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Use of surfactants to enhance the CO2 storage capacity in the geologic carbon storage

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Geologic carbon storage is the most readily available technique that can store the carbon in a relatively larger volume. The higher injectivity and the larger storage capacity are required for the efficient and economical geological carbon storage. The storage capacity of reservoirs highly depends on the multiphase flow properties of the reservoirs, especially the residual saturation of CO2 . The CO2-compatible surfactants can enhance the storage capacity by increasing the residual saturation of CO2, due to the reduced interfacial tension between brine and CO2 . A few groups of CO2-compatible surfactants have been tested for their performance in controlling interfacial tension in various pressure and temperature conditions. The interfacial tension and contact angle on commercially available substrate, such as quartz mineral and sandstones, were experimentally measured. The pressure and temperature ranges 25~40℃ and 4~10MPa, respectively. Non-ionic surfactants perform better than ionic surfactants in the brine-CO2 system, whereas the performances were similar to each other in the brine-air system. The contact angel alteration become more prominent in higher pressures. Lower interfacial tension and higher contact angle, induced from surfactants, will lower capillary pressure, and thus increase the residual saturation of CO2. The lower capillary pressure also enhance the sweep efficiency during the geologic carbon storage operation. Further study with various and systematic measurement conditions are required for the operation design in field scale.

Participation

In-Person

References

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Primary author: Dr JOO YONG, Lee (Korea Institute of Geoscience and Mineral Resources)

Co-authors: Mr JAE EUN , Ryou (Chungbuk National University); JEON, Min-Kyung (Korea Institute of Geoscience and Mineral Resources); JUNG, Jongwon (Chungbuk National University); KWON, Tae-Hyuk (KAIST); Dr YONGCHAN, Park (Korea Institue of Geoscience and Mineral resources)

Presenter: Dr JOO YONG, Lee (Korea Institute of Geoscience and Mineral Resources)

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