Abstract Submitted
for the SHOCK07 Meeting of
The American Physical Society

Impact Initiation of Rods of Pressed Polytetrafluoroethylene (PTFE) and Aluminum Powders WILLIS MOCK, JR., JASON T. DROTAR, Naval Surface Warfare Center, Dahlgren — A gas gun has been used to investigate the impact initiation of rods consisting of a mixture of 72 wt% PTFE (28 μm particle size) and 28 wt% aluminum (95 micron particle size) powders. The rods were 7.6 mm in diameter by 51 mm long, and were fabricated from material that had been pressed and sintered to a full density of 2.27 gm/cm^3. They were sabot-launched into steel anvils at impact velocities ranging from 468 to 970 m/sec. This corresponds to calculated initial impact stresses of 25 to 64 kbar, respectively. A framing camera was used to observe the time sequence of events. These include change in rod shape, fracture, and the initiation and evolution of the reaction phenomena. The time of observation of first light after impact was taken as the initiation time. Initiation occurred at discrete locations in the impacted material. At the lowest impact stress of 25 kbar no light was observed; this value was taken as the initiation threshold stress for this material. Above the initiation threshold, the initiation time dropped abruptly from 74 μs just above threshold to 14 μs at the highest impact velocity of 970 m/s. These results are compared with rod impact experiments for a similar material [1] in which the only major difference is a smaller aluminum particle size (9 micron). [1] W. Mock, Jr. and W. H. Holt, in Proc. APS Shock Compression of Condensed Matter–2005, p.1097.

Willis Mock, Jr.
Naval Surface Warfare Center, Dahlgren Laboratory

Date submitted: 02 Mar 2007 Electronic form version 1.4