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Phase transitions of titanium under dynamic loading. ALEXEY KOVALEV, MIKHAIL ZHERNOKLETOV, OLEG APRELKOV, ALEXEY PODURETS, VIKTOR SKOKOV, DMITRY ZAMOTAEV, Institute of Physics of Explosion, Russian Federal Nuclear Center All-Russia Research Institute of Experimental Physics. Sarov. Russia — Information on sound velocity, which characterizes substance behavior under conditions of shock compression followed by release, is required for formulation of substance equations of state. The kink in the dependence of sound velocity on pressure is associated with structural transitions including its melting in shock-compressed substance. Investigations of the (α-ω) titanium phase transition revealed significant discrepancy in the measured values of the transition. Pressures of phase transition completion varied from $\approx$17.5 to 22 GPa under dynamic compression. Interaction of Ti with majority of elements gives opportunity to produce many alloys with various properties. In structure, which is formed when annealing, titanium alloy VT-20 is classified as a pseudo α-alloy with its structure presented by the α-phase and insignificant quantity of the β-phase. The authors present results of sound velocity measurement in shock-compressed samples of VT1-0 titanium and VT-20. In titanium, kinks were recorded at the dependence of sound velocity on pressure at the pressures of 20-40 and 60-90 GPa. These kinks can be explained by phase transitions. X-ray structural analysis revealed presence of the ω-phase in the samples, which had been recovered after loading by pressures in steel ampoules in the range from 9 to 23 GPa. Beginning of VT-20 alloy melting relates to pressure of 130 GPa at shock adiabat.

Marvin Zocher
LANL

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