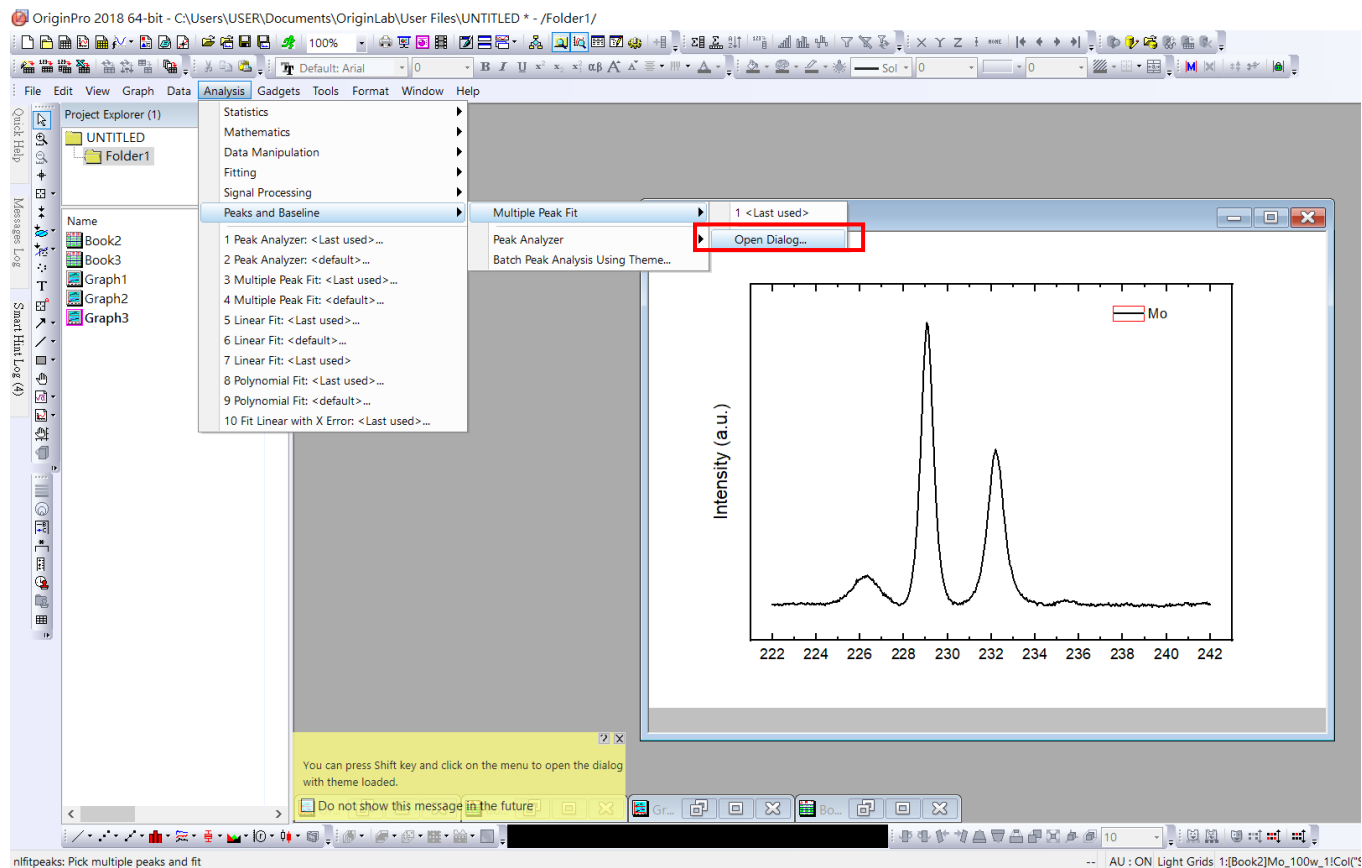
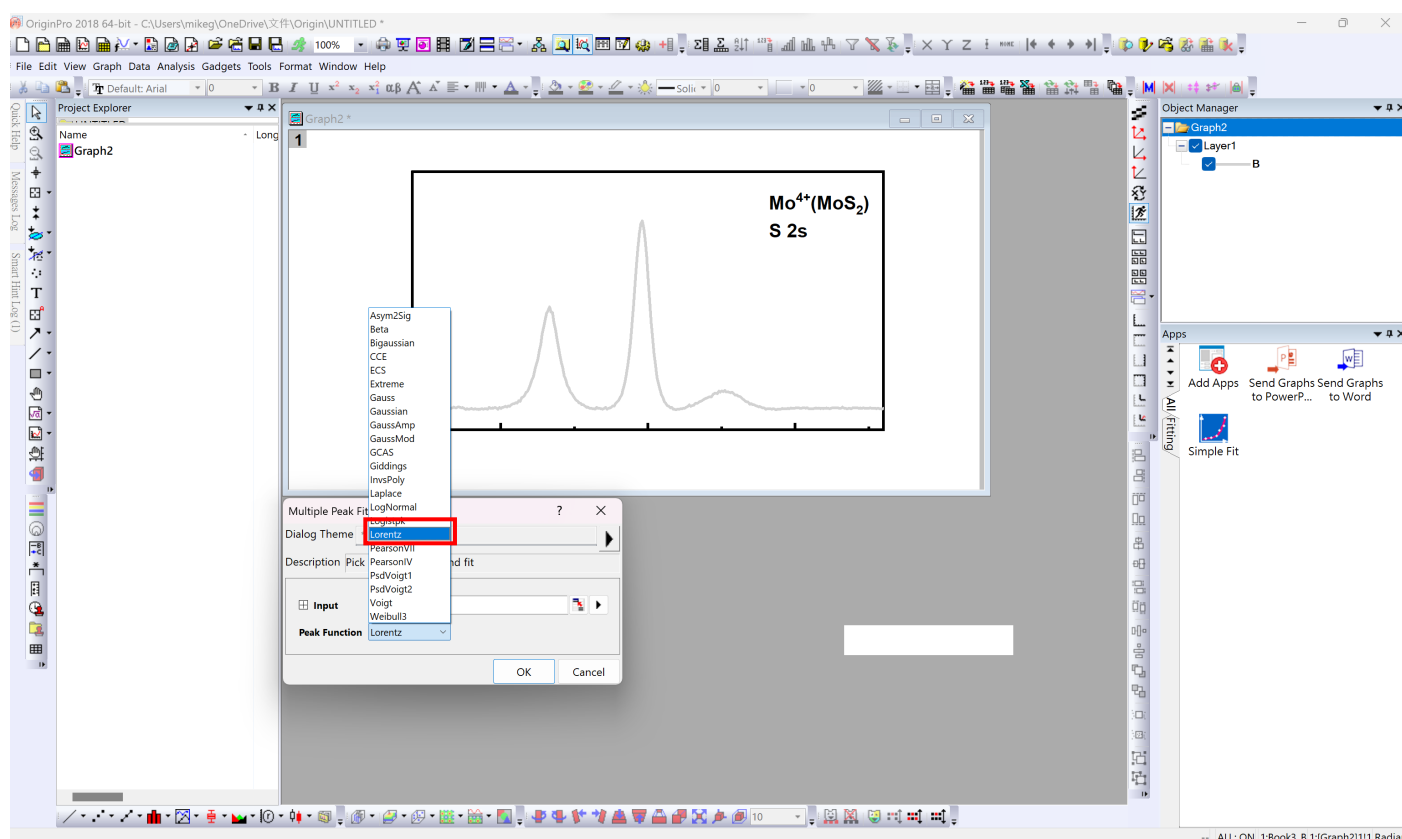


XPS 元素比例計算

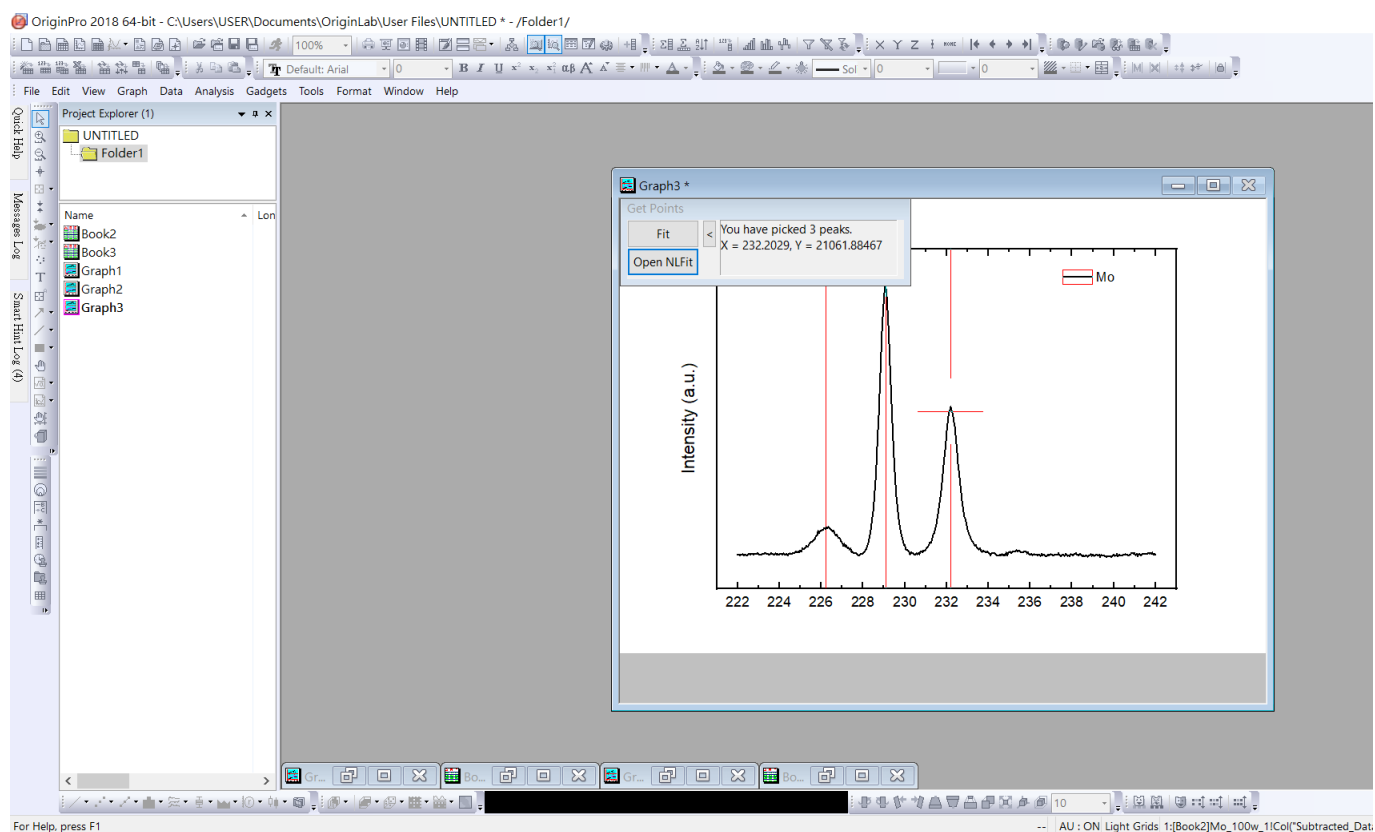
1. 首先使用分析軟體進行數據之對應元素波峰擬合(peak fitting)，可使用 CasaXPS、Origin、MultiPak 等等...以下使用 origin 作為示範。
2. 從分析軟體獲得對應元素之峰值擬合後面積。擬合方式以 origin 作為示範。
3. 先選擇 Analysis --- Peaks and Baseline --- Multiple Peak Fit --- Open Dial



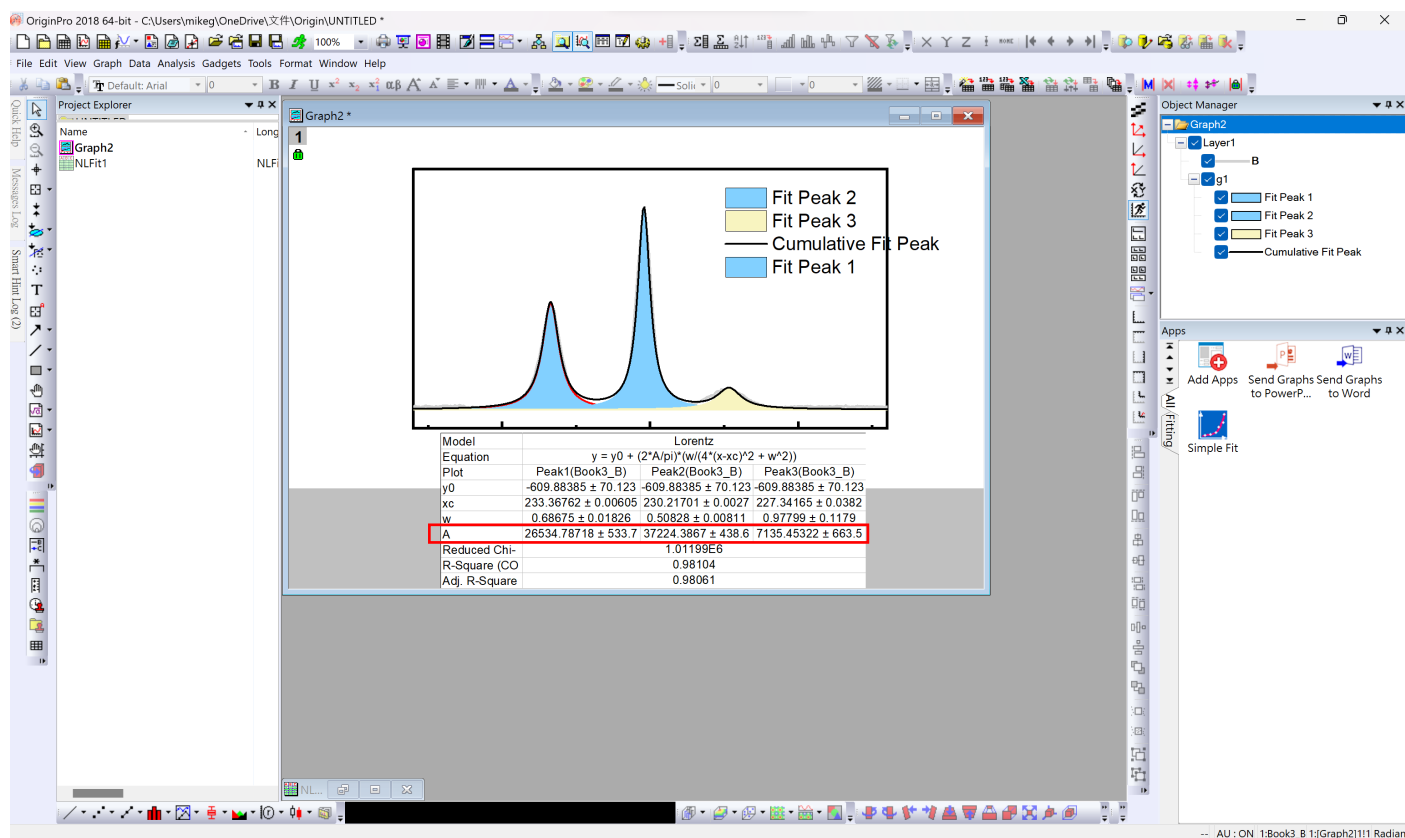
4. 選擇 Lorentz



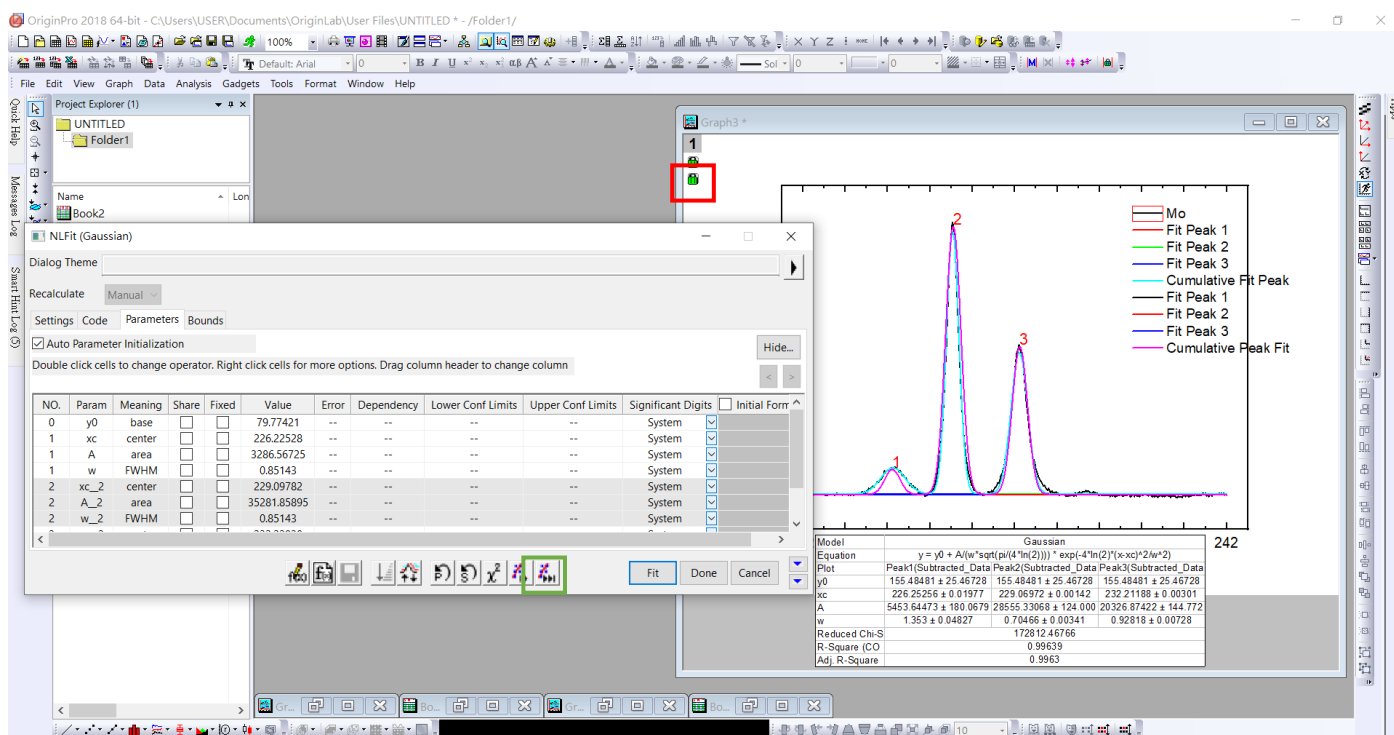
5. 在欲擬合之特徵峰上左鍵點兩下設置為擬合起點後，點選 Open NLFit



6. 擬合出來的結果會顯示於表格中，Model 欄位中的 A 即是面積。



7. 若是擬合出來解果與 raw data 沒有重疊，可點選率色小點(紅框處)，更改 peak 位置至適當位置後，再重新疊代結果(點選綠框處)。



8. 擬合完成後，將面積加總。根據量測儀器找出對應之 TOA(take-off-angle)之 Atomic Sensitivity Factors. Note: VPIII TOA: 45°
9. 將加總後面積除以對應之 Atomic Sensitivity Factors，最終獲得之數值即能計算元素比例。

$$\text{E.g. } MoS_2 = \frac{S(\text{Total Area})}{\frac{\text{Atomic Sensitivity Factor}}{Mo(\text{Total Area})}} \approx 2$$

Appendix B:

XPS Sensitivity Factors

The sensitivity factors contained in MultiPak's ESCA database were calculated for both peak area and height data and assume an analyzer transmission that is independent of energy and an x-ray source angle of 54.7 deg. The database can be modified by the user, as described in Section 3, "Transition Dialog Box." For more information about the use of the ESCA sensitivity factors, refer to Appendix A, "Sensitivity Factors."

Element	Transition	Peak	S _x		Acquisition		Analysis		*	†	‡
			Area	Height	High	Low	High	Low			
Aluminum Al 13	Al2p	74	0.256	0.249	88	68	87	69	3	1	2
	Al2s	119	0.312	0.230	133	113	132	114	2	1	2
Antimony Sb 51	Sb3d3	539	3.649	3.318	549	529	548	530	2	1	2
	Sb3d5	530	5.334	5.334	543	523	542	524	3	1	2
	Sb3p1	814	0.809	0.355	824	804	823	805	2	1	2
	Sb3p3	768	1.733	0.657	778	758	777	759	2	1	2
	Sb4d	34	1.405	1.208	48	28	47	29	2	1	2
	Sb_MNN	1022	0.000	0.883	1040	1010	1039	1011	2	1	2
	Sb_MNN1	1032	0.000	0.866	1040	1010	1039	1011	0	1	2
Argon Ar 18	Ar2p	241	1.231	0.962	255	235	254	236	3	1	2
	Ar2s	319	0.494	0.321	332	312	331	313	0	1	2
	Ar_LMM	1272	0.000	0.266	1285	1260	1284	1261	0	1	2
Arsenic As 33	As2p1	1362	1.232	0.069	1372	1352	1371	1353	2	1	2
	As2p3	1326	2.464	0.525	1340	1320	1339	1321	2	1	2
	As3d	44	0.741	0.713	56	36	55	37	3	1	2
	As3p	142	1.341	0.577	162	137	161	138	0	1	2
	As3s	205	0.350	0.577	215	195	214	196	0	1	2
	As_LMM	266	0.000	0.340	284	259	283	260	2	1	2
	As_LMM1	230	0.000	0.628	250	220	249	221	0	1	2

* Peak labeling (e.g., 0 = "none").

† Number of sweeps.

‡ Background type.

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B: XPS Sensitivity Factors

Element	Transition	Peak	S _x		Acquisition		Analysis		*	†	‡
			Area	Height	High	Low	High	Low			
Barium Ba 56	Ba3d3	795	5.001	4.835	805	785	804	786	2	1	2
	Ba3d5	780	7.343	6.971	794	774	793	775	3	1	2
	Ba4d	90	3.224	1.852	105	85	104	86	2	1	2
	Ba4p3	177	0.620	0.554	187	167	186	168	0	1	2
	Ba_MNN	886	0.000	0.682	930	860	929	861	2	1	2
	Ba_MNN1	900	0.000	0.962	930	860	929	861	0	1	2
Beryllium Be 4	Be1s	113	0.080	0.080	127	107	126	108	3	1	2
Bismuth Bi 83	Bi4d3	467	1.952	0.792	477	457	476	458	2	1	2
	Bi4d5	443	2.907	1.163	462	437	461	438	2	1	2
	Bi4f	159	9.848	5.656	172	152	171	153	3	1	2
	Bi4f5	164	4.515	4.515	174	154	173	155	2	1	2
	Bi4f7	159	5.656	5.656	178	153	177	154	2	1	2
	Bi4p3	681	1.606	0.412	691	671	690	672	2	1	2
	Bi5d	26	1.551	0.916	40	20	39	21	0	1	2
Boron B 5	B1s	191	0.171	0.171	202	182	201	183	3	1	2
	B_KLL	1310	0.000	0.006	1325	1290	1324	1291	0	1	2
Bromine Br 35	Br3d	69	1.149	1.066	83	63	82	64	3	1	2
	Br3p	182	1.502	0.711	198	178	197	179	2	1	2
	Br3p1	189	0.512	0.289	199	179	198	180	0	1	2
	Br3p3	182	0.988	0.711	192	172	191	173	0	1	2
	Br3s	256	0.410	0.178	266	246	265	247	0	1	2
Cadmium Cd 48	Cd3d3	412	2.858	2.858	422	402	421	403	2	1	2
	Cd3d5	405	4.148	4.148	419	399	418	400	3	1	2
	Cd3p1	652	0.820	0.338	662	642	661	643	2	1	2
	Cd3p3	618	1.682	0.788	633	613	632	614	2	1	2
	Cd3s	772	0.800	0.788	782	762	781	763	0	1	2
	Cd4d	11	0.752	0.582	21	1	20	2	2	1	2
	Cd_MNN	1103	0.000	0.673	1120	1090	1119	1091	2	1	2
	Cd_MNN1	1110	0.000	0.938	1120	1090	1119	1091	0	1	2

* Peak labeling (e.g., 0 = "none").

† Number of sweeps.

‡ Background type.

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B: XPS Sensitivity Factors

Element	Transition	Peak	S _x		Acquisition		Analysis		*	†	‡
			Area	Height	High	Low	High	Low			
Calcium Ca 20	Ca2p	347	1.927	1.281	361	341	360	342	3	1	2
	Ca2p1	350	0.658	0.585	360	340	359	341	2	1	2
	Ca2p3	347	1.281	1.281	362	342	361	343	2	1	2
	Ca2s	439	0.548	0.303	454	434	453	435	2	1	2
	Ca_LMM	1197	0.000	0.212	1207	1175	1206	1176	0	1	2
Carbon C 6	C1s	284.8	0.314	0.314	298	278	297	279	3	1	2
	C_KLL	1223	0.000	0.020	1240	1200	1239	1201	2	1	2
Cerium Ce 58	Ce3d	882	12.000	1.560	916	876	915	877	2	1	2
	Ce3d3	900	5.001	1.052	910	890	909	891	2	1	2
	Ce3d5	882	7.343	1.560	902	872	901	873	3	1	2
	Ce4d	108	2.720	0.817	125	105	124	106	2	1	2
	Ce_MNN	833	0.000	0.838	860	820	859	821	2	1	2
Cesium Cs 55	Cs3d	724	11.800	6.801	759	719	758	720	3	1	2
	Cs3d3	738	4.805	4.709	748	728	747	729	2	1	2
	Cs3d5	724	6.995	6.801	738	718	737	719	2	1	2
	Cs3p3	997	1.658	0.460	1007	987	1006	988	2	1	2
	Cs4d	75	2.761	1.726	90	70	89	71	2	1	2
	Cs4p3	158	0.620	0.533	168	148	167	149	0	1	2
	Cs_MNN	918	0.000	1.092	950	890	949	891	2	1	2
	Cs_MNN1	931	0.000	0.976	950	890	949	891	0	1	2
Chlorine Cl 17	Cl2p	199	0.954	0.797	213	193	212	194	3	1	2
	Cl2s	270	0.468	0.316	285	265	284	266	2	1	2
	Cl_LMM	1304	0.000	0.181	1315	1290	1314	1291	0	1	2
Chromium Cr 24	Cr2p	577	2.488	1.623	607	567	606	568	0	1	2
	Cr2p1	586	0.860	0.860	596	576	595	576	0	1	2
	Cr2p3	577	1.623	1.623	589	569	588	570	3	1	2
	Cr2s	698	0.892	0.109	708	688	707	689	0	1	2
	Cr3p	45	0.200	0.238	58	38	57	39	2	1	2
	Cr3s	77	0.080	0.069	87	67	86	68	0	1	2
	Cr_LMM	959	0.000	0.118	975	945	974	946	0	1	2
	Cr_LMM1	997	0.000	0.361	1015	980	1014	981	0	1	2
	Cr_LMM2	917	0.000	0.366	925	905	924	906	0	1	2

* Peak labeling (e.g., 0 = "none").

† Number of sweeps.

‡ Background type.

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B: XPS Sensitivity Factors

Element	Transition	Peak	S _x		Acquisition		Analysis		*	†	‡
			Area	Height	High	Low	High	Low			
Cobalt Co 27	Co2p	781	3.529	2.322	815	765	814	766	0	1	2
	Co2p1	796	1.056	1.008	806	786	805	787	0	1	2
	Co2p3	781	2.113	2.322	795	770	794	771	3	1	2
	Co3p	61	0.486	0.347	75	55	74	56	0	1	2
	Co3s	103	0.170	0.117	113	93	112	94	0	1	2
	Co_LMM	713	0.000	0.000	735	685	734	686	2	1	2
	Co_LMM1	777	0.000	0.438	795	765	794	766	0	1	2
	Co_LMM2	838	0.000	0.302	865	820	864	821	0	1	2
Copper Cu 29	Cu2p	934	4.395	2.930	974	924	973	925	0	1	2
	Cu2p1	954	1.313	1.152	964	944	963	945	0	1	2
	Cu2p3	934	2.626	2.930	952	927	951	928	3	1	2
	Cu3p	77	0.897	0.552	109	59	109	60	2	1	2
	Cu_LMM	568	0.000	0.129	620	540	619	541	2	1	2
	Cu_LMM1	548	0.000	1.087	560	530	559	531	0	1	2
	Cu_LMM2	640	0.000	0.134	660	620	659	621	0	1	2
	Cu_LMM3	648	0.000	0.189	660	620	659	621	0	1	2
Dysprosium Dy 66	Dy3d5	1295	7.343	0.000	1305	1285	1304	1286	2	1	2
	Dy4d	154	2.668	2.668	175	145	174	146	3	1	2
	Dy4p3	293	0.750	0.751	306	286	305	287	2	1	2
Erbium Er 68	Er4d	169	2.650	2.650	180	160	179	161	3	1	2
	Er4p	320	0.741	0.741	335	315	334	316	2	1	2
Europium Eu 63	Eu3d	1126	12.000	1.890	1185	1110	1184	1111	2	1	2
	Eu3d5	1126	7.343	1.890	1150	1115	1149	1116	3	1	2
	Eu4d	128	2.689	2.689	180	120	179	121	2	1	2
Fluorine F 9	F1s	686	1.000	1.000	699	679	698	680	3	1	2
	F2s	30	0.056	0.056	42	22	41	23	2	1	2
	F_KLL	832	0.000	0.430	845	820	844	821	2	1	2
	F_KLL1	858	0.000	0.029	870	845	869	846	0	1	2
	F_KLL2	877	0.000	0.028	890	870	889	871	0	1	2
Gadolinium Gd 64	Gd3d	1186	12.000	0.896	1215	1175	1214	1176	2	1	2
	Gd4d	141	2.683	2.683	167	132	166	133	3	1	2

* Peak labeling (e.g., 0 = "none").

† Number of sweeps.

‡ Background type.

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B: XPS Sensitivity Factors

Element	Transition	Peak	S _x		Acquisition		Analysis		*	†	‡
			Area	Height	High	Low	High	Low			
Gallium Ga 31	Ga2p1	1144	1.376	1.023	1154	1134	1153	1135	2	1	2
	Ga2p3	1117	2.751	2.203	1140	1110	1139	1111	3	1	2
	Ga3d	20	0.438	0.438	34	14	33	15	2	1	2
	Ga3p	105	1.145	0.545	121	101	120	102	0	1	2
	Ga3s	160	0.290	0.438	170	150	169	151	0	1	2
	Ga_LMM	419	0.000	1.008	430	410	429	411	0	1	2
	Ga_LMM1	392	0.000	1.991	405	380	404	381	0	1	2
	Ga_LMM2	487	0.000	0.241	500	460	499	461	0	1	2
	Ga_LMM3	504	0.000	0.239	515	490	514	491	0	1	2
	Ga_LMM4	514	0.000	0.356	520	505	519	506	0	1	2
Germanium Ge 32	Ge2p1	1250	1.368	0.711	1260	1240	1259	1241	2	1	2
	Ge2p3	1219	2.735	1.479	1245	1210	1244	1211	3	1	2
	Ge3d	31	0.535	0.520	45	25	44	26	2	1	2
	Ge3p	124	1.243	0.541	140	120	139	121	0	1	2
	Ge3s	181	0.310	0.541	191	171	190	172	0	1	2
	Ge_LMM	342	0.000	0.915	350	330	349	331	2	1	2
	Ge_LMM1	310	0.000	1.934	320	300	319	301	0	1	2
	Ge_LMM2	412	0.000	0.249	422	402	421	403	0	1	2
	Ge_LMM3	433	0.000	0.247	443	413	442	414	0	1	2
	Ge_LMM4	444	0.000	0.369	464	424	463	425	0	1	2
Gold Au 79	Au4d3	354	1.702	0.790	364	344	363	345	2	1	2
	Au4d5	336	2.513	1.103	355	335	354	336	2	1	2
	Au4f	85	6.805	3.849	99	79	98	80	3	1	2
	Au4f5	89	3.019	3.019	99	79	98	80	2	1	2
	Au4f7	85	3.849	3.849	100	80	99	81	2	1	2
	Au4p1	643	0.382	0.072	653	633	652	634	2	1	2
	Au4p3	547	1.134	0.363	557	537	556	538	2	1	2
Hafnium Hf 72	Hf4d	213	3.052	1.169	243	203	242	204	0	1	2
	Hf4d3	224	1.292	0.853	234	214	233	215	2	1	2
	Hf4d5	213	1.844	1.169	243	203	242	204	2	1	2

* Peak labeling (e.g., 0 = "none").

† Number of sweeps.

‡ Background type.

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B: XPS Sensitivity Factors

	Hf4f	17	2.901	2.405	29	9	28	10	3	1	2
	Hf4p1	437	0.385	0.187	447	427	446	428	0	1	2
	Hf4p3	382	0.810	0.456	392	372	391	373	2	1	2

Element			Transition	Peak	S _x		Acquisition		Analysis		*	†	‡
					Area	Height	High	Low	High	Low			
Holmium	Ho	67	Ho4d	161	2.659	2.659	185	155	184	156	3	1	2
			Ho4p	306	0.746	0.746	320	300	319	301	2	1	2
Indium	In	49	In3d3	453	3.239	3.239	463	443	462	444	2	1	2
			In3d5	445	4.530	4.530	459	439	458	440	3	1	2
			In3p1	704	0.829	0.365	714	694	713	695	2	1	2
			In3p3	666	1.705	0.761	680	660	679	661	2	1	2
			In3s	828	0.830	0.761	838	818	837	819	0	1	2
			In4d	17	0.840	0.761	27	7	26	8	2	1	2
			In_MNN	1076	0.000	0.784	1090	1060	1089	1061	2	1	2
			In_MNN1	1084	0.000	0.769	1090	1060	1089	1061	0	1	2
Iodine	I	53	I3d3	630	4.168	4.168	640	620	639	621	2	1	2
			I3d5	619	6.302	6.302	633	613	632	614	3	1	2
			I3p1	930	0.779	0.211	940	920	939	921	2	1	2
			I3p3	874	1.700	0.476	884	864	883	865	2	1	2
			I4d	50	2.009	1.507	64	44	63	45	2	1	2
			I_MNN	982	0.000	0.784	1000	950	999	951	2	1	2
			I_MNN1	971	0.000	0.808	1000	950	999	951	0	1	2
Iridium	Ir	77	Ir4d3	313	1.518	0.744	323	303	322	304	2	1	2
			Ir4d5	297	2.298	1.124	313	288	312	289	2	1	2
			Ir4f	62	5.484	3.332	75	55	74	56	3	1	2
			Ir4f5	65	2.286	2.496	75	55	74	56	2	1	2
			Ir4f7	62	3.124	3.332	74	54	73	55	2	1	2
			Ir4p1	579	0.389	0.151	589	569	588	570	2	1	2
			Ir4p3	497	1.063	0.577	507	487	506	488	2	1	2
Iron	Fe	26	Fe2p	710	2.946	1.964	740	700	739	701	0	1	2
			Fe2p1	723	0.972	0.972	733	713	732	714	0	1	2
			Fe2p3	710	1.964	1.964	727	702	726	703	3	1	2
			Fe3p	55	0.362	0.292	68	48	67	49	2	1	2
			Fe3s	92	0.140	0.243	102	82	101	83	0	1	2

* Peak labeling (e.g., 0 = "none").

† Number of sweeps.

‡ Background type.

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B: XPS Sensitivity Factors

	Fe_LMM	784	0.000	0.506	795	770	794	771	2	1	2
	Fe_LMM1	839	0.000	0.486	850	820	849	821	0	1	2
	Fe_LMM2	888	0.000	0.401	900	850	899	851	0	1	2

Element	Transition	Peak	S _x		Acquisition		Analysis		*	†	‡
			Area	Height	High	Low	High	Low			
Krypton Kr 36	Kr3d	88	1.400	1.249	102	82	101	83	3	1	2
	Kr3p	208	1.601	0.781	230	205	229	206	0	1	2
	Kr3p1	216	0.533	0.781	230	205	229	206	0	1	2
	Kr3p3	208	1.068	0.781	230	205	229	206	0	1	2
Lanthanum La 57	La3d	834	12.000	5.135	867	827	866	828	2	1	2
	La3d3	851	5.001	3.316	861	841	860	842	2	1	2
	La3d5	834	7.343	5.135	850	825	849	826	3	1	2
	La4d	101	2.730	2.730	115	95	114	96	2	1	2
	La4p3	195	0.650	0.890	205	185	204	186	0	1	2
	La_MNN	867	0.000	1.907	880	840	879	841	2	1	2
Lead Pb 82	Pb4d3	435	1.868	0.957	445	425	444	426	2	1	2
	Pb4d5	413	2.774	1.180	432	407	431	408	2	1	2
	Pb4f	138	9.000	5.131	152	132	151	133	3	1	2
	Pb4f5	143	3.820	4.289	153	133	152	134	2	1	2
	Pb4f7	138	5.172	5.131	150	125	149	126	2	1	2
	Pb4p3	645	1.175	0.392	655	635	654	636	2	1	2
	Pb5d	19	1.414	0.848	34	14	33	15	0	1	2
Lithium Li 3	Li1s	56	0.028	0.028	71	51	70	52	3	1	2
Lutetium Lu 71	Lu4d	197	2.617	2.617	218	193	217	194	2	1	2
	Lu4f	7	0.000	0.000	20	0	19	1	3	1	2
	Lu4p1	413	0.385	0.727	423	403	422	404	2	1	2
	Lu4p3	359	0.800	0.727	374	354	373	355	2	1	2
	Lu4s	509	0.420	0.727	519	499	518	500	0	1	2
Magnesium Mg 12	Mg1s	1305	1.035	0.976	1317	1297	1316	1298	3	1	2
	Mg2p	51	0.167	0.167	64	44	63	45	2	1	2
	Mg2s	90	0.274	0.206	104	84	103	85	2	1	2
	Mg_KLL	305	0.000	2.627	318	298	317	299	2	1	2

* Peak labeling (e.g., 0 = "none").

† Number of sweeps.

‡ Background type.

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B: XPS Sensitivity Factors

Element	Transition	Peak	S _x		Acquisition		Analysis		*	†	‡
			Area	Height	High	Low	High	Low			
Manganese Mn 25	Mn2p	641	2.688	1.757	672	632	671	633	0	1	2
	Mn2p1	652	0.923	0.923	662	642	661	643	0	1	2
	Mn2p3	641	1.757	1.757	654	634	653	635	3	1	2
	Mn3p	48	0.260	0.265	63	43	62	44	2	1	2
	Mn3s	83	0.110	0.219	93	53	92	54	0	1	2
	Mn_LMM	900	0.000	0.347	920	890	919	891	2	1	2
	Mn_LMM1	852	0.000	0.648	870	840	869	841	0	1	2
	Mn_LMM2	944	0.000	0.232	960	920	959	921	0	1	2
Mercury Hg 80	Hg4d3	379	1.801	0.840	389	369	388	370	2	1	2
	Hg4d5	359	2.607	1.152	377	352	376	353	2	1	2
	Hg4f	100	7.512	4.302	115	95	114	96	3	1	2
	Hg4f5	104	3.204	3.204	114	94	113	95	2	1	2
	Hg4f7	100	4.302	4.302	115	90	114	91	2	1	2
	Hg4p3	577	1.406	0.476	587	567	586	568	2	1	2
Molybdenum Mo 42	Mo3d	230	3.544	2.243	242	222	241	223	3	1	2
	Mo3d3	233	1.403	1.467	243	223	242	224	2	1	2
	Mo3d5	230	2.139	2.243	243	223	242	224	2	1	2
	Mo3p1	413	0.708	0.413	423	403	422	404	2	1	2
	Mo3p3	396	1.393	0.869	410	390	409	391	2	1	2
	Mo3s	508	0.620	0.135	518	498	517	499	0	1	2
	Mo4p	36	0.517	0.135	46	26	45	27	0	1	2
Neodymium Nd 60	Nd3d	980	12.000	4.373	1025	970	1024	971	2	1	2
	Nd3d5	981	7.343	4.373	1000	970	999	971	3	1	2
	Nd4d	120	2.708	2.708	133	113	132	114	2	1	2
Neon Ne 10	Ne1s	863	1.215	1.215	876	856	875	857	3	1	2
	Ne2s	41	0.098	0.098	55	35	54	36	0	1	2
	Ne_KLL	669	0.000	0.461	675	655	674	656	0	1	2

* Peak labeling (e.g., 0 = "none").

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‡ Background type.

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B: XPS Sensitivity Factors

Element	Transition	Peak	S _x		Acquisition		Analysis		*	†	‡
			Area	Height	High	Low	High	Low			
Nickel Ni 28	Ni2p	855	3.702	2.468	894	844	893	845	0	1	2
	Ni2p1	873	1.154	1.191	883	863	882	864	0	1	2
	Ni2p3	855	2.309	2.468	873	848	872	849	3	1	2
	Ni3p	67	0.693	0.416	80	60	79	61	2	1	2
	Ni3s	112	0.200	0.136	122	102	121	103	0	1	2
	Ni_LMM	641	0.000	1.047	660	610	659	611	2	1	2
	Ni_LMM1	712	0.000	0.586	725	690	724	691	0	1	2
	Ni_LMM2	778	0.000	0.305	785	750	784	751	0	1	2
Niobium Nb 41	Nb3d	206	3.127	2.046	217	197	216	198	3	1	2
	Nb3d3	209	1.249	1.314	219	199	218	200	2	1	2
	Nb3d5	206	1.876	2.046	217	197	216	198	2	1	2
	Nb3p1	379	0.660	0.432	389	369	388	370	2	1	2
	Nb3p3	364	1.330	0.871	377	357	376	356	2	1	2
	Nb3s	470	0.590	0.149	480	460	479	461	0	1	2
	Nb4p	31	0.505	0.149	41	21	40	22	0	1	2
Nitrogen N 7	N1s	402	0.499	0.499	411	391	410	392	3	1	2
	N_KLL	1107	0.000	0.036	1090	1120	1089	1121	0	1	2
Osmium Os 76	Os4d	279	3.653	1.134	312	272	311	273	0	1	2
	Os4d3	294	1.439	0.801	304	284	303	285	2	1	2
	Os4d5	279	2.205	1.134	312	272	311	273	2	1	2
	Os4f	52	4.880	3.067	66	46	65	47	3	1	2
	Os4p1	549	0.374	0.110	559	539	558	540	2	1	2
	Os4p3	475	0.995	0.412	485	465	484	466	2	1	2
Oxygen O 8	O1s	531	0.733	0.733	543	523	542	524	3	1	2
	O2s	23	0.035	0.035	35	15	34	16	0	1	2
	O_KLL	978	0.000	0.171	990	960	989	961	2	1	2

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‡ Background type.

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B: XPS Sensitivity Factors

Element	Transition	Peak	S _x		Acquisition		Analysis		*	†	‡
			Area	Height	High	Low	High	Low			
Palladium Pd 46	Pd3d	337	5.637	3.309	350	330	349	331	3	1	2
	Pd3d3	342	2.323	2.323	352	332	351	333	2	1	2
	Pd3d5	337	3.309	3.309	352	332	351	333	2	1	2
	Pd3p1	561	0.787	0.404	571	551	570	552	2	1	2
	Pd3p3	534	1.586	0.821	548	528	547	529	2	1	2
	Pd3s	671	0.740	0.821	681	661	680	662	0	1	2
	Pd4p	52	0.570	0.821	62	42	61	43	0	1	2
	Pd_MNN	1159	0.000	0.942	1170	1140	1169	1141	0	1	2
Phosphorus P 15	P2p	133	0.525	0.485	143	123	142	124	3	1	2
	P2s	191	0.380	0.276	205	185	204	186	2	1	2
Platinum Pt 78	Pt4d3	333	1.596	0.614	343	323	342	324	2	1	2
	Pt4d5	316	2.377	1.114	333	308	332	309	2	1	2
	Pt4f	73	6.080	3.524	86	66	85	67	3	1	2
	Pt4f5	76	2.553	2.553	86	66	85	67	2	1	2
	Pt4f7	73	3.524	3.524	88	68	87	69	2	1	2
	Pt4p3	521	1.083	0.413	531	511	530	512	2	1	2
	Pt_NNN	1317	0.000	0.000	1350	1300	1349	1301	0	1	2
Potassium K 19	K2p	293	1.552	1.039	307	287	306	288	3	1	2
	K2p1	296	0.512	0.512	306	286	305	287	2	1	2
	K2p3	293	1.039	1.039	307	287	306	288	2	1	2
	K2s	378	0.517	0.312	392	372	391	373	0	1	2
	K_LMM	1239	0.000	0.304	1250	1230	1249	1231	0	1	2
Praseodymium Pr 59	Pr3d	930	12.000	6.335	970	920	969	921	2	1	2
	Pr3d5	932	7.343	6.335	957	927	956	928	3	1	2
	Pr4d	114	2.715	2.715	127	107	126	108	2	1	2
Rhenium Re 75	Re4d	263	3.491	1.142	295	255	294	256	0	1	2
	Re4d3	277	1.374	0.794	287	267	286	268	2	1	2

* Peak labeling (e.g., 0 = "none").

† Number of sweeps.

‡ Background type.

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B: XPS Sensitivity Factors

	Re4d5	263	2.107	1.142	295	255	294	256	2	1	2
	Re4f	43	4.339	2.939	55	35	54	36	3	1	2
	Re4p1	521	0.368	0.123	531	511	530	512	2	1	2
	Re4p3	449	0.962	0.429	459	439	458	440	2	1	2
	Re4s	628	0.470	0.094	638	618	637	619	0	1	2

Element	Transition	Peak	S _x		Acquisition		Analysis		*	†	‡
			Area	Height	High	Low	High	Low			
Rhodium Rh 45	Rh3d	309	5.092	2.981	322	302	321	303	3	1	2
	Rh3d3	314	2.106	2.106	324	304	323	305	2	1	2
	Rh3d5	309	2.816	2.816	324	304	323	305	2	1	2
	Rh3p1	522	0.770	0.413	532	512	531	513	2	1	2
	Rh3p3	498	1.560	0.836	513	493	512	494	2	1	2
	Rh3s	629	0.710	0.836	639	619	638	620	0	1	2
	Rh4p	48	0.570	0.836	58	38	57	39	0	1	2
	Rh_MNN	1185	0.000	0.724	1205	1170	1204	1171	0	1	2
Rubidium Rb 37	Rb3d	110	1.673	1.455	125	105	124	106	3	1	2
	Rb3p	238	1.669	0.860	260	235	259	236	0	1	2
	Rb3p1	247	0.550	0.422	257	237	256	238	2	1	2
	Rb3p3	238	1.117	0.860	260	235	259	236	2	1	2
	Rb3s	322	0.470	0.222	332	312	331	313	0	1	2
Ruthenium Ru 44	Ru3d	282	4.529	2.705	295	275	294	276	3	1	2
	Ru3d3	286	1.821	1.821	296	276	295	277	2	1	2
	Ru3d5	282	2.705	2.705	297	277	296	278	2	1	2
	Ru3p1	485	0.740	0.410	495	475	494	476	2	1	2
	Ru3p3	463	1.496	0.840	478	458	477	459	2	1	2
	Ru3s	586	0.680	0.840	596	576	595	577	0	1	2
	Ru4p	43	0.550	0.840	53	33	52	34	0	1	2
	Ru_MNN	1212	0.000	0.510	1230	1200	1229	1201	0	1	2
Samarium Sm 62	Sm3d3	1108	5.001	2.694	1130	1091	1129	1092	2	1	2
	Sm3d5	1083	7.343	2.309	1100	1065	1099	1066	3	1	2
	Sm4d	132	2.694	2.694	147	127	146	128	2	1	2
Scandium Sc 21	Sc2p	402	1.959	1.306	414	394	413	395	3	1	2
	Sc2p1	407	0.651	0.497	417	397	416	398	2	1	2
	Sc2p3	402	1.306	1.306	417	397	416	398	2	1	2

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B: XPS Sensitivity Factors

	Sc2s	501	0.564	0.293	516	496	515	497	0	1	2
	Sc_LMM	1149	0.000	0.175	1160	1135	1159	1136	0	1	2
	Sc_LMM1	1118	0.000	0.375	1128	1100	1127	1101	0	1	2

Element			Transition	Peak	S _x		Acquisition		Analysis		*	†	‡
					Area	Height	High	Low	High	Low			
Selenium	Se	34	Se3d	56	0.821	0.640	69	49	68	50	3	1	2
			Se3p1	169	0.498	0.064	179	159	178	160	0	1	2
			Se3p3	163	0.996	0.296	173	153	172	154	0	1	2
			Se3s	232	0.380	0.000	242	222	241	223	0	1	2
			Se_LMM	300	0.000	1.128	182	157	181	158	2	1	2
			Se_LMM1	184	0.000	0.500	202	177	201	178	0	1	2
			Se_LMM2	143	0.000	2.355	163	133	162	134	0	1	2
			Se_LMM3	259	0.000	0.322	279	249	278	250	0	1	2
			Se_LMM4	288	0.000	0.397	308	278	307	279	0	1	2
Silicon	Si	14	Si2p	102	0.368	0.341	114	94	113	95	3	1	2
			Si2s	153	0.347	0.254	165	145	164	146	2	1	2
Silver	Ag	47	Ag3d	368	6.277	3.742	382	362	381	363	3	1	2
			Ag3d3	374	2.527	2.527	374	354	373	355	2	1	2
			Ag3d5	368	3.742	3.742	384	364	383	365	2	1	2
			Ag3p1	604	0.796	0.435	614	594	613	595	2	1	2
			Ag3p3	573	1.649	0.814	585	565	584	566	2	1	2
			Ag3s	719	0.770	0.814	729	709	728	710	2	1	2
			Ag4d	5	0.664	2.422	15	-5	14	-4	2	1	2
			Ag4p	60	0.580	0.814	70	50	69	51	2	1	2
			Ag4s	98	0.178	0.814	108	88	107	89	2	1	2
			Ag_MNN	1129	0.000	0.750	1145	1120	1144	1121	2	1	2
			Ag_MNN1	1135	0.000	0.946	1145	1120	1144	1121	0	1	2
Sodium	Na	11	Na1s	1072	1.102	1.102	1086	1066	1085	1067	3	1	2
			Na2p	31	0.084	0.070	41	21	40	22	0	1	2
			Na2s	64	0.180	0.166	78	58	77	59	0	1	2
			Na_KLL	493	0.000	1.440	520	488	519	489	2	1	2
			Na_KLL1	532	0.000	0.330	545	528	544	529	0	1	2
Strontium	Sr	38	Sr3d	133	1.992	1.669	153	128	152	129	3	1	2
			Sr3p	269	1.747	0.873	291	266	290	267	0	1	2
			Sr3p1	280	0.579	0.416	290	270	289	271	2	1	2

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	Sr3p3	269	1.164	0.873	291	266	290	267	2	1	2
	Sr3s	358	0.500	0.146	368	348	367	349	0	1	2
	Sr4p	21	0.461	0.146	31	11	30	12	0	1	2

Element	Transition	Peak	S _x		Acquisition		Analysis		*	†	‡
			Area	Height	High	Low	High	Low			
Sulfur S 16	S2p	165	0.717	0.650	175	155	174	156	3	1	2
	S2s	229	0.426	0.309	242	222	241	223	2	1	2
	S_LMM	1336	0.000	0.000	1350	1320	1349	1321	0	1	2
Tantalum Ta 73	Ta4d	229	3.224	1.160	260	220	259	221	0	1	2
	Ta4d3	241	1.282	0.769	251	231	250	232	2	1	2
	Ta4d5	229	1.934	1.160	260	220	259	221	2	1	2
	Ta4f	25	3.384	2.665	37	17	36	16	3	1	2
	Ta4p1	464	0.391	0.161	474	454	473	455	2	1	2
	Ta4p3	403	0.820	0.475	413	393	412	394	2	1	2
	Ta4s	566	0.440	0.131	576	556	575	557	0	1	2
Tellurium Te 52	Te3d3	585	4.088	4.088	595	575	594	576	2	1	2
	Te3d5	575	5.850	5.850	587	567	586	568	3	1	2
	Te3p1	873	0.794	0.397	883	863	882	864	2	1	2
	Te3p3	822	1.750	0.875	832	812	831	813	2	1	2
	Te4d	43	1.721	1.358	57	37	56	38	2	1	2
	Te_MNN	995	0.000	0.883	1015	985	1014	986	2	1	2
	Te_MNN1	1005	0.000	1.011	1015	985	1014	986	0	1	2
Terbium Tb 65	Tb3d	1244	12.000	0.621	1275	1235	1274	1236	2	1	2
	Tb4d	150	2.672	2.672	170	140	169	141	3	1	2
Thallium Tl 81	Tl4d3	406	1.765	0.782	416	396	415	395	2	1	2
	Tl4d5	385	2.693	1.137	403	378	402	379	2	1	2
	Tl4f	118	8.334	4.743	132	112	131	113	3	1	2
	Tl4f5	122	3.585	3.585	132	112	131	113	2	1	2
	Tl4f7	118	4.743	4.743	133	113	132	114	2	1	2
	Tl4p3	608	1.164	0.434	618	598	617	599	2	1	2
	Tl5d	13	1.276	0.780	28	8	27	9	0	1	2
Thorium Th 90	Th4d3	714	2.252	0.783	724	704	723	705	2	1	2
	Th4d5	677	3.524	1.208	695	670	694	671	2	1	2
	Th4f5	344	7.450	7.450	354	334	353	335	2	1	2
	Th4f7	335	9.568	9.568	347	327	346	328	3	1	2
	Th5d	87	2.060	1.236	102	82	101	83	0	1	2

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	Th5d3	94	0.822	0.822	104	84	103	85	0	1	2
	Th5d5	87	1.236	1.236	102	82	101	83	0	1	2

Element			Transition	Peak	S _x		Acquisition		Analysis		*	†	‡
					Area	Height	High	Low	High	Low			
Thulium	Tm	69	Tm4d	180	2.637	2.637	185	165	184	166	3	1	2
Tin	Sn	50	Sn3d	488.5	8.288	4.890	500	480	499	481	2	1	2
			Sn3d3	494	3.398	3.398	504	484	503	485	2	1	2
			Sn3d5	486	4.890	4.890	500	480	499	481	3	1	2
			Sn3p1	757	0.824	0.350	767	747	766	748	2	1	2
			Sn3p3	715	1.732	0.734	730	710	729	711	2	1	2
			Sn3s	885	0.870	0.804	895	875	894	876	0	1	2
			Sn4d	25	1.100	0.804	35	15	34	16	2	1	2
			Sn_MNN	1049	0.000	0.814	1070	1040	1069	1041	2	1	2
			Sn_MNN1	1058	0.000	0.902	1070	1040	1069	1041	0	1	2
Titanium	Ti	22	Ti2p	458	2.077	1.385	469	449	468	450	3	1	2
			Ti2p1	464	0.690	0.690	474	454	473	455	2	1	2
			Ti2p3	458	1.385	1.385	476	451	475	452	2	1	2
			Ti2s	565	0.589	0.284	578	558	577	559	2	1	2
			Ti3p	37	0.090	0.210	52	32	51	33	2	1	2
			Ti3s	59	0.030	0.171	70	50	69	51	0	1	2
			Ti_LMM	1068	0.000	0.332	1080	1055	1079	1056	0	1	2
			Ti_LMM1	1098	0.000	0.182	1110	1080	1109	1081	0	1	2
Tungsten	W	74	W4d	245	3.328	1.152	276	236	275	237	0	1	2
			W4d3	257	1.387	0.827	267	247	266	248	2	1	2
			W4d5	245	2.010	1.152	276	236	275	237	2	1	2
			W4f	34	3.863	2.810	46	26	45	27	3	1	2
			W4p1	491	0.386	0.125	501	481	500	482	2	1	2
			W4p3	425	0.830	0.469	435	415	434	416	2	1	2
			W4s	594	0.460	0.118	604	584	603	585	0	1	2
Uranium	U	92	U4d3	781	2.359	0.836	791	771	790	772	2	1	2
			U4d5	739	3.697	1.248	757	732	756	733	2	1	2

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	U4f5	391	8.474	8.474	401	381	400	382	2	1	2
	U4f7	380	10.800	10.800	387	372	386	373	3	1	2
	U5d	96	2.189	1.368	110	90	109	91	0	1	2
	U5d3	104	0.818	0.818	114	94	113	95	0	1	2
	U5d5	96	1.368	1.368	110	90	109	91	0	1	2

Element	Transition	Peak	S _x		Acquisition		Analysis		*	†	‡
			Area	Height	High	Low	High	Low			
Vanadium V 23	V2p	515	2.184	1.456	536	511	535	512	0	1	2
	V2p1	523	0.725	0.725	533	513	532	514	0	1	2
	V2p3	515	1.456	1.456	527	507	526	508	3	1	2
	V2s	630	0.688	0.134	640	620	639	621	0	1	2
	V3p	40	0.140	0.224	53	33	52	34	0	1	2
	V3s	66	0.050	0.183	75	55	74	56	0	1	2
	V_LMM	1014	0.000	0.114	1030	1000	1029	1001	0	1	2
	V_LMM1	1048	0.000	0.413	1060	1040	1059	1041	0	1	2
	V_LMM2	977	0.000	0.307	1000	955	999	956	0	1	2
Xenon Xe 54	Xe3d3	685	4.404	4.404	695	675	694	676	2	1	2
	Xe3d5	672	6.670	6.670	684	664	683	665	3	1	2
	Xe4d	63	2.387	1.610	77	57	76	58	2	1	2
	Xe_MNN	955	0.000	1.127	970	920	969	921	2	1	2
Ytterbium Yb 70	Yb4d	185	2.631	2.631	215	165	214	166	3	1	2
	Yb4p1	389	0.385	0.734	405	379	404	380	2	1	2
	Yb4p3	333	0.760	0.734	348	328	347	329	2	1	2
	Yb4s	482	0.410	0.734	492	472	491	473	0	1	2
Yttrium Y 39	Y3d	158	2.343	1.824	171	151	170	152	3	1	2
	Y3p	301	1.833	0.885	323	298	322	299	0	1	2
	Y3p1	313	0.610	0.434	323	303	322	304	2	1	2
	Y3p3	301	1.222	0.885	323	298	322	299	2	1	2
	Y3s	395	0.530	0.143	405	385	404	386	0	1	2
	Y4p	24	0.460	0.143	34	14	33	15	0	1	2
Zinc Zn 30	Zn2p1	1045	1.384	1.253	1055	1035	1054	1036	2	1	2
	Zn2p3	1022	2.768	2.680	1036	1016	1035	1017	3	1	2
	Zn3d	10	0.371	0.549	20	0	19	1	0	1	2
	Zn3p	89	1.029	0.549	104	84	103	85	2	1	2

* Peak labeling (e.g., 0 = "none").

† Number of sweeps.

‡ Background type.

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B: XPS Sensitivity Factors

	Zn3s	140	0.260	0.549	150	130	149	131	0	1	2
	Zn_LMM	495	2.911	0.546	515	480	514	481	2	1	2
	Zn_LMM1	472	0.000	1.919	492	480	491	481	0	1	2
	Zn_LMM2	582	0.000	0.242	600	570	599	571	0	1	2
	Zn_LMM3	573	0.000	0.379	600	570	599	571	0	1	2

Element			Transition	Peak	S _x		Acquisition		Analysis		*	†	‡
					Area	Height	High	Low	High	Low			
Zirconium	Zr	40	Zr3d	181	2.767	1.977	194	174	193	175	3	1	2
			Zr3p	331	1.917	0.885	345	325	344	326	0	1	2
			Zr3p1	345	0.635	0.439	355	335	354	336	2	1	2
			Zr3p3	331	1.278	0.885	352	322	351	323	2	1	2
			Zr3s	431	0.560	0.175	441	421	440	422	0	1	2
			Zr4p	28	0.468	0.175	38	18	37	19	0	1	2

* Peak labeling (e.g., 0 = “none”).

† Number of sweeps.

‡ Background type.

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