TARGETing crystallisation for Enhanced Carbon Capture and Storage (TARGET-CCS)

Project description

The release of greenhouse gases and particularly CO_2 into the atmosphere leads to global warming. One recognised and recommended technology to mitigate this problem is carbon capture and storage. Once injected into geological reservoirs, CO_2 can be retained by several mechanisms including structural and mineral trapping. Mineral trapping (i.e., crystallisation of carbonates due to interaction between dissolved CO_2 and minerals) can effectively sequester CO_2 within mineral structures, providing long-term storage of CO_2 during thousands of years.

Basaltic rocks are considered as a great potential repository for CCS because of their Ca, Mg and Fe content, high reactivity to CO_2-containing fluids and their abundance on the Earth's surface. Despite their high content of Al, Na and K, no methods to target the crystallisation and stabilisation of metastable aluminium-bearing carbonate minerals (e.g., dawsonite, tunisite, alumohydrocalcite) have been tested during the carbonation of basaltic rocks. Besides, if this carbonation could be carried out at (near)-ambient conditions, the infrastructure costs for CCS would be substantially lowered. TARGET-CCS will carry out an in-depth study of the crystallisation and stability of these minerals under a range of environmental conditions using a combination of conventional laboratory (spectroscopic, microscopic, solid-state) techniques and synchrotron-based diffraction and scattering.

Person specification

Applications are invited from students who can demonstrate a solid background in geochemistry and mineralogy. Passion for laboratory work and keen interest and self-motivation for solving problems is essential. Candidates must have an excellent, relevant geoscience honours degree. The project is fully funded for four years with a stipend of 18.5k per annum, includes fees for EU applicants, and has a projected start date of 1st September 2018. Note that applicants must have been resident in a EU member state for 3 out of the last 5 years to be eligible for EU fees.

The PhD student will be based at Trinity College Dublin (Geology Department, School of Natural Sciences), but s/he will also be required to undertake some work at synchrotron facilities (e.g., Diamond Light Source) during short periods of time as well as travel to present results at international conferences.

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Trinity College Dublin

Founded in 1592, Trinity is at the nexus of tradition and innovation, offering undergraduate and postgraduate programmes across 24 schools and three faculties: arts, humanities, and social sciences; engineering, maths and science; and health sciences. Spread across 47 acres in Dublin's city centre, Trinity's 17,000-strong student body comes from all 32 counties of Ireland, and 16% of students come from outside the country. Of those, 40% are from outside the European Union, making Trinity's campus cosmopolitan and bustling, with a focus on diversity.

Further details of the Geology Department, the School of Natural Sciences and Trinity College Dublin can be accessed at:

http://www.tcd.ie/Geology/
http://naturalscience.tcd.ie/
http://www.tcd.ie/

Contact information
Enquiries for further details are also welcome.

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