



## **Polymorphism of calcite at high pressure and high temperature**

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Carbonates may play a fundamental role as carbon repository phases in the Earth's interior[1]. Recent crystal structure determinations by single crystal diffraction technique at high pressure [2] have shown that these phases may adopt very complex structures at pressures corresponding to Earth's upper and lower mantle. Calcite,  $\text{CaCO}_3$ , transforms to low symmetry phases. Computational studies have confirmed that some of these polymorphs,  $\text{CaCO}_3$ -VI in particular, are thermodynamically stable compared to calcite and aragonite. We investigated also the high temperature polymorphism, by experiments at controlled atmosphere and we confirmed the recently proposed  $\text{CaCO}_3$ -V structure [3] above  $1000^\circ\text{C}$  and ambient pressure. In-situ experiments at simultaneous high pressure and temperature defined more accurately the phase relationship between these polymorphs and the effect of Mg and Fe substitution.

1. R. M. Hazen, A. P. Jones, J. A. Baross ed., *Reviews in Mineralogy and Geochemistry*, 75 (2013).
2. M. Merlini, M. Hanfland, *High Pressure Research* 33, 511-522 (2013).
3. N. Ishizawa et al., *Scientific Reports*, 3, 2832 (2013).