

GENERATING SYNTHETIC DATA FOR TRAINING PREDICTIVE SPECTROSCOPIC MODELS

PHD PROJECT

University of South Australia

PRIMARY SUPERVISOR

Dr Caroline Tiddy

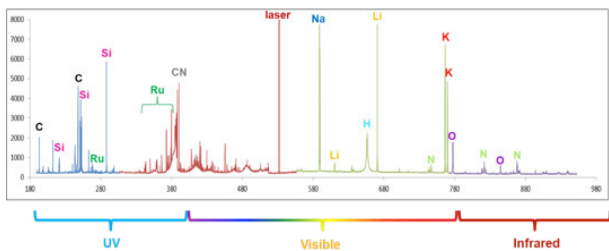
e: caroline.tiddy@unisa.edu.au

t: +61 8 8302 5272

CO-SUPERVISORS

Dr Ben Van der Hoek (UniSA), Neil Francis, Dr Jessica Stromberg, Steven Tassios and Dr Yulia Uvarova (CSIRO)

PARTICIPATING ORGANISATIONS



RESEARCH PROJECT

This project will investigate generation and testing of training datasets that can be used to develop predictive models that may be used in automation and machine learning in the context of advancement of downhole spectroscopic instruments. Predictive models in mining and exploration are often limited by the available training data. This occurs because there is a trade-off between model complexity and model overfitting. Creation of a well-fitted model capable of capturing complex predictive relationships requires a large volume of training data, which may not be practical to acquire due to time, cost and other resource constraints.

The project will consider two approaches:

1. The first approach will investigate training of predictive models using synthetically generated data. This will require development of a high-quality forward model that will generate realistic spectra for mixtures of minerals in an in-situ drill hole environment. It is anticipated that a semi-empirical approach will be required, incorporating mathematical methods, physical modelling and experimental work.
2. The second approach will investigate use of historical data to develop predictive models. Historical data has limited application to development of training models for new spectroscopic tools because the datasets may have been acquired under different environmental conditions and/or with different instrumentation. Investigation of this approach will require advancement of methods for transferring existing calibrations and spectral datasets such that they can be aggregated with new observations for training models for new instruments.