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Hugoniot and impact-induced phase transition of magnesite

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ABSTRACT

Hugoniot equation-of-state and release adiabat results are presented for magnesite to a pressure of ~140 GPa. A sharp change in the shock velocity and particle velocity relation suggests that a phase transition to a high-pressure phase occurs at 107±10 GPa. Decomposition of magnesite was observed by abrupt volume expansion during the pressure release from a pressure over the phase transition and by investigating post-shock magnesites recovered from hypervelocity impacts of mini-flyers performed using a laser-driven acceleration. Post-shock magnesites above 95 GPa contained MgO crystallites and the amount of MgO increased with increasing shock pressure.

Keywords: Magnesite, equation of state, high pressure, phase transition, decomposition