

Physical and Chemical Changes of the Casing Cement and Cap-rock by Super Critical CO₂

Daisuke Tanaka[1]; Yasuhiro Yamada[2]; Sumihiko Murata[2]

[1] Civil and Earth resources Eng., Kyoto Univ; [2] Civ. Earth Res. Eng., Kyoto Univ.

In order to reduce the emission of CO₂ to the air, for mitigating global warming, sequestration of CO₂ into the subsurface is important technical problem. To keep the sequestration safely and surely in very large time scale, we should know how much CO₂ affect on reservoir. So the purpose of this work is to know what happens on reservoir surrounding materials when they are exposed to super critical CO₂ and water for a long time.

In this experiment four samples are selected, two types of casing cement and two types of mudstone, as reservoir surrounding materials. In the beginning they are soaked in super critical CO₂ (60 degrees centigrade, 1500psi) for 3 months, and subsequently a half volume of samples are soaked in carbonated water and another half are soaked in super critical CO₂ for 9 months.

Some changes are seen at both outside and inside of cement samples. There are many crystals of aragonite on surface and in pore space of cement samples. Probably, the porosity of sample is reduced by crystal made in pore space. On the other hand, no change is seen in mudstone sample. Eventually, it is thought that the change on cement samples in this experiment upgrade a sealing ability with reducing the porosity and permeability.