Acadamh Ríoga na hÉireann
Royal Irish Academy

Charlemont grant report

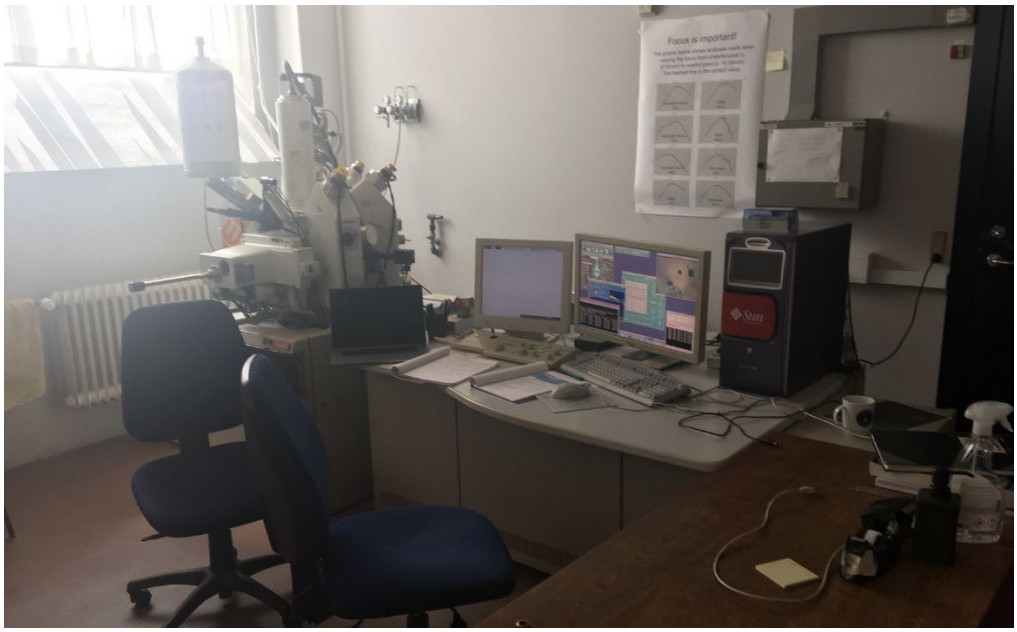
Recipient name:	Dr Lingli Zhou
Discipline and subject area:	€2,238 in 2020
Amount and year awarded:	Sciences; Earth and Environmental Sciences
Title of project:	Characterising Energy Critical Metal occurrence in the Irish-type Zn-Pb deposits

Summary of findings:

The main scientific findings of this study is precise chemical composition of the Irish sulphide ore and carbonate mineral phases tailing samples, which was measured by Electron Probe (EPMA) analysis at the Copenhagen University.

A precise measurement of the major element (Fe, Zn, Pb, S) composition of sulphide minerals is very important to process the trace element composition measured by the laser ablation-ICPMS analysis at Trinity College Dublin. In particular, the critical metals (In, Ga and Ge) are usually present below 1000 ppm in content in the sulphide mineral phases, which could easily be affected the content of major element that is to be used for processing the trace element compositions.

In addition, EPMA analysis of carbonate minerals is traditionally challenging. However, through several days of testing and problem-shooting we (myself and the collaborator Prof. Tod Waight) managed to overcome the challenge and acquired good quality data for my carbonate samples, i.e. zinc, lead and iron carbonates. The analytical protocol we established in the laboratory could serve for future analysis of any carbonate mineral phases.



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Plans for continuing collaboration:

Ireland has not yet accommodated a electron probe and the collaboration established this time with the electron probe laboratory of Copenhagen University will be strategically and technically important for future research on the sulphide and carbonate mineral analysis.

Although the planned lab work was not completed at Aarhus University, but an academic visit to Prof. Thomas Ulrich was made to discuss future collaborations. A joint grant application between UCD and Aarhus University is also within the scope for discussion, proposing to work on the rare earth mineral resources in Greenland.

Published work and publication plans:

Two papers are planned to be published, which will include the analytical results supported by this grant. The two papers will be focused on the sulphide ore geochemistry and tailing mineralogy and geochemistry characterisation, respectively.

The plan journals for the submission are Ore Geology Reviews and Science of the Total Environment, respectively.

Dissemination and plans for future dissemination:

A conference talk is scheduled for presenting this result in Denver, Colorado. The conference is Society Economic Geologist (SEG) 2022: Minerals for our future.

I am a chair of theme "Exploring the full value chain from mine to market", and also an oral presenter of an accepted abstract titled "A mineralogical and geochemical study of energy critical metals in the carbonate-hosted Zn-Pb mine tailings, Ireland". The talk will be partly based on the analytical results acquired from the visit to Copenhagen University.

Collaborations and planned collaborations:

Additional academic collaboration was built with the Electron Probe laboratory of Copenhagen University and with Prof. Tod Waight there. The initial plan was visiting the Electron Probe lab of the Department of Geosciences at Aarhus University. However, the analytical instrument was/is broken down and couldn't host my visit during the funding period. Prof. Thomas Ulrich, my previous contact at Aarhus University, recommended me to the laboratory at Copenhagen University. In this way a new academic collaboration has been developed.

Outreach and engagement activities:

Since the results are fresh (coming out this month) there hasn't been a plan or an opportunity of disseminating the results yet. However, hopefully by late this year I will have the opportunity of talking about the results by engaging with general public.