

Stability of carbonate minerals in the Earth's interior

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It is known that the stability of carbonate minerals is important to understand the carbon cycle in the Earth's interior, because the carbonate minerals are major host phases for carbon in the mantle. Therefore, pressure-induced phase transitions and elastic properties of carbonates have been the object of intense experimental and theoretical investigations. Recently our theoretical calculations and high-pressure experiments have already showed a lot of discoveries of new high-pressure phases of carbonates, such as MgCO₃ [1], CaCO₃ [2], SrCO₃ [3], BaCO₃ [4], and MnCO₃ [5]. Most new high-pressure phases have carbon cations exhibiting a three-fold coordination with the oxygen ions. In contrast, a couple of new high-pressure phases show the four-fold coordination, which is the same of many silicate minerals. Our study indicates that carbonate minerals are stable at pressures corresponding to the deep mantle.

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[3] Ono et al., *Phys. Chem. Minerals*, 32, 8-12 (2005).

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[5] Ono, *Mineral. Mag.*, 71, 105-111 (2007).