MELTING OF MONOCRYSTALLINE MGO UNDER SHOCK COMPRESSION

Nikolaev D.N.,** Ostrik A.V.

IPCP RAS, Chernogolovka, Russia
**nik@ficp.ac.ru*

Equation of state of Magnesium oxide at high pressure is important for understanding the interiors of Earth and rocky planets as well as rocky cores of gas giants. Also, it's shock wave properties is necessary to develop a synthetic equations of state of meteoroids and planet crusts matherials, demanded by hydrodynamic simulation of planetary impacts and spacecraft meteoroid shielding. A lot of data on MgO properties at high pressure, including shock Hugoniot (Z-machine and OMEGA laser experiments) and Hugoniot temperature (OMEGA and LULI laser experiments) were obtained recently. Despite this, the position of coexistence line of theoretically predicted B1â€“B2 polymorphic transition and melting line are still a question. In this work, the results of experiments on shock compression of monocrystalline, optically transparent MgO samples with a cumulative explosive generators up to pressure 1 TPa is presented. Shock velocities in quartz reference and MgO sample were measured, allowed to determine it's shock compressibility by impedance matching. Hugoniot temperatures were registered by a fast optical pyrometer. The obtained shock Hugoniot data were in a good agreement with Z-machine data. Temperature data allows to make a assumptions about the position of region of solidâ€“melt coexistence at the Hugoniot curve. Also, the indication of Hugoniot passinh through the triple point of solid B1 - solid B2 - melt phases was obtained. Comparison of our melting data with existing experimental data and theoretical models will be presented. Work was supported by Russian Ministry of Science, contract with JIHT 075-15-2020-785. Experiments were carried out using the instrumentation base of the Moscow Regional Explosive Centre for Collective Use in IPCP RAS.