Abstract Submitted
for the SHOCK05 Meeting of
The American Physical Society

Molecular-dynamics investigation into influence of nano-particles in spall SERGEY KRAICHIKOV, VLADIMIR DREMOV, PHILIPP SAPOZHNIKOV, RFNC-VNIITF — Recent experiments seem to find nano-particles at every void at the spall plane of Cu targets. 3D molecular-dynamics simulations of planar shock experiments have been carried out to check for whether the nano-particles act as stress concentrators, decreasing significantly the spall strength. The MD model set-up was constructed of two samples of different length colliding at given velocity. As a result of an interaction of two release waves formed after shock waves reached free surfaces the region of negative pressure was created in the longer sample. This stretching led to fracture of the longer sample. The calculations have been carried out with carbon and lead foreign nano-particles introduced into copper matrix. The effects of the nano-particles average size (1-2 nm and 2-4 nm cases have been considered) and their concentration upon the spall strength and the mechanism of spallation have been studied.

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Date submitted: 12 Mar 2005 Electronic form version 1.4