

Abstract Submitted
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Shock-wave response of Ti-Ni shape memory alloys in the transformation temperature range¹ SERGEY V. RAZORENOV, GENNADY V. GARKUSHIN, Institute of Problems of Chemical Physics RAS, Chernogolovka, Russia, GENNADY I. KANEL, Joint Institute for High Temperatures RAS, Moscow, Russia, NIKOLAY N. POPOV, Russian Federal Nuclear Center, VNIIEF, Sarov, Russia — The behavior of $\text{Ti}_{51.1}\text{Ni}_{48.9}$ and $\text{Ti}_{49.4}\text{Ni}_{50.6}$ alloys under shock wave loading was investigated to observe their martensitic transformations. Tested samples had the grain sizes $\sim 30 \mu\text{m}$ and 0.05 to $0.3 \mu\text{m}$. Reduction of the grain size was done by means of severe plastic deformation methods. In the experiments, the VISAR velocity histories were recorded over the test temperatures range from 193 K to 415 K which involves the temperatures of thermoelastic martensitic transformations of the alloys. Waveforms demonstrate temperature dependences of the Hugoniot elastic limits which is controlled by the critical stress for inducing martensitic transformation, phase transformation without expected so called plateau, and in some cases signatures of pseudo-elastic behavior. The reduction of the material grain size has led to rise in both the HEL values and transformation rates and decrease of the spall strength over whole temperature range.

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