

Abstract Submitted
for the SHOCK07 Meeting of
The American Physical Society

Atomistic study of nanoprecipitates influence on plasticity and fracture of crystalline metals¹ VLADIMIR STEGAILOV, ALEXEY KUKSIN, GENRI NORMAN, ALEXEY YANILKIN, Joint Institute for High Temperatures of RAS, Moscow, Russia — The recent experimental results [G.I.Kanel et al., 2006] show the essential influence of the nanoprecipitates on spall strength of copper single crystals. In this work we address this issue by the molecular dynamics study. The models under consideration are the EAM systems of Al nanoclusters in the Cu matrix and Cu clusters in the Al matrix. We consider these two cases as the representative examples of nanocluster-matrix difference in shear strength. Three ways of the high strain rate deformation modeling are studied: hydrostatic and uniaxial strain and shock wave loading in the impactor-target model. The preexisting edge dislocation interaction with the precipitate under shear deformation is addressed. The effect of the precipitate size is considered.

¹This work was partially supported by the RFBR grant 05-08-65423, RAS programs # 3, 9 and 14, and SNL under the US DOE/NNSA ASC program.

Vladimir Stegailov
Joint Institute for High Temperatures of RAS, Moscow, Russia

Date submitted: 28 Mar 2007

Electronic form version 1.4