Abstract Submitted for the SHOCK11 Meeting of The American Physical Society

Conductivity of manganese oxide under megabar multiple-shock pressure V.V. AVDONIN, A.M. MOLODETS, V.E. FORTOV, IPCP RAS, Chernogolovka — It is known that in many substances metal-insulator transitions can not be explained by the one-electron band theory and usually associated with electron interaction. For example in compounds of transition metals the electrons of internal partially filled d- or f-shells are localized in the ionic core. Their transfer to the neighboring ions that is required for the appearance of metallic conduction is impossible due to the large loss in energy-electron interaction. Substances which are insulators for this reason (Mott insulators) are widely studied under static conditions using the diamond anvil cell basically at room temperature. This paper presents experimental data of metallization of manganese oxide under high shock pressures and temperatures. The electrical properties of MnO investigated using advanced techniques of step shock compression in little-studied region of pressures up to 100 GPa and temperatures up to 4000 K. The experimental data of electrical conductivity with their mathematical modeling can marked the high conductivity range of manganese oxide in the previously unexplored area of temperatures and pressures. This increase of electrical conductivity was interpreted as the Mott insulator-metal transition under high pressures and temperatures. This study was supported by the Presidium RAS Program "Thermal physics and mechanics of extreme energy effects and physics of strongly compressed matter."

> Vladimir Avdonin IPCP RAS, Chernogolovka

Date submitted: 18 Feb 2011

Electronic form version 1.4