

Self-diffusion of proton in portlandite

Naoki Noguchi[1]; Keiji Shinoda[1]

[1] Geosciences, Osaka City Univ.

The influence of hydrogen bonding in mineral on self-diffusion of proton is essential for understanding mechanism of proton mobility. The self-diffusion of proton in portlandite ($\text{Ca}(\text{OH})_2$) is interesting because there are a possibility that the hydrogen bonding formed between CaO_6 octahedral layers in portlandite cause the rapid rotational diffusion of proton (Raugei et al. 1999). We have experimentally determined diffusion coefficient of proton of portlandite.

The diffusion experiments were carried out using a cold seal pressure vessel, and the tracer; D_2O was diffused to single crystals of portlandite at 573-723K and 1.5kbar. H-D diffusion profile in the single crystal of portlandite was measured using micro Raman spectroscopy. The result of the analysis in the [100] direction shows that pre-exponential factor ; D_0 is $6.9 \times 10^{-12} \text{m}^2/\text{s}$ and the activation enthalpy is 48kJ/mol. The activation enthalpy is the lowest value in that of hydrous minerals.