ELECTRICAL CONDUCTIVITY OF POLYTETRAFLUOROETHYLENE IN THE MEGABAR RANGE OF QUASI-ISENTROPIC COMPRESSION

Golyshev A.A.,[*1] ***Sobolev D.V.,***[2] ***Molodets A.M.***[1]

[1]*IPCP RAS, Chernogolovka, Russia,* [2]*MSU, Moscow, Russia*

[*]*golyshev@icp.ac.ru*

Polytetrafluoroethylene (PTFE, DuPont Teflon) is one of the widely used as insulator due to its unique properties such as chemical resistance and robustness against decomposition, high dielectric strength, and others (see [1, 2] and references herein). Therefore, PTFE is used as an insulator not only under ordinary conditions, but also when measuring the electrical resistivity of materials under dynamic loading conditions. As is known, the electrical resistance of most materials under extreme conditions of high pressures of shock compression can decrease. PTFE in this case is not an exception, its electrical resistance decreases with pressure. Accordingly, measurements of the electrical conductivity of PTFE under shock compression were carried out (see [1–3]).

In practice, measuring the electrical resistivity of shock-compressed materials often require measurements in the phase diagram range with reduced temperatures (see, for example, [4]). In this connection measurements of the electrical resistivity of PTFE in the region of the high (megabar) pressure-low temperature (due to a decrease to cryogenic initial temperatures) were carried out and presented in the report.

In the experiments carried out to measure the electrical conductivity of PTFE under the above conditions the high-conductivity state of PTFE was registered. It is shown that the least electrical resistivity of PTFE is recorded at a pressure of ∼80-100 GPa. The effect of an abrupt decrease in the electrical resistivity of a shocked PTFE is reversible: in release wave at a pressure of 80 GPa, the electrical resistance of PTFE returns to practically the initial value.

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