

Rhombohedra shape of dolomite formation mediated by microbial activity under high pressure

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The mineral dolomite is commonly found throughout the geological record, but very rarely in modern sedimentary environments even though the modern sea water is highly supersaturated with respect to dolomite. Microbial mediation, as one proposed mechanism to concur the kinetics barrier within dolomite formation, is criticized mainly because only small sized non-rhobohedra shape of the mineral has been generated so far, which is apparently distinguished with the field observation. Though the dolomite could be formed under laboratorial condition in the presence of several microbiologically metabolic pathways, the dolomite crystal observed in these test appeared different in shape and size with the most common shape found in field.

In this study, we succeeded in synthesize rhombohedra shaped dolomite mineral with incubate bacterium strain *Sporosarcina psychrophila* DSM 6497 in presence of 54 mM CaCl_2 and 421 mM MgCl_2 at 15 °C for 4 days(7 MPa). The well-ordered crystal sized about 2-10 μm . Our results directly prove that rhombohedra type dolomite can be of microbial origin. Further we found that *Sporosarcina psychrophila* DSM6497, which have been reserved under ambient condition over decades, was piezophile. Under its optimal pressures (7MPa), the temperature and salinity ranges became wider while the pH range became narrower compared to those that under ambient condition. Preteomic analysis implicated that chaotropic is the key stress for *Sporosarcina psychrophila* DSM6497, high pressure is an important environmental factor to alleviated such chaotropic effect. This could be the reason why dolomite was found widely in older statum, especailly those from precambrian.