# Molecular geochemistry of Zn in continental rivers

MONTARGES-PELLETIER EMMANUELLE[1], LE MEUR MATHIEU[1], KANBAR HUSSEIN[1], GAUTHIER CHRISTOPHE[1], BIHANNIC ISABELLE[1], GLEY RENAUD[1], VANTELON DELPHINE[2]

[1]LIEC, CNRS, Université de Lorraine, 15 avenue du Charmois, 54500 Vandœuvre-lès-Nancy, France. Emmanuelle.montarges@univ-lorraine.fr, m.lemeur@hotmail.fr, hsen.k@hotmail.com, christophe.gauthier@univ-lorraine.fr, isabelle.bihannic@univ-lorraine.fr, renaud.gley@univ-lorraine.fr

[2]Synchrotron SOLEIL, l'Orme des Merisiers, Saint Aubin BP 48, 91192 Gif-sur-Yvette, France. delphine.vantelon@synchrotron-soleil.fr

Widely used in industry and commonly encountered in numerous domestic products, Zn is ubiquitous in continental waterbodies, in sediments and suspended particles (SPM). This element is therefore often used as a marker of anthropogenic inputs in aquatic media. In this context, Zn behavior in rivers of the Moselle watershed (french part) was investigated, from low- to highly impacted areas such as ancient steel-making watersheds [1-2].

Zn speciation was investigated through spectroscopic tools as a possible fingerprint of environmental processes and sources, in order to decipher lithogenic, urban or industrial particles. Combined to element and mineralogical compositions by ICP-MS, XRD and TEM-EDXS analyses, XAS spectra at Zn K-edge were acquired at low temperature in bulk and microscopic modes, on environmental and reference samples. In sediments, XANES and EXAFS spectroscopies confirmed the predominance of amorphous Zn sulfides and unraveled minor Zn oxide species. The linear combination fitting of XANES spectra obtained on SPM, combined to the Zn concentration determination, was particularly helpful to evidence specific Zn sources during river floods. During high flow regime, dioctahedral clay minerals were evidenced as the main Zn bearing suspended particles and fingerprint the speciation of naturally occuring Zn.

Those investigations demonstrate the added value of Zn speciation to monitor and understand the water-sediment interface as well as the power of synchrotron-based tools to study environmental matrices.

[1] Kanbar et al. (2017) Sci. Total Environ. **599–600**, 540–553. [2] Montargés-Pelletier et al. (2014) Envir. Sci. Poll. Res., **21**, 4, 2744-2760.