

## Compositional and textural trends of microcrystalline dolomite found within massive gas hydrate in Joetsu Basin

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Recent exploratory drilling of massive gas hydrates in the Sea of Japan has revealed the presence of relatively pure, spherical growths of microcrystalline dolomite. The absence of sediment in association with the dolomite suggests that they were formed within hypersaline fluid inclusions which are situated inside of the hydrate itself. Stable isotope analysis of the dolomites suggests that the carbon isotopes are in equilibrium with the dissolved inorganic carbon in porewaters, while oxygen isotopes are consistent with the depletion of <sup>18</sup>O during hydrate formation. Composition of the microcrystalline dolomite appears to be consistent with other hypersaline environments such as evaporative lagoons, where similar mineralization occurs, including characteristic pairing of spherical dolomite aggregates. XRD analysis indicates that other carbonates, such as aragonite and calcite, are completely absent and Mg/Ca ratios range from 0.76 to 1.04, with the highest ratios generally found in the deeper samples. SEM-EDS analysis of sections of polished grains indicates that the grains have hollow cores, and are uniform in Mg/Ca ratios from the outer portion to the inner portion. Anomalous Mg/Ca ratios in shallow hydrate may indicate areas where shallow hydrate exposures have been released from the seafloor, followed by renewed shallow hydrate growth.

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