



USER MEETING 2018

22-23 NOVEMBER

National Centre for Synchrotron Science



Contribution ID: 112

Type: Oral

Illuminating the mineralogy and geochemistry of mineral processing byproducts with coupled synchrotron XRD and XANES

Thursday, 22 November 2018 15:45 (30 minutes)

Increasing global demand for mineral and energy resources, coupled with declining ore grades, are creating growing global stockpiles of by-products including waste rock (~ 56 GT/yr) and tailings (~7 GT/yr). These are unusual geological materials, at extremes of pH and salinity, typically exhibiting elevated concentrations of elements and minerals present at otherwise low concentrations throughout Earth's crust, bearing process-derived minerals that are unstable under Earth surface temperatures and pressures, and in the case of tailings, with very fine particle sizes. Understanding and predicting the weathering behaviour of these materials, and opportunities for reprocessing or reuse, hinges on accurate mineralogical identification and quantification, which can be challenging in such complex, multi-phase mixtures often bearing novel minerals. Using synchrotron XRD and XANES, our work with bauxite residue (alumina refining tailings) has solved structures for novel process minerals in the sodalite and cancrinite groups, and identified mineralogical hosts and speciation of trace elements including As, Cr, and V. Incorporation of anions into sodalites increases unit cell size in the order carbonate

Primary authors: SANTINI, Talitha (University of Western Australia); Ms SCULLETT-DEAN, Grace (The University of Queensland); Mr VOGRIN, John (The University of Queensland); Dr VAUGHAN, James (The University of Queensland)

Presenter: SANTINI, Talitha (University of Western Australia)

Session Classification: Parallel Session 9

Track Classification: Earth and Environment