

Dynamic behavior of calcite under planetary impact condition

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No EOS models over 100 GPa, which corresponds to planetary impacts conditions, has been investigated by the experimental approach although calcite is a common mineral in chondritic meteorites and surface materials of rocky planets. In this study, calcite single crystals were shock compressed to pressures between 200 and 1000 GPa using the laser driven decaying shock method. Our temperature profiles by decaying shock experiments indicated the large difference from the theoretical model (SESAME 7331) with increasing pressure, and a melting of shocked calcite occurred between 140 and 270 GPa along the Hugoniot. The residual temperature of released calcite was estimated to be approximately 3300 K at the shock pressure of 200 GPa (at shock temperature of 6000 K).

Keywords: Laser shock compression, Planetary impact, Calcite, Shock-induced gas