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Combined Analysis: XRD, XRF, Raman and IR spectroscopies: SOLSA European project

Combined analysis is further developed to encompass even larger materials science disciplines than previously, extending it to XRF, Raman and IR spectroscopies. It will first be used within the frame of the European project SOLSA. The SOLSA project aims to construct an analytical expert system for on-line-on-mine real-time mineralogical and geochemical analyses on sonic drilled cores, an unprecedented challenge both in terms of instrumental, methodological and software developments. Two instrumental developments will be carried out during this European project, one at the laboratory scale (ID1) deserving methodological testing, the other at the operational on-mine scale (ID2). At present, only ID1 is achieved for first tests. This instrument will perform simultaneously x-ray diffraction experiments, coupled to x-ray fluorescence, Raman and IR spectroscopies. It consists in a 4 circles diffractometer equipped with a curved position sensitive detector and a Cu micro source, a fluorescence detector, and an innovative system of fiber optics and mirrors to achieve Raman and IR probing. All the four experiments are able to probe a flat surface sample within approximately the same sampled volume. In order to benefit of the complementarity of the four techniques, an expert system able to refine all datasets has to be developed. For the x-ray diffraction and fluorescence parts, the actual combined analysis methodology is operational for structure, microstructure, texture, stress, phases and element analyses. Complementing the combined analysis approach by Raman and IR spectroscopies are targeted in this project to help phase identifications and quantifications. In this aim the expert system will use open databases, either already existing like the crystallography open database, or to be developed like the Raman open database. We will illustrate the actual state-of-the-art combined analysis and envision its near-future developments within the spectroscopy's context.

Speaker Biography

Daniel Chateigner is a professor at IUT of Caen University of Caen Normandy, France in the CRISMAT-ENSICAEN, CNRS lab. He was a lecturer at University of Maine (1997-2000). He received his habilitation research fellow in the earth and planetary science department at University of California at Berkeley (1996). He was a research fellow in the Laboratory of Crystallography, France. He received his CNRS-Grenoble (1995) PhD from Grenoble in physics and crystallography in 1994. He was an editor of combined analysis, ISTE-Wiley (2010).

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