

Mineralogical and geochemical studies of sedimentary systems in GSJ, AIST, for the underground storage of CO₂

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As the Kyoto Protocol became effective in February, 2004, immediate actions are now required to attain 6% reduction of the emission of greenhouse-effect gases to the reference year during the first commitment period from 2008 to 2013. The geologic sequestration of CO₂ to a underground saline aquifer is considered to be the most feasible methods.

It is necessary to confirm long-term stability for underground CO₂ sequestration to obtain public recognition and acceptance. The geochemical interactions of injected CO₂ with interstitial saline water and surrounding sedimentary rocks are an important factor to understand the stability of underground reservoir. The injection of CO₂ must reduce pH of the interstitial water. This change may trigger the dissolution of some of the constituent minerals in the host sedimentary rocks, thereby affecting the property and stability of the reservoir. Or, during a very long period, the elevated CO₂ activity would promotes precipitation of carbonates, a process commonly observed in natural diagenesis of sedimentary rocks. The mineralogical and geochemical characteristics of rock-fluid interactions are essential to evaluate the stability of underground CO₂ reservoir.

We have been studying rock(mineral)-water-CO₂ interactions in CO₂-rich environments to understand a possible way of mitigation of injected CO₂ to the underground environment. Our studies include those on natural analogues, such as the geochemistry and rock-water interaction in CO₂-bearing springs and mineralogical changes of sedimentary rocks in diagenetic environments. Importance of geochemical characteristics of interstitial waters in sedimentary basins is stressed as constraints on dissolution experiments and geochemical simulation.