



Curtin University



Faculty of Science and Engineering

2020 Australian Government Research Training Program Scholarships

Strategic Project Profile

PROJECT TITLE: Exploring the geochemical/isotopic record contained within mineral inclusions in zircon

FIELD OF RESEARCH CODE: 0402

PROJECT SYNOPSIS:

Zircon is by far the most important mineral used to date rocks via the U-Pb decay scheme and to trace crustal evolution via Hf and O isotopic and allied trace element studies. Very commonly, igneous zircon contains co-precipitated mineral inclusions such as apatite, feldspar and micas. Despite decades of zircon studies, this inclusion suite has been largely ignored, yet has the potential to provide a range of complementary geochemical information, including clues to the origins of detrital zircons in sediments. For studies of the early Earth in particular, it is difficult to obtain such information in any other way.

In this project the student will undertake a series of geochemical case studies on zircon inclusions, including but not necessarily restricted to Sr isotope analysis of apatite and Pb isotope analysis of feldspar, and will combine the results with data from the host zircons to obtain new insights into geological histories and crustal processes. Because of their small size, the inclusions will be analysed by SIMS (secondary ion mass spectrometry) using methods both established and currently under development by the supervisor team.

Because these investigations are in their infancy, the student will be able to contribute to technique development and to a first order evaluation of the applicability of these methods and of the integrity of the data so obtained. An important question to address is how faithfully the inclusions preserve their original compositions in the face of potential geological disturbances. In addition to SIMS analysis, characterisation of the inclusions will entail the use of various SEM-based imaging methods.

The analytical program will be undertaken using the world class facilities of the John de Laeter Centre at Curtin as well as collaborating institutions, and the student will benefit from the opportunities presented by an outstanding research environment at TIGeR, Curtin's Institute for Geoscience Research.

FEASIBILITY AND RESOURCING – DESCRIPTION OF THE SUPPORT THIS PROJECT WILL RECEIVE:

The student would be working on aspects of a fully funded ARC Discovery Project DP190103849. The analytical costs associated with the student project would be covered by the ARC funding. The student would be eligible for some additional support for travel, etc, as a member of TIGeR.

WHAT MINIMAL ATTRIBUTES AND SKILLS EXPECTED BY THE CANDIDATE BE COMPETITIVE:

This project would suit a student with some experience and aptitude in geochemical / mineral analysis, ideally involving SEM imaging and/or mass spectrometry.

THE SIGNIFICANCE OF THE PROJECT/ PROGRAM FOR THE ENROLLING SCHOOL OR INSTITUTION:

Geochemistry is the cornerstone of research in the School of Earth and Planetary Sciences, being the field of research in which Curtin has consistently achieved the maximum ERA ranking of 5. It is the essential activity of TIGeR and enabled by the world-class infrastructure of the John de Laeter Centre.

Students are advised to contact the Project Lead listed below prior to submission of their scholarship application to discuss their suitability to be involved in this strategic project.

PROJECT LEAD CONTACT

NAME: Professor Pete Kinny, Faculty of Science and Engineering

EMAIL: p.kinny@curtin.edu.au

CONTACT NUMBER: +61 8 9266 4071

CO-SUPERVISOR

NAME: Alex Nemchin

EMAIL: A.Nemchin@curtin.edu.au