

Radiation sensing for process control

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ABSTRACT

Understanding the distribution of critical detrimental elements is crucial to process control, remediation and reclamation. The Institute for Photonics and Advanced Sensing (IPAS) at the University of Adelaide is pursuing a broad range of technologies for radiation sensing to assist in this understanding. The core capability is built from a combination of the Prescott Environmental Luminescence Laboratory and the IPAS optical fibre group. Research is supported by the ARC Industrial Transformation Research Hub for Australian Copper Uranium and industry partners.

Specialist plastic and glass fibres for independent detection of alpha and beta radiation have been developed for monitoring of mineral processing. This has led to investigation of potential nuclide specific sensors for process control. In parallel, new techniques for spatial resolution of radionuclides have been created with applications to characterise mineral and organic materials. The techniques are sensitive enough to allow surface contamination to be differentiated from bulk inclusions. Investigation into materials and techniques for retrospective and forensic dosimetry is ongoing and interlinked with the luminescence dating program. These methods allow sampling of material or structures to confirm previous exposure to radiation. Finally the laboratory has been

equipped with state of the art detectors for gamma and alpha spectrometry at levels ranging from naturally occurring radioactive material in the environmental background to short lifetime medical isotopes. The methods available include measurement of grades in ores and concentrates as well as quantification of daughter nuclides in out of equilibrium decay chains for remediation verification.

The University of Adelaide is also working towards launching a Centre for Radiation Research, Education and Innovation (CRREI), a multi-institutional centre planned to bring together experts in radiation to serve the needs of Australian industry and the public. The analysis capabilities above are expected to become a core part of the centre.