

Faculty Name:

Shaina Kelly

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Lab:

Kelly Lab (PoreStore)

Project Title:

Capillary trapping capacity in carbon storage geological samples

Description:

Geologic storage of CO₂ is a critical decarbonization pathway. CO₂ and other non-aqueous fluids may be stored in subsurface reservoirs through four trapping mechanisms (physical/structural, capillary, dissolution, and mineralization trapping), all exhibiting spatial-temporal changes throughout a porous material.

This research project will further develop Kelly Lab in-lab workflows for characterizing water-CO₂ multiphase flow and capillary trapping capacity over time in rocks and minerals containing varied nanopores, silicates, and wetting properties. Tasks may include: (1) Preparing samples and sample holder cells of varied sizes/shapes, surface chemistry treatments, and exposed faces (boundary conditions); (2) High pressure saturation units to control the brine saturation of samples (initial condition); (3) Precision imbibition setups for measuring fluid spontaneous and forced imbibition under various fluid mixtures; and (4) Fluid drainage apparatuses including customized porous plate and centrifuge techniques and gas-liquid porometers to determine capillary pressure versus saturation (P_c - S_w) and pore size distribution. Complementary correlative microscopy and materials characterization will be conducted at university shared user facilities. Subsurface rocks, outcrops, mineral samples, aggregates, and synthetic porous media such as sintered glass will be utilized.

Location of Research:

On-Site

of hrs/week:

25

Department/Program:

Earth and Environmental Engineering

Eligibility:

BS, Second Year, BS, Third Year, BS, Fourth Year, MS

To apply, please contact:

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