Electronic Supplementary Material (ESI) for Environmental Science: Processes & Impacts.

Electronic Supplementary Information for:

Comparison of nickel speciation in workplace aerosol samples using sequential extraction analysis and x-ray absorption near-edge structure spectroscopy

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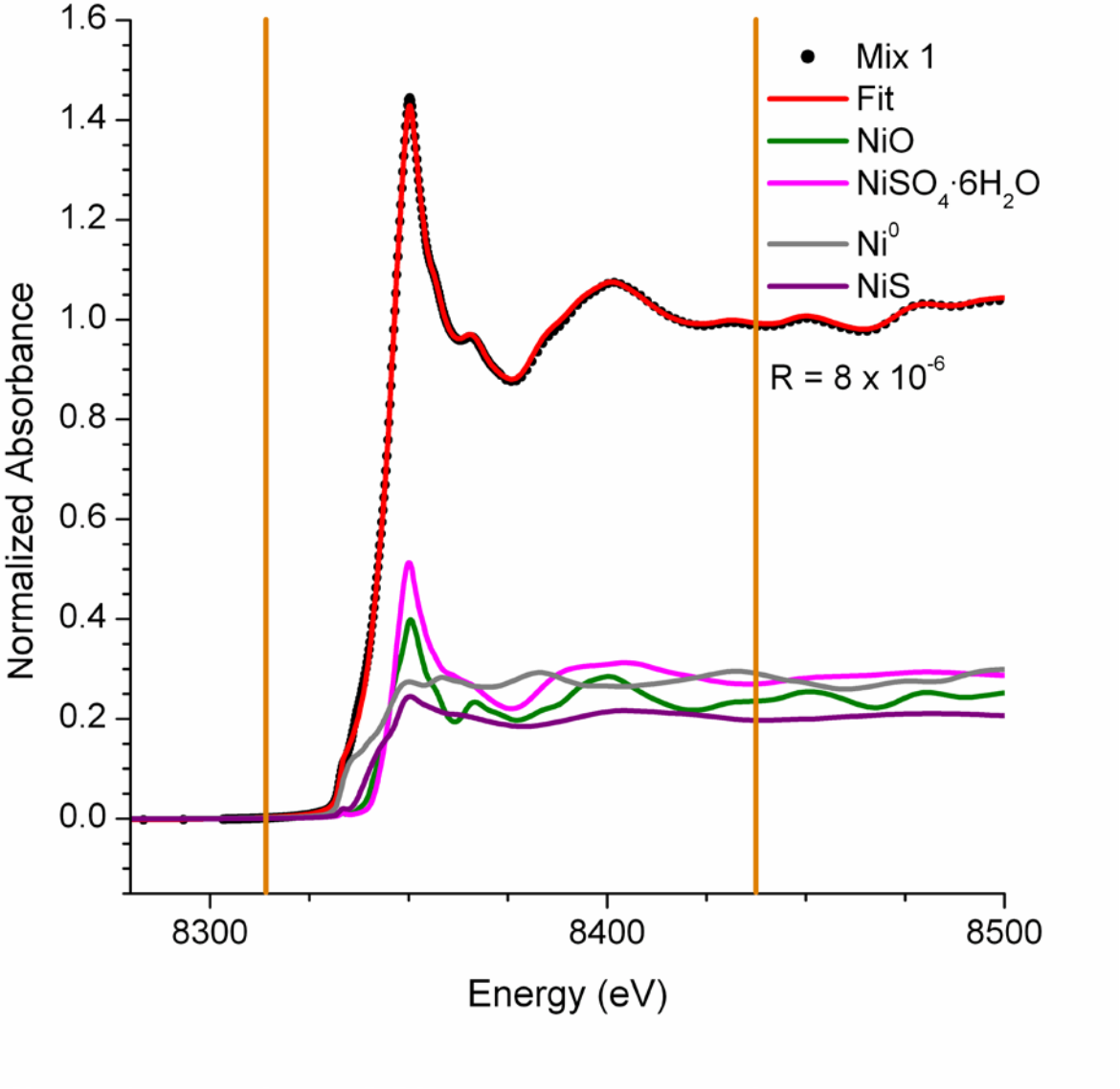

Figure Mix-1. Nickel K-edge XANES spectrum of Mix 1 is shown as black dots. The LC fit is shown in red. The component spectra of $NiSO_4 \cdot 6H_2O$, NiS, Ni^0 and NiO are shown in pink, purple, grey and green respectively. The orange bars indicate the LC fitting range.

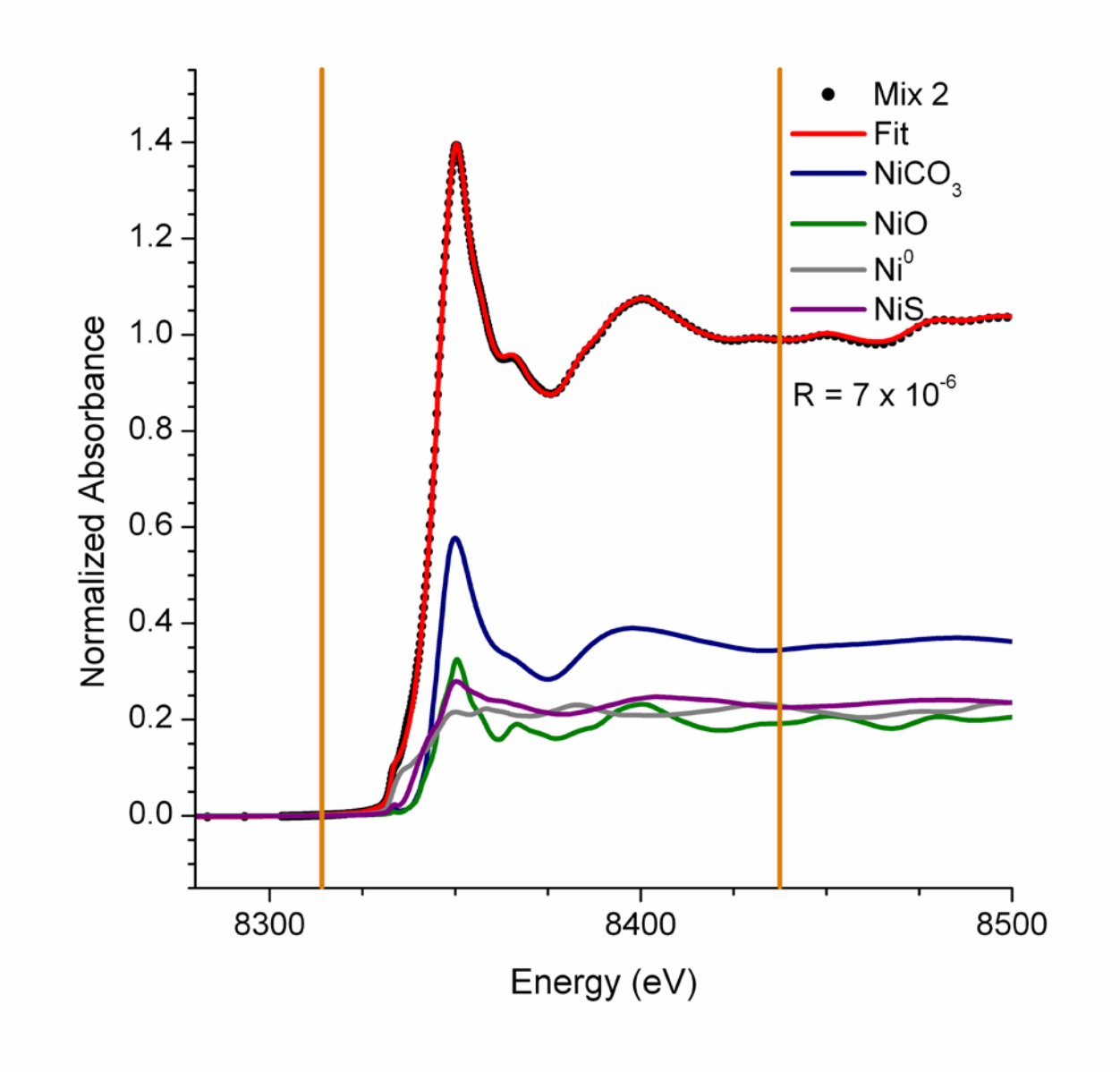

Figure Mix-2. Nickel K-edge XANES spectrum of Mix 2 is shown as black dots. The LC fit is shown in red. The component spectra of $NiCO_3$, NiS, Ni^0 and NiO are shown in navy, purple, grey and green respectively. The orange bars indicate the LC fitting range.

Table ESI-1. Percent composition determined by LC fitting of the XANES spectra of two mixtures of reference compounds.

	$NiCO_3$	$NiSO_4 \cdot 6H_2O$	NiO	Ni^0	NiS
Prepared (%)		27	20	32	21
XANES/ LC Fit (%)		28	24	28	20
Prepared (%)	36		21	23	20
XANES/ LC Fit (%)	35		20	23	22

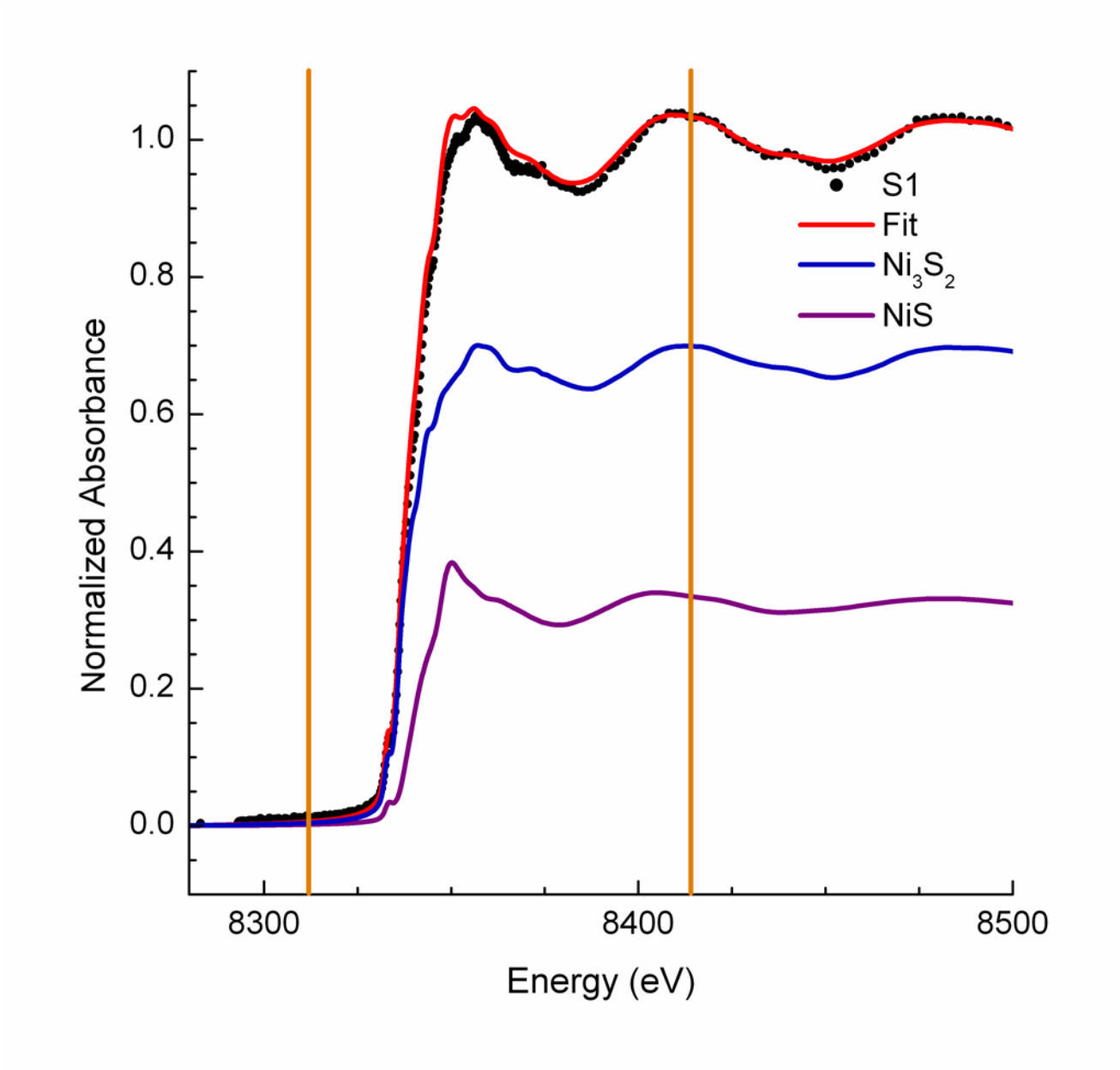

Figure S1. Nickel K-edge XANES spectrum of Sulphidic sample S1 is shown as black dots. The LC fit is shown in red. The component spectra of Ni_3S_2 and NiS are shown in blue and purple respectively. The orange bars indicate the LC fitting range.

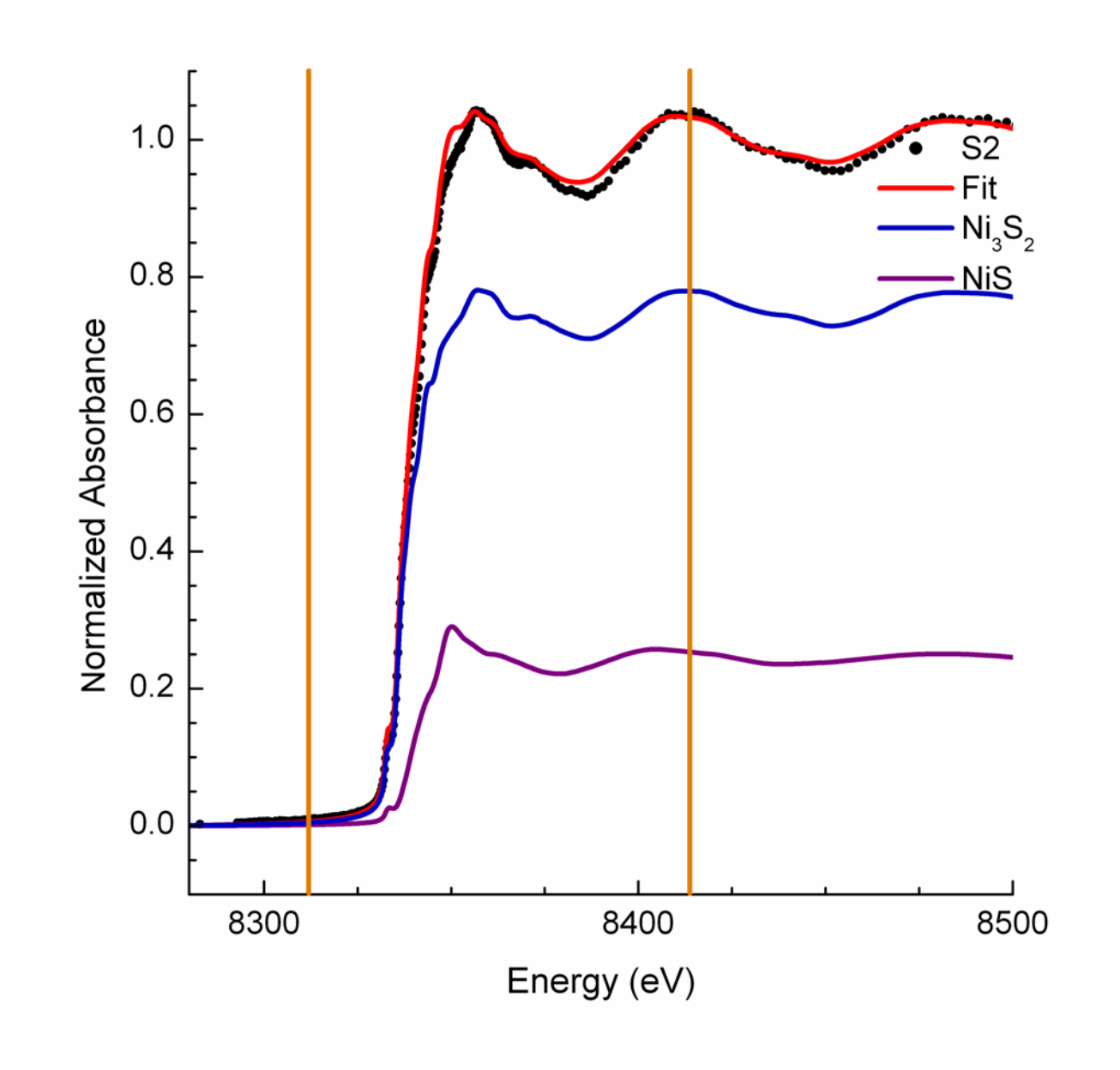

Figure S2. Nickel K-edge XANES spectrum of Sulphidic sample S2 is shown as black dots. The LC fit is shown in red. The component spectra of Ni_3S_2 and NiS are shown in blue and purple respectively. The orange bars indicate the LC fitting range.

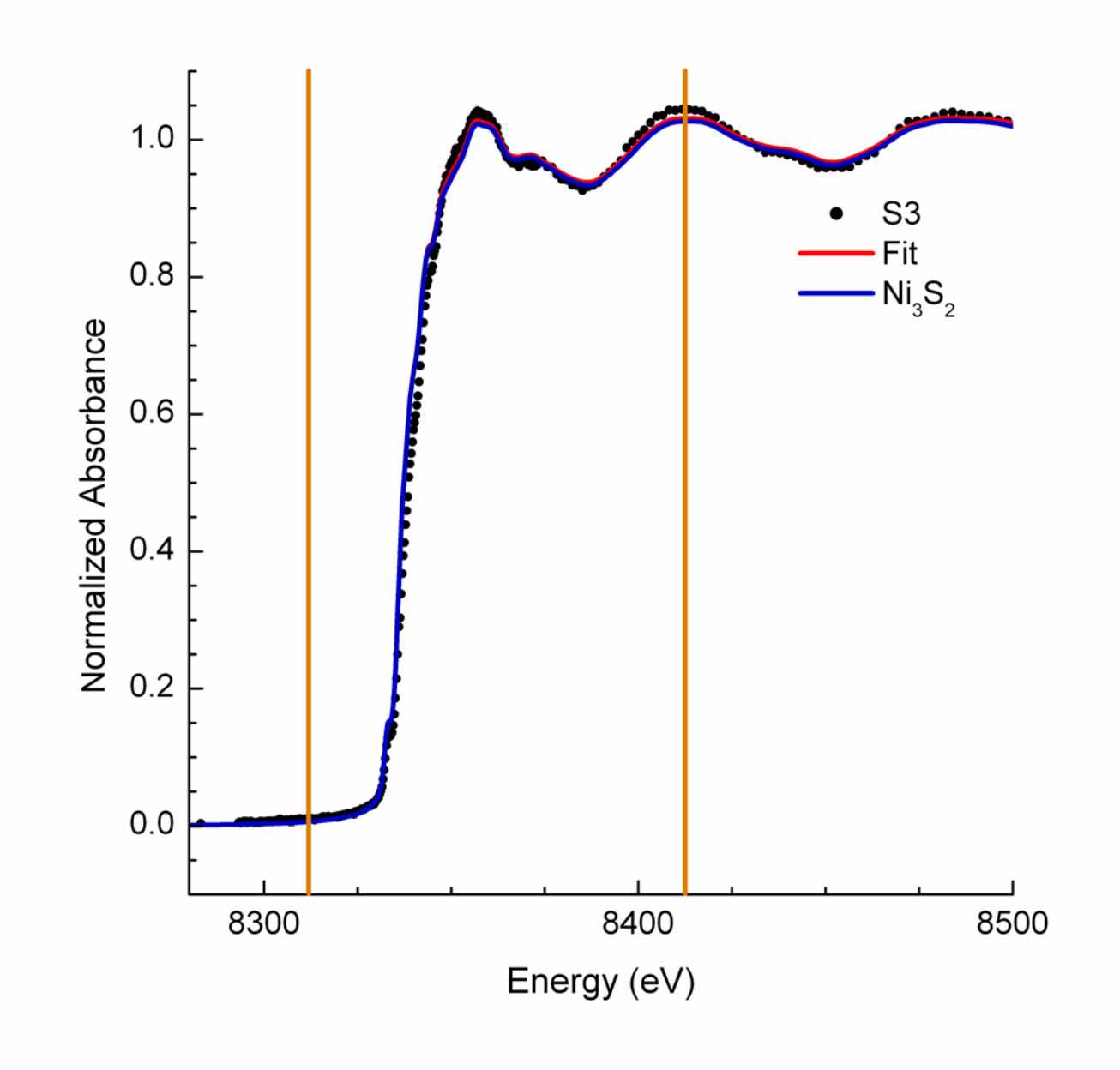

Figure S3. Nickel K-edge XANES spectrum of Sulphidic sample S3 is shown as black dots. The LC fit is shown in red. The component spectrum of Ni_3S_2 is shown in blue. The orange bars indicate the LC fitting range.

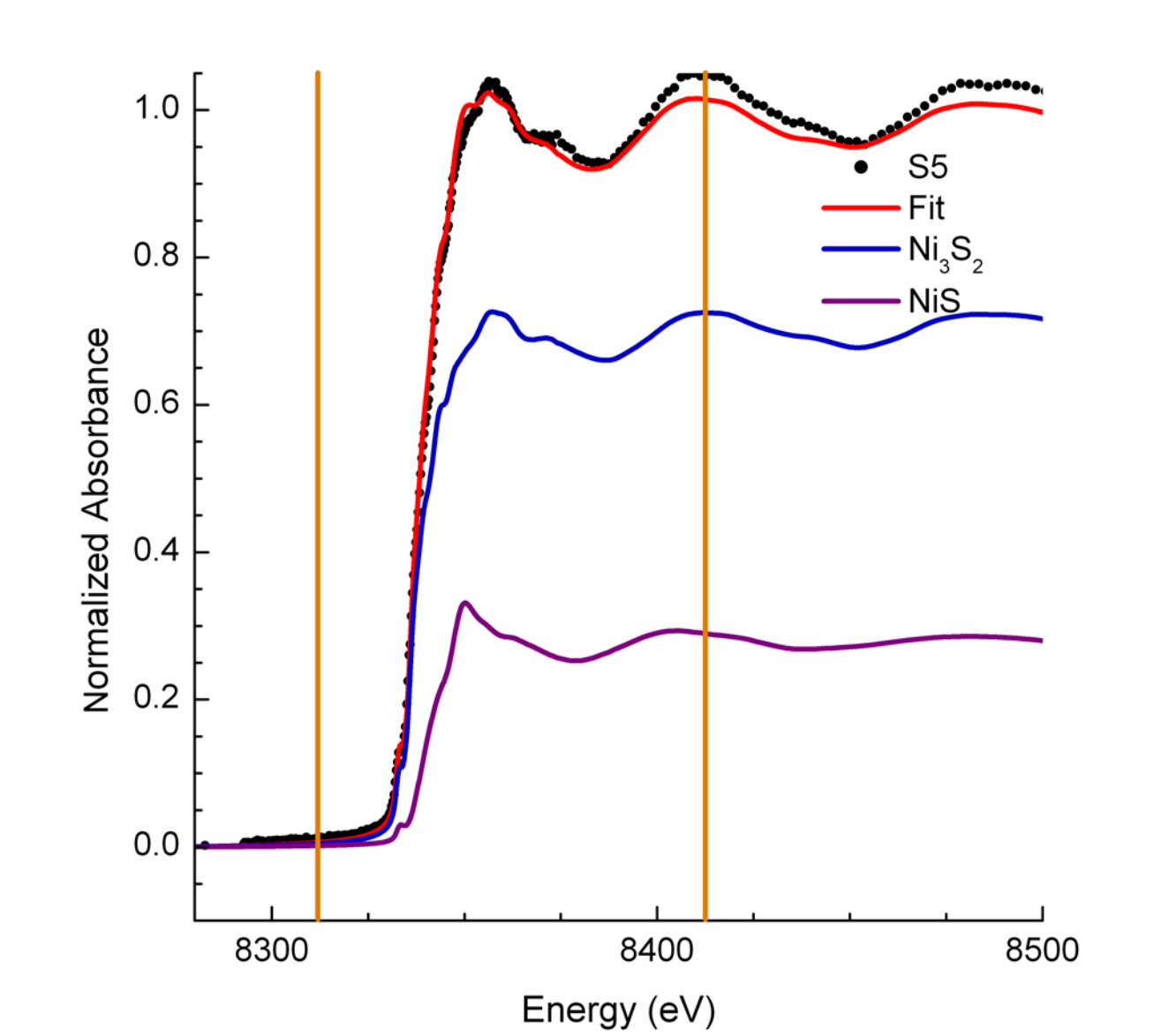

Figure S5. Nickel K-edge XANES spectrum of Sulphidic sample S5 is shown as black dots. The LC fit is shown in red. The component spectra of Ni_3S_2 and NiS are shown in blue and purple respectively. The orange bars indicate the LC fitting range.

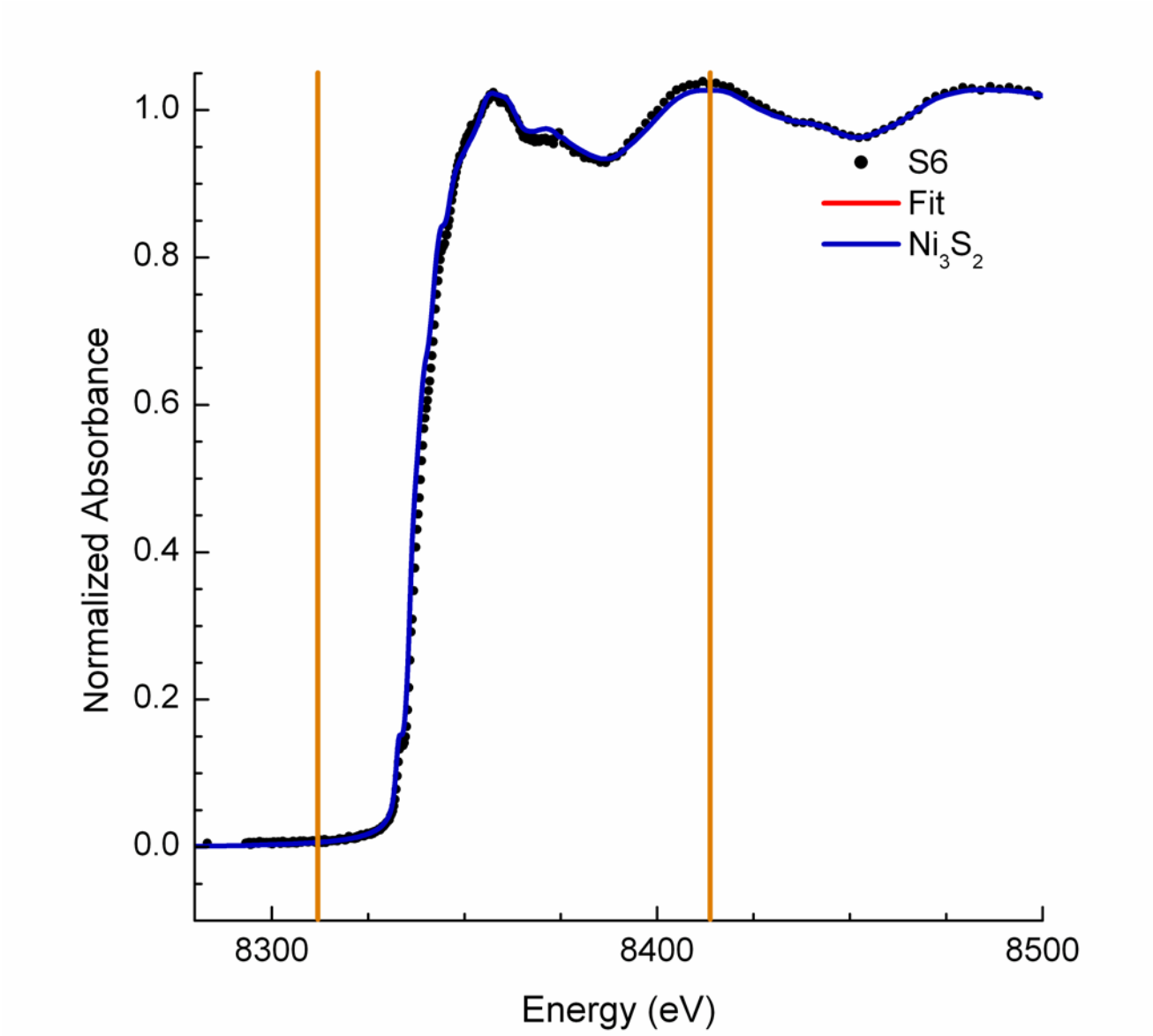

Figure S6. Nickel K-edge XANES spectrum of Sulphidic sample S6 is shown as black dots. The LC fit is shown in red. The component spectrum of Ni_3S_2 is shown in blue. The orange bars indicate the LC fitting range.

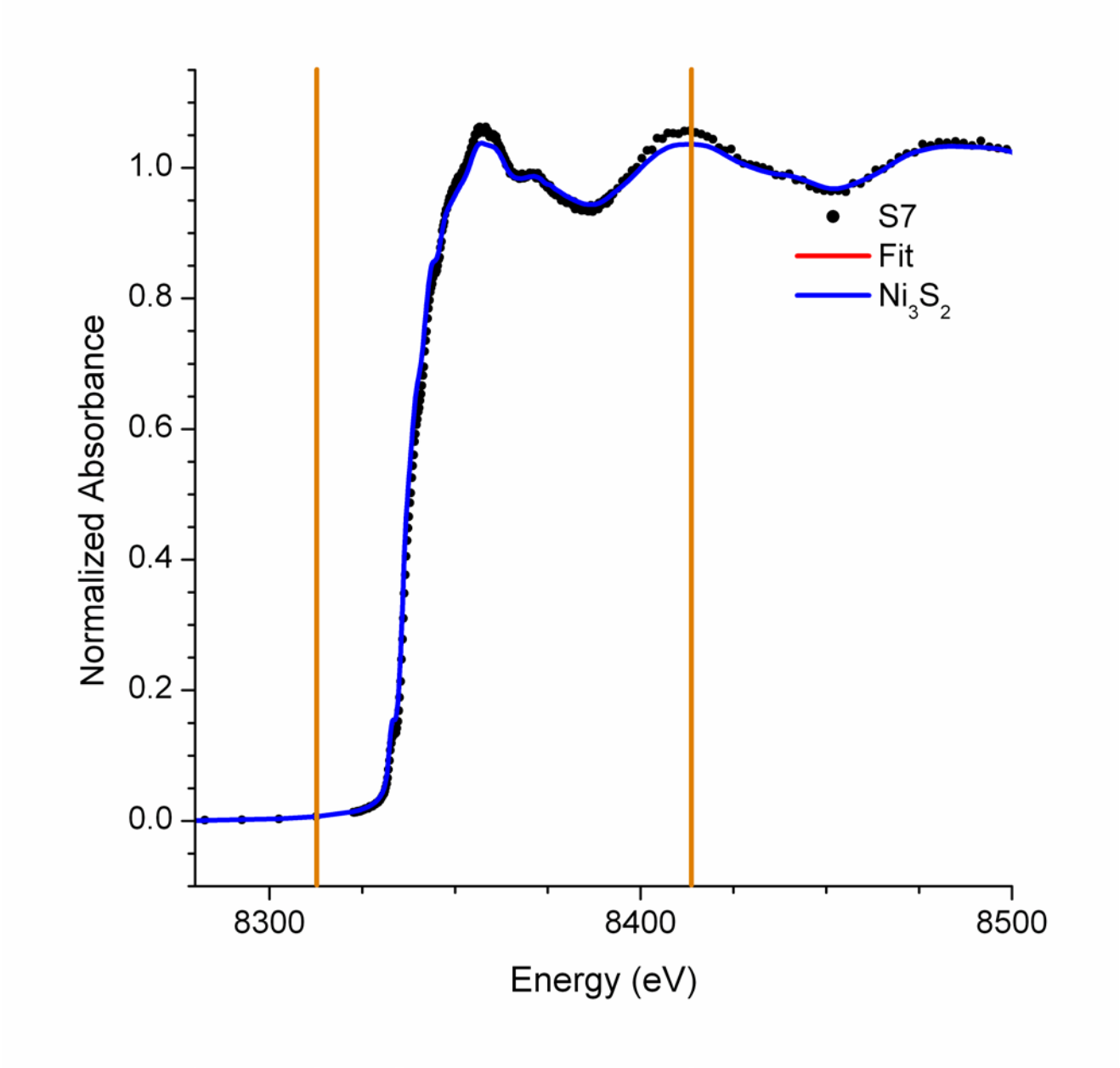

Figure S7. Nickel K-edge XANES spectrum of Sulphidic sample S7 is shown as black dots. The LC fit is shown in red. The component spectrum of Ni_3S_2 is shown in blue. The orange bars indicate the LC fitting range.

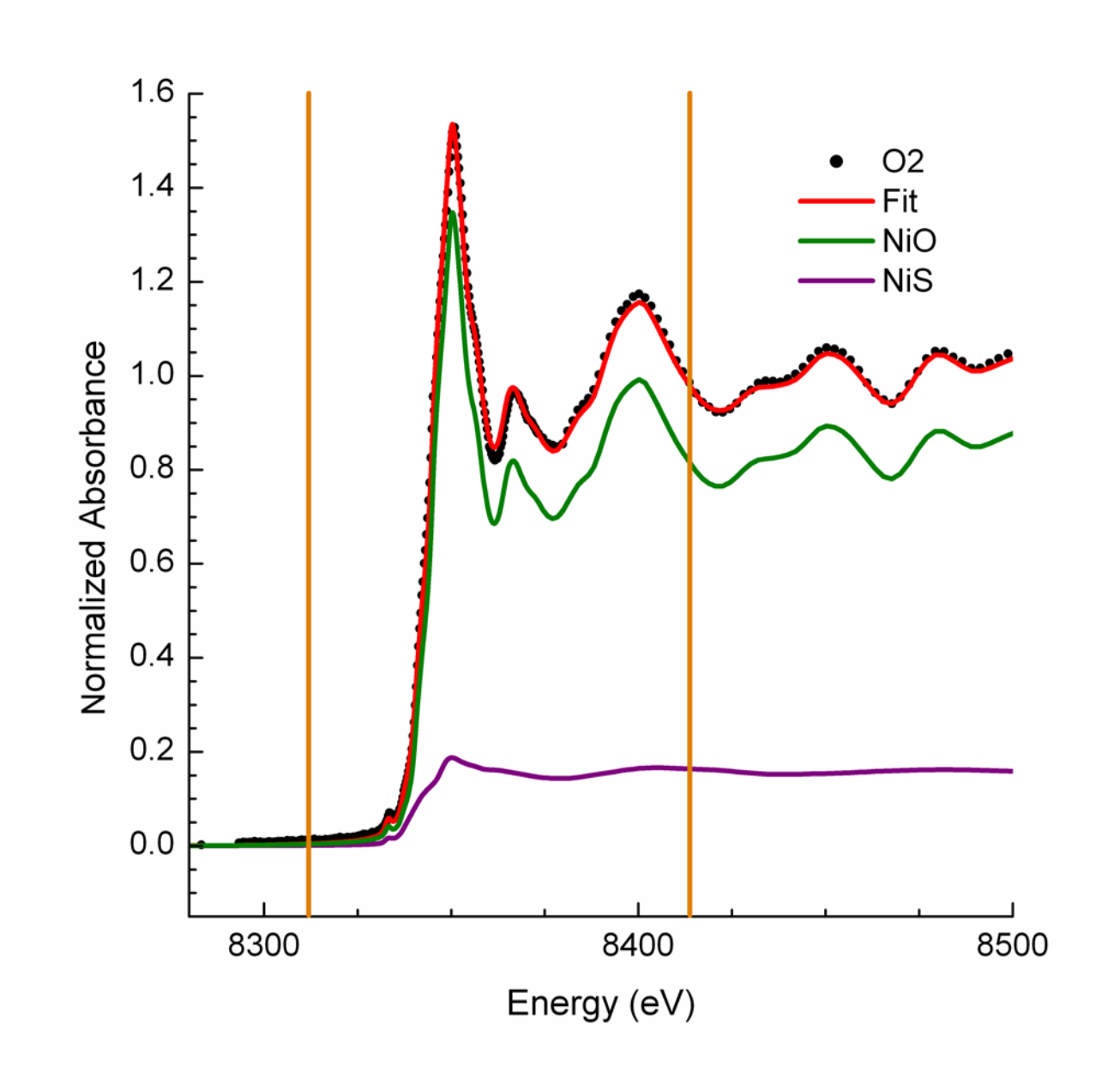

Figure O2. Nickel K-edge XANES spectrum of Oxidic sample O2 is shown as black dots. The LC fit is shown in red. The component spectra of NiO and NiS are shown in green and purple respectively. The orange bars indicate the LC fitting range.

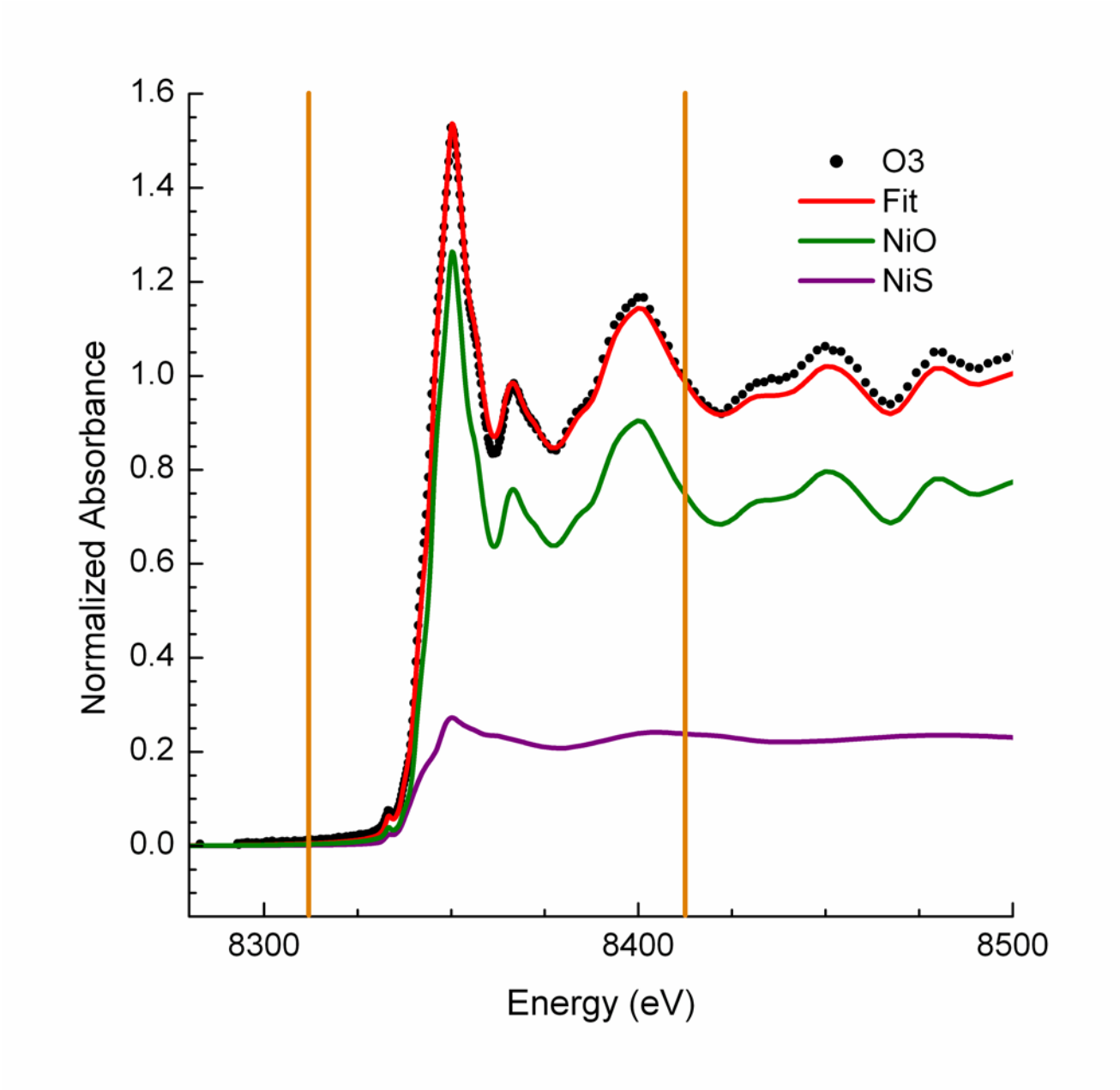

Figure O3. Nickel K-edge XANES spectrum of Oxidic sample O3 is shown as black dots. The LC fit is shown in red. The component spectra of NiO and NiS are shown in green and purple respectively. The orange bars indicate the LC fitting range.

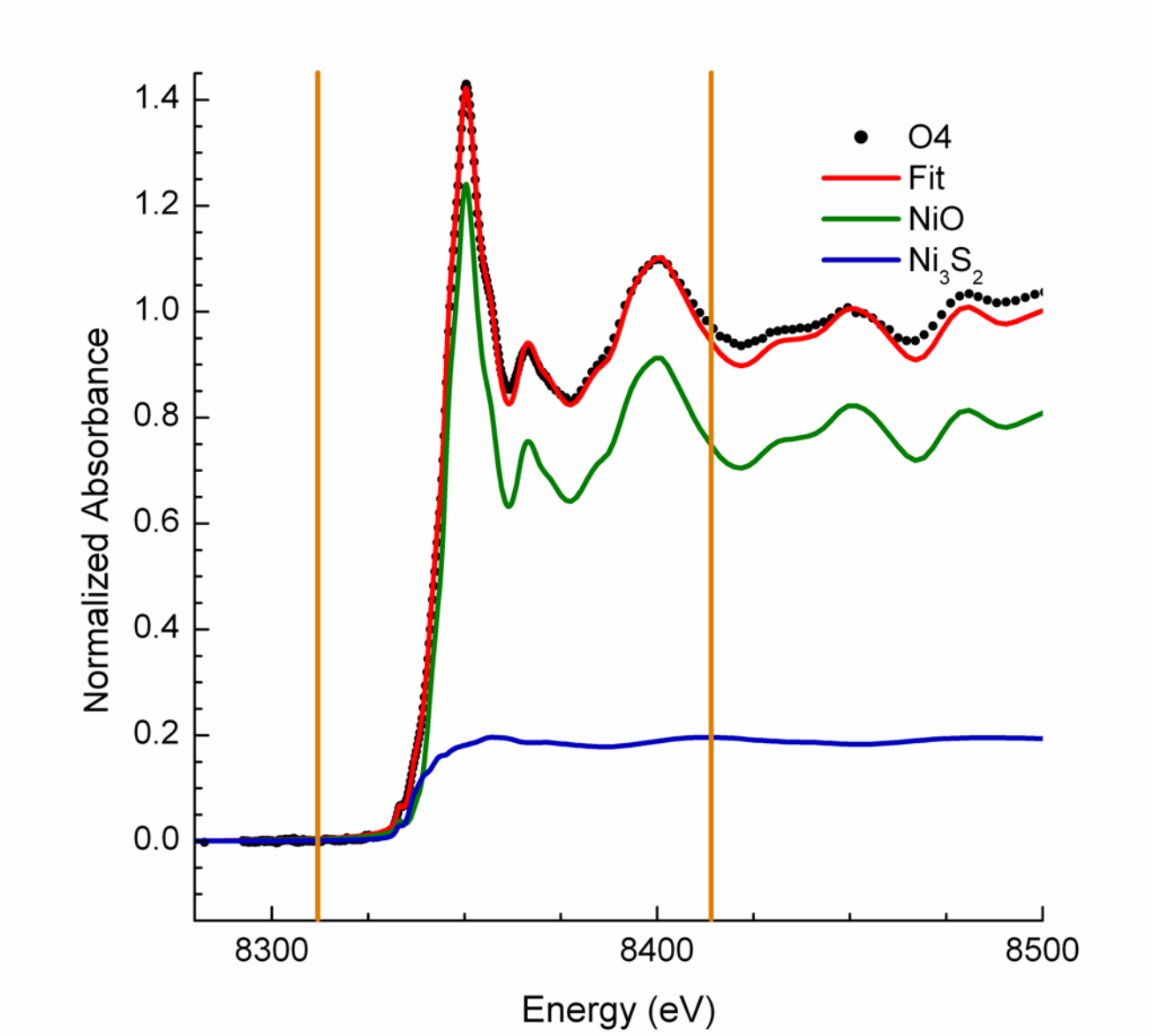

Figure O4. Nickel K-edge XANES spectrum of Oxidic sample O4 is shown as black dots. The LC fit is shown in red. The component spectra of NiO and Ni_3S_2 are shown in green and blue respectively. The orange bars indicate the LC fitting range.

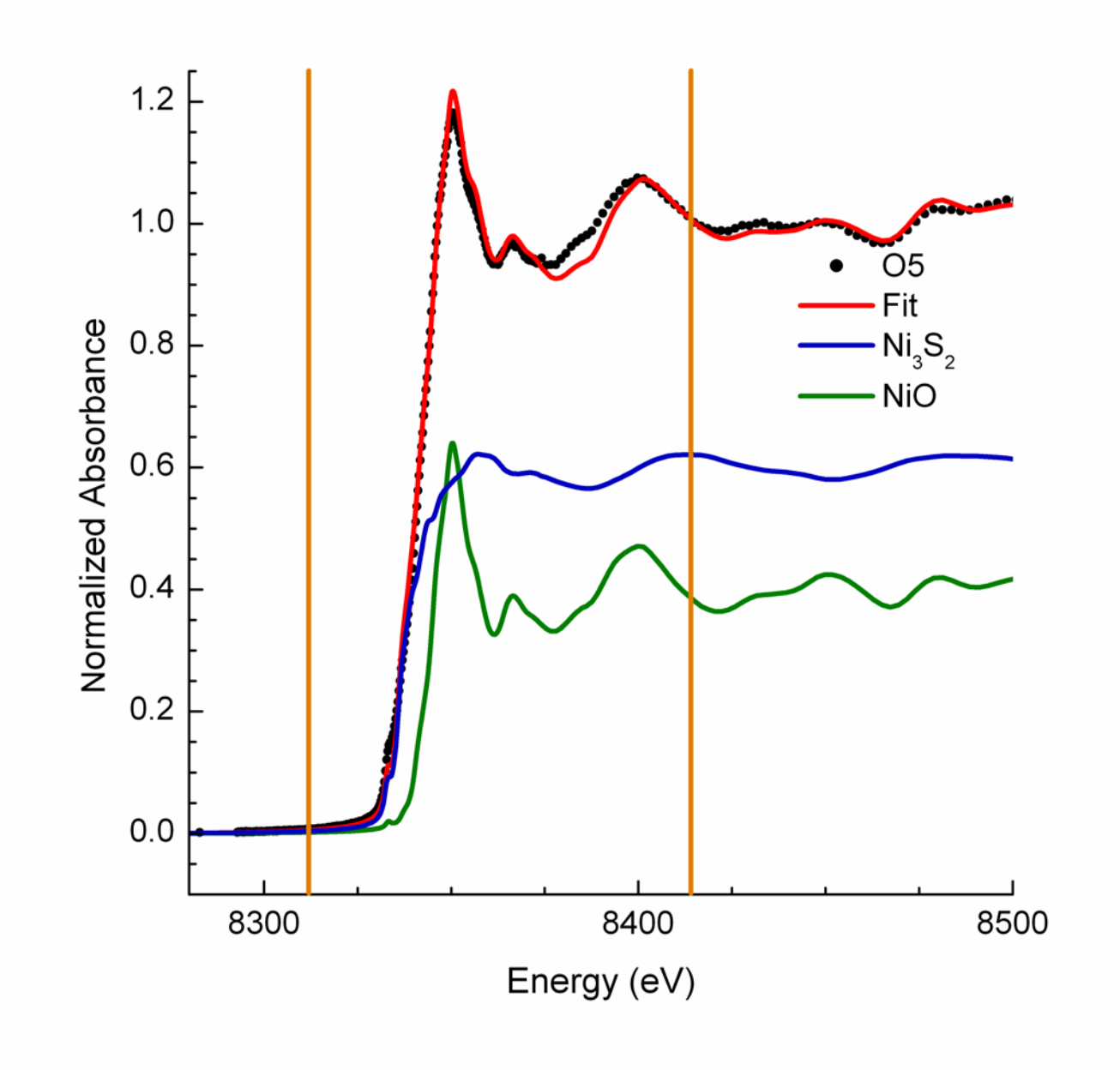

Figure O5. Nickel K-edge XANES spectrum of Oxidic sample O5 is shown as black dots. The LC fit is shown in red. The component spectra of Ni_3S_2 and NiO are shown in blue and green respectively. The orange bars indicate the LC fitting range.

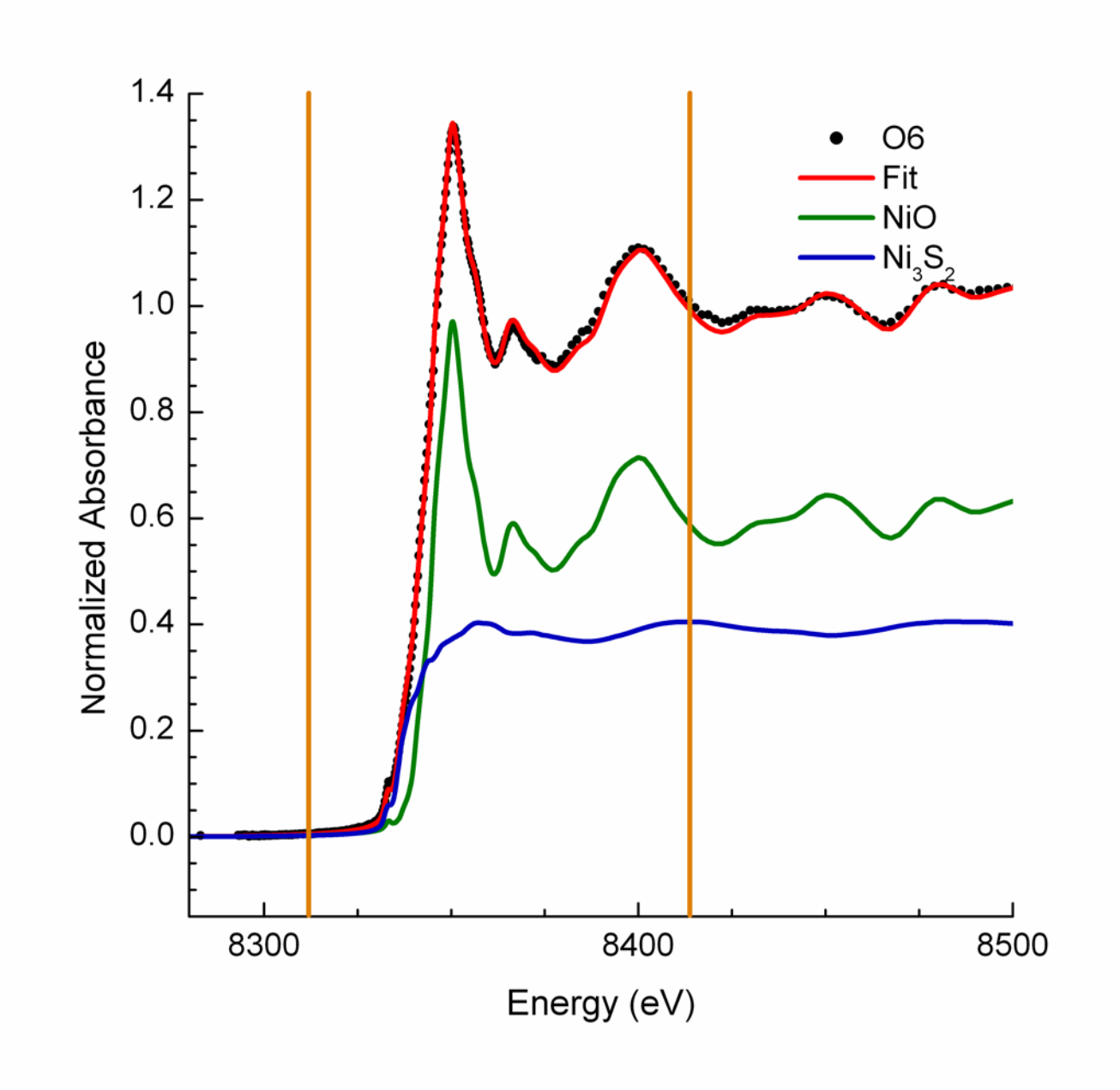

Figure O6. Nickel K-edge XANES spectrum of Oxidic sample O6 is shown as black dots. The LC fit is shown in red. The component spectra of NiO and Ni_3S_2 are shown in green and blue respectively. The orange bars indicate the LC fitting range.

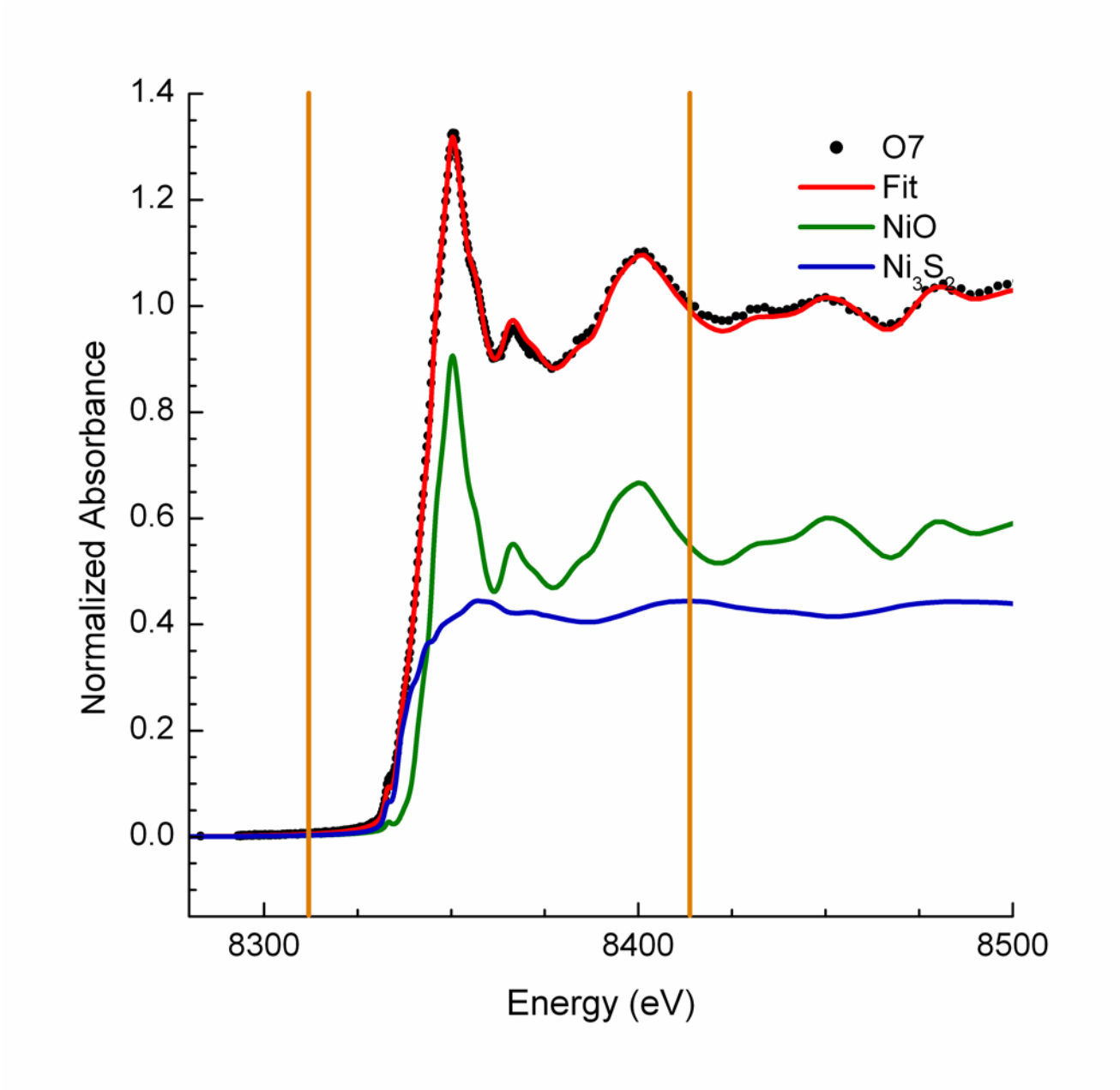

Figure O7. Nickel K-edge XANES spectrum of Oxidic sample O7 is shown as black dots. The LC fit is shown in red. The component spectra of NiO and Ni_3S_2 are shown in green and blue respectively. The orange bars indicate the LC fitting range.

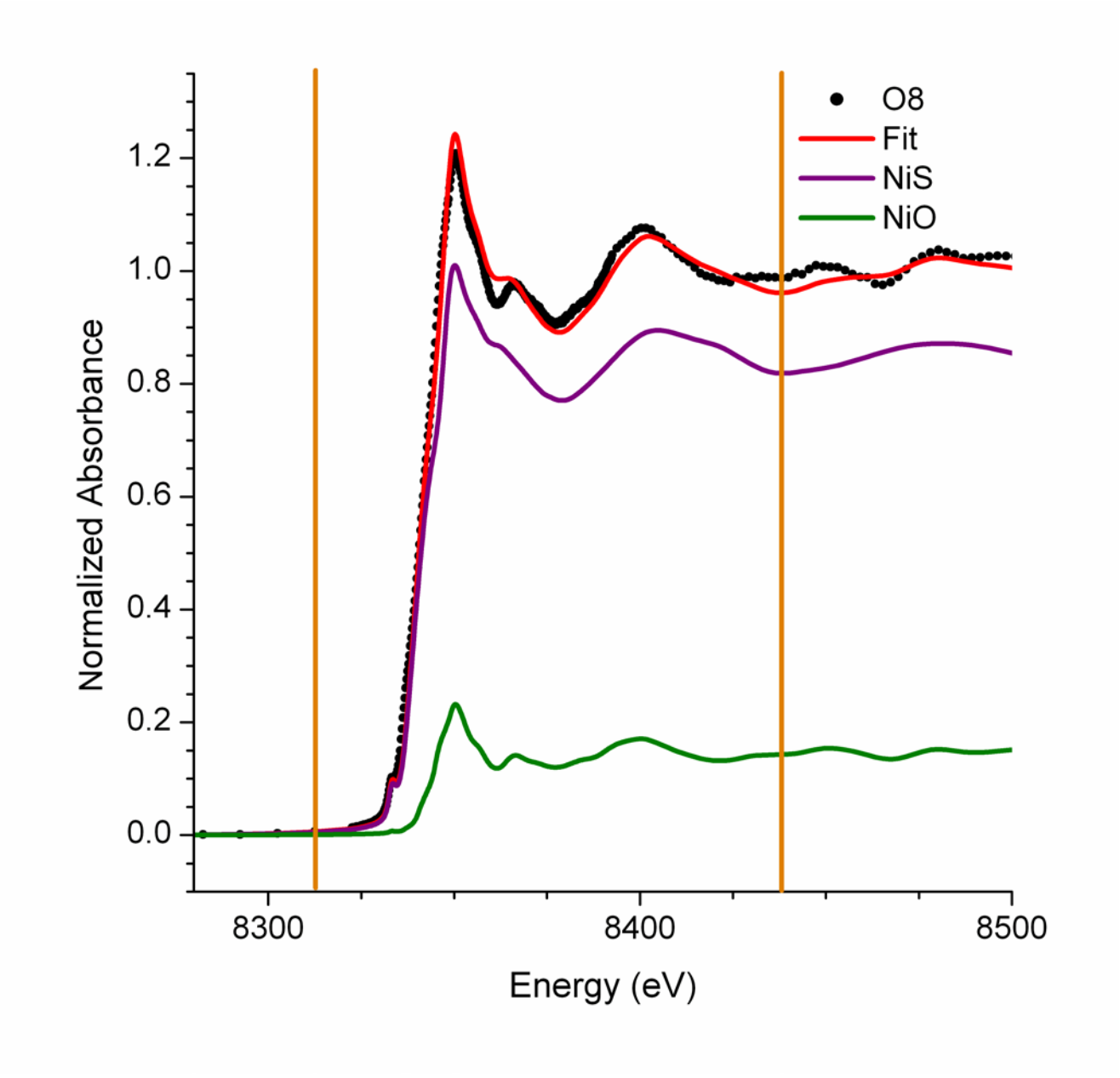

Figure O8. Nickel K-edge XANES spectrum of Oxidic sample O8 is shown as black dots. The LC fit is shown in red. The component spectra of NiO and Ni_3S_2 are shown in green and blue respectively. The orange bars indicate the LC fitting range.

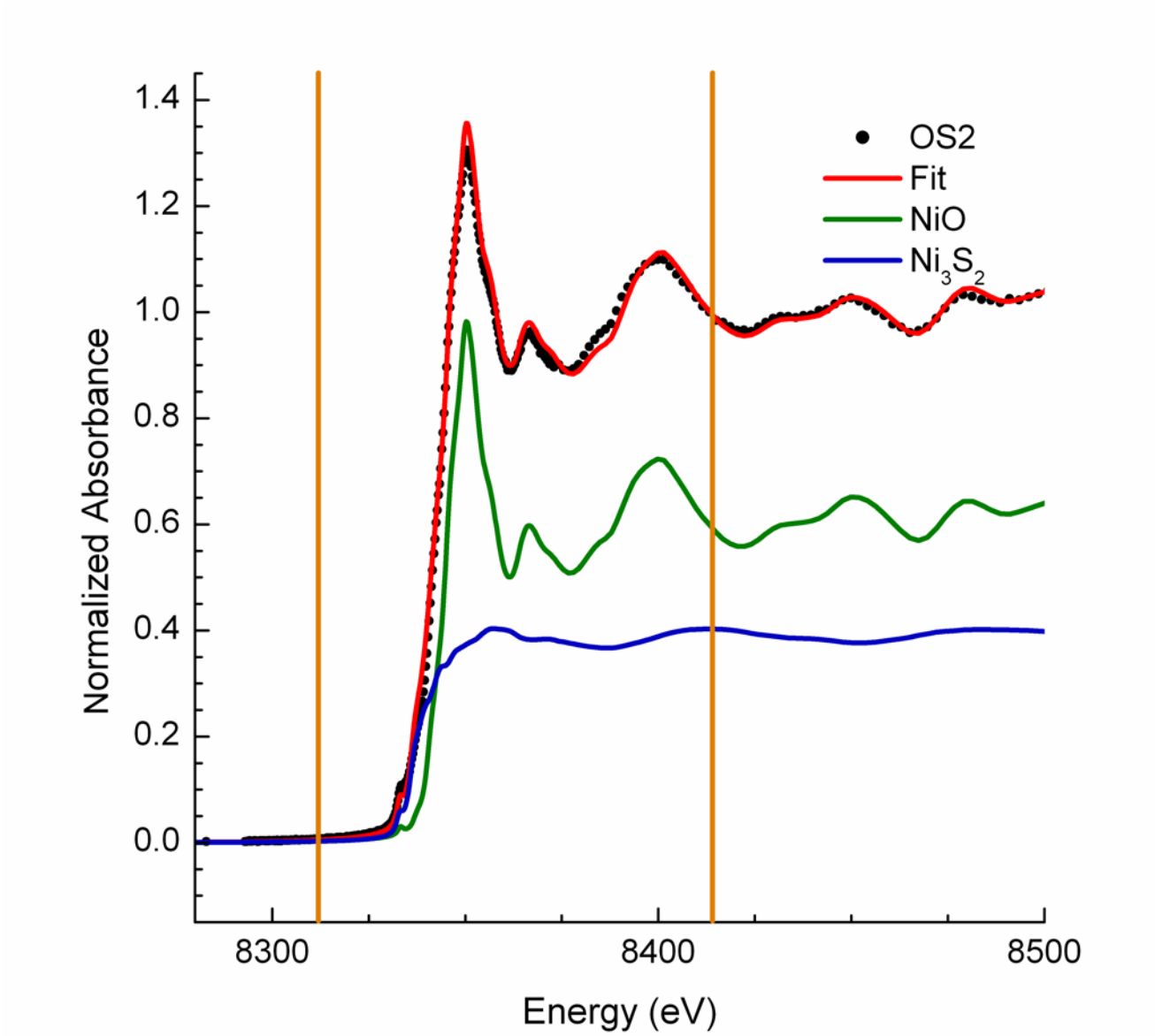

Figure OS2. Nickel K-edge XANES spectrum of Oxidic/Sulphidic sample OS2 is shown as black dots. The LC fit is shown in red. The component spectra of NiO and Ni_3S_2 are shown in green and blue respectively. The orange bars indicate the LC fitting range.

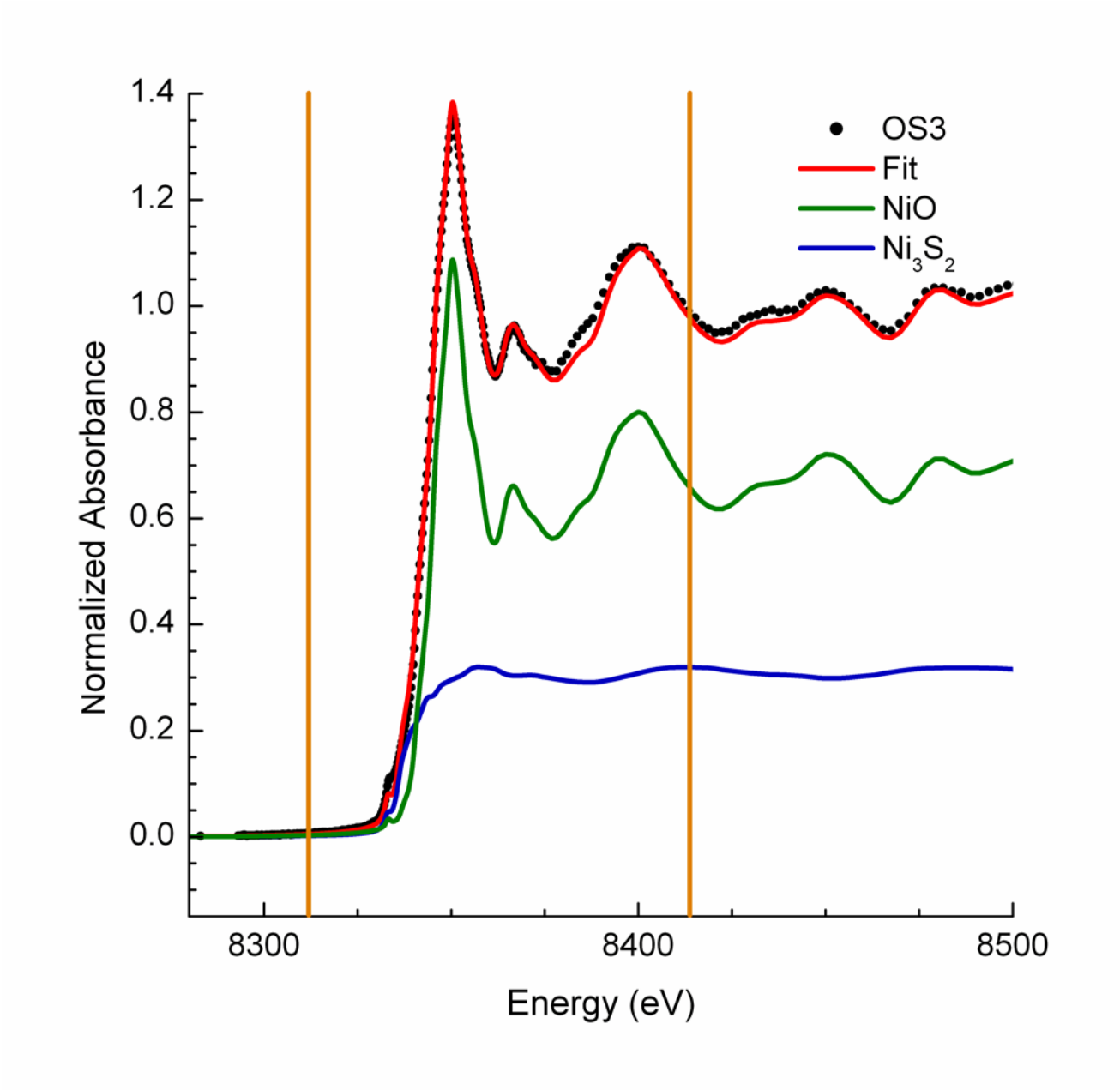

Figure OS3. Nickel K-edge XANES spectrum of Oxidic/Sulphidic sample OS3 is shown as black dots. The LC fit is shown in red. The component spectra of NiO and Ni_3S_2 are shown in green and blue respectively. The orange bars indicate the LC fitting range.

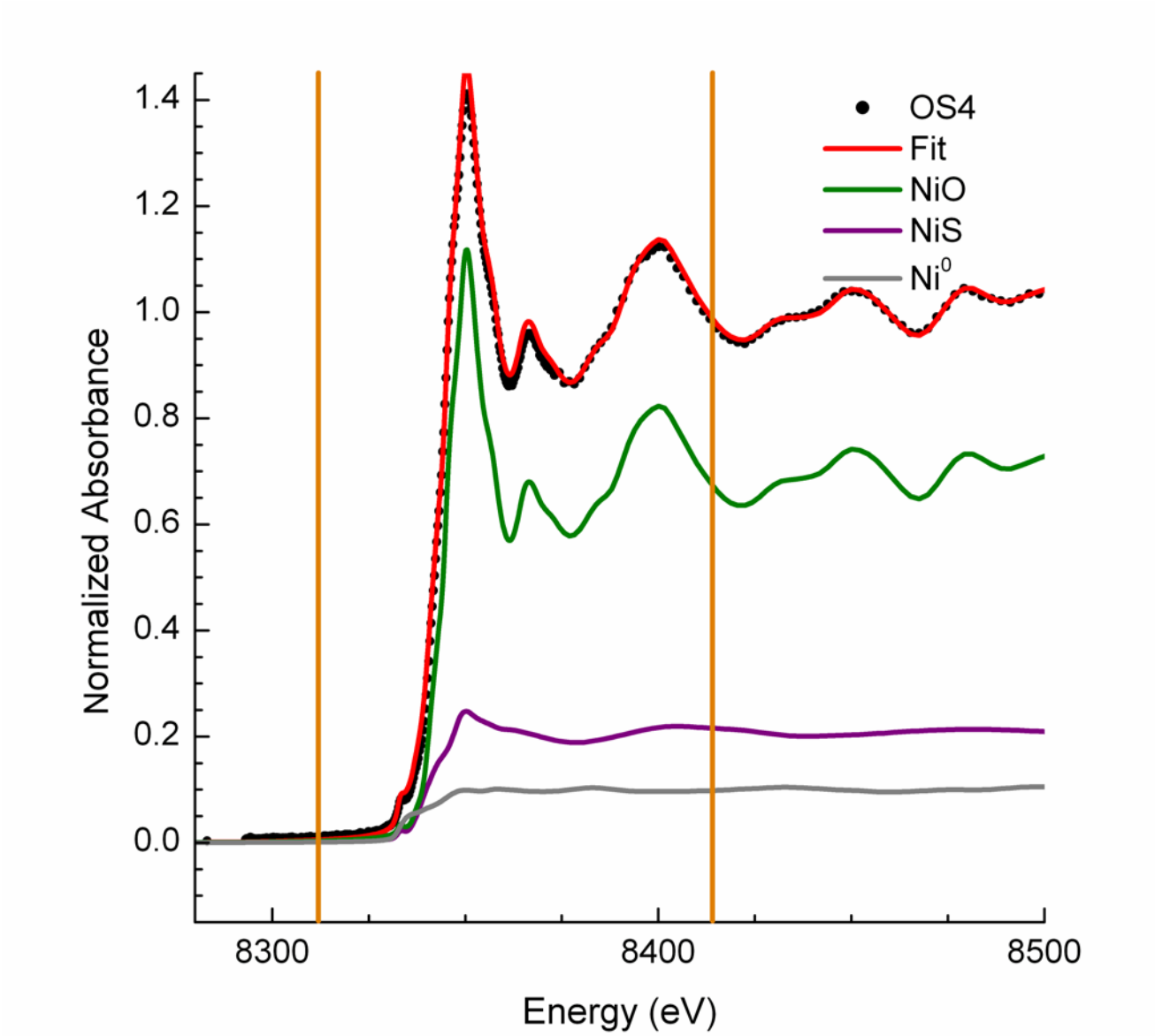

Figure OS4. Nickel K-edge XANES spectrum of Oxidic/Sulphidic sample OS4 is shown as black dots. The LC fit is shown in red. The component spectra of NiO, NiS and Ni^0 are shown in green, purple and grey respectively. The orange bars indicate the LC fitting range.

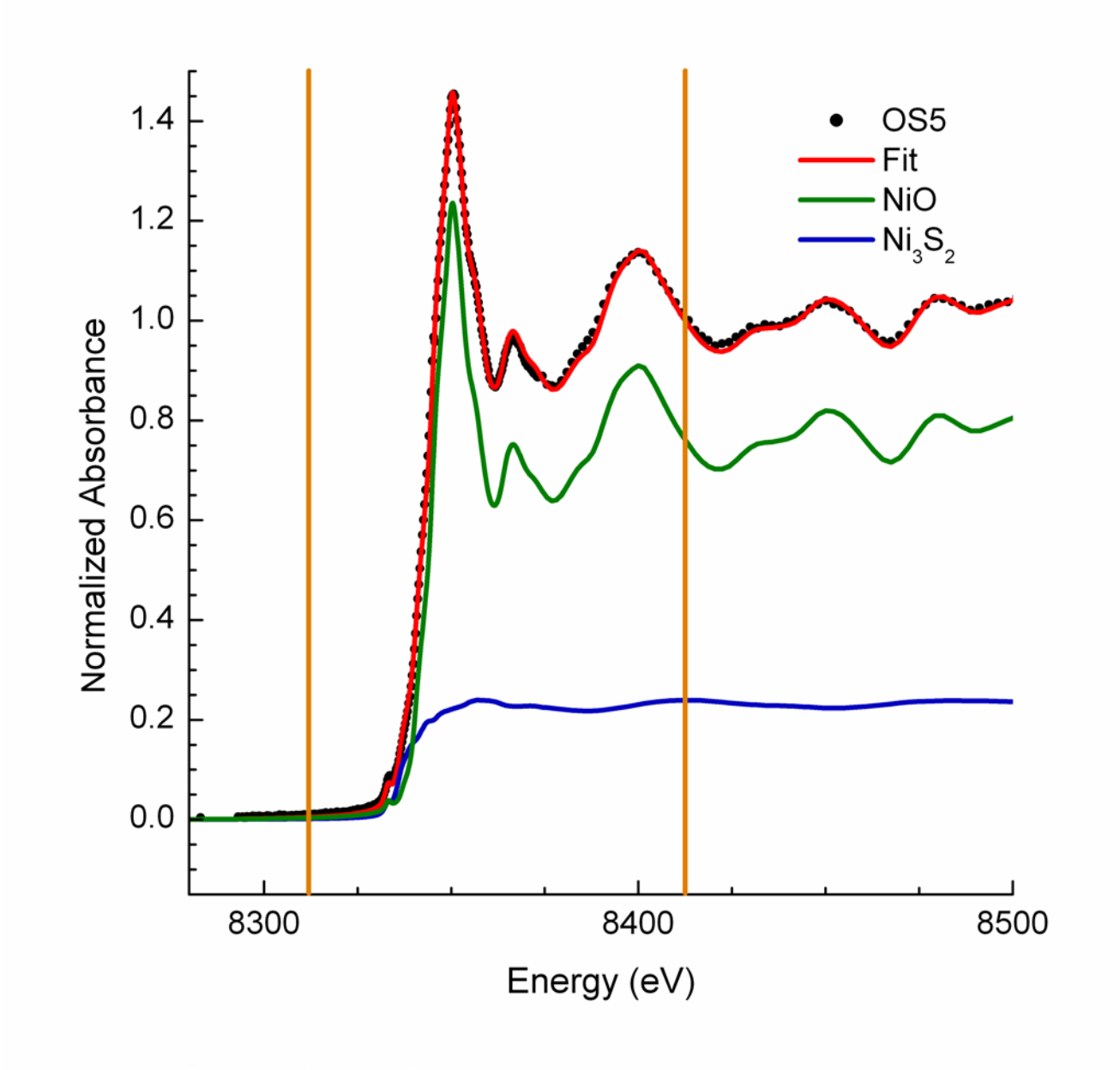

Figure OS5. Nickel K-edge XANES spectrum of Oxidic/Sulphidic sample OS5 is shown as black dots. The LC fit is shown in red. The component spectra of NiO and Ni_3S_2 are shown in green and blue respectively. The orange bars indicate the LC fitting range.

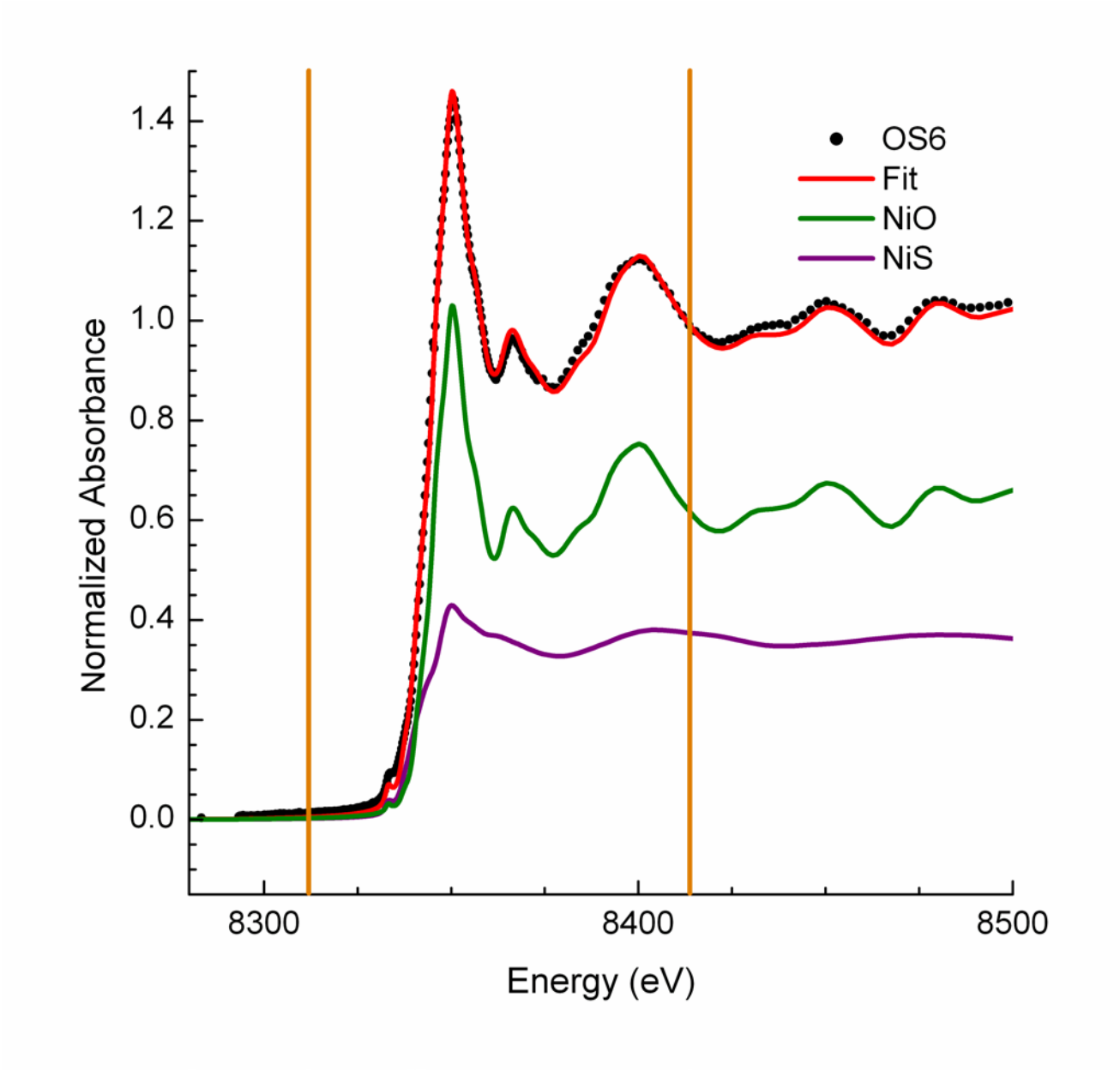

Figure OS6. Nickel K-edge XANES spectrum of Oxidic/Sulphidic sample OS6 is shown as black dots. The LC fit is shown in red. The component spectra of NiO and NiS are shown in green and purple respectively. The orange bars indicate the LC fitting range.

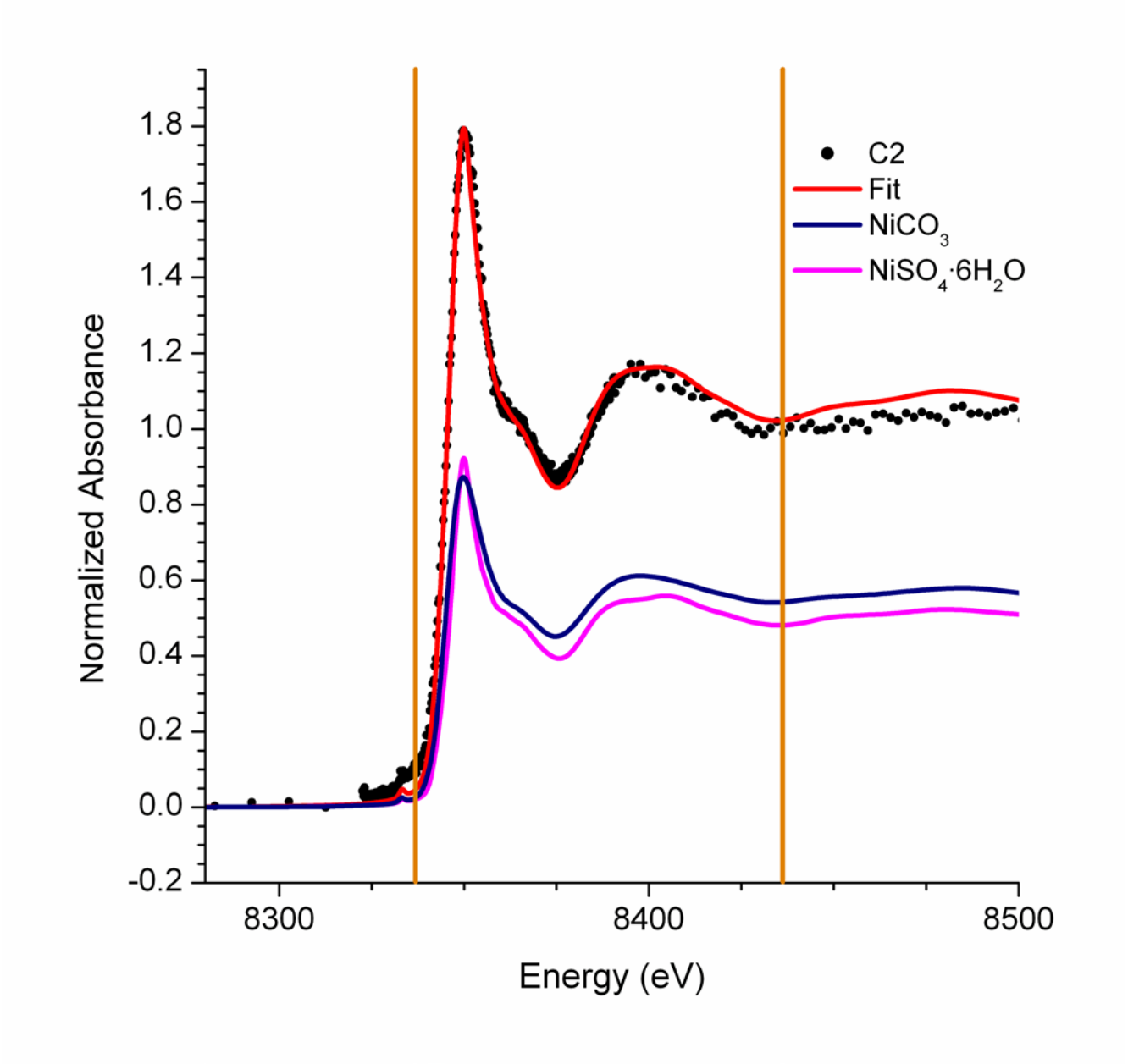

Figure C2. Nickel K-edge XANES spectrum of Carbonate sample C2 is shown as black dots. The LC fit is shown in red. The component spectra of $NiCO_3$ and $NiSO_4 \cdot 6H_2O$ are shown in navy and pink respectively. The orange bars indicate the LC fitting range.

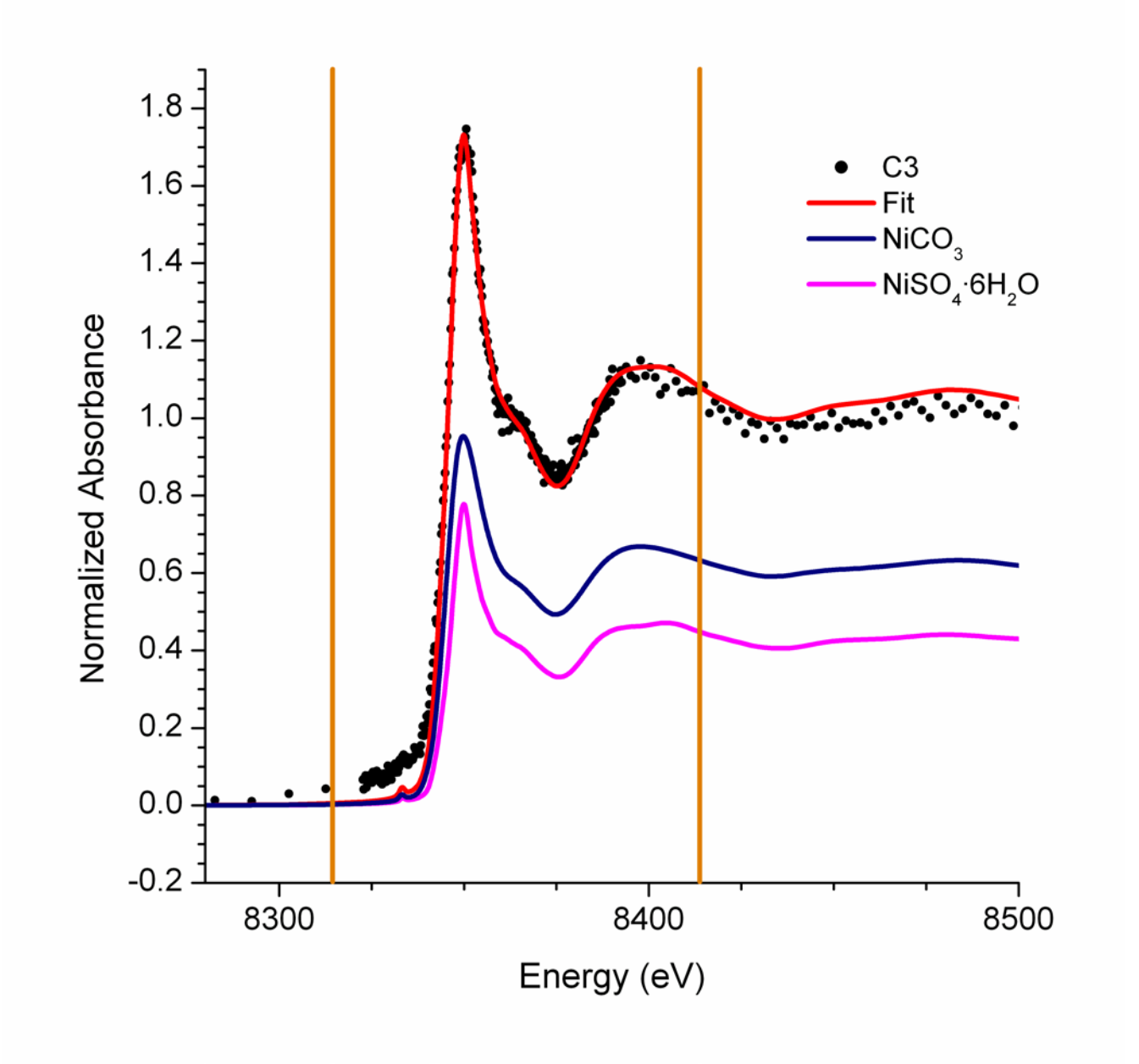

Figure C3. Nickel K-edge XANES spectrum of Carbonate sample C3 is shown as black dots. The LC fit is shown in red. The component spectra of $NiCO_3$ and $NiSO_4 \cdot 6H_2O$ are shown in navy and pink respectively. The orange bars indicate the LC fitting range.

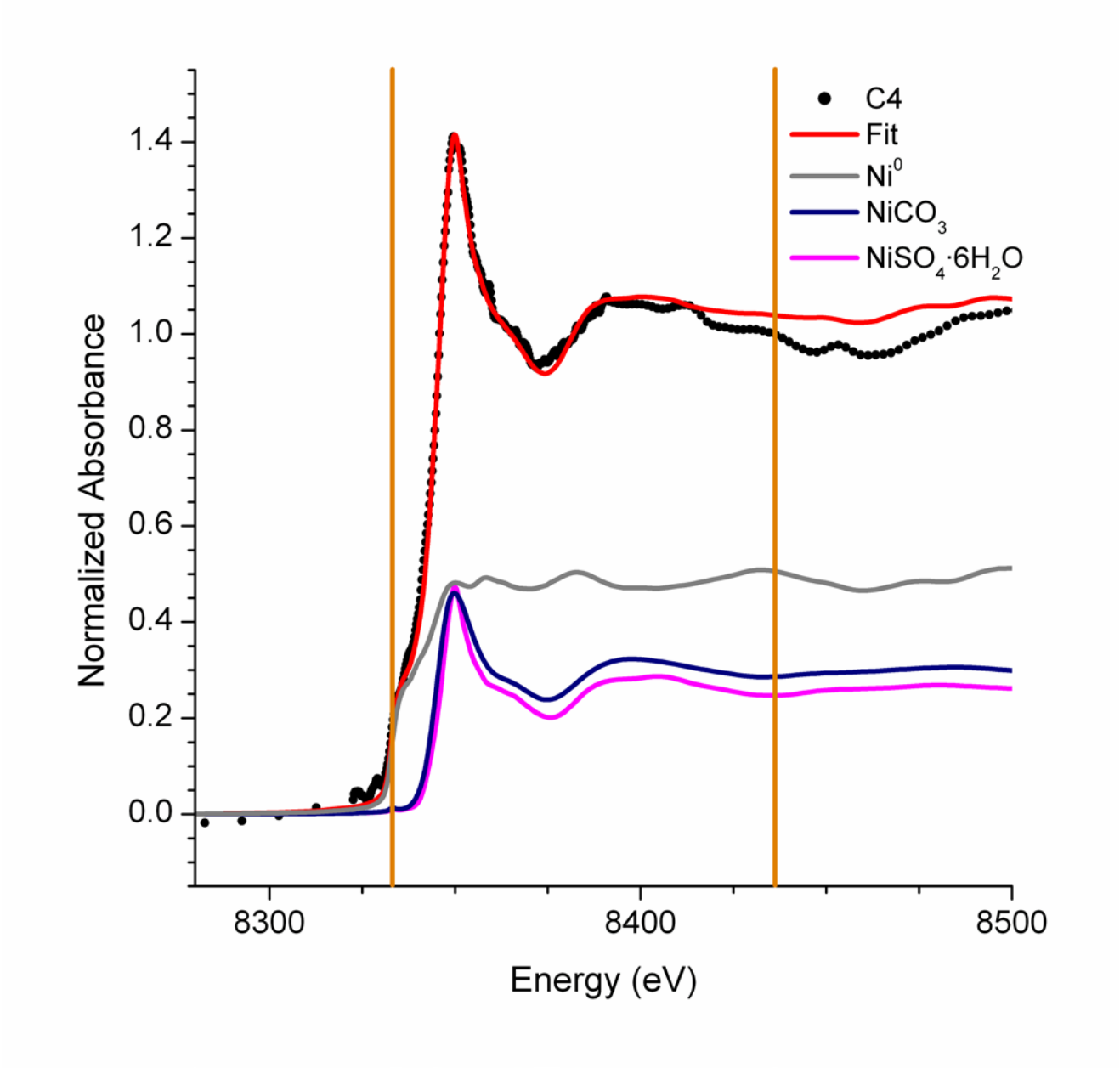

Figure C4. Nickel K-edge XANES spectrum of Carbonate sample C4 is shown as black dots. The LC fit is shown in red. The component spectra of $NiCO_3$ and $NiSO_4 \cdot 6H_2O$ are shown in navy and pink respectively. The orange bars indicate the LC fitting range.

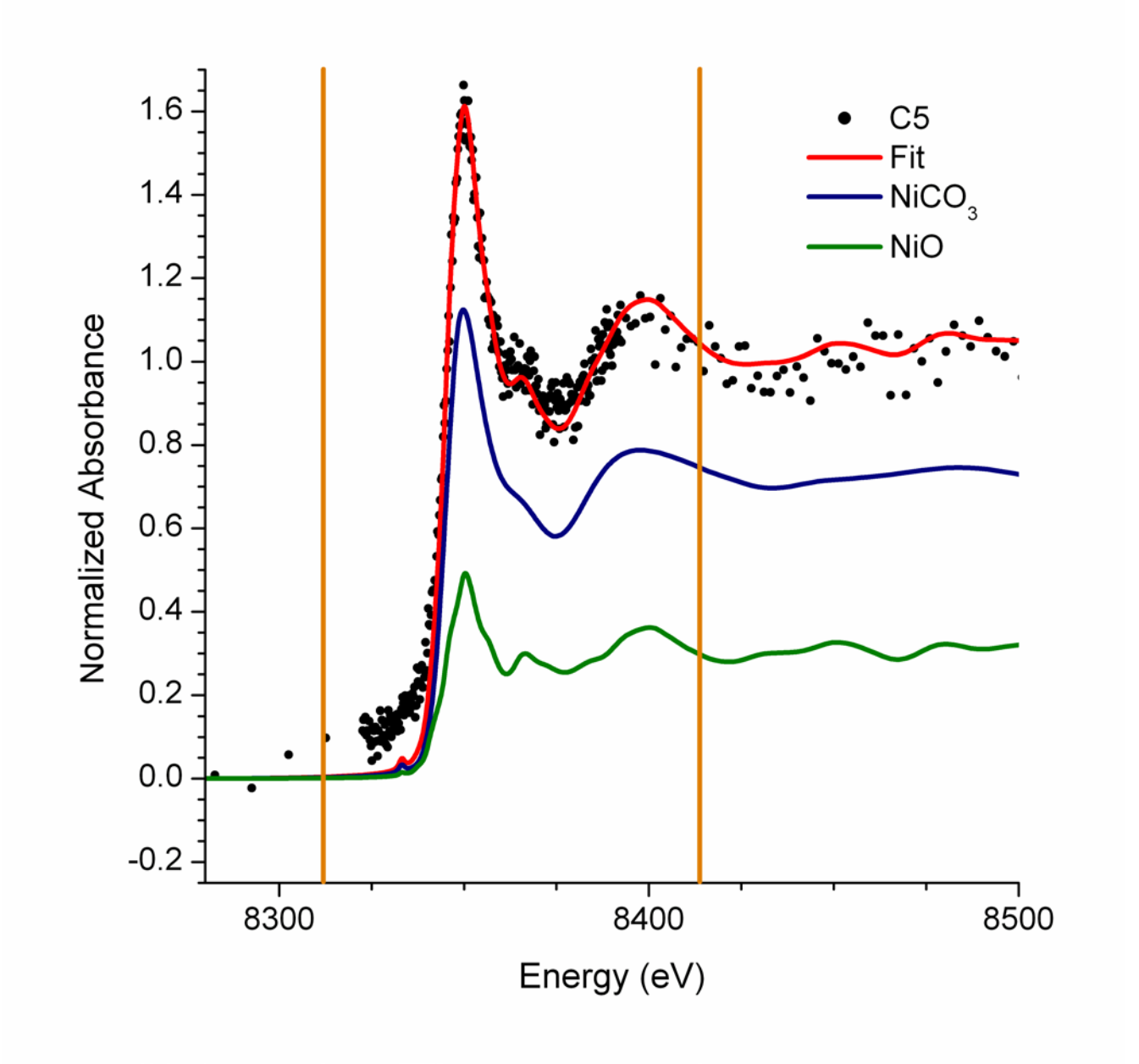

Figure C5. Nickel K-edge XANES spectrum of Carbonate sample C5 is shown as black dots. The LC fit is shown in red. The component spectra of $NiCO_3$ and NiO are shown in navy and green respectively. The orange bars indicate the LC fitting range.

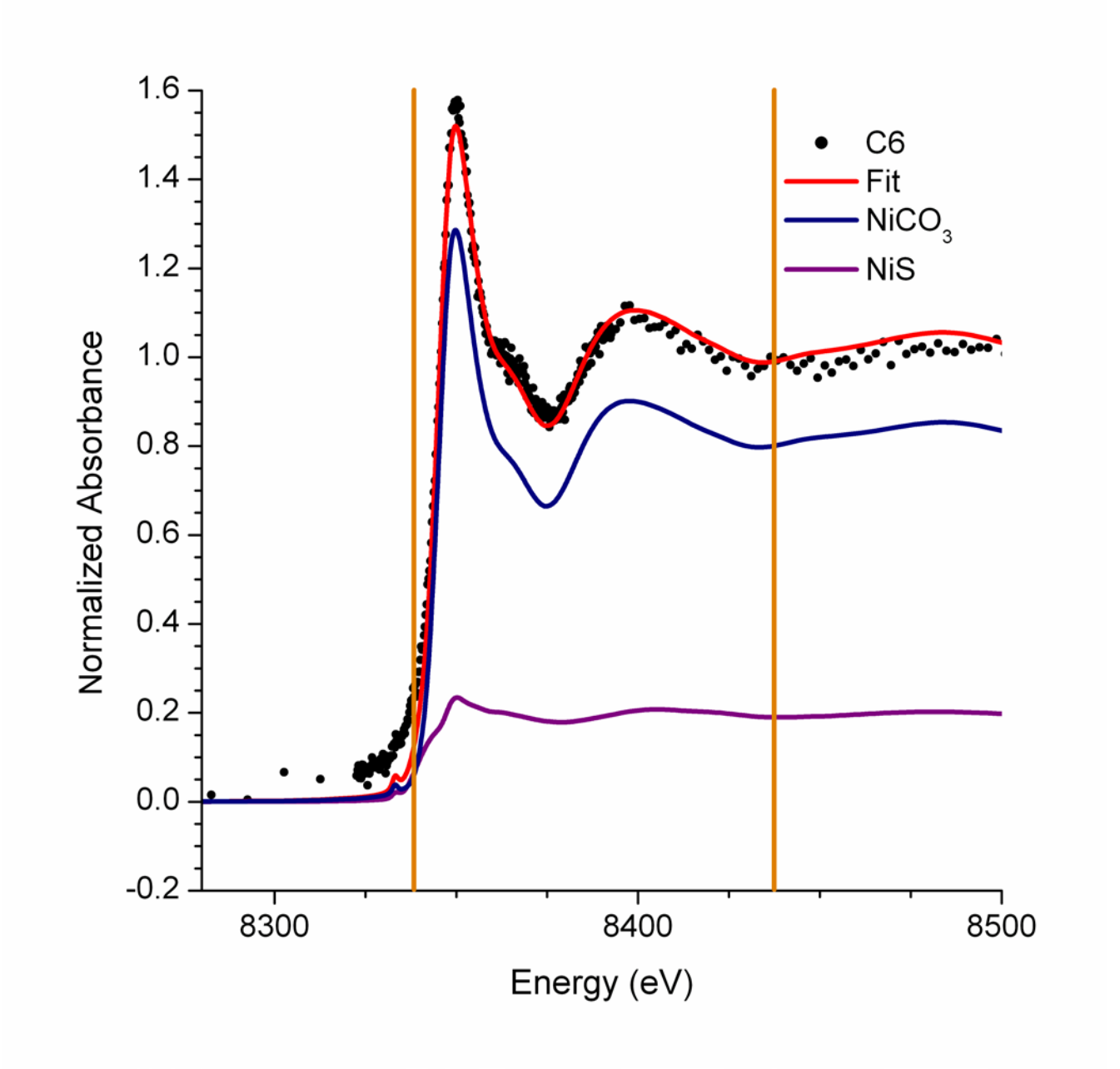

Figure C6. Nickel K-edge XANES spectrum of Carbonate sample C6 is shown as black dots. The LC fit is shown in red. The component spectra of $NiCO_3$ and NiS are shown in navy and purple respectively. The orange bars indicate the LC fitting range.

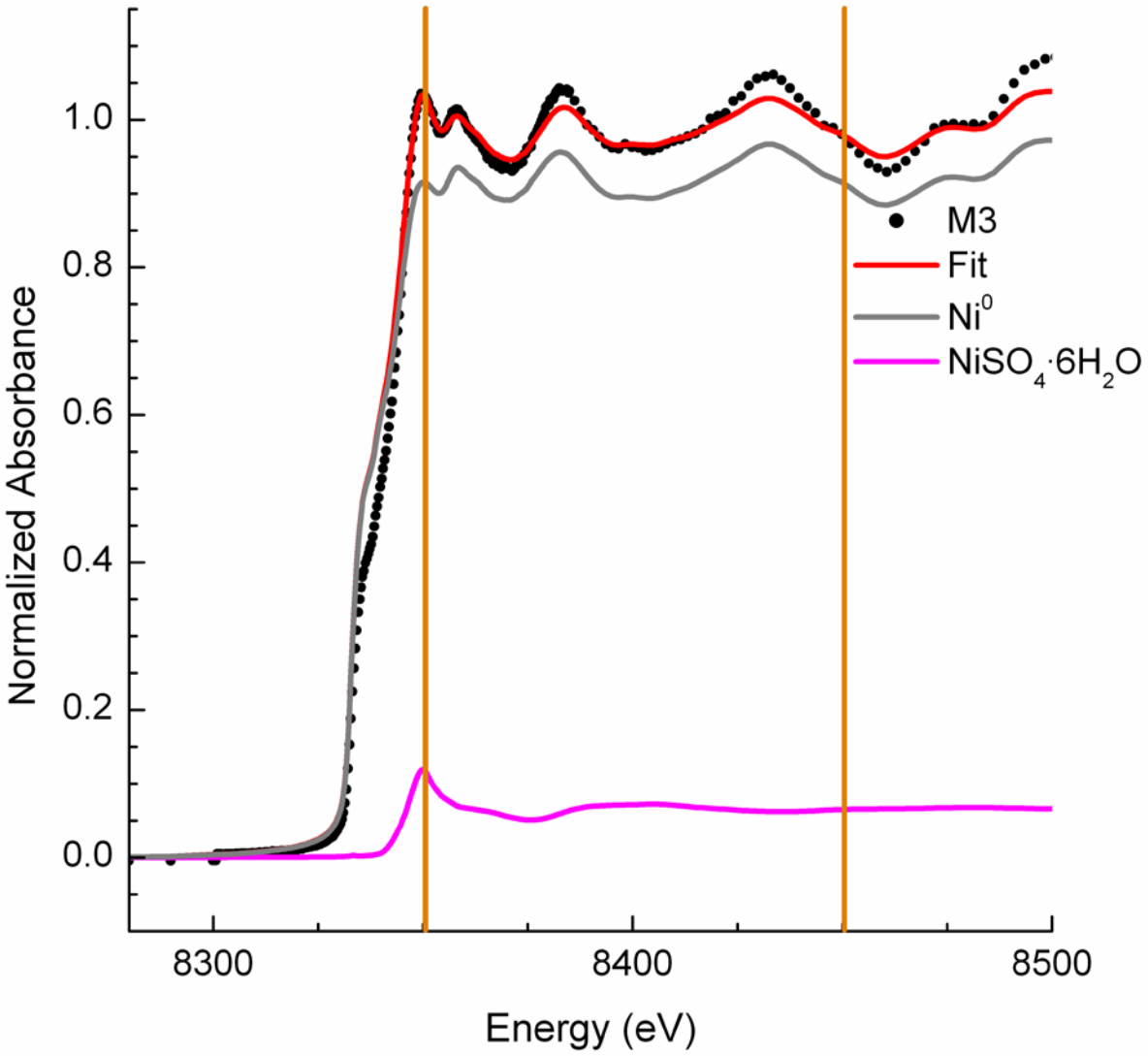

Figure M3. Nickel K-edge XANES spectrum of Metallic sample M3 is shown as black dots. The LC fit is shown in red. The component spectra of Ni^0 and $NiSO_4 \cdot 6H_2O$ are shown in grey and pink respectively. The orange bars indicate the LC fitting range.

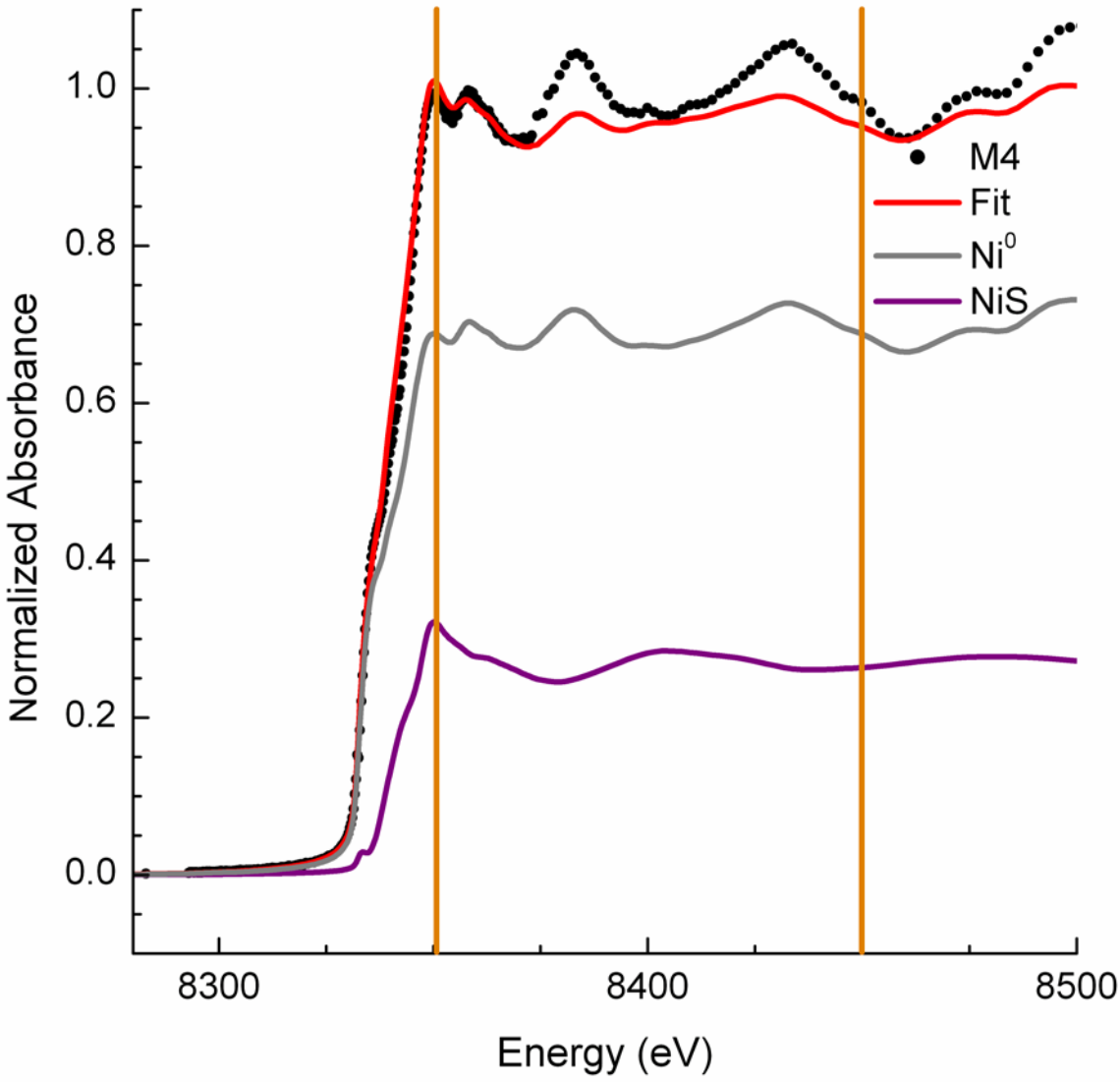

Figure M4. Nickel K-edge XANES spectrum of Metallic sample M4 is shown as black dots. The LC fit is shown in red. The component spectra of Ni^0 and $NiSO_4 \cdot 6H_2O$ are shown in grey and pink respectively. The orange bars indicate the LC fitting range.

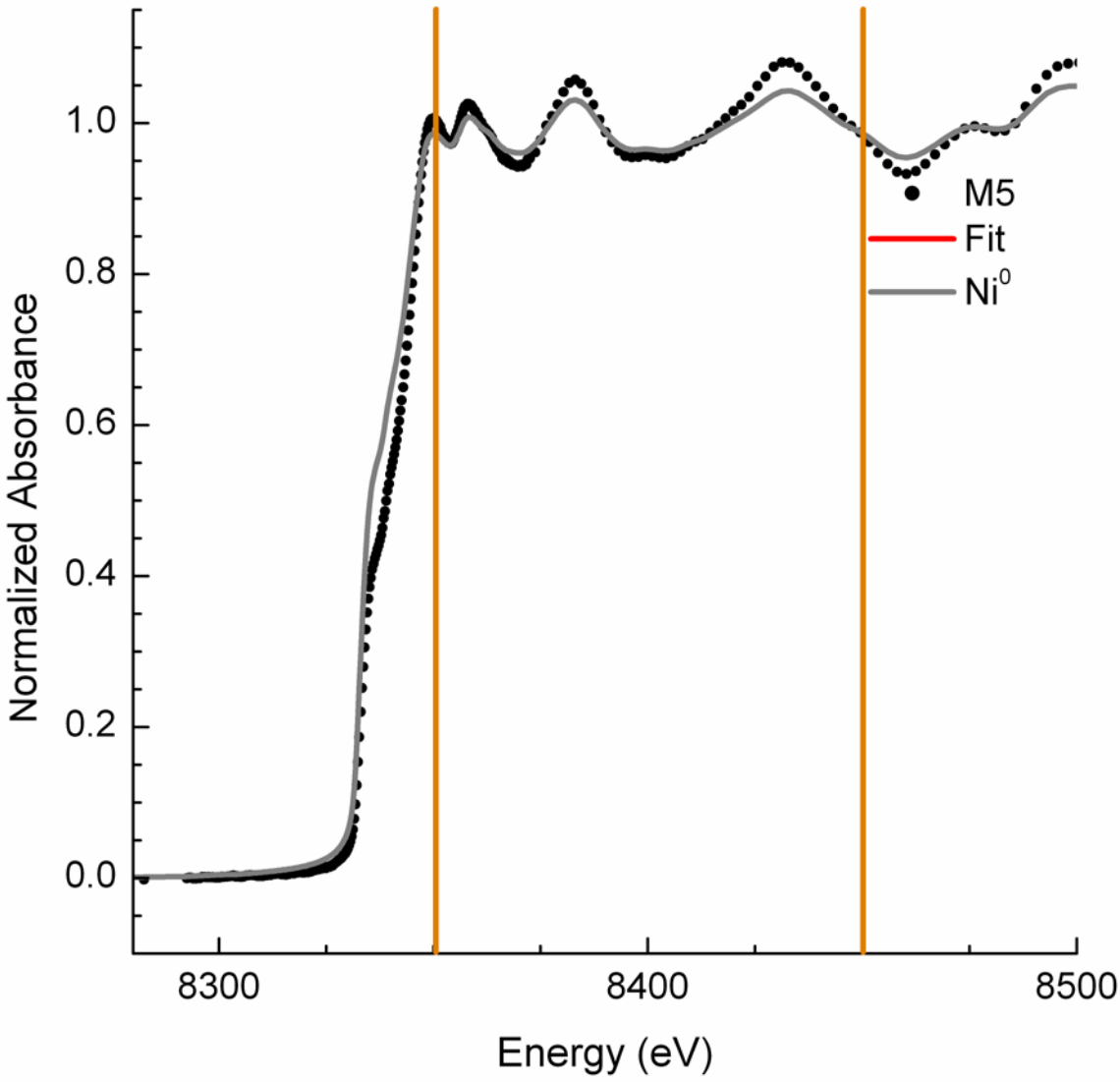

Figure M5. Nickel K-edge XANES spectrum of Metallic sample M5 is shown as black dots. The LC fit is shown in red. The component spectrum of Ni^0 is shown in grey. The orange bars indicate the LC fitting range.

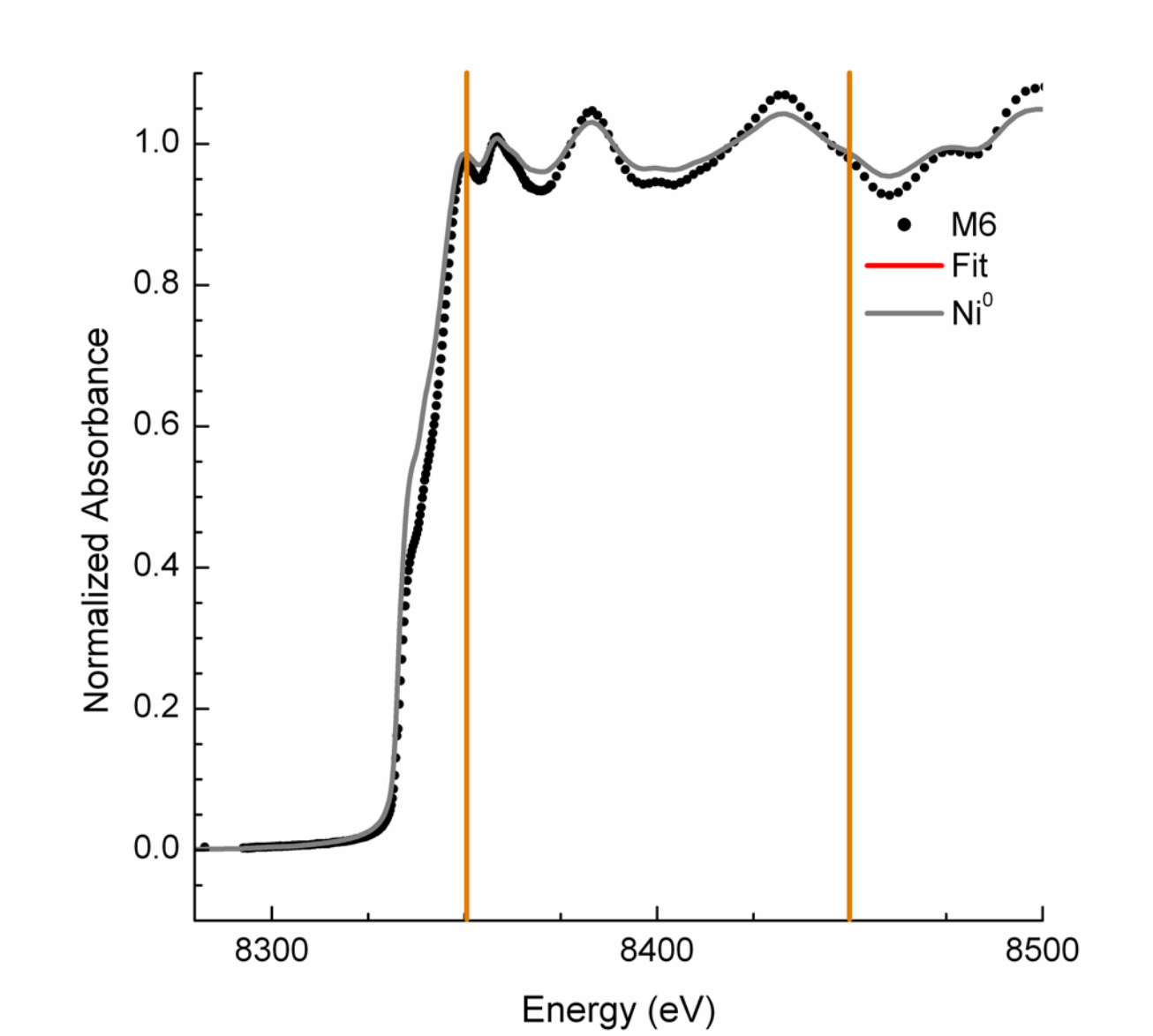

Figure M6. Nickel K-edge XANES spectrum of Metallic sample M6 is shown as black dots. The LC fit is shown in red. The component spectrum of Ni^0 is shown in grey. The orange bars indicate the LC fitting range.

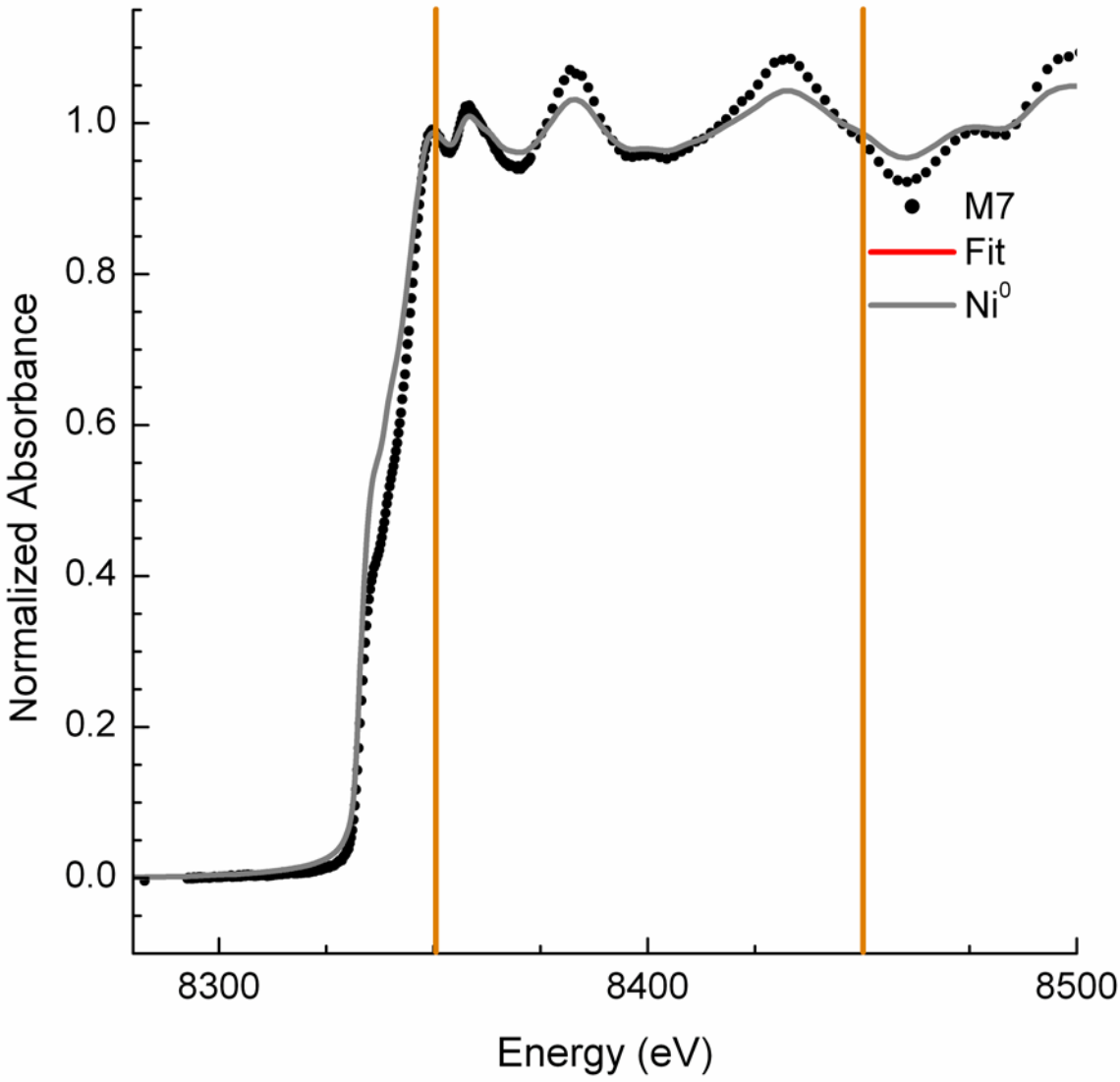

Figure M7. Nickel K-edge XANES spectrum of Metallic sample M7 is shown as black dots. The LC fit is shown in red. The component spectrum of Ni^0 is shown in grey. The orange bars indicate the LC fitting range.

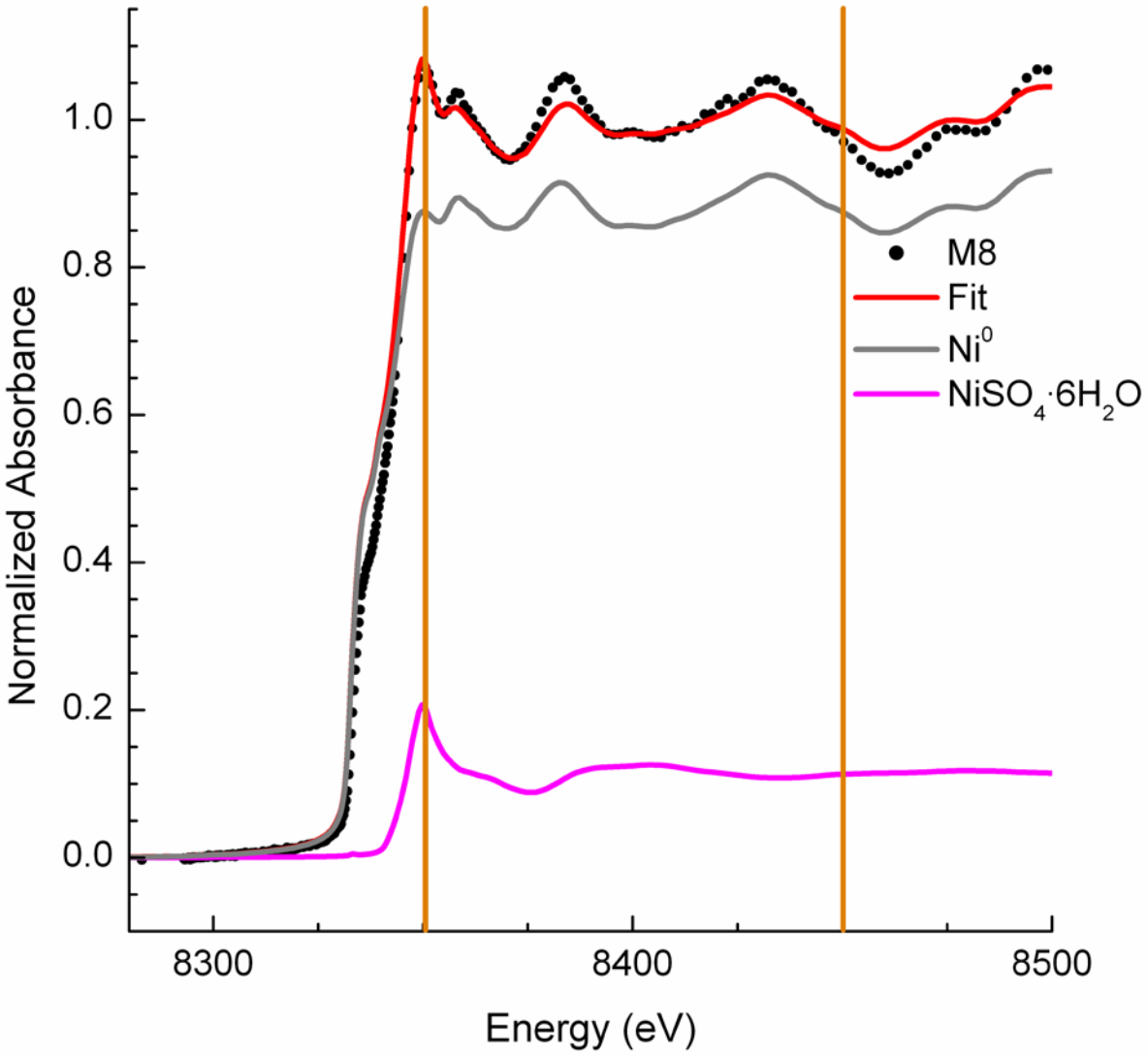

Figure M8. Nickel K-edge XANES spectrum of Metallic sample M8 is shown as black dots. The LC fit is shown in red. The component spectra of Ni^0 and $NiSO_4 \cdot 6H_2O$ are shown in grey and pink respectively. The orange bars indicate the LC fitting range.

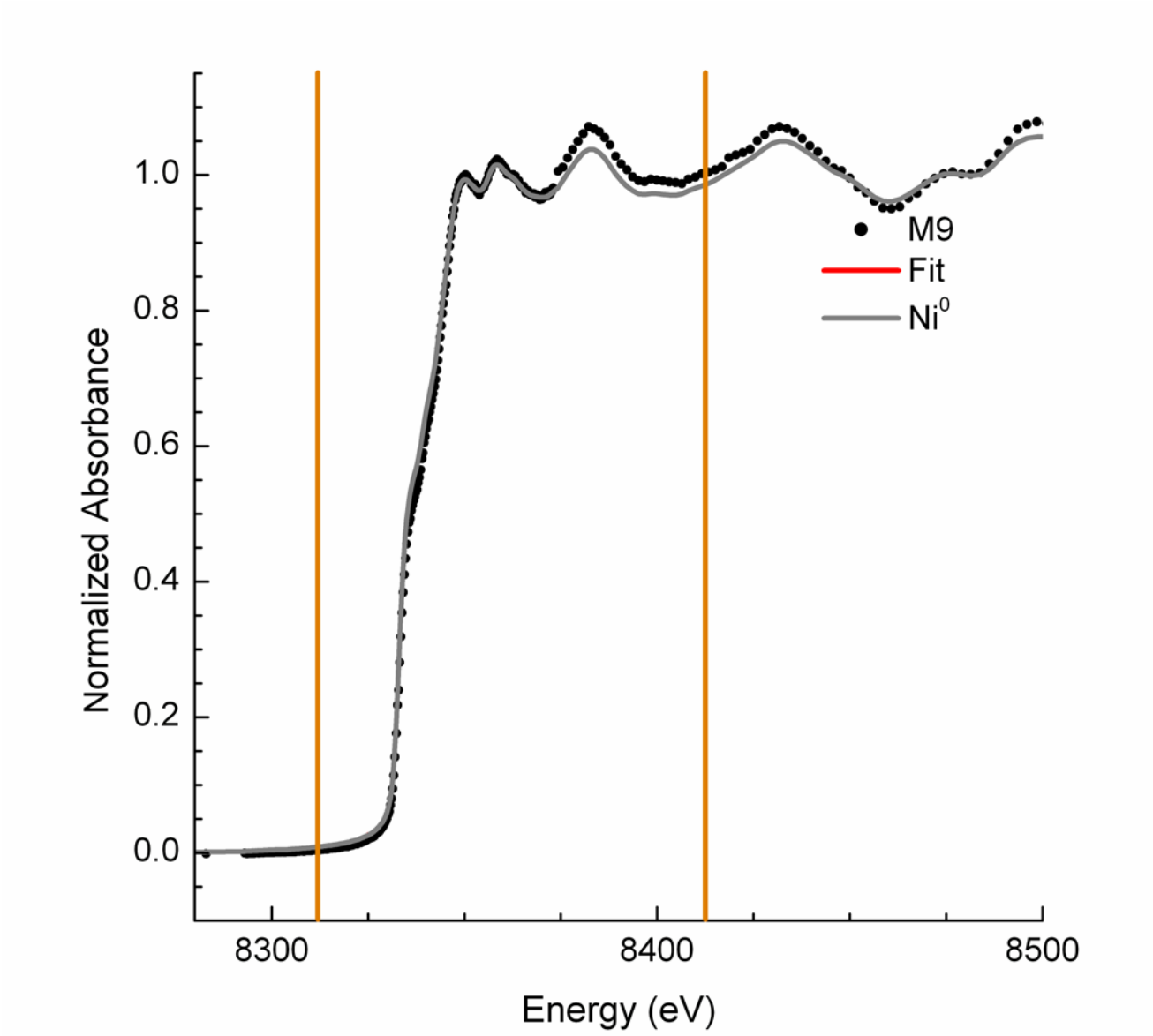

Figure M9. Nickel K-edge XANES spectrum of Metallic sample M9 is shown as black dots. The LC fit is shown in red. The component spectrum of Ni^0 is shown in grey. The orange bars indicate the LC fitting range

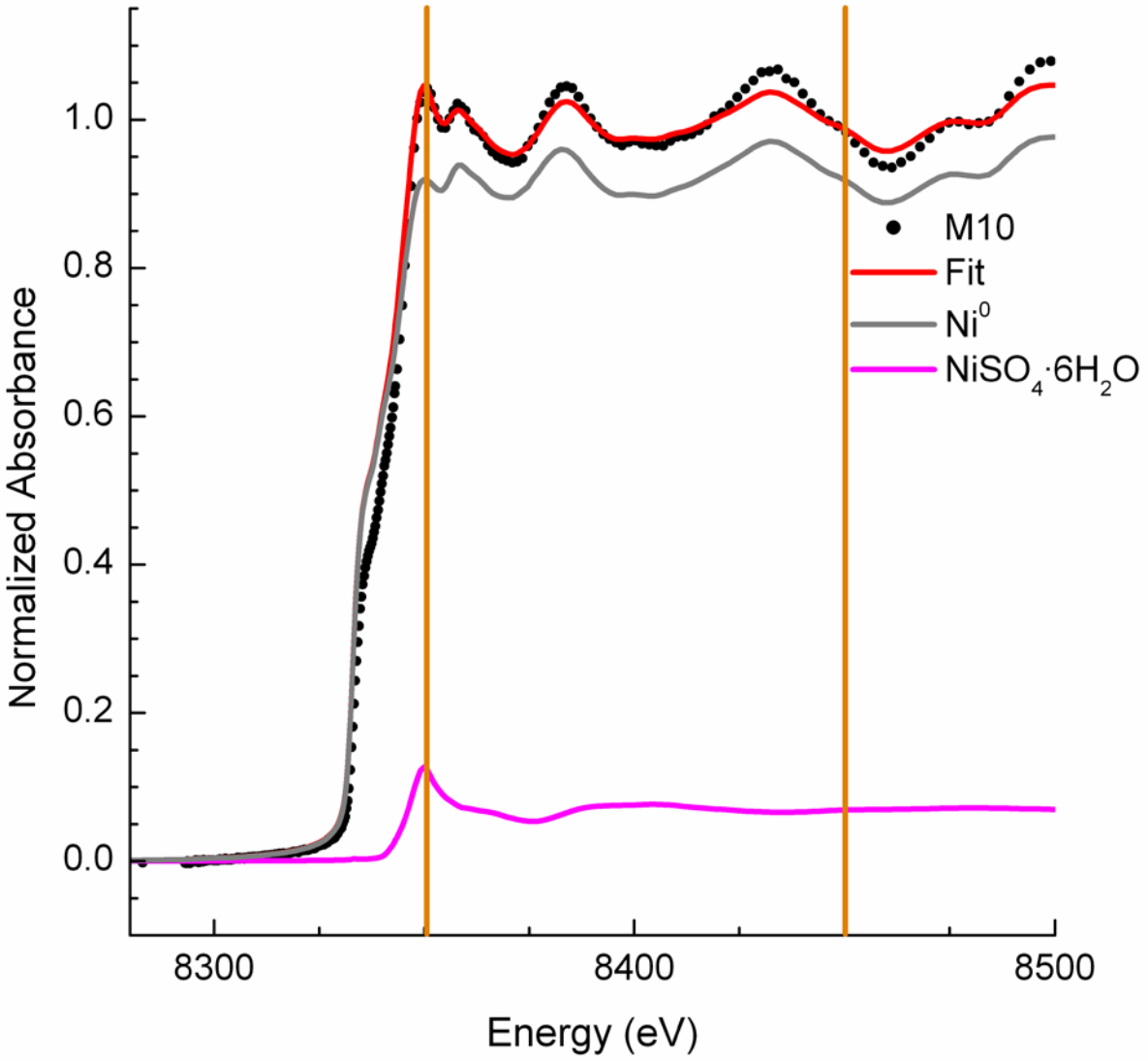

Figure M10. Nickel K-edge XANES spectrum of Metallic sample M10 is shown as black dots. The LC fit is shown in red. The component spectra of Ni^0 and $NiSO_4 \cdot 6H_2O$ are shown in grey and pink respectively. The orange bars indicate the LC fitting range.

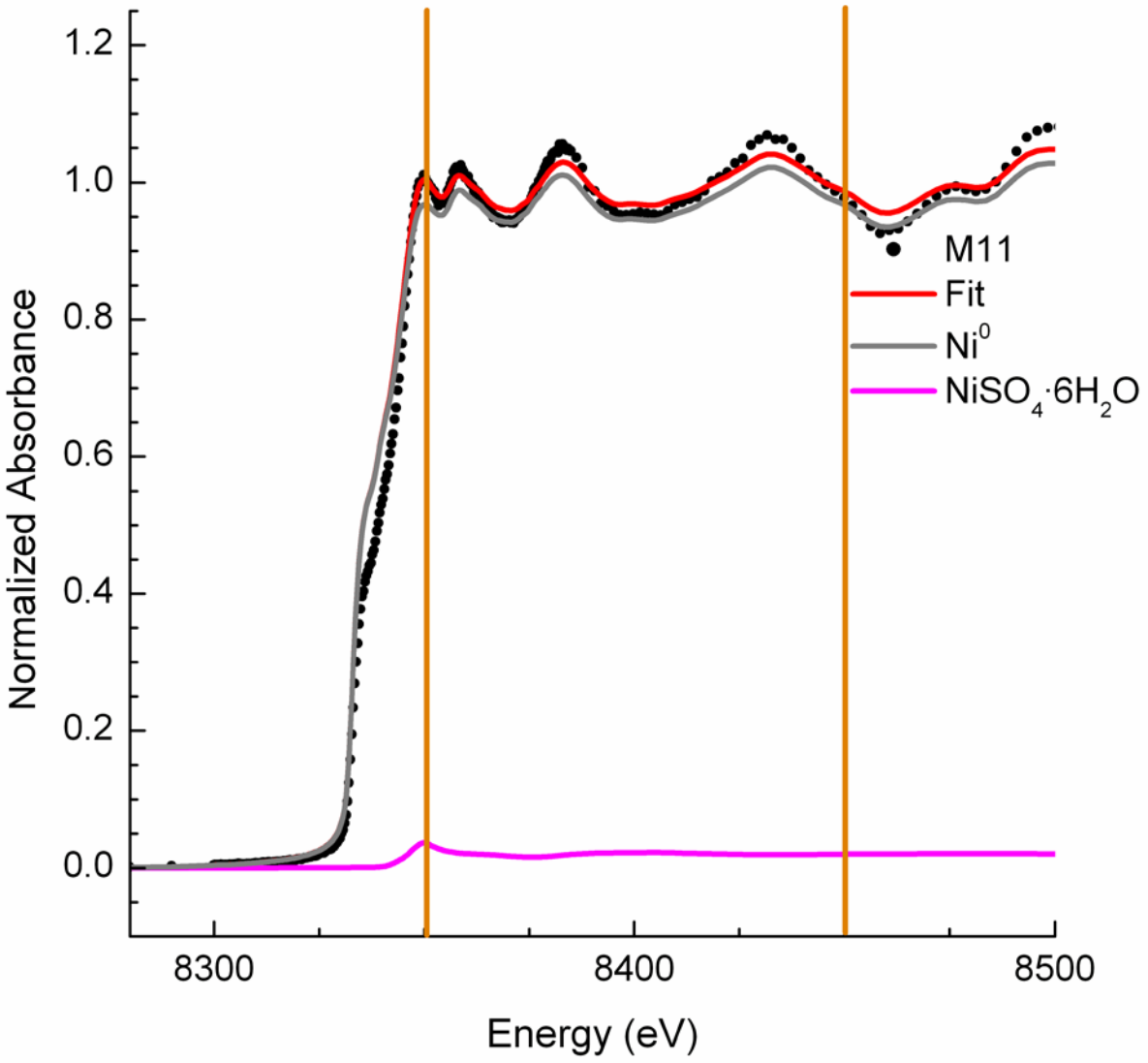

Figure M11. Nickel K-edge XANES spectrum of Metallic sample M11 is shown as black dots. The LC fit is shown in red. The component spectra of Ni^0 and $NiSO_4 \cdot 6H_2O$ are shown in grey and pink respectively. The orange bars indicate the LC fitting range.

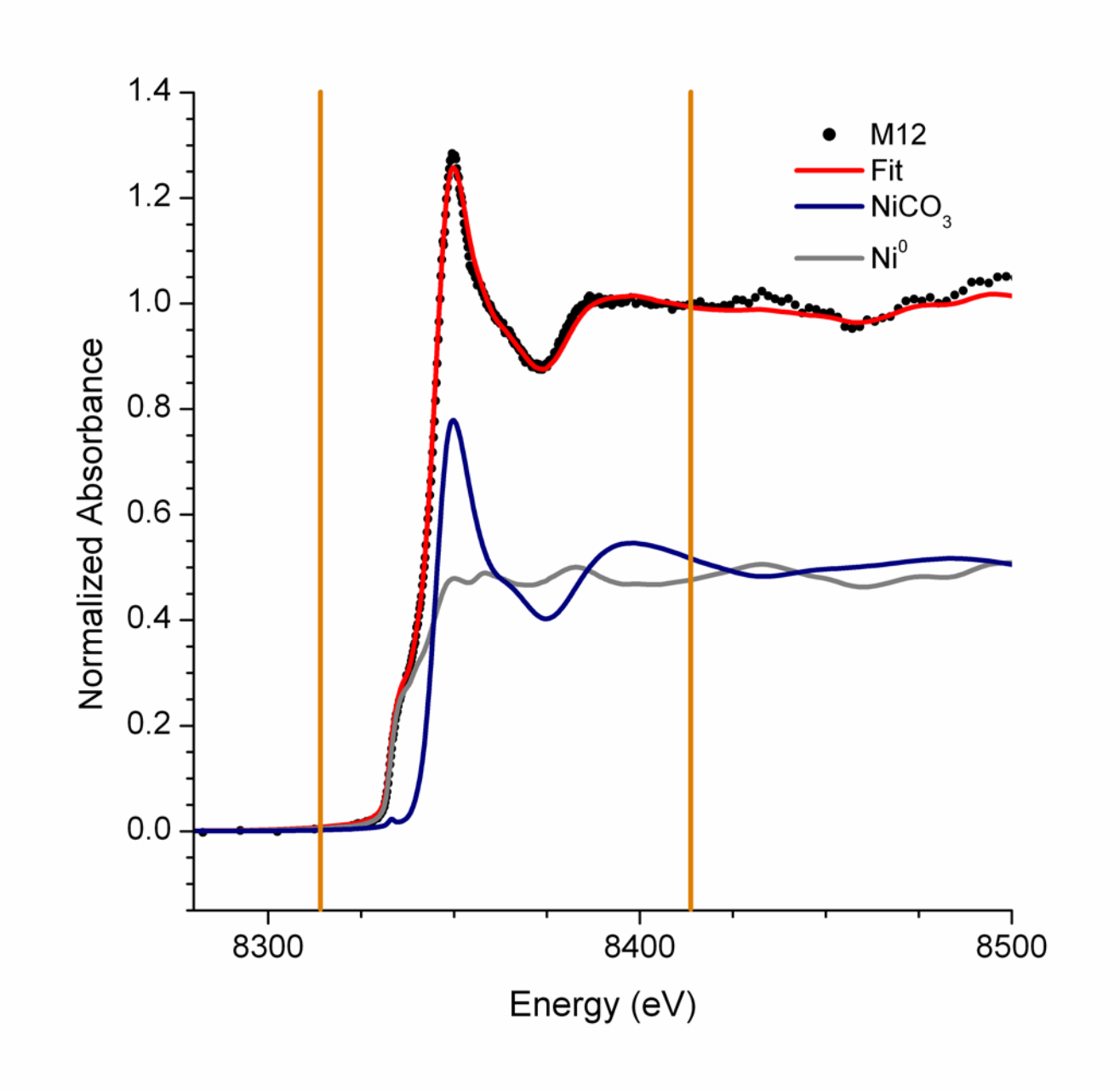

Figure M12. Nickel K-edge XANES spectrum of Metallic sample M12 is shown as black dots. The LC fit is shown in red. The component spectra of $NiCO_3$ and Ni^0 are shown in navy and grey respectively. The orange bars indicate the LC fitting range.

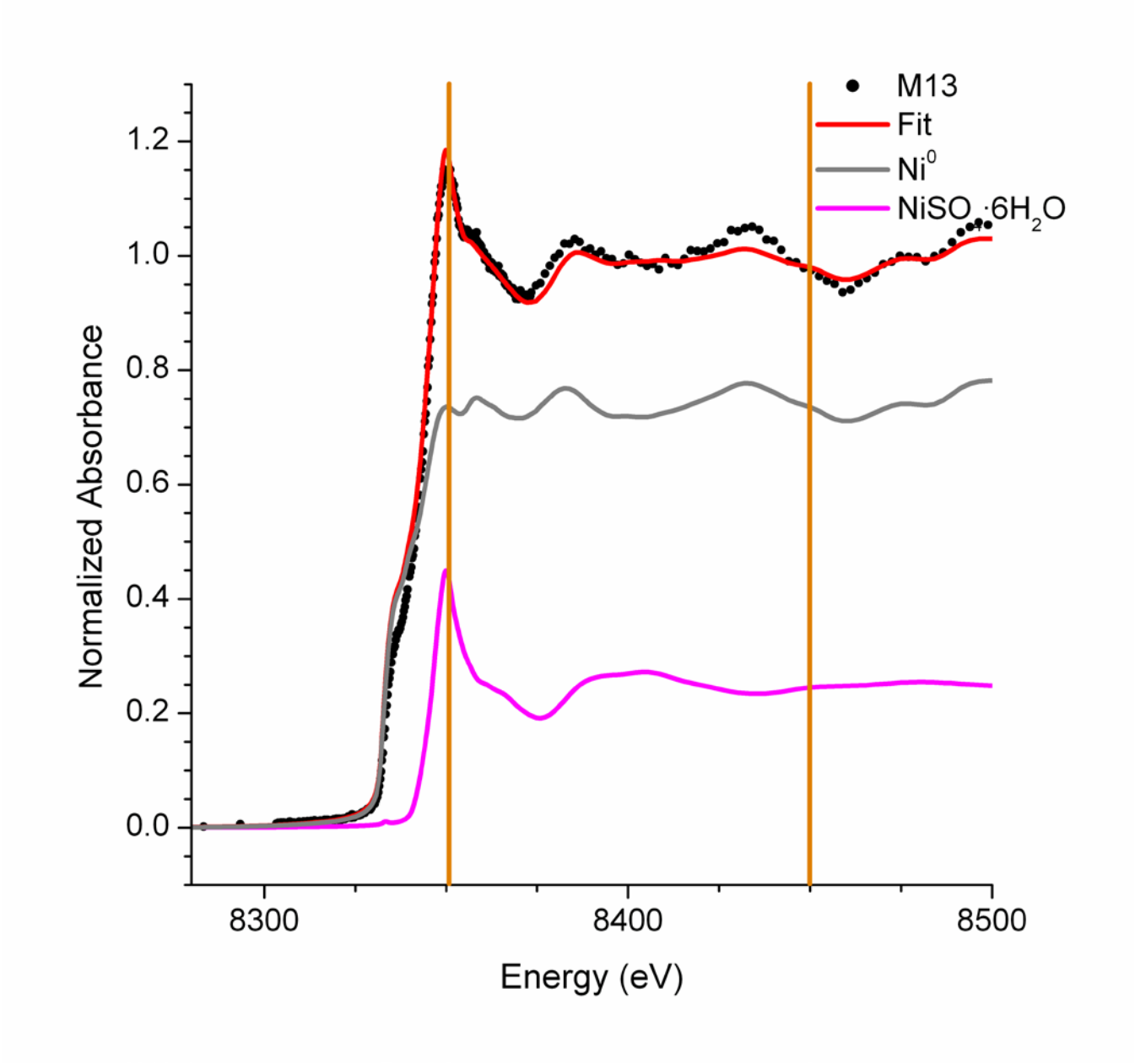

Figure M13. Nickel K-edge XANES spectrum of Metallic sample M13 is shown as black dots. The LC fit is shown in red. The component spectra of Ni^0 and $NiCO_3$ are shown in grey and navy respectively. The orange bars indicate the LC fitting range.

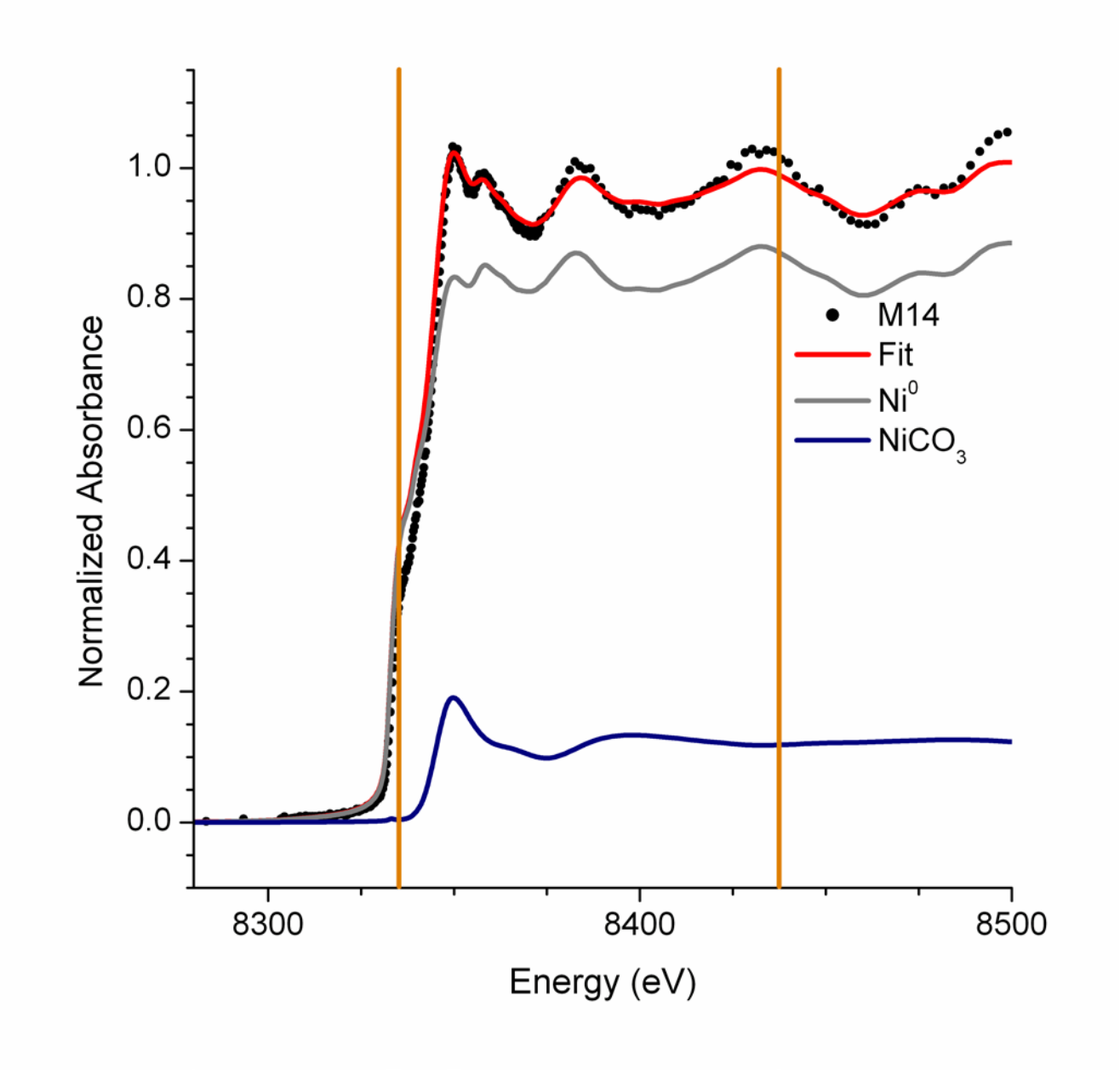

Figure M14. Nickel K-edge XANES spectrum of Metallic sample M14 is shown as black dots. The LC fit is shown in red. The component spectra of Ni^0 and $NiCO_3$ are shown in grey and navy respectively. The orange bars indicate the LC fitting range.

Filter	Sampling Date	Plant	Building	Sampling Location	Zatka Sequential Extraction Results								
					Soluble	Sulphidic	Metallic	Oxidic	Sum	Soluble	Sulphidic	Metallic	Oxidic
					reported as mg/m3					Component Percentage (%)			
S1	February-05-08	Smelter	Separation	Jumbo Cells	0.0076	0.0440	0.0029	0.0039	**0.0584**	13.00	**75.28**	4.96	6.76
S2	February-19-08	Smelter	Separation	Jumbo Cells	0.0121	0.0581	0.0063	0.0052	**0.0817**	14.80	**71.08**	7.70	6.42
S3	February-26-08	Smelter	Separation	Jumbo Cells	0.0267	0.1250	0.0026	0.0055	**0.1597**	16.71	**78.25**	1.60	3.43
S4	February-05-08	Smelter	Separation	Ground Flr Ba	0.0237	0.1180	0.0029	0.0070	**0.1516**	15.63	**77.82**	1.91	4.64
S5	February-19-08	Smelter	Separation	Ground Flr Ba	0.0073	0.0415	0.0010	0.0065	**0.0563**	12.94	**73.66**	1.79	11.61
S6	February-26-08	Smelter	Separation	Ground Flr Ball Mills 2a&2B	0.0810	0.2990	0.0071	0.0106	**0.3977**	20.37	**75.18**	1.79	2.67
S7	February-11-08	Smelter	Casting	#89 Control R	0.0052	0.0271	0.0012	0.0061	**0.0396**	13.17	**68.50**	2.98	15.34
S8	February-27-08	Smelter	Casting	#89 Control R	0.0901	0.7960	0.0127	0.0220	**0.9208**	9.78	**86.45**	1.38	2.39
S9	March-24-08	Smelter	Casting	#89 Control R	0.0225	0.2170	0.0053	0.0127	**0.2575**	8.74	**84.27**	2.06	4.93
S10	December-13-07	CCNR	NRC	Track Hopper	0.005	0.0209	0.0026	0.005	**0.0335**	14.93	**62.39**	7.76	14.93
S11	December-20-07	CCNR	NRC	Track Hopper	0.0069	0.0261	0.0052	0.0408	**0.0790**	8.73	33.04	6.58	**51.65**
S12	January-14-08	CCNR	NRC	Track Hopper	0.0072	0.0752	0.0102	0.0102	**0.1028**	7.00	**73.15**	9.92	9.92
S13	January-22-08	CCNR	NRC	Track Hopper	0.0141	0.0569	0.0044	0.0064	**0.0818**	17.24	**69.59**	5.38	7.79
O1	February-05-08	Smelter	Shipping	FEN Bulk Loa	0.0014	0.0052	0.0005	0.0561	**0.0632**	2.21	8.29	0.79	**88.71**
O2	February-11-08	Smelter	Shipping	FEN Bulk Loa	0.0012	0.0039	0.0005	0.0757	**0.0814**	1.54	4.84	0.59	**93.03**
O3	February-19-08	Smelter	Shipping	FEN Bulk Loading	0.0014	0.0045	0.0019	0.0966	**0.1045**	1.38	4.32	1.82	**92.48**
O4	November-15-07	CCNR	NRC	Clydach Landing	0.0044	0.0099	0.0023	0.0201	**0.0367**	11.99	26.98	6.27	**54.77**
O5	January-03-08	CCNR	NRC	Clydach Landing	0.0153	0.0277	0.0063	0.0367	**0.0860**	17.79	32.21	7.33	**42.67**
O6	January-08-07	CCNR	NRC	Clydach Landing	0.0021	0.005	0.001	0.0107	**0.0188**	11.17	26.60	5.32	**56.91**
O7	January-14-08	CCNR	NRC	Clydach Landing	0.0044	0.0185	0.0031	0.0258	**0.0518**	8.49	35.71	5.98	**49.81**
O8	December-20-07	CCNR	NRC	Clydach Landing	0.0096	0.0087	0.0026	0.0217	**0.0426**	22.54	20.42	6.10	**50.94**
OS1	November-15-07	CCNR	NRC	Behind Converters - '944	0.0087	0.0092	0.0055	0.061	**0.0844**	10.31	10.90	6.52	**72.27**
OS2	January-03-07	CCNR	NRC	Behind Converters - '944	0.0048	0.0068	0.0028	0.0395	**0.0539**	8.91	12.62	5.19	**73.28**
OS3	January-08-08	CCNR	NRC	Behind Converters - '944	0.0031	0.0053	0.0051	0.0531	**0.0666**	4.65	7.97	7.66	**79.72**
OS4	January-24-08	CCNR	NRC	Behind Converters - '944	0.0026	0.0039	0.0011	0.0348	**0.0424**	6.13	9.26	2.59	**82.02**
OS5	January-22-08	CCNR	NRC	#17 Charging Conveyors	0.0032	0.0052	0.0008	0.0220	**0.0312**	10.27	16.59	2.57	**70.58**
OS6	January-24-08	CCNR	NRC	#17 Charging Conveyors	0.0042	0.0034	0.0007	0.0196	**0.0279**	15.06	12.12	2.51	**70.30**
OS7	February-11-08	Smelter	FBR	#2 Gatefeeder	0.0276	0.2090	0.0133	0.1730	**0.4229**	6.53	**49.42**	3.14	40.91
OS8	February-26-08	Smelter	FBR	#2 Gatefeeder	0.0522	0.3980	0.0079	0.4700	**0.9281**	5.62	42.88	0.86	**50.64**
OS9	February-27-08	Smelter	FBR	#2 Gatefeeder	0.0108	0.0585	0.0034	0.0789	**0.1516**	7.12	38.59	2.24	**52.05**
M12	November-13-07	CCNR	IPC	#1 Local Powder Packaging	0.0011	0.0025	0.0035	0.0214	**0.0285**	3.86	8.77	12.28	**75.09**
M1	November-26-07	CCNR	IPC	#1 Local Powder Packaging	0.0007	0.0009	0.0023	0.0113	**0.0152**	4.61	5.92	15.13	**74.34**
M2	November-28-07	CCNR	IPC	#1 Local Powder Packaging	0.0017	0.001	0.0086	0.0379	**0.0492**	3.46	2.03	17.48	**77.03**
M3	November-28-07	CCNR	IPC	#7 Local Powder Pack.	0.0031	0.004	0.0069	0.0265	**0.0405**	7.65	9.88	17.04	**65.43**
M4	January-16-08	CCNR	IPC	#1 Local Powder Packaging	0.0008	0.0016	0.0025	0.0111	**0.0160**	4.99	10.11	15.61	**69.29**
M5	November-13-07	CCNR	IPC	Battery Powder Packaging	0.001	0.0016	0.0068	0.0409	**0.0503**	1.99	3.18	13.52	**81.31**
M6	November-26-07	CCNR	IPC	Battery Powder Packaging	0.0011	0.002	0.044	0.129	**0.1761**	0.62	1.14	24.99	**73.25**
M7	November-28-07	CCNR	IPC	Battery Powder Packaging	0.0008	0.0009	0.0048	0.035	**0.0415**	1.93	2.17	11.57	**84.34**
M8	December-04-07	CCNR	IPC	Battery Powder Packaging	0.0013	0.0008	0.0018	0.0115	**0.0154**	8.44	5.19	11.69	**74.68**
M9	January-16-08	CCNR	IPC	Battery Powder Packaging	0.0008	0.002	0.0048	0.0531	**0.0607**	1.32	3.29	7.91	**87.48**
M10	November-27-07	CCNR	IPC	Packaging & Shipping - OSP	0.0016	0.0011	0.0056	0.0213	**0.0296**	5.41	3.72	18.92	**71.96**
M11	December-04-07	CCNR	IPC	Packaging & Shipping - OSP	0.0007	0.0014	0.0013	0.0148	**0.0182**	3.85	7.69	7.14	**81.32**
M13	May-05-08	PCR	Rounds	Automatic Shearing	0.0024	0.0014	0.0010	0.0017	**0.0065**	**36.92**	21.54	15.38	26.15
M14	May-07-08	PCR	Rounds	Automatic Shearing	0.0016	0.0012	0.0009	0.0019	**0.0056**	28.57	21.43	16.07	**33.93**
M15	May-09-08	PCR	Rounds	Automatic Shearing	0.0014	0.0018	0.0014	0.0017	**0.0063**	22.22	**28.57**	22.22	26.98
M16	May-06-08	PCR	Rounds	Ten Kilo Bag Line	0.0063	0.0016	0.0041	0.0075	**0.0195**	32.31	8.21	21.03	**38.46**
M17	May-08-08	PCR	Rounds	Ten Kilo Bag Line	0.0066	0.0011	0.0038	0.0032	**0.0147**	**44.90**	7.48	25.85	21.77
M18	May-09-08	PCR	Rounds	Ten Kilo Bag Line	0.0041	0.0014	0.0030	0.0022	**0.0107**	**38.32**	13.08	28.04	20.56
C1	May-05-08	PCR	Cobalt	Cred Truck Unloading	0.0023	0.0013	0.0004	0.0009	**0.0049**	**46.94**	26.53	8.16	18.37
C2	May-06-08	PCR	Cobalt	Cred Truck Unloading	0.0019	0.0027	0.0009	0.0011	**0.0066**	28.79	**40.91**	13.64	16.67
C3	May-07-08	PCR	Cobalt	Cred Truck Unloading	0.0014	0.0020	0.0004	0.0010	**0.0048**	29.17	**41.67**	8.33	20.83
C4	May-05-08	PCR	Cobalt	Cobalt Precip Area	0.0012	0.0014	0.0006	0.0010	**0.0042**	28.57	**33.33**	14.29	23.81
C5	May-06-08	PCR	Cobalt	Cobalt Precip Area	0.0028	0.0014	0.0010	0.0019	**0.0071**	**39.44**	19.72	14.08	26.76
C6	May-07-08	PCR	Cobalt	Cobalt Precip Area	0.0010	0.0014	0.0009	0.0016	**0.0049**	20.41	28.57	18.37	**32.65**

Filter	Sampling Date	Plant	Building	Sampling Location	XANES Spectroscopy LCF										
					Ni3S2	NiS	NiO	Ni(0)	NiSO4.6H2O	NiCO3	Soluble	Sulphidic	Metallic	Oxidic	Carbonate
					Component Percentage (%)						Component Percentage (%)				
S1	February-05-08	Smelter	Separation	Jumbo Cells	68.00	32.00					0	100	0	0	0
S2	February-19-08	Smelter	Separation	Jumbo Cells	76.00	24.00					0	100	0	0	0
S3	February-26-08	Smelter	Separation	Jumbo Cells	100.00						0	100	0	0	0
S4	February-05-08	Smelter	Separation	Ground Flr Ball Mills 2a&2B	73.00	27.00					0	100	0	0	0
S5	February-19-08	Smelter	Separation	Ground Flr Ball Mills 2a&2B	100.00						0	100	0	0	0
S6	February-26-08	Smelter	Separation	Ground Flr Ball Mills 2a&2B	100.00						0	100	0	0	0
S7	February-11-08	Smelter	Casting	#89 Control Panel	45.00	55.00					0	100	0	0	0
S8	February-27-08	Smelter	Casting	#89 Control Panel	100.00						0	100	0	0	0
S9	March-24-08	Smelter	Casting	#89 Control Panel	100.00						0	100	0	0	0
S10	December-13-07	CCNR	NRC	Track Hopper	74.00		13.00	13.00			0	74	13	13	0
S11	December-20-07	CCNR	NRC	Track Hopper	54.00		28.00	18.00			0	54	18	28	0
S12	January-14-08	CCNR	NRC	Track Hopper	65.00			35.00			0	65	35	0	0
S13	January-22-08	CCNR	NRC	Track Hopper	76.00		14.00	10.00			0	76	10	14	0
O1	February-05-08	Smelter	Shipping	FEN Bulk Loading	16.00		84.00				0	16	0	84	0
O2	February-11-08	Smelter	Shipping	FEN Bulk Loading		16.00	84.00				0	16	0	84	0
O3	February-19-08	Smelter	Shipping	FEN Bulk Loading		24.00	76.00				0	24	0	76	0
O4	November-15-07	CCNR	NRC	Clydach Landing	20.00		80.00				0	20	0	80	0
O5	January-03-08	CCNR	NRC	Clydach Landing	60.00		40.00				0	60	0	40	0
O6	January-08-07	CCNR	NRC	Clydach Landing	40.00		60.00				0	40	0	60	0
O7	January-14-08	CCNR	NRC	Clydach Landing	41.00		59.00				0	41	0	59	0
O8	December-20-07	CCNR	NRC	Clydach Landing		32.00	52.00	16.00			0	32	16	52	0
OS1	November-15-07	CCNR	NRC	Behind Converters - '944		30.00	70.00				0	30	0	70	0
OS2	January-03-07	CCNR	NRC	Behind Converters - '944	39.00		61.00				0	39	0	61	0
OS3	January-08-08	CCNR	NRC	Behind Converters - '944	32.00		68.00				0	32	0	68	0
OS4	January-24-08	CCNR	NRC	Behind Converters - '944	21.00		79.00				0	21	0	79	0
OS5	January-22-08	CCNR	NRC	#17 Charging Conveyors	23.00		77.00				0	23	0	77	0
OS6	January-24-08	CCNR	NRC	#17 Charging Conveyors		36.00	64.00				0		0	64	0
OS7	February-11-08	Smelter	FBR	#2 Gatefeeder	75.00		25.00				0	75	0	25	0
OS8	February-26-08	Smelter	FBR	#2 Gatefeeder		85.00	15.00				0	63	0	37	0
OS9	February-27-08	Smelter	FBR	#2 Gatefeeder	63.00		37.00				0	85	0	15	0
M12	November-13-07	CCNR	IPC	#1 Local Powder Packaging		30.00	70.00				0	30	0	70	0
M1	November-26-07	CCNR	IPC	#1 Local Powder Packaging				96.00	4.00		0	0	96	0	0
M2	November-28-07	CCNR	IPC	#1 Local Powder Packaging				96.00	4.00		0	0	96	0	0
M3	November-28-07	CCNR	IPC	#7 Local Powder Pack.				94.00	6.00		0	0	94	0	0
M4	January-16-08	CCNR	IPC	#1 Local Powder Packaging				95.00	5.00		0	0	95	0	0
M5	November-13-07	CCNR	IPC	Battery Powder Packaging				100.00			0	0	100	0	0
M6	November-26-07	CCNR	IPC	Battery Powder Packaging				100.00			0	0	100	0	0
M7	November-28-07	CCNR	IPC	Battery Powder Packaging				100.00			0	0	100	0	0
M8	December-04-07	CCNR	IPC	Battery Powder Packaging				89.00	11.00		0	0	89	0	0
M9	January-16-08	CCNR	IPC	Battery Powder Packaging				100.00			0	0	100	0	0
M10	November-27-07	CCNR	IPC	Packaging & Shipping -OSP				93.00	7.00		0	0	93	0	0
M11	December-04-07	CCNR	IPC	Packaging & Shipping -OSP				98.00	2.00		0	0	98	0	0
M13	May-05-08	PCR	Rounds	Automatic Shearing			3rd	2nd	1st		0	0	Tertiatry	econdary	50
M14	May-07-08	PCR	Rounds	Automatic Shearing			3rd	2nd	1st		0	0	Tertiatry	econdary	50
M15	May-09-08	PCR	Rounds	Automatic Shearing			3rd	2nd	1st		0	0	Tertiatry	econdary	50
M16	May-06-08	PCR	Rounds	Ten Kilo Bag Line				53±5	47±5		0	0	53	0	47
M17	May-08-08	PCR	Rounds	Ten Kilo Bag Line				80.00	20.00		0	0	80	0	20
M18	May-09-08	PCR	Rounds	Ten Kilo Bag Line				90.00	10.00		0	0	90	0	10
C1	May-05-08	PCR	Cobalt	Cred Truck Unloading			30.00			70.00	0	0	0	30	70
C2	May-06-08	PCR	Cobalt	Cred Truck Unloading		20.00				80.00	0	20	0	0	80
C3	May-07-08	PCR	Cobalt	Cred Truck Unloading				47.00	25.00	29.00	25	0	47	0	29
C4	May-05-08	PCR	Cobalt	Cobalt Precip Area		24.00				76.00	0	24	0	0	76
C5	May-06-08	PCR	Cobalt	Cobalt Precip Area					47.00	53.00	47	0	0	0	53
C6	May-07-08	PCR	Cobalt	Cobalt Precip Area					41.00	59.00	41	0	0	0	59