PROGRAM 1:
DEFINE

Real-time Fluorine Mineral Identification using Novel Fluorescence Technology

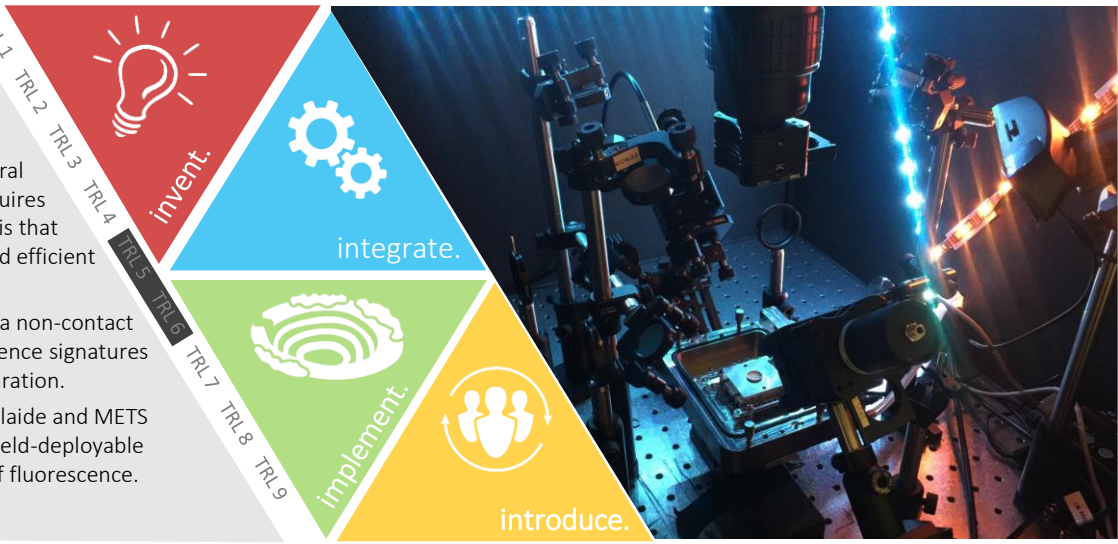
PROJECT P1-014

This project investigates a new technique for real-time identification of fluorine abundance and mineral speciation.

Currently, identifying fluorine within mineral structure in real-time is challenging; it requires time-consuming off-line laboratory analysis that is incompatible with grade engineering and efficient decision-making.

The University of Adelaide has developed a non-contact optical technique based on novel fluorescence signatures that eliminates the need for sample preparation.

In this project, CRC ORE, University of Adelaide and METS company Scantech will create and test a field-deployable prototype system based on novel forms of fluorescence.



THE UNIVERSITY of ADELAIDE

SCANTECH PROCESS CONTROL SPECIALISTS

CRC ORE

Project Scope

The objective is to identify and quantify fluorine abundance in natural minerals. Fluorine can be detrimental to process chemistry or final product value.

The University of Adelaide has demonstrated the laboratory feasibility of the new technique, which uses previously unknown fluorescence signals from fluorine-bearing minerals in near-infrared range.

This lies beyond the historically studied UV/visible conventional fluorescence emission band – effectively representing a novel tool for real-time mineral-specific detection that is highly suitable for on-belt sensing.

The prototype will involve a large array sensor system that enables complete exposed surface coverage in the cross-belt application (not point sampling) with safe, non-ionising, optical illumination from relatively low-cost LED or laser diode arrays.

A sub-study will be conducted to investigate whether the system is suitable for phosphorous in iron ore deposits, arsenic in copper and/or nickel deposits, tungsten in gold deposits and fluorine is coal deposits.

Program Manager:	Greg Wilkie, CRC ORE
Project Leader:	Nigel Spooner, University of Adelaide
Timing:	July 2019 – March 2021
Participant:	University of Adelaide, Scantech
Deposit Type:	Coal

Image (top): University of Adelaide fluorescence equipment

Project Outcomes & Learnings

Real-time understanding of fluorine grade can enable efficient reagent addition (reducing cost) or improve blending and stream diverting strategies (increasing the value of the final product).

The project outcome will be a real-time fluorine grade measurement system in the form of an on-belt analyser.

It will be the only system with enough sensitivity to enable non-destructive real-time fluorine monitoring and will complements existing on-belt analysis techniques (PGNAA or XRF).

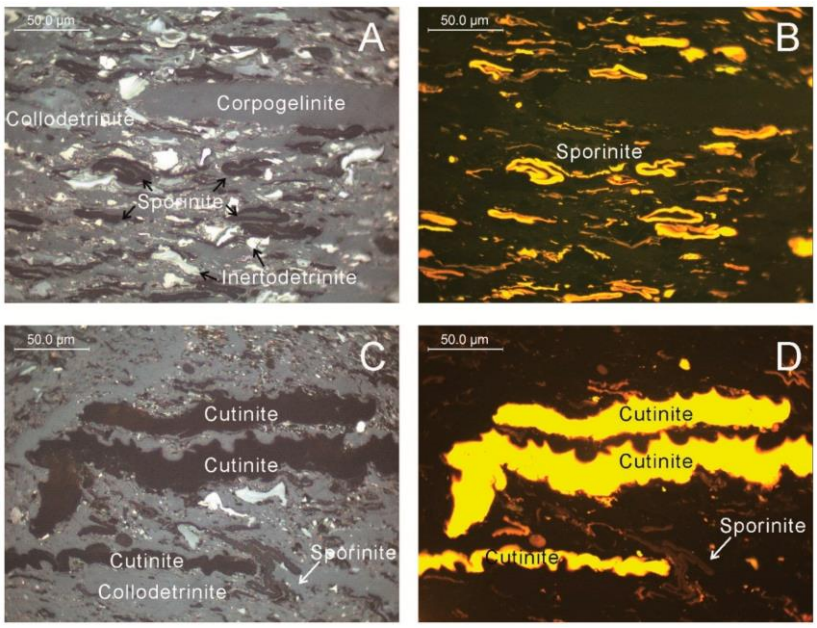


Image (above): Examples of fluorescence in coal. Image originally appeared in article - Mineralogical and Geochemical Characteristics of the Early Permian Upper No. 3 Coal from Southwestern Shandong, China. Minerals 2016, 6(3), 58.

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Optimising Resource Extraction