Abstract Submitted
for the SHOCK15 Meeting of
The American Physical Society

Characterization of energetic and non-energetic polymers for laser ablation propulsion applications[1] PREM KIRAN PATURI, LEELA CHELIKANI, NARASIMHA RAO BILLA, NAGARAJU GUTHIKONDA, ACRHEM, University of Hyderabad, TUSHAR JANA, School of Chemistry, University of Hyderabad, ACRHEM TEAM, SCHOOL OF CHEMISTRY TEAM — Energetic Polymers, considered to be cleaner, environmental friendly materials are one of the primary candidates for future plasma thrusters. For e.g., energetic hydroxyl terminated polybutadiene (HTPB) is being used as a binder for high-performance composite propellants. Understanding the conversion of optical energy to kinetic energy is essential in evaluating these materials as thrusters. Spatio-temporal evolution of laser ablative (LA) and blow-off (BO) shock waves (SW) during laser excitation provide a valuable insight into the energy release of the polymers. LASW and LBOSW during 7 ns laser pulse (532 nm, 10Hz) interaction with $\sim$ 200 micron thick HTPB and its variants with energetic additives taken in the form of a sheet were studied simultaneously using defocused shadowgraphic imaging over 0.2 - 30 μs time scales. The results were compared with non-energetic polyvinyl chloride (PVC) under same experimental conditions. The SW was observed to propagate faster through the HTPB variant compared to HTPB. Appearance of LBOSW at different time scales for the polymers revealed the shock propagation characteristics through the polymers.

[1]The work is supported by Defence Research and Developement Organization, India through Grants-in-Aid Program.

Prem Kiran Paturi
ACRHEM, University of Hyderabad

Date submitted: 30 Jan 2015 Electronic form version 1.4