

SHOCK19-2019-000718

Abstract for an Invited Paper  
for the SHOCK19 Meeting of  
the American Physical Society

**Studies of reactive and nonreactive metal ejecta transporting in nonreactive and reactive gases and vacuum**  
WILLIAM BUTTLER, LANL

We report on our studies of reactive and nonreactive metal fragments transporting in reactive and nonreactive gases. We postulate that reactive metal fragments ejected into a reactive gas, such as  $D_2$ , will break up into smaller fragments in situations where they are otherwise stable in a nonreactive gas such as He. To evaluate the hypothesis, we explosively eject hot, micron-scale fragments into vacuum and shocked gases. We diagnosed the hydrodynamics and the ejecta source with laser Doppler velocimetry, piezoelectric pressure transducers and dynamic Mie scattering. Further, we imaged the ejecta transport at infrared wavelengths and particle imaging velocimetry, discovered an optical scattering diagnostic that revealed dynamic ejecta sheet breakup dynamics, and we applied CARS to shocked  $D_2$ . This work presents results of the experimental and theoretical studies, but details of important diagnostics are in this conference section.

In collaboration with: Jason Cooley, James Hammerberg, Roland Schulze, John Schwarzkopf, Daniel Sheppard, James Barefield, John Charonko, Johnny Goett, Michael Grover, Brandon La Lone, Jason Mance, Ruben Manzanares, John Martinez, Martin Schauer, Derek Schmidt, Gerald Stevens, William Turley, Ruben Valencia