

Stable Isotope Studies of Microbially-induced Carbonates

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Despite the frequent occurrence of microbially-induced carbonate minerals in terrestrial environments, and the potential application of stable isotope geochemistry of these minerals to various fields of earth science (e.g., from paleoclimatology to astrobiology), stable isotope systematics of microbially-induced carbonates have not been thoroughly studied yet.

As a first step to investigate stable isotope effects in microbially-induced carbonate minerals, four types of divalent carbonates were precipitated using *Proteus mirabilis* in the laboratory at 25 °C. Their mineralogy was confirmed to be calcite, aragonite, Mg-calcite, or strontianite by X-ray diffraction (XRD) analysis and scanning electron microscopy (SEM). Subsequently, we conducted stable isotope analysis of the four carbonate minerals, as well as the solution media from which each carbonate mineral was formed, using a dual-inlet isotope ratio mass spectrometer (DI-IRMS). The stable isotope effects observed in the microbially-induced carbonate minerals will be compared to those of abiogenic carbonates [e.g., 1, 2] to quantify the direction and magnitude of the non-equilibrium isotope effects. The mechanisms of the observed isotope effects will also be discussed at the meeting.

[1] Kim *et al* (2007) *Geochim. Cosmochim. Acta.* **71**, 4704-4715 [2] Kim and O'Neil (1997) *Geochim. Cosmochim. Acta.* **61**, 3461-3475