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Results of investigations of phase transitions of shock compressed metals. MIKHAIL ZHERNOKLETOV, ALEXEY KOVALEV, ALEXEY PODURETS, VLADIMIR SIMAKOV, Institute of Physics of Explosion, Russian Federal Nuclear Center All-Russia Research Institute of Experimental Physics. Sarov. Russia, RFNC VNIIEF TEAM — Formations of new crystalline modifications in compressed substances are undeniably among interesting phenomena in physics of shock waves. Since the early 2000, experts from IPE RFNC-VNIIEF have been actively involved in efforts aimed to determine ranges of melting and recording phase transitions at shock adiabats of metals and organic substances by measuring sound velocities with use of the rarefaction overtake technique, which employs indicator liquids and pressure profiles by manganine and PVDF pressure gauges. In the pressure range from 4 to 12 GPa, a two-wave structure was recorded in cerium. Analysis of structures of the shock wave and rarefaction wave in the range (0.6-6.0) GPa points to the fact that a rarefaction shock wave is formed in the release phase in cerium. Post-test investigations of the cerium samples by the X-ray structural analysis have not revealed changes in cerium phase structure. Basing on our investigations, cerium starts melting at shock adiabat at the pressure of ˜ 13 GPa. Jumps of sound velocities, which were revealed in tin and zinc at the pressures of (60 - 90) GPa and (105 - 130) GPa, can be respectively associated with the beginning and completion of melting at their shock adiabats.

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