

Visualization of local environment around forming/dissolving carbonate minerals with the fluorescent probe

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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 and ionic concentration around carbonate minerals dissolving in inorganic environment, by using the fluorescent probe. In the present study, we have tried to apply this technique to the formation process of calcium carbonate.

Calcium carbonate was synthesized by the counter diffusion method, in which calcium chloride and sodium carbonate solutions were counter-diffused through an agarose gel matrix containing the fluorescent probe like 8-hydroxypyrene-1,3,6-trisulfonic acid (HPTS). We observed under a microscope that pH in the middle part of gel first increased gradually with time and turn downward after crystals formed. The counter diffusion method with gel media for the carbonate synthesis has attracted attention as a valid tool in the study of biomineralization because the calcification sites in some organisms were recently suggested to have the features of a highly viscous sol or gel matrix. Therefore, the detail observation of the local condition around forming calcium carbonate in gel matrix could provide new insights into the knowledge of biomineralization mechanisms.

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