



## Mercury speciation on three European mining districts by XANES techniques

JM Esbri (1), EM Garcia-Noguero (1), B Guerrero (2), D Kocman (3), A Bernaus (2), X Gaona (2), P Higuera (1), R Alvarez (4), J Loredó (4), M Horvat (3), M Ávila (2), and the Pablo Higuera Team

(1) Universidad Castilla-La Mancha, Ingeniería Geológica y Minera, Almadén, Spain (pablo.higuera@uclm.es), (2) Department of Chemistry, Autonomous University of Barcelona, 08193 Bellaterra, SPAIN, (3) Jozef Stefan Institute, Ljubljana SI-1001, Slovenia, (4) Department of Mining and Mines Exploration, University of Oviedo, Oviedo 33004, SPAIN.

The mobility, bioavailability and toxicity of mercury in the environment depend on the chemical species in which is present in soil, sediments, water or air. In this work we used synchrotron radiation to determine mercury species in geological samples of three mercury mining districts: Almadén (Spain), Idria (Slovenia) and Asturias (Spain). The aim of this study was to find differences on mobility and bioavailability of mercury on three mining districts with different type of mineralization. For this purpose we selected samples of ore, calcines, soils and stream sediments from the three sites, completely characterized by the Almadén School of Mines, Josef Stefan Institute of Ljubljana and Oviedo School of Mines.

Speciation of mercury was carried out on Synchrotron Laboratories of Hamburg (HASYLAB) by XANES techniques. Spectra of pure compounds [ $\text{HgCl}_2$ ,  $\text{HgSO}_4$ ,  $\text{HgO}$ ,  $\text{CH}_3\text{HgCl}$ ,  $\text{Hg}_2\text{Cl}_2$  (calomel),  $\text{HgS}_{red}$  (cinnabar),  $\text{HgS}_{black}$  (metacinnabar),  $\text{Hg}_2\text{NCl}_{0.5}(\text{SO}_4)_{0.3}(\text{MoO}_4)_{0.1}(\text{CO}_3)_{0.1}(\text{H}_2\text{O})$  (mosesite),  $\text{Hg}_3\text{S}_2\text{Cl}_2$  (corderoite),  $\text{Hg}_3(\text{SO}_4)\text{O}_2$  (schuetteite) y  $\text{Hg}_2\text{ClO}$  (terlinguaite)] were obtained on transmittance mode. The number and type of the compounds required to reconstruct experimental spectra for each sample was obtained by PCA analysis and linear fitting of minimum quadratics of the pure compounds spectra. This offers a semiquantitative approach to the mineralogical constitution of each analyzed sample.

The results put forward differences on the efficiency of roasting furnaces from the three studied sites, evidenced by the presence of metacinnabar on the less efficient (Almadén and Asturias) and absence on the most efficient (Idria). For the three studied sites, sulfide species (cinnabar and metacinnabar) were largely more abundant than soluble species (chlorides and sulfates).

On the other hand, recent results on the mobility of both Hg and As on the target sites will be presented. These results correlate with the related chemical species found by XANES techniques.