

SPECIFIC ELECTRICAL CONDUCTIVITY OF SAPPHIRE AT SHOCK COMPRESSION UP TO 750 GPa

Nikolaev D.N., Ternovoi V.Ya., Shutov A.V., Ostriuk A.V.*

ICCP RAS, Chernogolovka, Russia

**nik@iccp.ac.ru*

Monocrystalline sapphire is widely used as insulator in experiments on measurements of the electrical conductivity of single and multiple shock compressed matter. However, direct measurements of electrical resistance of shock-compressed sapphire were performed only up to 220 GPa [1], where extrapolated data indicated metallic level of conductance at pressure over 270 GPa. In this talk the new data on electrical conductivity of monocrystalline m-cut sapphire under shock compression up to 750 GPa will be presented. The Mach cumulative generators of shock wave, analogous to [2], in single- and double- staged configurations, were used for shock loading of measuring cell.

3-electrodes scheme of resistance measurements was used. Optical multi-channel pyrometry and fast optical detectors were used to measure shock velocity and brightness temperatures in sapphire sample. Also a reflectance was measured at 810 nm channel. The data obtained was compared with calculations [3]. At pressure 550 GPa the measured electrical conductivity of sapphire didnt exceed 60 S / cm, that opens possibility to use it as an electric insulator for measurement of electrical properties of compressed Hydrogen. Work performed under RFBR 18-08-00964 A project, using facilities of Moscow regional center for collective use of RAS. _____

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2. Nikolaev D., Ternovoi V., Kim V., Shutov A. // Journal of Physics: Conference Series. 2014. V. 500. No. 14. P. 1-5.
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