IMA2018 Abstract submission

Increasing resource efficiency through continuous monitoring from exploration to processing

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The SOLSA project: Combined techniques and databases for mineral identification

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What is your preferred presentation method?: Oral presentation

: Abstract

Combined mineralogical and chemical analyses on drill cores are highly demanded by mining and metallurgical companies to speed up exploration, mining and define geo-metallurgical parameters for beneficiation. At present now, the mineralogical analyses are mainly done by exploiting a single or independent techniques, such as hyperspectral imaging and X-ray fluorescence (XRF). The automated coupling of different analytical instruments is still a technological challenge in progress in our laboratories.

SOLSA integrates for the first time the sonic drilling coupled to an on-line-real-time analytical system (RGB, profilometer, XRF and hyperspectral cameras), which will define regions of interests (ROI). These ROIs will be analyzed by combined X-ray diffraction (XRD), XRF - Raman (RS) and Infrared (IR) spectroscopies on a single and world-unique instrument. The whole SOLSA system will integrate an intelligent software for close-to-real-time data interpretation [1].

To maximize the information gathered from the mineral, RS and other analytical techniques, like Infrared (IR) and/or XRD can be combined to complement each other. Consequently, combined XRD-RS measurements and analyses complemented by Raman and XRD databases will offer an exceptional benefit as the complementary information from both techniques allowing deeper characterization and understanding of minerals. For SOLSA, the Crystallography Open Database (COD) [2] containing nearly 400000 entries will serve the crystallographic definitions of the phases composing the studied materials. The COD was chosen since it is the largest curated and validated open access collection of small molecule crystal structures that has been successfully used for various academic and industrial tasks [3].

The main objectives of the present presentation are: (1) presenting the first combined XRF-XRD-RS measurements for precise mineral identification, and (2) to describe a reliable Raman Open-access Database (ROD, http://solsa.crystallography.net/rod) containing experimental high quality Raman spectra, associated with DFT-simulated spectra. The novelty of this database will be interconnectedness with other open databases like the COD (http://www.crystallography.net/cod).

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