

## 2-year funded Masters position available

### Exploring mineral CO<sub>2</sub> capture potential in Ireland

**Masters Project Description:** This Masters project will explore the capability of a variety of Irish lithologies to act as mineral CO<sub>2</sub> capture sites as part of a broader feasibility study of CCUS (CO<sub>2</sub> capture, utilisation & storage) in Ireland. The successful candidate will work with geochemical fluid-rock interaction software to simulate potential reactions CO<sub>2</sub> rich fluids might have with Irish rock compositions. The MSc will then work with the University of Liverpool to perform fluid-rock interaction experiments on lithologies with compositions potentially conducive to interaction with CO<sub>2</sub> rich fluids such that carbonate minerals form as a result. This research seeks to determine a) whether a range of lithologies common in regions of Ireland will facilitate mineral CO<sub>2</sub> capture, b) determine the optimal environmental conditions (temperature, pressure, and fluid chemistry) that promote such fluid-rock reactions, and c) explore the chemical and crystallographic nature of any fluid-rock reaction driven carbonate mineralisation.

**Background:** NUI Galway and the University of Liverpool have been awarded funding to perform a comprehensive feasibility study of CCUS in Ireland. Work Package 1 will fully update Monaghan's 2006 techno-economic models of CCS to the current state of the art. WP2 will extend understanding of Ireland's storage capacity by modelling the role fault structures in Ireland play in subsurface CO<sub>2</sub> storage reservoirs with newly available data. WP3 (**this MSc project**) will explore the potential of a completely new form of CO<sub>2</sub> storage, permanent mineral capture. CO<sub>2</sub> capture and storage in mineral form is deemed as a potential long-term solution to reducing greenhouse gas emissions. WP3 will examine a range of metamorphic and igneous rocks from regions in Ireland where they are commonly found e.g. Connemara, the NW igneous province, and Donegal, for their ability to react with CO<sub>2</sub>-rich fluids in a way that captures carbon in solid form. This is an emerging field of study and has not been characterised for many countries including Ireland. It will involve both experimental tests and modelling. WPs 1-3 will fully update our understanding of CCS (not CCUS) to the international state of the art. WP4 will explore the utilisation of CO<sub>2</sub> in non-geological settings. Researchers in these WPs will work closely together to deliver the overall project.

**Duration:** 1<sup>st</sup> September 2021 – 30<sup>th</sup> August 2023

**Stipend & tuition:** €18,500 per annum plus tuition fees for 2 years.

**Requirements:** Honours Bachelors (Level 8) degree in Geology / Earth Sciences with *at least* a 2.1 Honours grade or equivalent. The successful candidate will have a strong background in **mineralogy, petrology, geochemistry**, and experience with modelling languages (for example **Matlab, Python, R**) is beneficial. **Strong written and spoken English communication skills are essential.** A background in geological experimental practise and laboratory experience is advantageous. **Open to EU and UK candidates.**

**How to apply:** Send a one-page cover letter, and your CV with names and contact details of two referees to the project supervisor, Dr. Tiernan Henry ([tiernan.henry@nuigalway.ie](mailto:tiernan.henry@nuigalway.ie)) and Dr David McNamara ([d.mcnamara@liverpool.ac.uk](mailto:d.mcnamara@liverpool.ac.uk)), with "**CCUS MSc application**" in the subject line. The closing date for receipt of applications is **9pm (Irish time) Friday 20<sup>th</sup> August 2021.**

#### Additional information

Dr. David McNamara: Google Scholar: <https://scholar.google.com/citations?user=ol-nnz0AAAAJ&hl=en> , Twitter: [@mcnamadd](https://twitter.com/mcnamadd), email: [d.mcnamara@liverpool.ac.uk](mailto:d.mcnamara@liverpool.ac.uk)