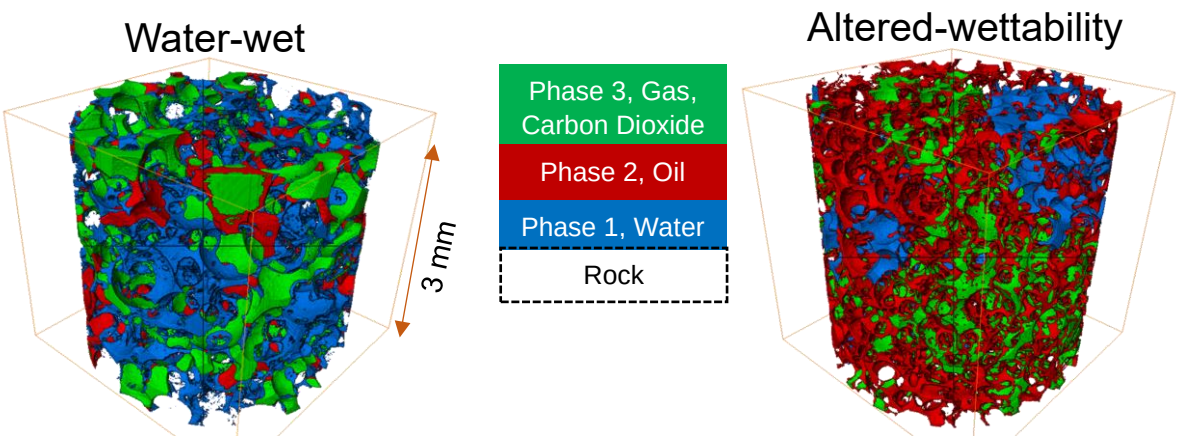
Pore-Scale Imaging, Analysis, and Data-Driven Pore-Scale Modelling



Many of the scientific challenges associated with a transition to a net-zero carbon economy by 2050, to avoid dangerous climate change, are associated with the flow of fluids deep underground in porous rock. It is in these rocks that carbon dioxide can be stored, to offset emissions from fossil fuels. Understanding, managing and designing this process requires a knowledge of how fluids flow at the micron-scale in the pore space. At Imperial College we have pioneered advanced X-ray imaging techniques to observe flow patterns inside porous media, as shown in the picture above.

Applications are invited for a Ph.D. studentship in the Department of Earth Science and Engineering. The successful candidate will have the opportunity of working with a dedicated team involving various academics and Departments within an industrially-funded project "Digital Rocks". You will use image-based digital technology to study CO_2 storage and enhanced oil recovery. Our aim is to develop unique measurement and modelling capabilities to stretch our fundamental understanding of rock properties, fluid properties and multiphase fluid flow in reservoirs, to enable radical enhancements in the design and prediction of flow processes underground.

You will work as part of an integrated, friendly and supportive team of scientists and engineers from all round the world who use innovative X-ray imaging techniques, image analysis and modelling to understand how fluids flow in porous media.

The main objectives of the PhD project will be to:

- Demonstrate an improved workflow combining imaging and measurement of multiphase flow properties.
- Provide benchmark datasets on displacement processes under a variety of conditions.
- Refine and improve the measurement of interfacial curvature and wettability and to explore the use of machine learning algorithms in image analysis.
- Analyse the datasets to track displacement processes and occupancy on a pore-by-pore basis together with measurements of capillary pressure and relative permeability.
- Acquire time-resolved datasets at synchrotron sources to obtain insights into the dynamics of displacement and to provide robust calibration for models.

In addition, the successful candidate will be expected to submit publications to refereed journals and to present their findings at major international conferences and to the sponsors.

The applicants should also have a proven aptitude for practical, experimental work and a genuine passion for research. Applicants are expected to have obtained (or be heading for) a first or upper-

second degree at master's level (or equivalent) in *any relevant engineering or physical science discipline* and be highly motivated.

Funding is available for UK citizens and EU citizens who have resided in the UK for the past three years. The studentship is for up to 3.5 years, plus tuition fees at the UK/EU or overseas rate for 3 years.

Applications should be made through the College's online application system:

http://www.imperial.ac.uk/study/pg/apply/how-to-apply/

Important information about the College's PhD application process can be found on the following page: http://www.imperial.ac.uk/study/pg

Informal enquiries about the post can be made to Professor Martin Blunt (m.blunt@imperial.ac.uk)