Controlling CO₂ movement with nanoparticles

Scientific Achievement
Shown experimentally that the mobility of CO₂ analog fluid is reduced when it displaces a brine laden with suitably treated nanoparticles.

Significance and Impact
CO₂ is a low viscosity, high mobility fluid that moves through preferential paths through the subsurface. Our discovery raises the possibility of reducing the mobility of the CO₂ only where needed, i.e. at incipient preferential paths. This can reduce the risk of leakage and increase the efficiency of CO₂ storage.

Research Details
- CO₂ and CO₂ analog fluids injected into sandstone cores with/without nanoparticles in the initial brine
- Measured patterns and saturations using CT scanning
- Preferential flow paths greatly reduced (see images)
- Low mobility phase likely the result of displacement processes creating micron droplets of CO₂ that are stabilized by the in-situ nanoparticles