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**The Spall Strength and Hugoniot Elastic Limit of Tantalum with Various Grain Size** SERGEY RAZORENOV, GENNADY GARKUSHIN, GENNADY KANEL, Institute of Problems of Chemical Physics RAS, Chernogolovka, 142432 Russia, OL'GA IGNATOVA, Russian Federal Nuclear Center,VNIIEF, Sarov, 607190 Russia — The VISAR free surface velocity histories have been measured for commercial grade coarse grain (50 – 60 $\mu$m) and ultra fine grained ($\sim$1 $\mu$m grain size after severe plastic deformation) tantalum and, for comparison, tantalum single crystals, at peak stresses around 12-14 GPa and strain rates of $10^5$–$10^6$ $c^{-1}$. The decrease in the grain size, which resulted in $\sim$25 % increase of the hardness, did not cause any essential influence on the HEL, the value of which is $\sim$2 GPa, but increases slightly the spall strength of the ultra fine grained tantalum (7.4 GPa) in comparison with the coarse grain samples ($\sim$7 GPa). In both cases the spall strength does not appreciably vary with increase of the peak shock stress up to 70 GPa. Insignificant influence of preceding shock compression on the spall strength value has been confirmed by experiments with samples recovered after shock-wave treatment at 40 GPa and 100 GPa peak stresses. The spall strength of tantalum single crystals has been found equal to $\sim$10 GPa that points to non-monotonous dependence of this value on the grain surface area. Different influence of the grain size on static and dynamic yield stresses are discussed in terms of general strain rate effects.

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