

PhD Opportunity:

Development of novel grouting technology for subsurface engineering & the net-zero carbon revolution

Funding:	£15,609 yearly stipend, home fees covered.
Duration:	3 years
Mode of study:	Full time

Supervisory team:

[Dr. James Minto](#)

[Dr. Matteo Pedrotti](#)

Application deadline:

13 August 2021

Project start date:

Flexible, ideally October 2021

Project Overview

- This lab-based project will focus on **developing micron- and nano-scale technology to create novel grouts** for enhancing the hydro-mechanical properties of the subsurface.
- During the project, different subsurface engineering applications will be scoped with the aim of targeting net-zero carbon related opportunities such as energy storage (compressed air, hydrogen), geothermal energy, and carbon sequestration.
- The candidate will be joining a research group with a track record in developing novel grouts, and in using advanced techniques such as X-ray micro CT and bespoke designed mechanical testing equipment to characterise and evaluate the grout effectiveness:

[Minto et al. "X-ray CT and multiphase flow characterization of a 'bio-grouted' sandstone core"](#)

[Minto et al. "Development of a reactive transport model for field-scale simulation of MICP"](#)

[Pedrotti et al. "Desiccation behaviour of colloidal silica grouted sand for the creation of hydraulic barriers"](#)

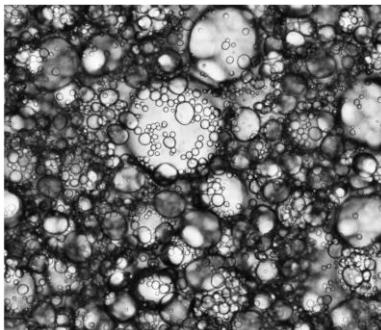
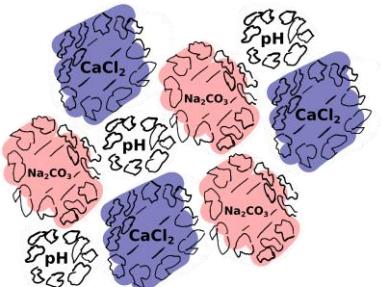


Fig. 1: Schematic representation (top) and optical microscope image (bottom) of an example novel grout delivery mechanism consisting of chemicals encapsulated by hydrophobic silica nanoparticles.

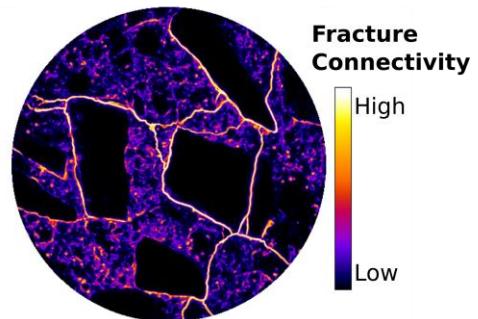
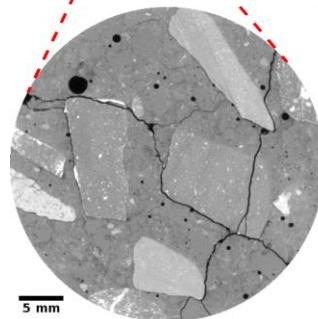


Fig. 2: Example engineering application: concrete infrastructure that has degraded and fractured leading to high permeability leakage pathways.

Training & Skills

The applicant will join the highly multidisciplinary [Centre for Ground Engineering & Energy Geosciences](#) in the Department of Civil & Environmental Engineering where they will have access to a wide range of laboratories and equipment such as SEM, XRD, X-ray CT, and learn skills from experts in areas such as X-ray CT acquisition and image processing, numerical flow modelling, mechanical testing, and in setting up and designing lab experiments. The applicant was also be mentored in writing research papers and future funding applications.

Alongside the PhD research, the applicant will carry out formal training leading to a Postgraduate Certificate in Researcher Professional Development aimed at enhancing a broad range of research and transferable skills.

Eligibility & Funding

Applications are invited from candidates who have achieved a first class or upper second class honours in a relevant degree, including:

- Civil Engineering,
- Geotechnical Engineering,
- Chemical Engineering,
- Petroleum Engineering,
- Environmental Engineering,
- Materials Science,
- Applied Physics,

or an equivalent qualification at Masters level, and must be highly motivated to undertake multidisciplinary research.

The studentship covers full UK PhD tuition fees (at the Home Fee rate) and a tax-free stipend of £15,609 per year for the full three-year project duration. International Students applying must be able to provide evidence and pay the difference between the UK Home Fee and the International Fee.

Application

For more details or information on how to apply, please contact James Minto:

james.minto@strath.ac.uk



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