Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Shear band blocking in explosively driven collapse of corrugated Ni-Al laminate cylinder[1] KARL OLNEY, PO-HSUN CHIU, University of California, San Diego, ANDREW HIGGINS, MATTHEW SERGE, McGill University, GREGORY FRITZ, ADAM STOVER, Johns Hopkins University, VITALI NESTERENKO, DAVID BENSON, University of California, San Diego — Ni-Al laminate materials have been identified as a possible material system that can be used as a reactive material due to the self-sustaining reaction between Al and Ni layers. Besides traditional ignition methods, shear bands developed during mechanical loading can provide sites where ignition can occur. Corrugated Ni-Al laminate samples were created by swaging alternating layers of Ni (20 micrometers thick) and Al (30 micrometers thick) foils. The thick-walled cylinder (TWC) technique was performed on a corrugated Ni-Al laminate cylinder sample to examine shear band development in this material. Post experiment examination of the corrugated Ni-Al laminate material showed that the development of global shear bands were blocked via mesoscale mechanisms. The collapse of the corrugated laminate cylinder was simulated providing insight into these mesoscale mechanisms that were involved in blocking the development of shear bands during the experiment. Despite the shear band resistance of the material, several regions of the sample had localized reactions of Al and Ni spanning approximately 10-20 layers of laminate.

[1]Funding was provided by ONR MURI N00014-07-1-0740 (Program Officer Dr. Clifford Bedford)

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Date submitted: 29 Nov 2012 Electronic form version 1.4