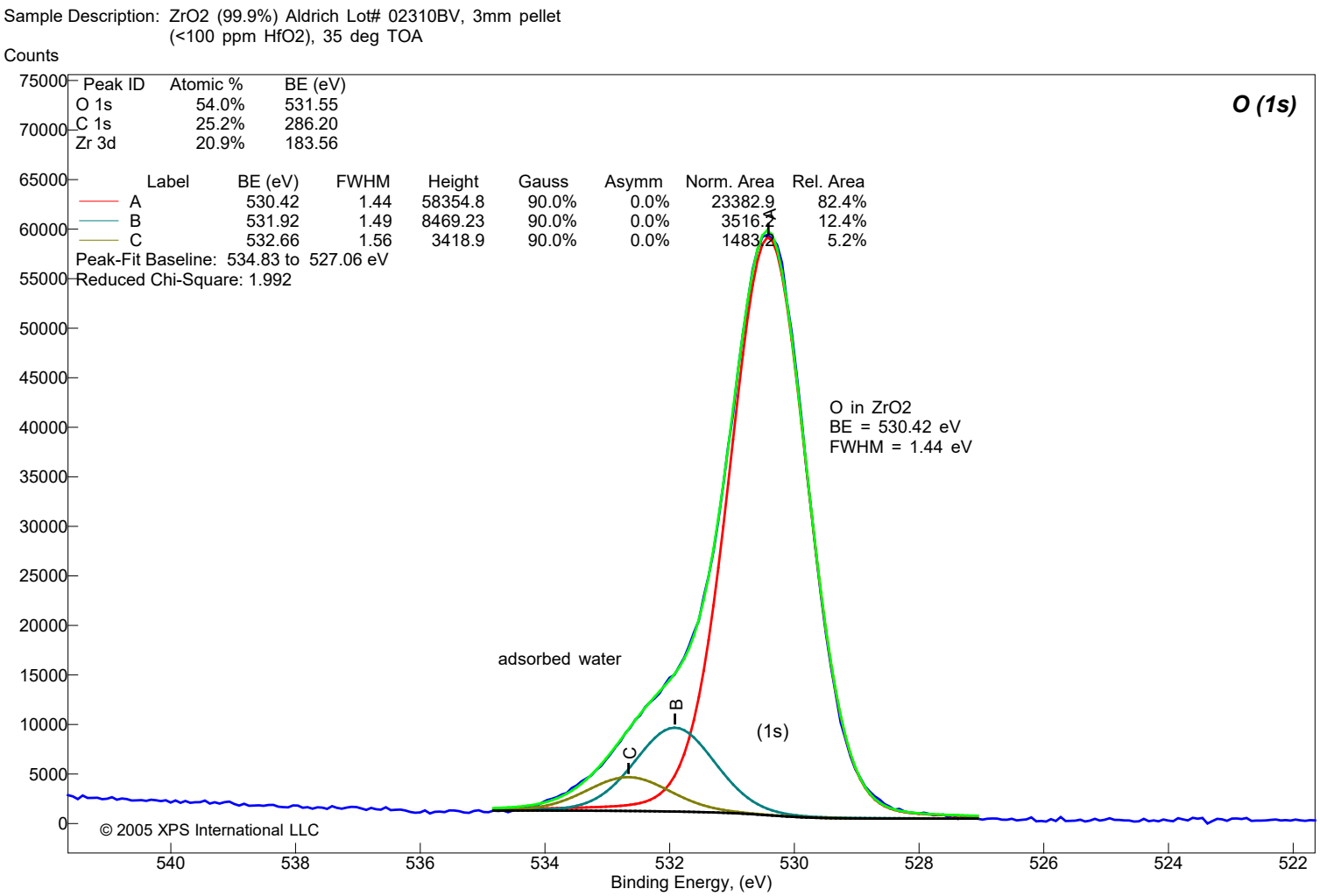
Zirconium (IV) Oxide (FW = 123.22)



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ZrO_2

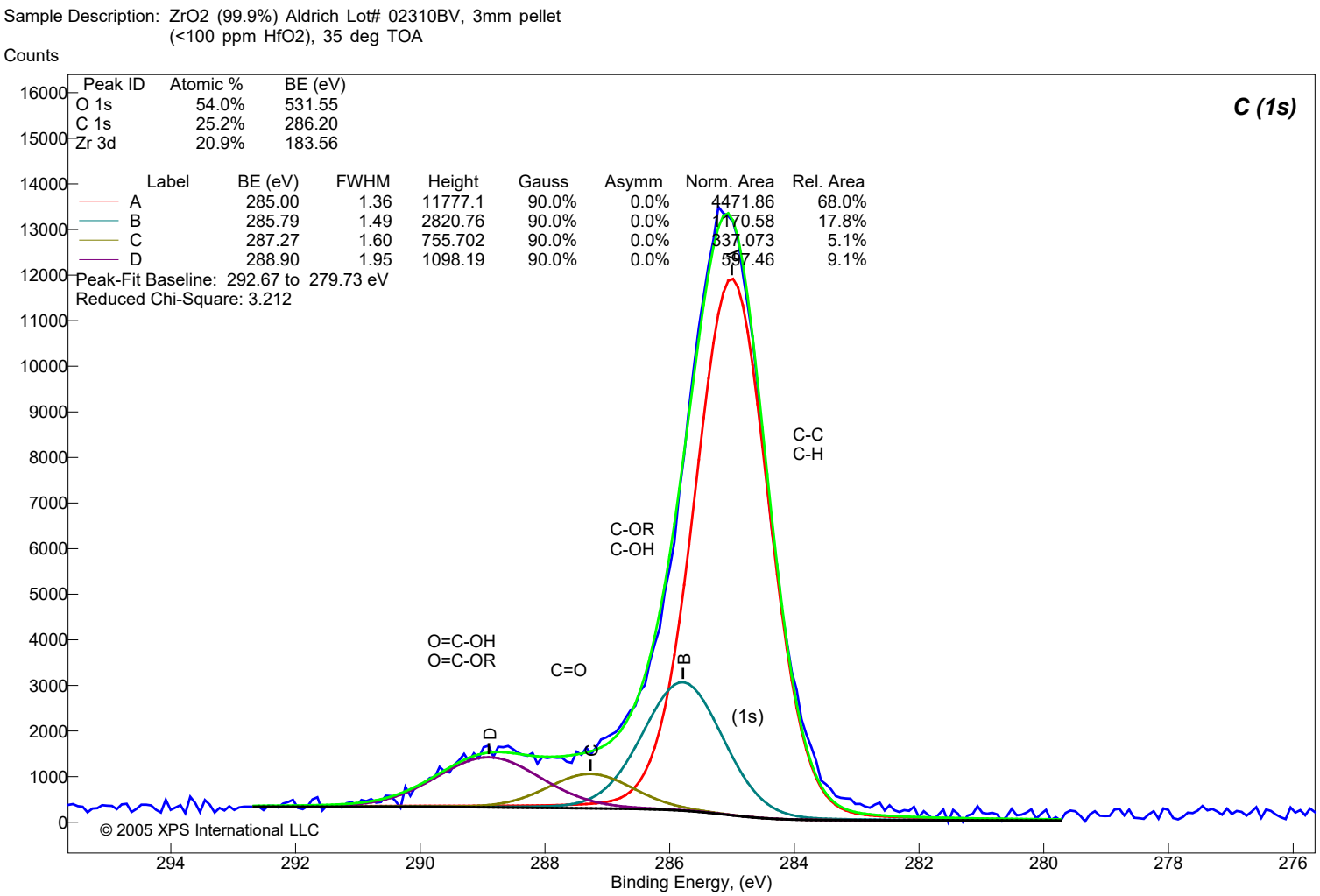
Zirconium (IV) Oxide (FW = 123.22)



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ZrO_2

Zirconium (IV) Oxide (FW = 123.22)

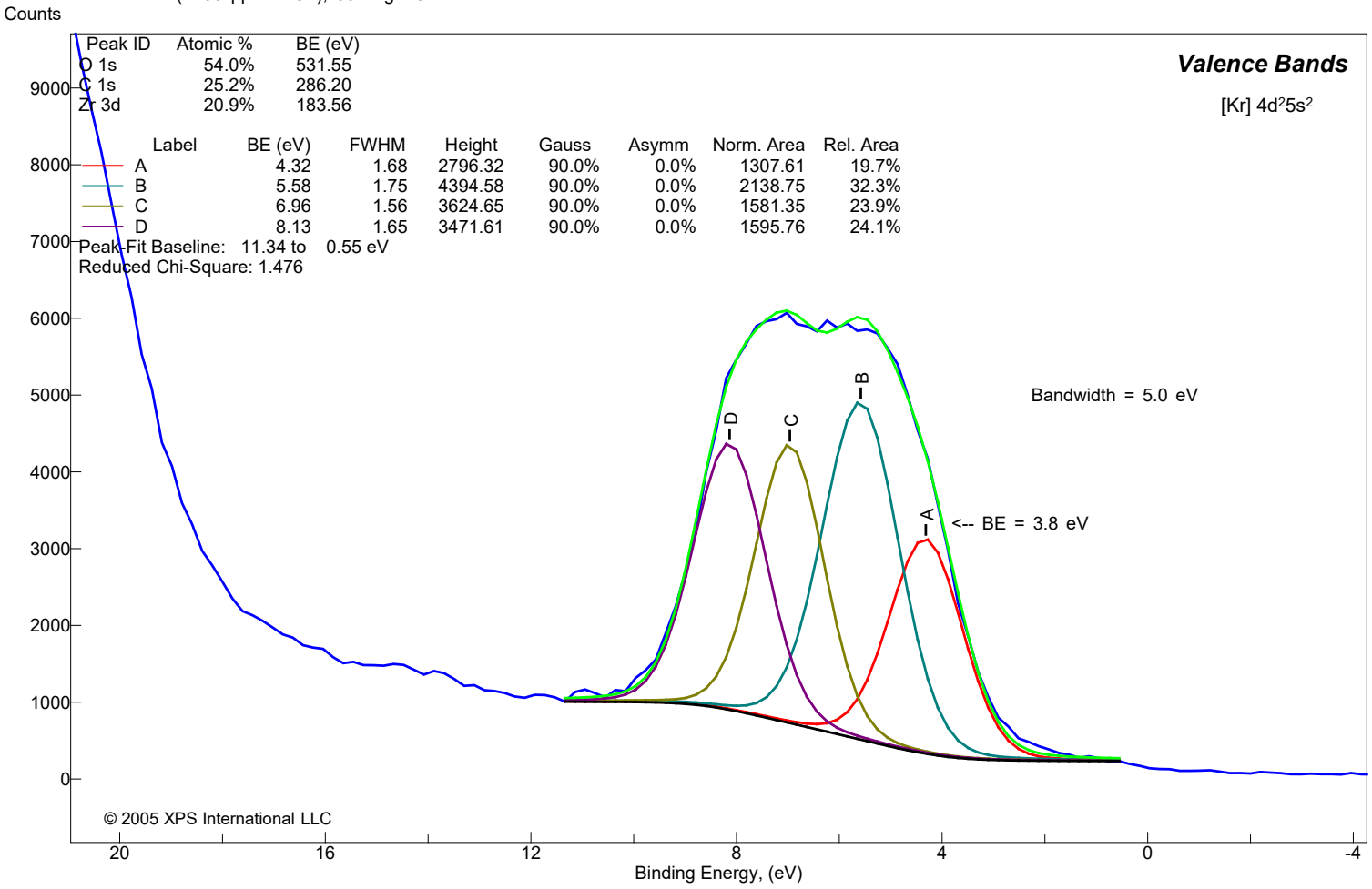


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ZrO_2

Zirconium (IV) Oxide (FW = 123.22)

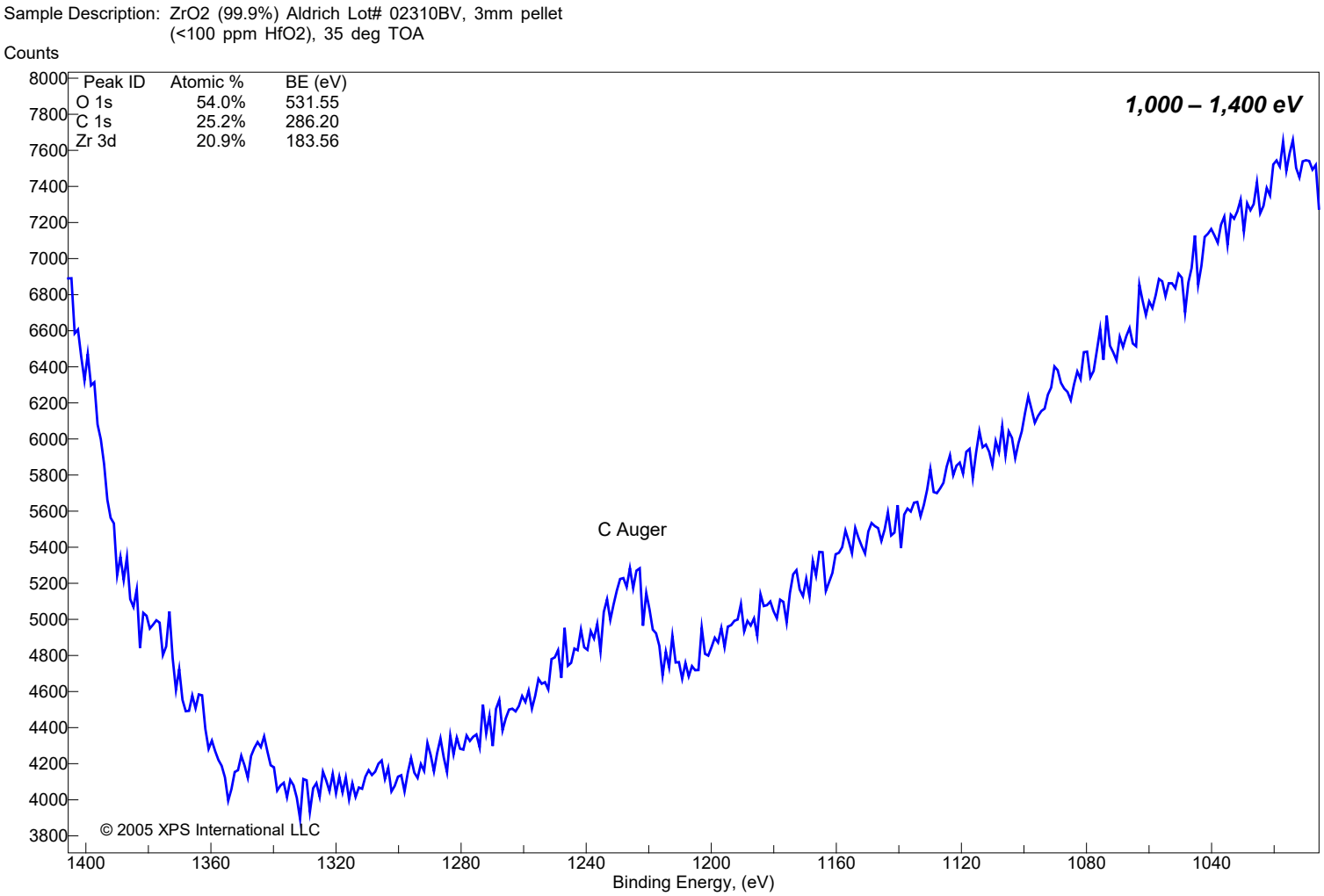
Sample Description: ZrO2 (99.9%) Aldrich Lot# 02310BV, 3mm pellet
(<100 ppm HfO2), 35 deg TOA



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ZrO_2

Zirconium (IV) Oxide (FW = 123.22)

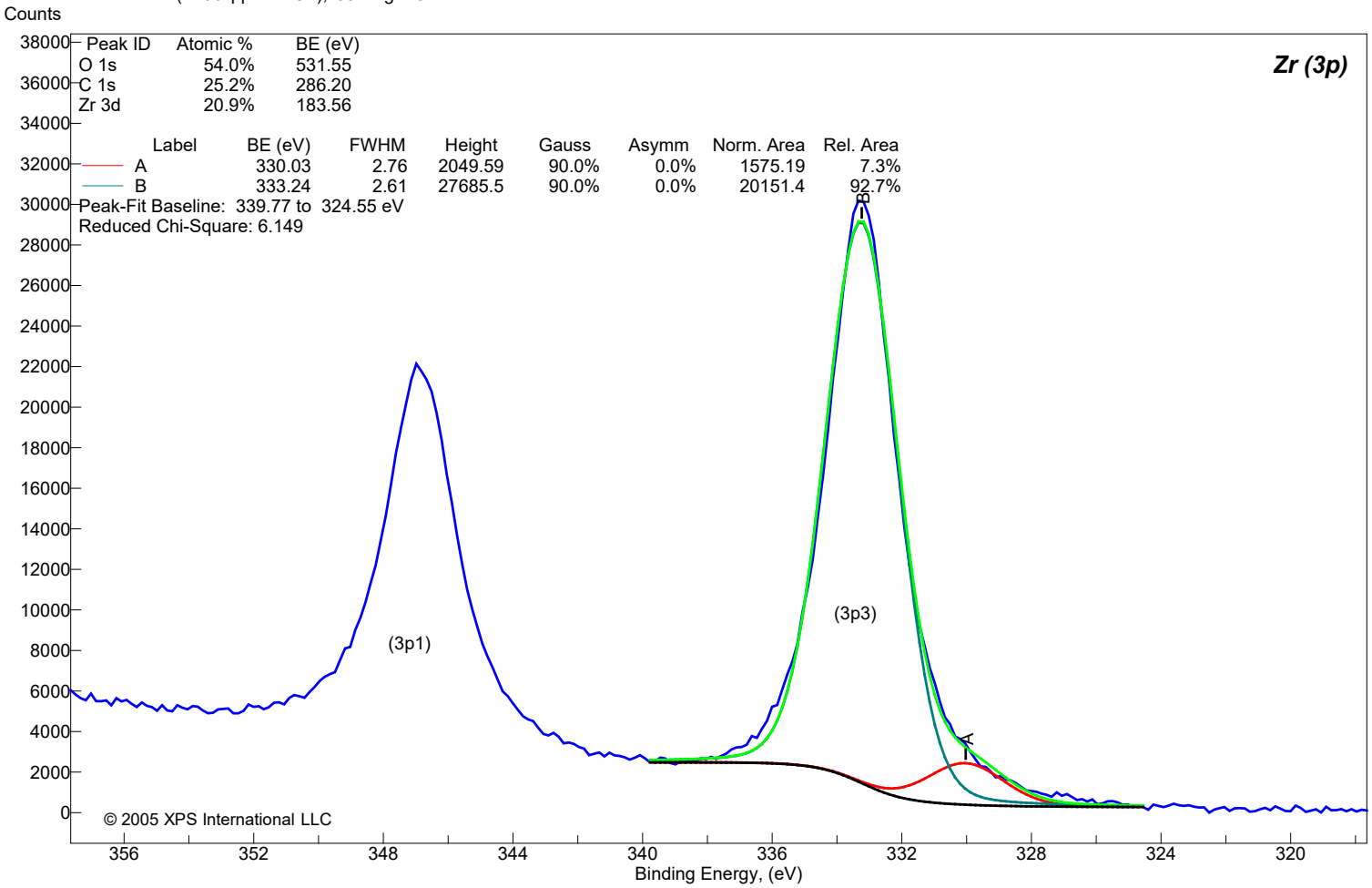


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ZrO_2

Zirconium (IV) Oxide (FW = 123.22)

Sample Description: ZrO2 (99.9%) Aldrich Lot# 02310BV, 3mm pellet
(<100 ppm HfO2), 35 deg TOA

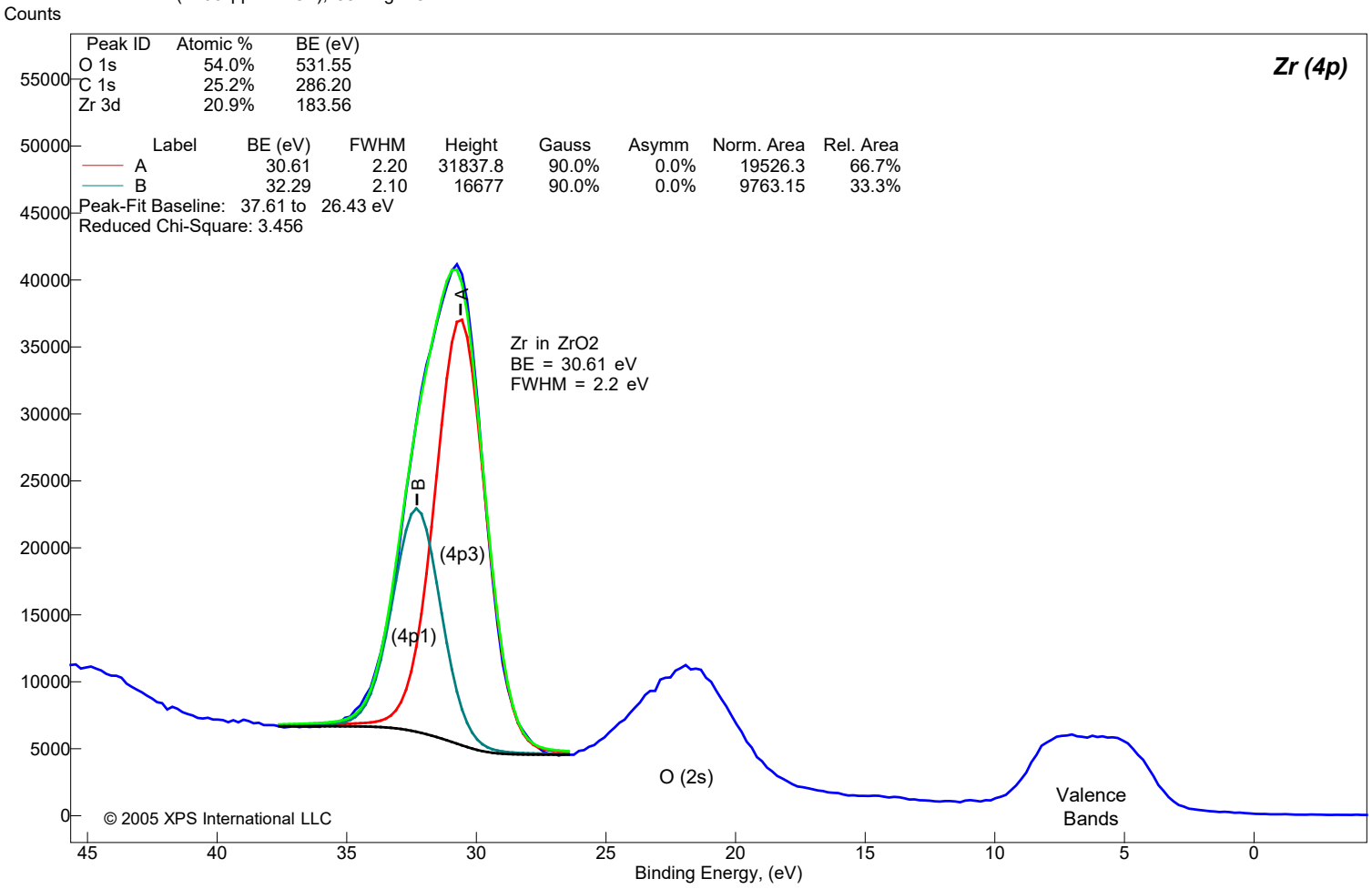


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ZrO_2

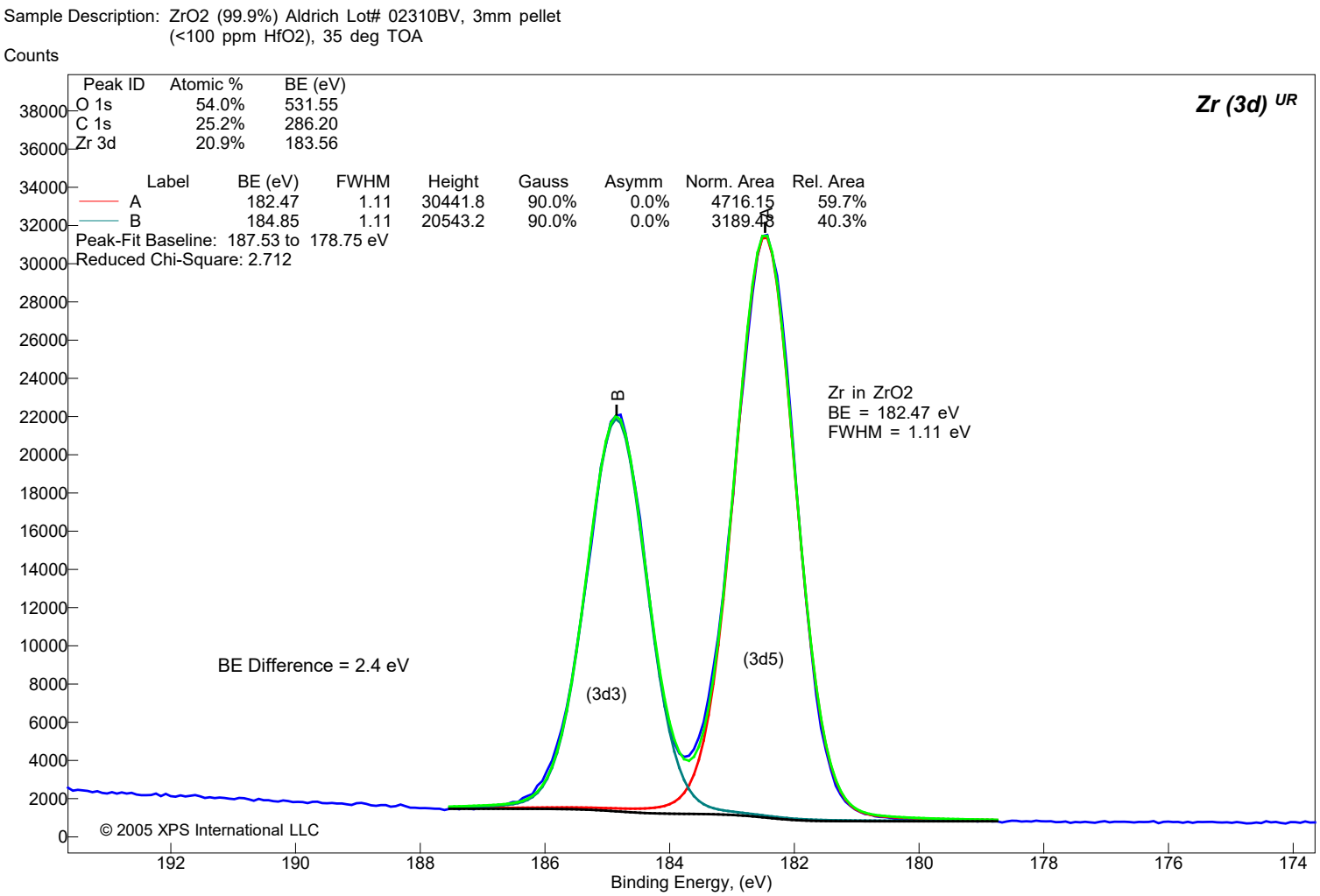
Zirconium (IV) Oxide (FW = 123.22)

Sample Description: ZrO2 (99.9%) Aldrich Lot# 02310BV, 3mm pellet (<100 ppm HfO2), 35 deg TOA



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Zirconium (IV) Oxide (FW = 123.22)



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