

TRIP REPORT ON VISITATION TO CSIRO, AUSTRALIA

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I was very fortunate to be awarded a grant from Geoscience Australia through the CAGS (China Australia Geology Sequestration Project) project for a three-month visitation to CSIRO Earth Science and Resource Engineering in Perth, Western Australia. During my three-month research period between August and November I completed a series of laboratory experiments relating to supercritical CO₂-water-mineral interaction under reservoir P/T conditions under the supervision of Dr Keyu Liu. Together with Dr Liu we designed an effective experimental protocol and carried out a range of experiments using a CO₂ core flooding system on both synthetic and natural sandstone samples. The work include (1) detailed characterization of the rock prior to the CO₂ coreflooding experiments, (2) CO₂ coreflooding under reservoir P/T condition with or without X-ray CT monitoring, and (3) rock and fluid characterization after coreflooding experiments using a range of laboratory techniques such as porosity-permeability analysis, acoustic and electric resistivity measurement, X-ray CT imaging, Scanning Electron Microscopy, water chemistry analysis.

The experiments have shown that under reservoir condition of 50 °C and 12.5 MPa CO₂ can react with carbonate cemented quartz sandstone in the presence of brine significantly within a relatively short period of less than 4 hours by dissolving the carbonate cement and enhancing the permeability of up to 37%. No noticeable reaction was found during the dry (without water in the system) coreflooding. In a primarily silica cemented quartz sandstone, no noticeable reaction was found between the supercritical CO₂ and the sandstone in the presence of brine over a period of 8 hours. A technical report containing some of the findings of the experimental work has been submitted to Geoscience Australia.

In addition to the CO₂ coreflooding experiments, I have gained quite a lot from my supervisor and other CSIRO staff on how to conduct an effective research through the initial planning, execution and post experimental analysis and reporting, which would benefit my future research enormously. The short visit also enabled me to understand the importance of

effective communication within a research team and how to cooperate with other researchers successfully, and to be a responsible team player so as to ensure the success of a project. At the same time, this visitation provides me a great opportunity to practice my ability to work and live independently.

I would like to thank both Geoscience Australia and CSIRO for the opportunity to visit Australia. I am grateful to Jessica Gurney of Geoscience Australia and Keyu Liu from CSIRO for their great effort that made my visit possible and successful. I will continue my research work on CCS in China University of Petroleum, Beijing and will complete my Master of Science in 2012.