

Micro-bubble Injection Enhanced dissolution during CO₂ Sequestration in saline

*LANLAN JIANG¹, Ziqiu Xue¹, Hyuck Park¹, Tamotsu Kiyama¹

1. Research Institute of Innovative Technology for the Earth

CO₂ micro-bubble injection is available for storing CO₂ in aquifers with non-anticline (monotonic) structure in a low-cost concept. In this study, the dynamic displacement and dissolution during CO₂ flushing was investigated by using medical X-ray CT scanner. CO₂ was injected into brine saturated sandstone with 0.05 mL/min under reservoir condition (10MPa/40°C). Two sets experiments with micro-bubble and normal bubble CO₂ were conducted to quantify compare the enhanced dissolution efficiency. Larger interfacial area between CO₂ and brine during the injection enhanced the mass transfer and delayed CO₂ breakthrough. The breakthrough time for micro bubble was nearly 120 min corresponding to 180 min for normal bubble under the same injection rate. By image analysis, the high sweep efficiency during micro-bubbles injection was obtained. Micro-bubble CO₂ preferred to trap into tiny pores since the small size bubble and micro-bubbles injection accelerated gas trapping because of the fully dissolution. CO₂ micro-bubble sequestration is also a novel technology to store CO₂ from the small- to middle-scale emission sources by enhanced dissolution and effective use of pore space suggested by our experimental results.

Keywords: micro bubble, CO₂ saturation, high sweep efficiency, dissolution