Shock compression of MgO up to one TPa: Compressibility and Hugoniot temperature measurements

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Magnesium oxide is a constituent of the Earth (of the low mantle and crust), rocky planets and meteoroids. Its equation of state is important for simulation of space impact phenomena and planet interiors. A lot of data on MgO properties at high pressure, including shock Hugoniot and melting curve were obtained recently at OMEGA and LULI laser facilities and at Z-machine. Despite this, the positions of coexistence line of B1–B2 polymorphic transition and melting line are still a question. In this work, the experiments on shock compression of monocrystalline, optically transparent MgO samples with a cumulative explosive generators. Shock velocities in quartz reference and MgO sample were measured, allowed to determine its shock compressibility by impedance matching. Hugoniot temperatures were registered by a fast optical pyrometer. Shock Hugoniot data is in a good agreement with Z-machine data. Temperature data allows to make a assumptions about the position of solid–melt coexistence region at the Hugoniot curve. Comparison of our melting data with various experimental data and theoretical models will be presented.