Mineralogical characterization of geological target layers for Carbon Capture and Storage (CCS)

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Carbon Capture and Storage(CCS) has drawn attention globally as a reduction technology for waste carbon dioxide (CO2) in large scale among several ways to reduce greenhouse gases. A practical study of CCS in small and medium scale has been started and a power plant was built on the Yeongil bay, Pohang, Korea. In 2017, it achieved success in offshore geological storage of carbon dioxide for the first in Korea, for the third in the world following Norway and Netherland. This study performed a core description from the Yeongil bay, mineralogical characteristics by X-ray diffraction, and texture analysis by SEM for evaluation of reservoir quality. There are two target storages; reservoir 1(R1), which is sandstone, and reservoir 2(R2), which is the main reservoir consisting of sandstone and conglomerate. Generally, all samples from the core has a similar mineralogy including quartz, K-feldspar, albite, chlorite, illite, and a few accessory minerals such as rutile, ilmenite, apatite, pyrite, zircon and so forth. R1 has calcite for filling cracks as well as pores and illite, kaolinite, chlorite, rutile mixture. While R1 rarely has pore filling chlorite, R2 sometimes has euhedral chlorite to fill pores and authigenic quartz with chlorite as diagenetic co-crystallization. There are several K-feldspars, which has dissolution texture and filled with albite, and quartz overgrowth texture in R2. R2 is more effective reservoir because of the result that R2 has relatively higher porosity, about 14-28%, and chlorite composition even though R2 has taken more compaction due to the depth. In addition, chlorite could take on a role in barrier of pore cementation. It would be possible to be changed under various conditions of pressure, temperature, and fluid composition.