Proposed Studentship

Energy_Critical_Elements – British Isles

Supervisor(s): Dr. Giulio Solferino

Project Description:

Energy-Critical-Elements (Bi, Co, Ga, Ge, In, REE, Sb, Se, Te – acronym ECE) are essential for the advancement of all modern-day technologies (e.g., building materials, vehicle parts, Li-batteries, permanent magnets, solar/photovoltaics cells, wind turbines - California Institute of Technology, 2011). The rapid growth of many EU economies (Poland, Romania, Bulgaria, etc.) has magnified the demand for these commodities across the European continent. The UK currently relies heavily, if not solely, on imports of ECE. Specifically, more than 90% come from three major countries: China, Russia and USA (Soleille et al., 2018). This is a clear 'critical supplying scenario'. In order to address the increased competition for sourcing ECE the government (UK) has set the target to foster the discovery of new primary resources, possibly within the British Isles. This goal is only attainable through a greater understanding of ECE concentration in ore minerals that will improve the efficiency of mining prospection.

Aim&Goals
This project aims to identify potential resources of Energy Critical Elements (ECE) within the United Kingdom, focusing on the prospective regions of the Lake District and the Pennine Orefield.

The research will explore the following areas:
- Geological setting of ore bodies: 3D shape of ore, mineralizing fluids pathways, effects of metamorphism/metasomatism/tectonic.
- Geochemistry of mineralisations: Range of critical elements present in economic grades, composition of fluids, distribution of ECE among ore forming minerals.
- Evaluation of resources: Estimation of grade and volume.
- Ore forming modelling: Preparation of ore-forming models applicable to worldwide mineralisation with similar geology.
- Economic viability of ECE extraction in the Pennine Orefield.

Training:
This project will train postgraduate students in essential scientific & technical skills required in an academic research environment and mineral resources exploration. Specific training will hinge on: EDS and CL Scanning Electron Microscopy, Reflected Light petrography, XRF, production of digitized geological maps and production of paragenetic sequences.

Person specification:
Background in geological mapping and fieldwork techniques is required. Strong background in reflected light microscopy and ArcGIS is desirable but not essential.

References:

California Institute of Technology (2011). Critical Metals for Sustainable Energy Applications. [online] California, pp.22-31.
Available at: http://resnick.caltech.edu/docs/R_Critical.pdf

Soleille, S., Kong, M., Planchon, M., Saidi, N., Devauze, C., Petarvratzi, E., Gunn, G., Brown, T., Shaw, R., Lefebvre, G., Le Gleuher, M., Rietveld, E., de Jong, j., Nijiand, T. and Bastien, T. (2018). Study on the review of the list of critical raw materials: final report. [online] Publications.europa.eu. Available at: https://publications.europa.eu/en/publication-detail/-/publication/08fdab5f-9766-11e7-b92d-01aa75ed71a1/language-e

*Details on how to apply can be found here **www.rhul.ac.uk/studyhere/postgraduate/applying***
*Please contact the Postgraduate Programmes Co-ordinator, if you have additional questions about the department or application procedures (email: **pgadmin@es.rhul.ac.uk** ; tel: 01784-443581).*
Applicants are requested to send an additional copy of their CV directly to the lead supervisor of the project in which they are interested. Please also contact the supervisor if you have any questions about the project itself