

Characterisation and Performance of Hydrotalcite-Derived CoMo Sulphide Catalysts for Selective HDS in the Presence of Olefin

Tiago L. Coelho^{1,4}, Santiago Arias², Victor O. Rodrigues¹, Sandra S. X. Chiaro³, Laetitia Oliviero⁴,
Françoise Maugé⁴, Arnaldo C. Faro Jr.^{1*}

¹ *Universidade Federal do Rio de Janeiro, Instituto de Química, Av. Athos da Silveira Ramos, 149, Bl. A, CEP: 21941-909 Cidade Universitária, Rio de Janeiro – RJ – Brazil*

² *Universidade do Estado do Rio de Janeiro, Instituto de Química, R. São Francisco Xavier, 524, CEP: 20550-900 Rio de Janeiro – RJ – Brazil*

³ *Centro de Pesquisas e Desenvolvimento Leopoldo Américo Miguez de Mello, PETROBRAS, Ilha do Fundão, CEP: 21941-598 – Rio de Janeiro, RJ – Brazil.*

⁴ *Laboratoire Catalyse et Spectrochimie, ENSICAEN, Université de Caen Basse Normandie, CNRS, 6, bd du Maréchal Juin, 14050 Caen, France.*

**Corresponding author. E-mail address: farojr@iq.ufrj.br*

Supplementary Material

Figure. SM1. Hydrodesulphurisation vs. reaction time for Co₂₄Mg₂Mo₄₃-S catalyst, under different WHSVs (58 and 36 h⁻¹).

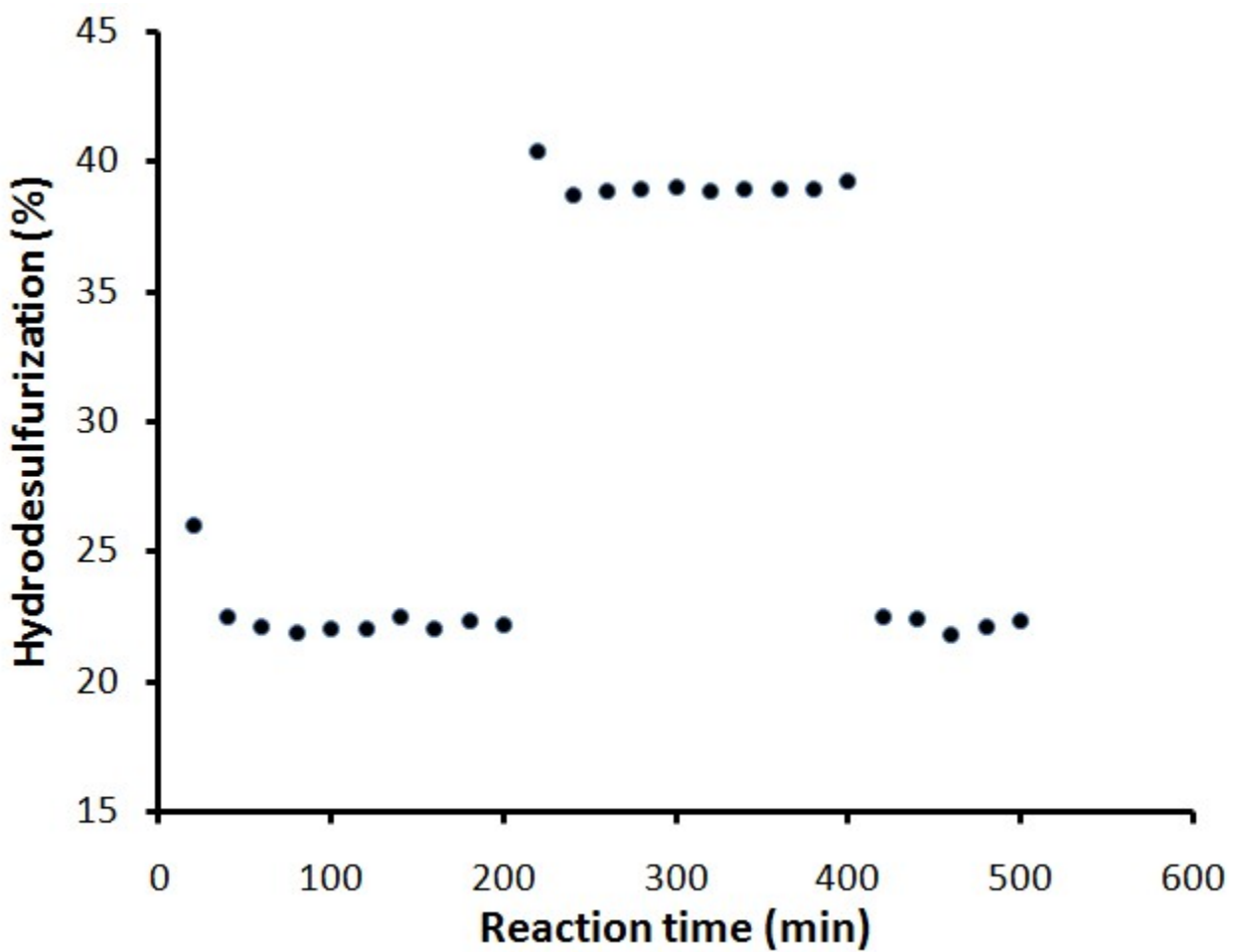


Figure. SM2. Scheme of passivation process.

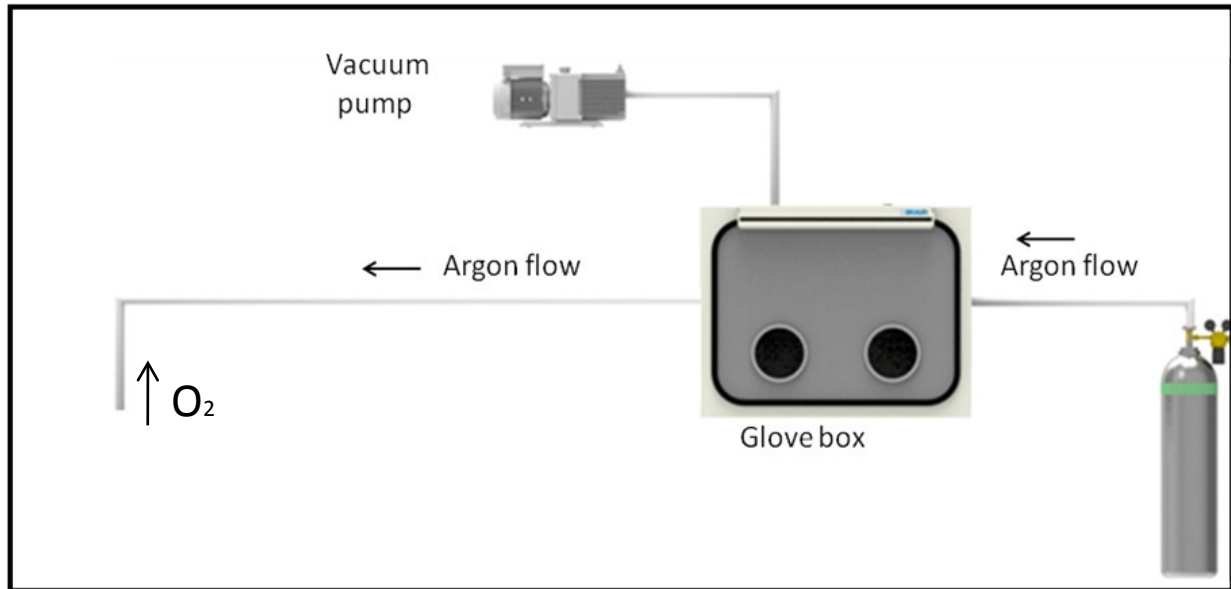


Figure SM3. Duplicate IR/CO experiments for all sulphides.

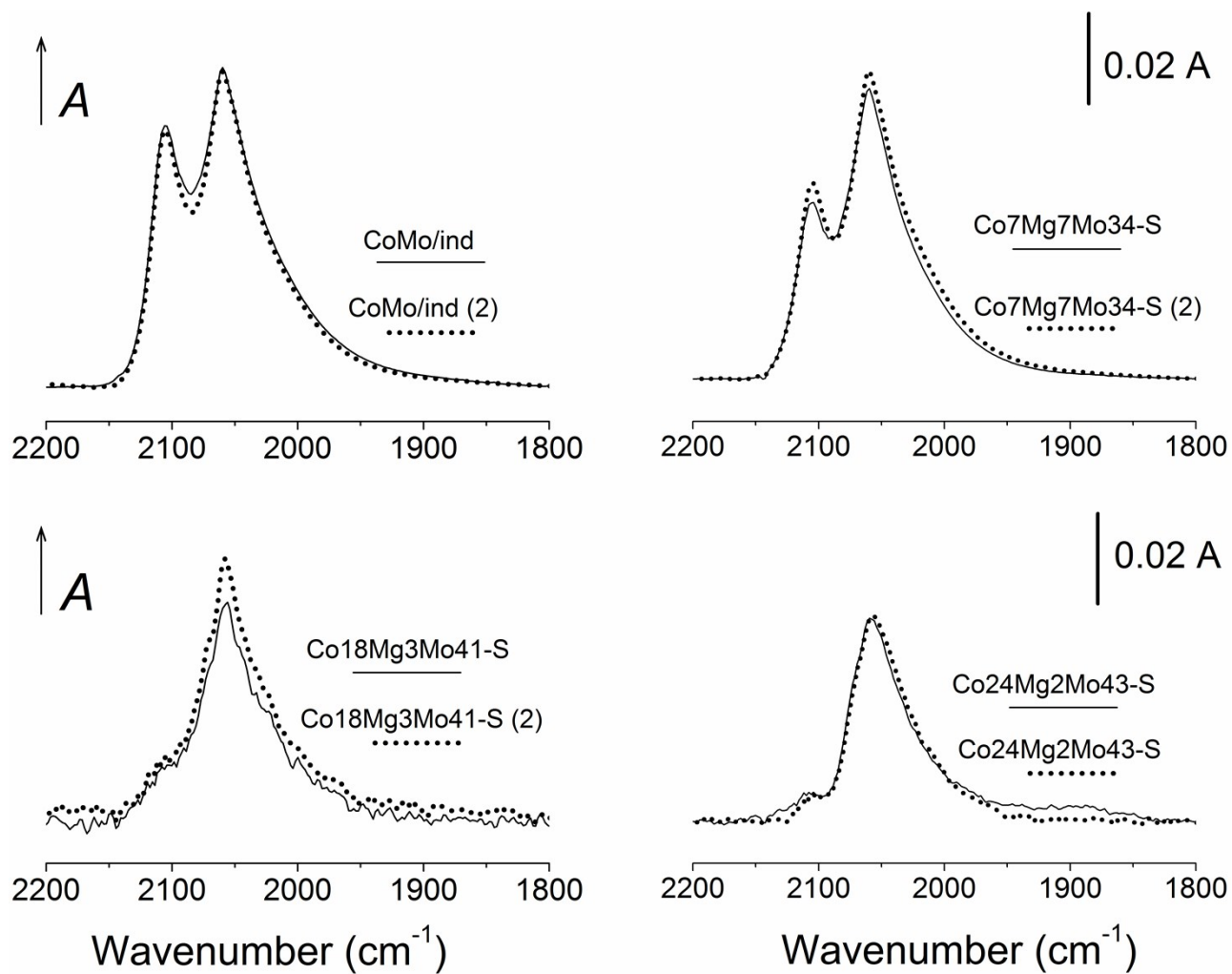


Figure SM4. CO/IR experiment at room temperature for HR306 sample.

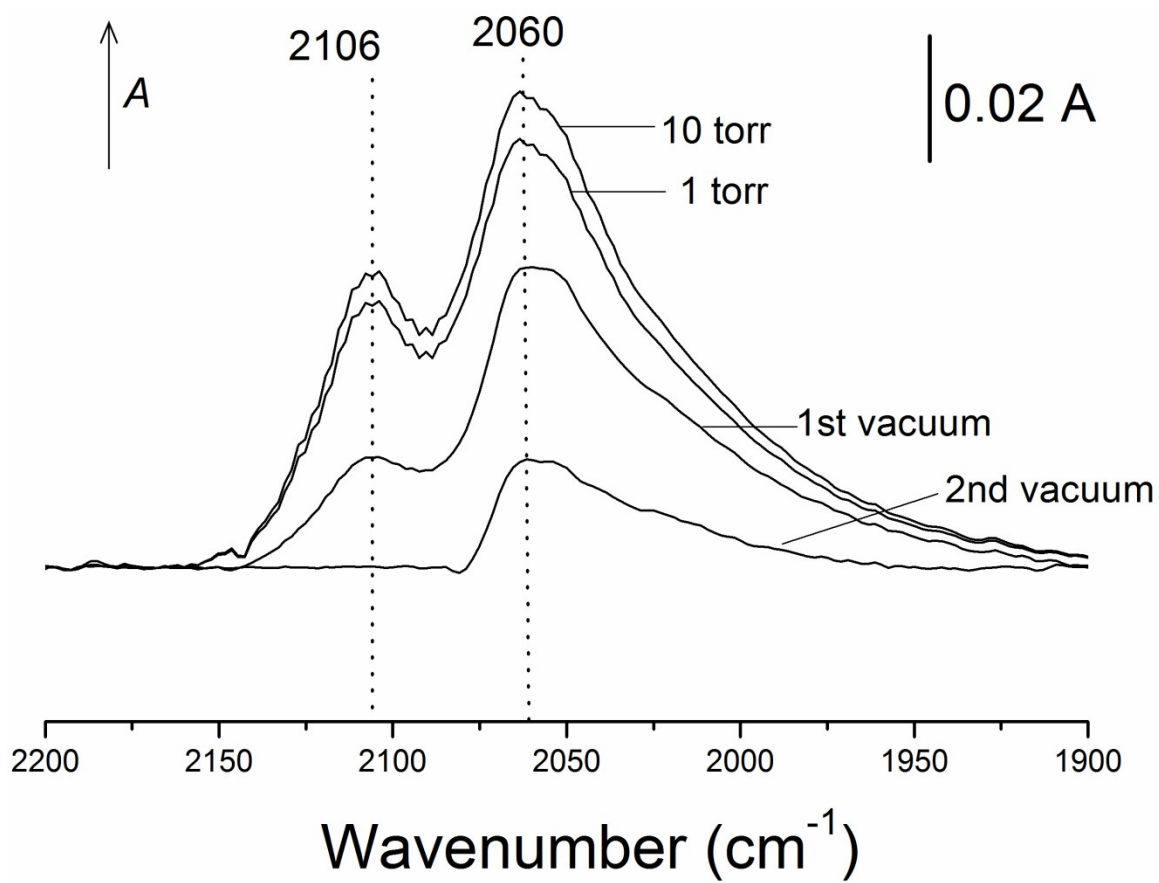


Figure SM5. Powder X-ray diffraction patterns for sulphides.

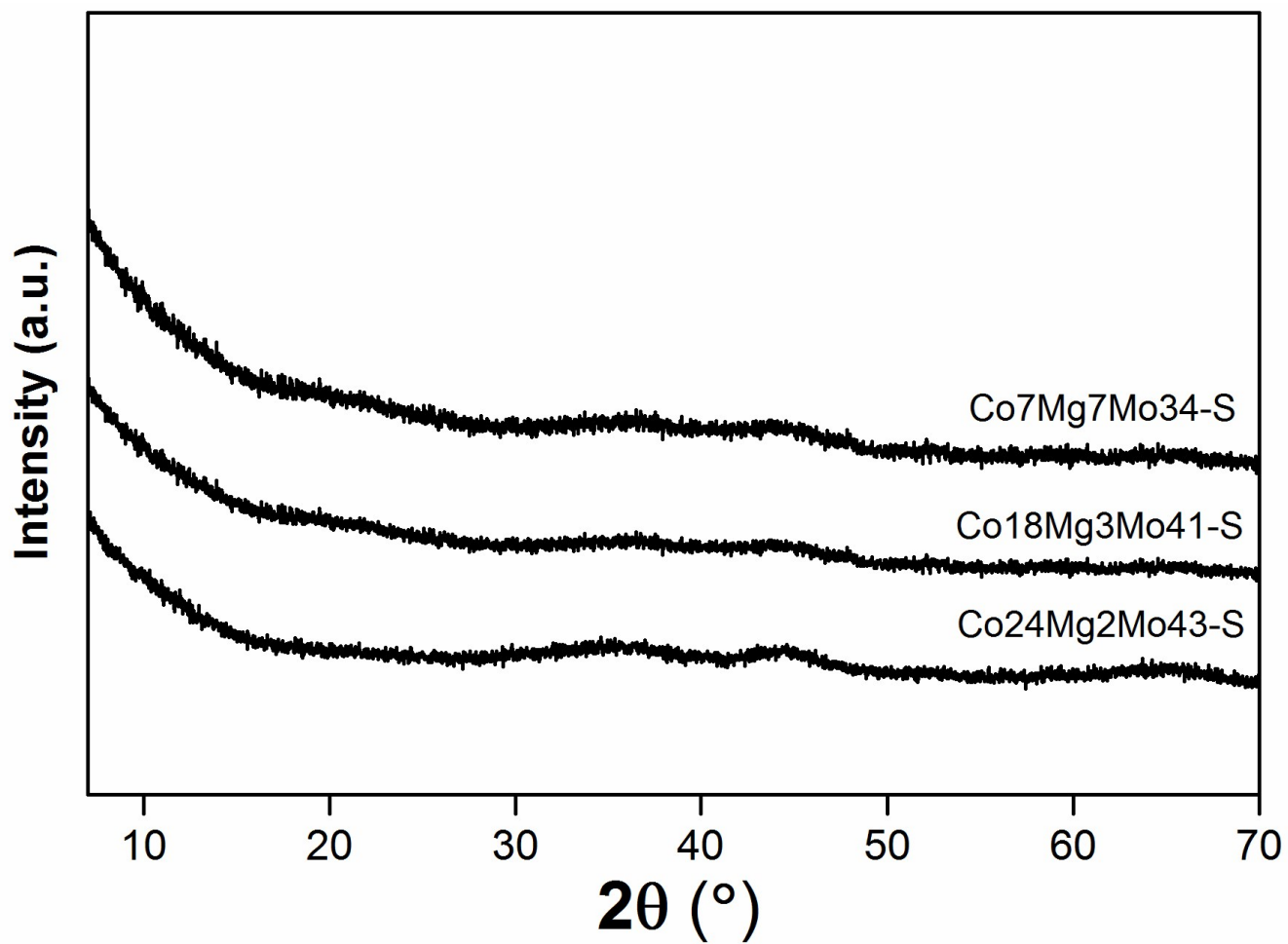


Figure SM6. Nitrogen adsorption-desorption isotherms for sulphide catalysts.

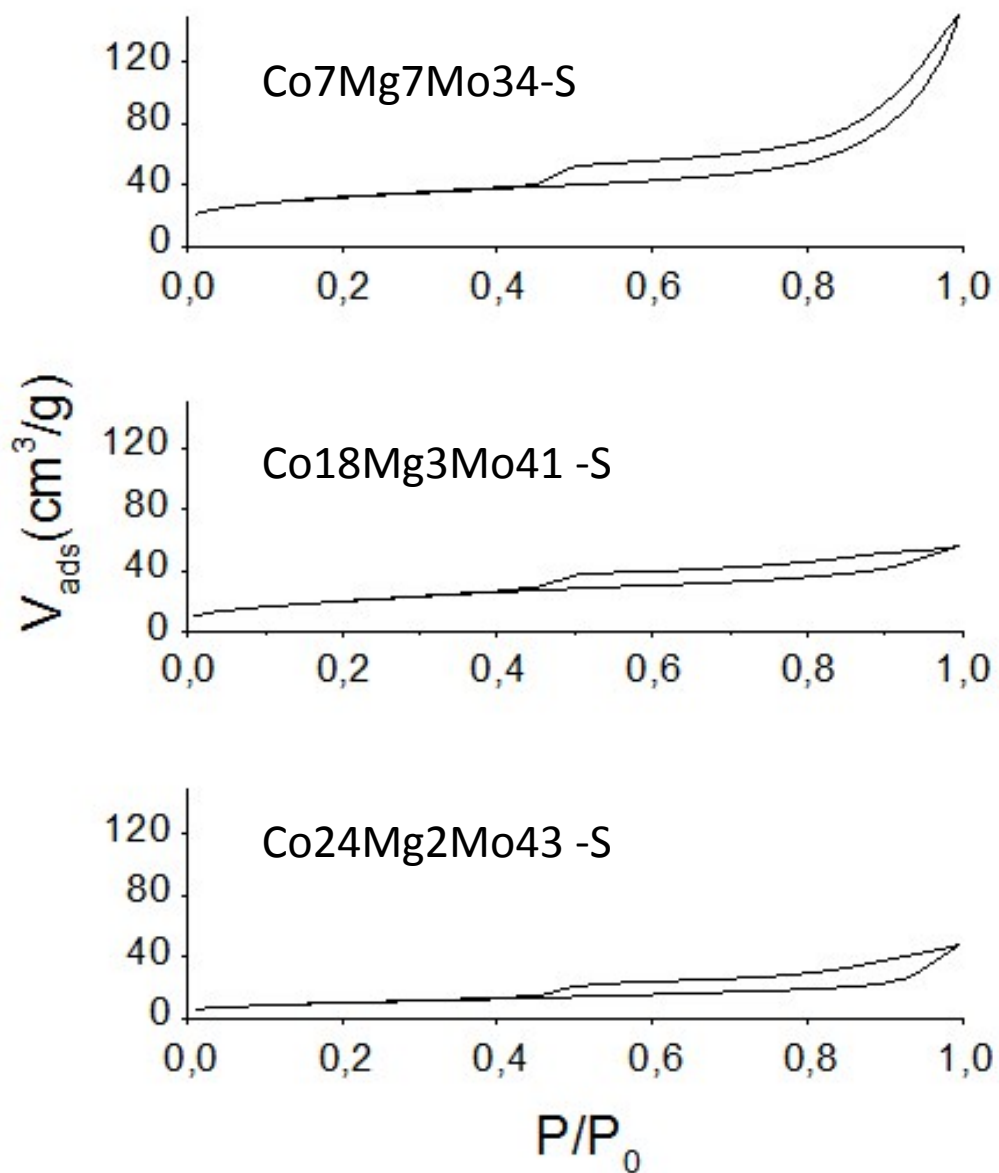


Figure SM7. XANES spectra of the oxide precursors (a) Co K-edge and (b) Mo K-edge. (I) $\text{Co}_7\text{Mg}_7\text{Mo}_3$ (II) $\text{Co}_{18}\text{Mg}_3\text{Mo}_4$ (III) $\text{Co}_{24}\text{Mg}_2\text{Mo}_4$.

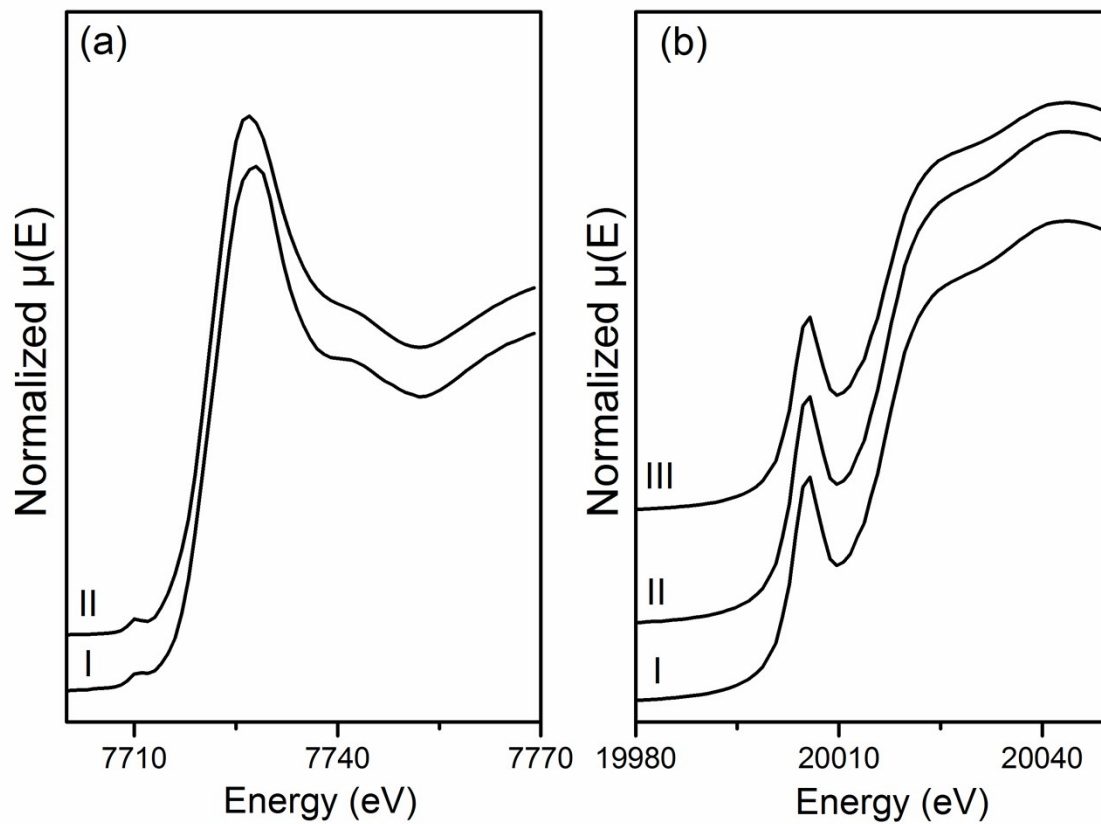


Figure SM8. Fitted XANES curves using a least-squares method for all samples at Mo K-edge.

Co₇Mg₇Mo₃₄-S (a) before re-sulphidation (b) after re-sulphidation. Co₁₈Mg₃Mo₄₁-S (c) before re-sulphidation (d) after re-sulphidation. Co₂₄Mg₂Mo₄₃-S (e) before re-sulphidation (f) after re-sulphidation. CoMo/ind (g) before re-sulphidation (h) after re-sulphidation.

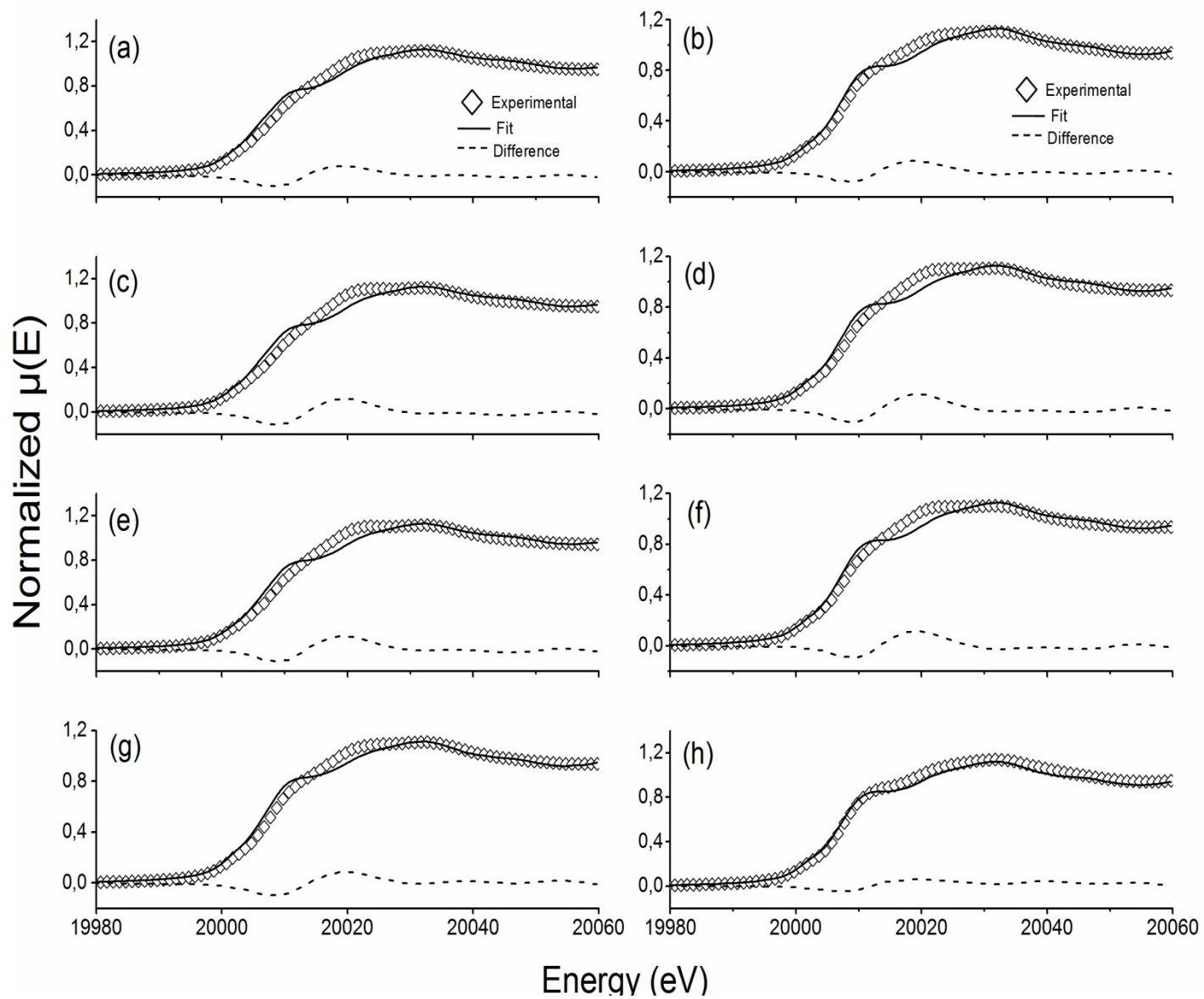


Figure SM9. Fitted XANES curves using a least-squares method for all samples at Co K-edge.

Co7Mg7Mo34-S (a) before re-sulphidation (b) after re-sulphidation. Co18Mg3Mo41-S (c) before re-sulphidation (d) after re-sulphidation. Co24Mg2Mo43-S (e) before re-sulphidation (f) after re-sulphidation. CoMo/ind (g) before re-sulphidation (h) after re-sulphidation.

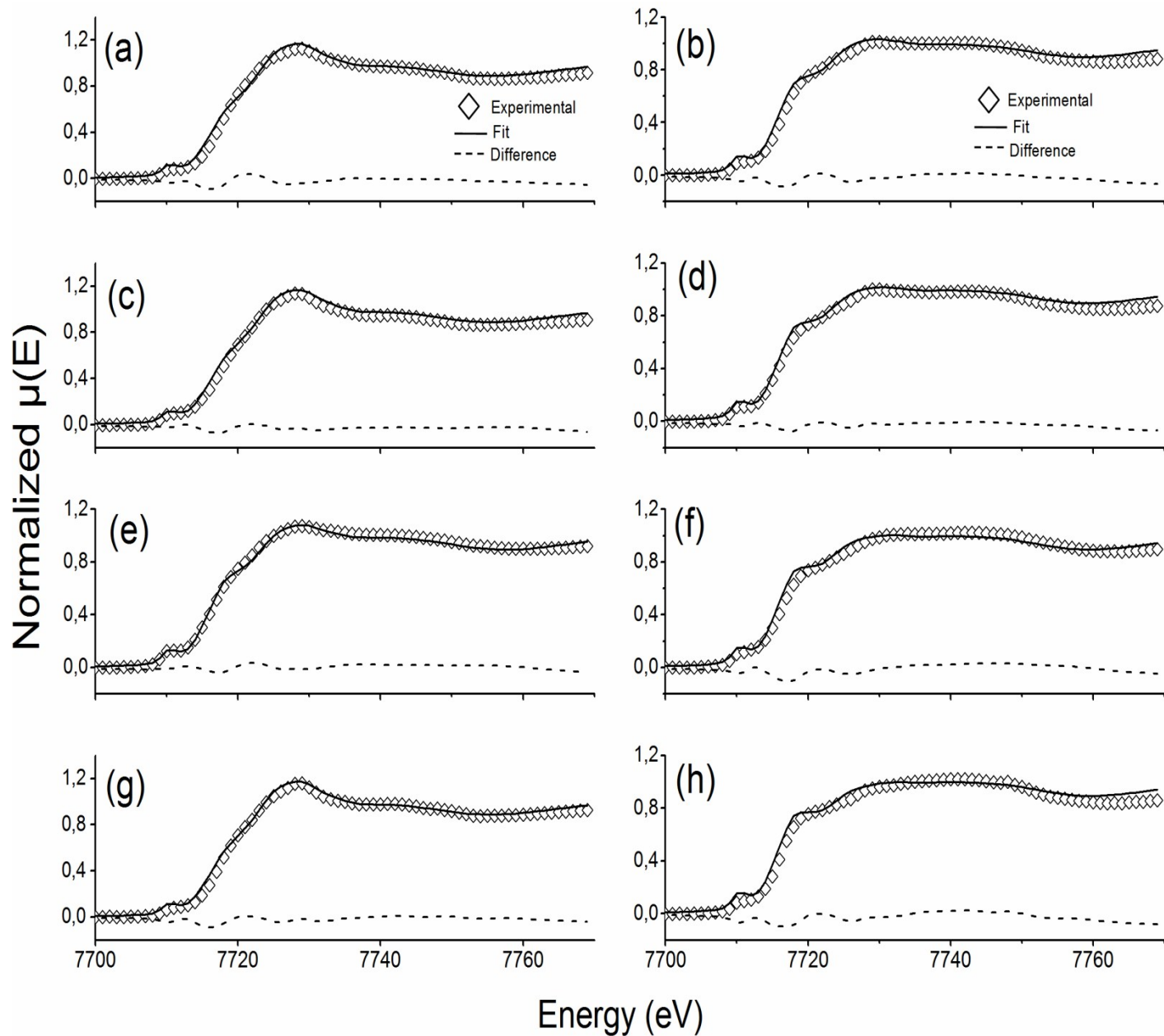


Figure SM10. TEM analysis of Co₂₄Mg₂Mo₄₃-S catalyst. On the right the area was magnified.

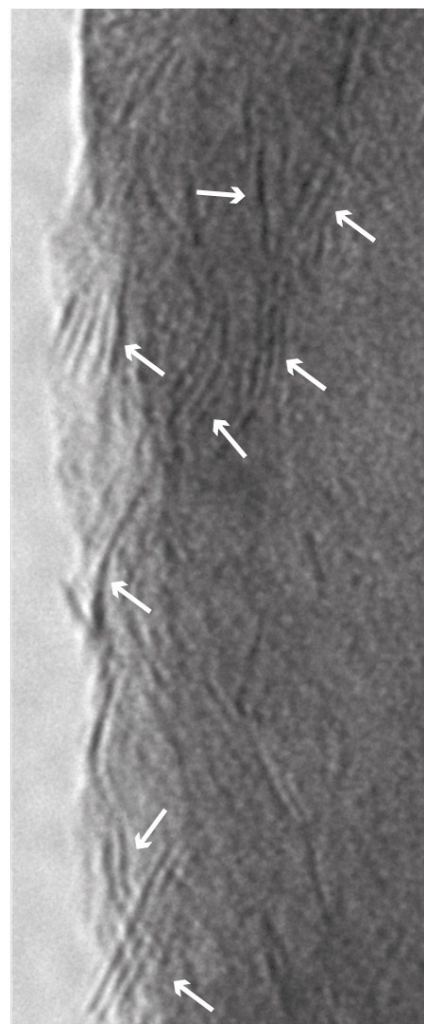
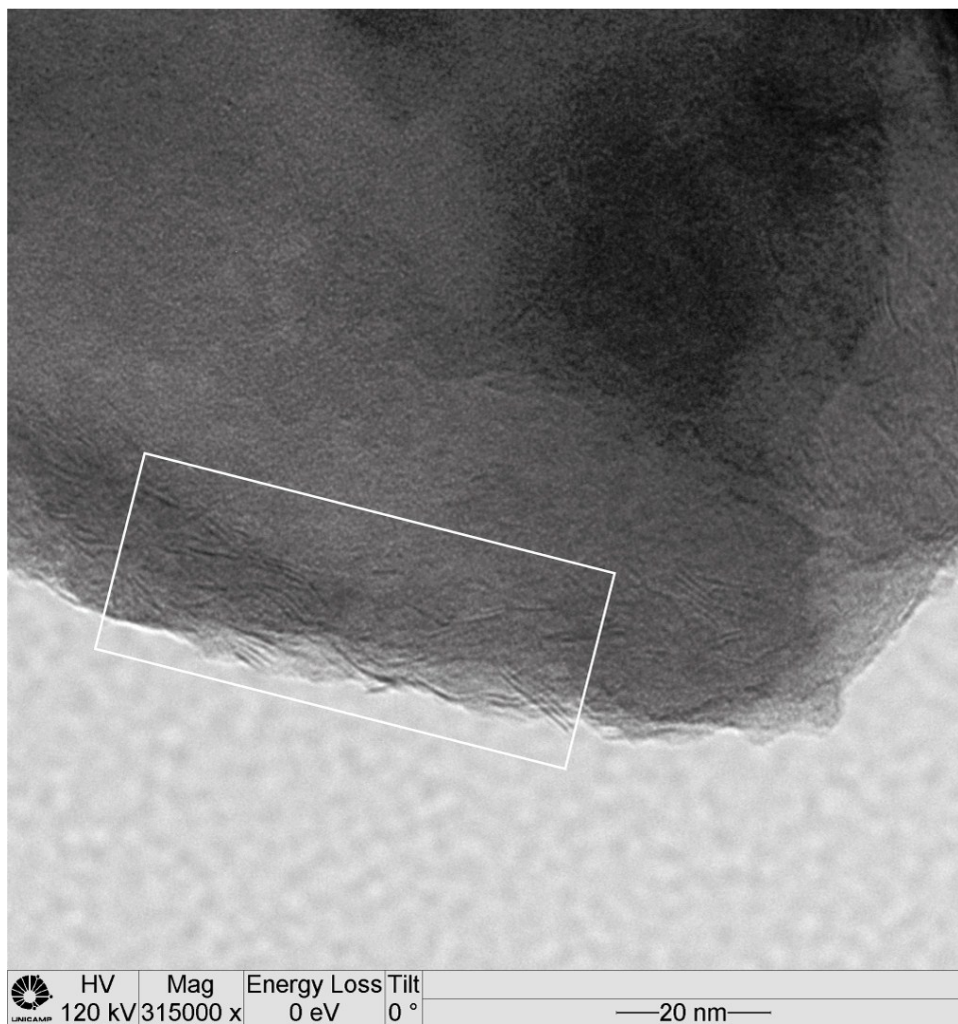


Figure SM11. Fitted XANES curves using an iterative alternating least-square method for all samples, at Mo K-edge. Co₇Mg₇Mo₃₄-S (a) before re-sulphidation (b) after re-sulphidation. Co₁₈Mg₃Mo₄₁-S (c) before re-sulphidation (d) after re-sulphidation. Co₂₄Mg₂Mo₄₃-S (e) before re-sulphidation (f) after re-sulphidation. CoMo/ind (g) before re-sulphidation (h) after re-sulphidation.

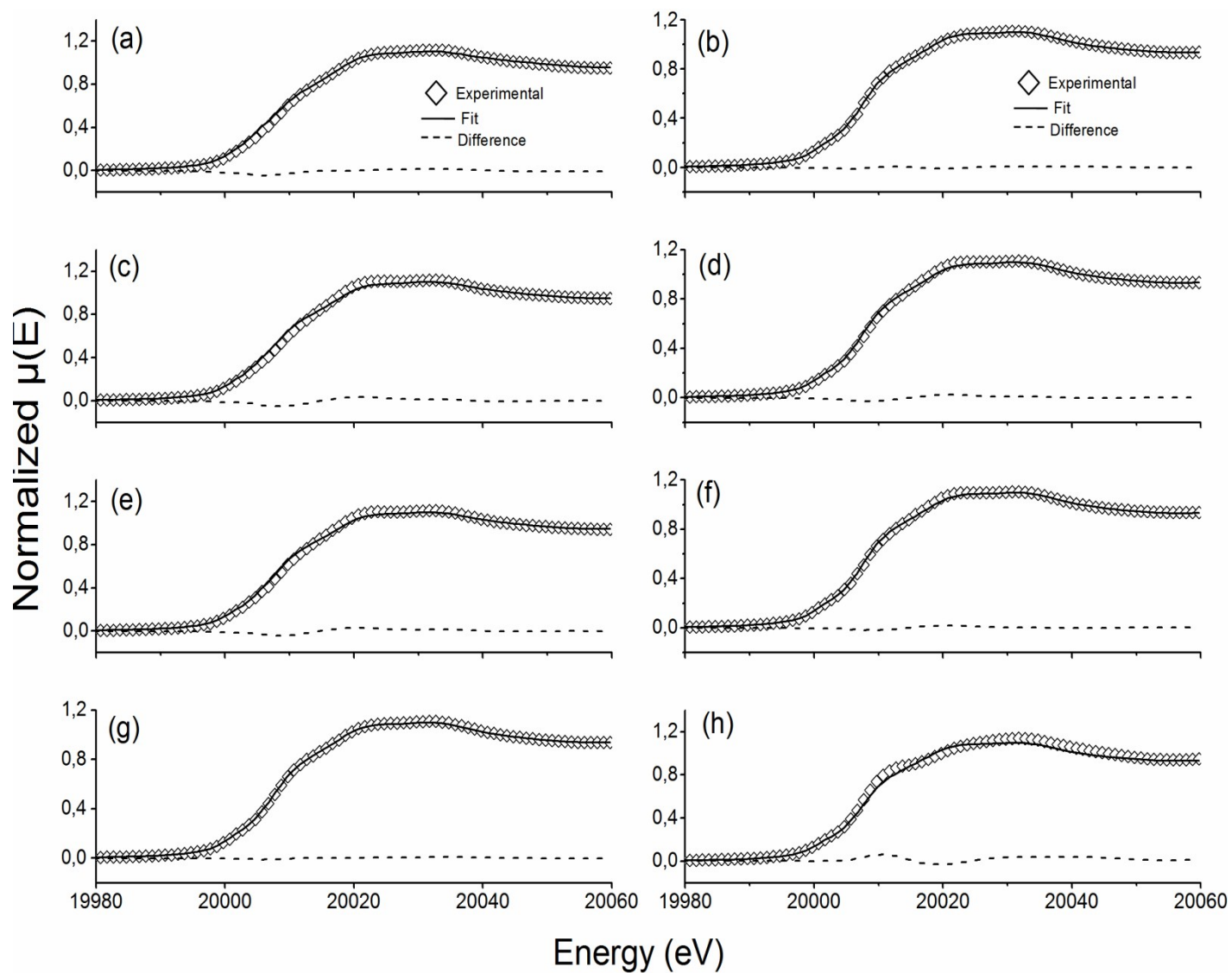


Figure SM12. Fitted XANES curves using an iterative alternating least-square method for all samples, at Co K-edge. Co₇Mg₇Mo₃₄-S (a) before re-sulphidation (b) after re-sulphidation. Co₁₈Mg₃Mo₄₁-S (c) before re-sulphidation (d) after re-sulphidation. Co₂₄Mg₂Mo₄₃-S (e) before re-sulphidation (f) after re-sulphidation. CoMo/ind (g) before re-sulphidation (h) after re-sulphidation.

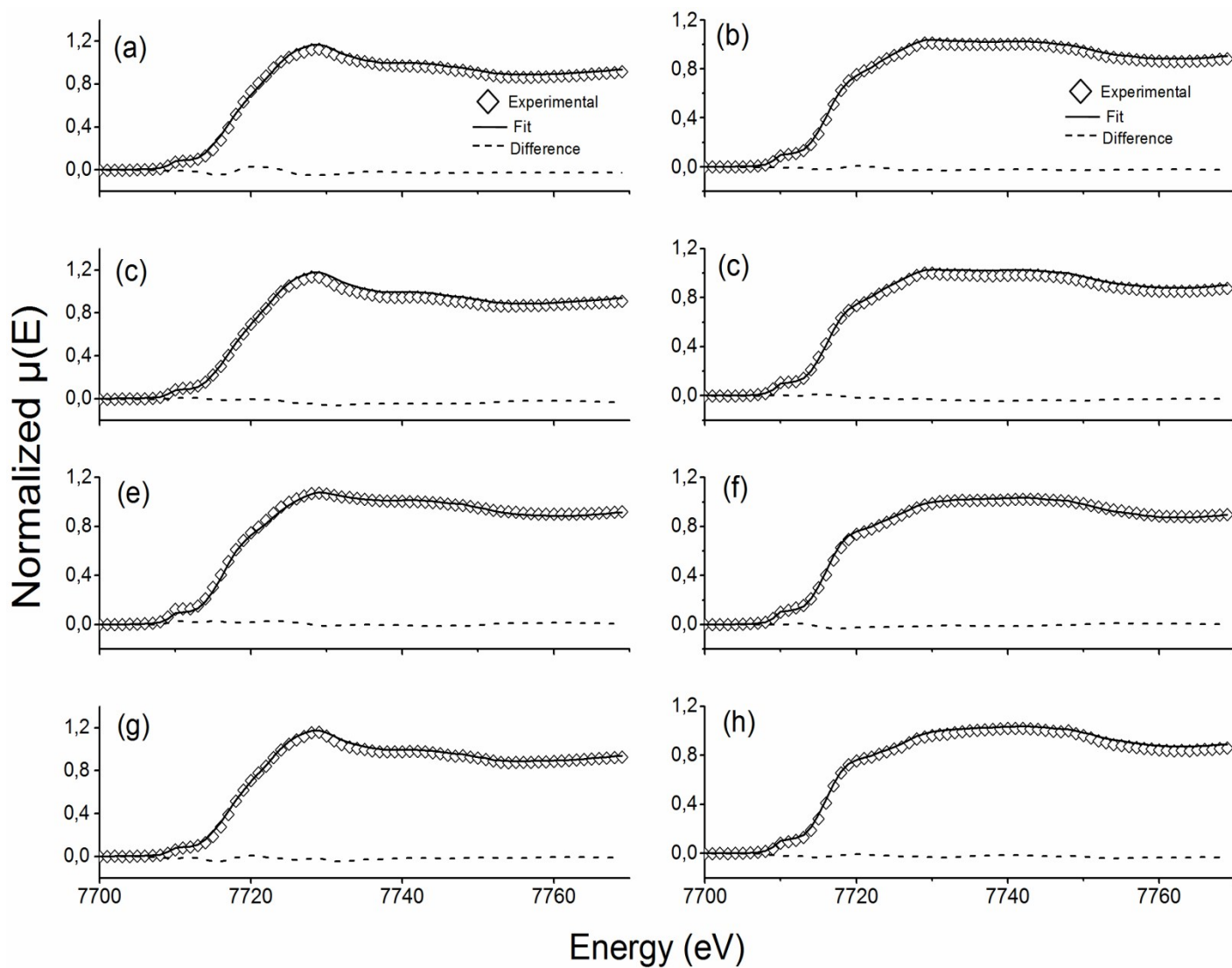


Figure SM13. Relationship between (a) HDS and (b) OHYD and space time.

