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## Multi-scale CO<sub>2</sub>-Brine Core Flooding Under X-Ray CT In Sandstone From Ordos Basin

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To understand how does the injected CO<sub>2</sub> migration could help increase the available storage capacity in geologic formations, this paper reports a series of experiments of core flooding. To examine the effects of CO<sub>2</sub> migration pathways in geologic formations, our team have developed a core flooding test of displacing water in porous media with CO<sub>2</sub>. The samples were obtained from the Ordos Basin, all formations being used for carbon capture and storage (CCS) pilot—Shenhua CCS demonstration project, with a capacity of 100,000 tones CO<sub>2</sub> per year, which is the first fully process of CCS in saline reservoir in China. All flooding tests in this paper were performed in the industry CT scanner, medical CT scanner and micro CT scanner.

Experiments were performed over several weeks by injecting CO<sub>2</sub>-saturated brine through samples. At the same time the samples were scanned with a computed tomography (CT) scanner at regular intervals (0.5mm) during the course of the experiments. Injection flow rates and temperature of the system were varied for each experiment. For the first test of every sample, the helium gas as the flow constant pressure 100 psi at different flow rates (0.72ml/min, 1.48 ml/min, 2.96 ml/min ) was test. Then the brine and CO<sub>2</sub> as the flow constant pressure 2000 psi at different flow rates (1.72ml/min, 3.43ml/min, 5.13 ml/min) was test. The constant injection pressure resulted in unstable flow patterns. For the subsequent tests a constant injection rate was set with the Isco pumps and with additional software controls to ensure the pore pressure did not exceed the confining pressure (2500 psi). As long as the injection pressure was less than the confining pressure the flow rate was constant for a constant delta pressure. When the injection pressure increased to a value close to the confining pressure the flow rate was decreased to ensure safe operations.

A review of the findings in common among the studied is presented in the final sections of this paper.

### References

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**Primary author:** Ms WANG, Yan (State Key Laboratory of Geomechanics and Geotechnical Engineering, Institute of Rock and Soil Mechanics, Chinese Academy of Sciences)

**Co-authors:** CRANDALL, Dustin; ZHANG, Liwei (Institute of Rock and Soil Mechanics, Chinese Academy of Sciences); Prof. WEI, Ning (State Key Laboratory of Geomechanics and Geotechnical Engineering, Institute of Rock and Soil Mechanics, Chinese Academy of Sciences); Prof. LI, Xiaochun (Institute of Rock and Soil Mechanics, Chinese Academy of Sciences); Mr MOORE, Johnathan (AECOM, National Energy Technology Laboratory); Dr BROMHAL, Grant (Department of Energy, National Energy Technology Laboratory)

**Presenter:** Ms WANG, Yan (State Key Laboratory of Geomechanics and Geotechnical Engineering, Institute of Rock and Soil Mechanics, Chinese Academy of Sciences)

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