

## Visualization of pH and Ca<sup>2+</sup> concentration during the formation/dissolution of carbonate minerals

\*Jun Kawano<sup>1</sup>, Makoto Yazaki<sup>2</sup>, Yukiko Konno<sup>3</sup>, Takashi Toyofuku<sup>4,5</sup>, Yukiko Nagai<sup>4,6</sup>, Takaya Nagai<sup>1</sup>

1. Faculty of Science, Hokkaido University, 2. Graduate School of Science, Hokkaido University, 3. School of Science, Hokkaido University, 4. JAMSTEC, 5. TUMSAT, 6. NMNS

To understand the formation or dissolution mechanism of crystal in aqueous solution, it should be important to analyze the local condition of solution just around dissolving or growing crystal. Recently, we have succeeded to visualize the distribution of pH around carbonate minerals dissolving in inorganic environment, by using the fluorescent probe [1]. In the present study, we have tried to visualize the distribution of Ca<sup>2+</sup> concentration in addition to pH during the dissolution/formation of minerals.

By using HPTS (8-hydroxypyrene-1,3,6-trisul-fonic acid) and Rhod-FF as a fluorescent probe for pH and Ca<sup>2+</sup> concentration respectively, the distributions of pH and Ca<sup>2+</sup> concentration around dissolving calcium carbonate in an aqueous solution were succeeded to visualize simultaneously. While pH just above the surfaces increases and saturates rapidly, Ca<sup>2+</sup> concentration changes more slowly. pH and Ca<sup>2+</sup> concentration during the synthesis of calcium carbonate crystals by counter diffusion method were visualized by using HTPS and calcein, which shows that different Ca<sup>2+</sup>/CO<sub>3</sub><sup>2-</sup> condition in the formation environment affected the morphology and polymorph of forming crystals. These results suggested this kind of visualization technique could provide new insight into the dissolution/formation mechanism of minerals.

[1] Kawano et al. (2019) Cryst. Growth Des., **19**, 4212-4217.

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