Abstract Submitted
for the SHOCK19 Meeting of
The American Physical Society

High Speed Microscopic Imaging of Initiation and Propagation of Adiabatic Shear Bands PINKESH MALHOTRA, PRADEEP GUDURU, Brown University, BROWN UNIVERSITY TEAM — We present an experimental technique to image the deformation fields associated with dynamic failure events such as adiabatic shear band initiation and propagation at high spatial and temporal resolutions simultaneously. The temporal resolution of the experimental system is 250 ns and the spatial resolution is $\sim 1\mu$m, while maintaining a relatively large field of view ($\sim$1.11 mm x 0.63 mm). The experimental capability is used to resolve the deformation field near a notch tip at micron scale to identify the conditions for initiation of an adiabatic shear instability and the deformation field associated with a propagating shear band in polycarbonate and a martensitic stainless steel. An ordered array of 10 μm diameter speckles deposited on the sample surface near the notch tip serve as markers to track evolution of deformation field. The combination of high spatial and temporal resolutions allows us to study the role of microstructural heterogeneities on initiation and propagation of dynamic failure events.

Pinkesh Malhotra
Brown University

Date submitted: 02 Mar 2019 Electronic form version 1.4