

Abstract Submitted  
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**Time-Resolved Spectroscopic Measurements of Aluminum Oxidation in a Laser Ablation Event** JAMES LIGHTSTONE, JOEL CARNEY, Indian Head Division, Naval Surface Warfare Center — Laser ablation of an aluminum sheet is used to create a high pressure and temperature environment for the investigation of aluminum (Al) oxidation. High energy pulsed lasers are used to initiate the ablation and to probe oxidation products in the expanding plume as a function of time and space. Emission, absorption, and scattering spectroscopies are used to deduce information on the observed reaction pathways, species concentrations, and internal energies. Emission measurements using a streak camera with 0.1 nm spectral resolution exhibit the line profiles of atomic Al and aluminum monoxide (AlO), which are sensitive to excited state populations and internal energy distributions. Analogous ground state information is recorded using absorption (laser induced fluorescence) spectroscopy. In general, comparable emission and absorption results for AlO imply a level of equilibrium within the expansion. Results from these studies will be presented along with progress toward adapting optical scattering (Raman) spectroscopies to identify additional aluminum oxide species formed in the ablation plume. The application of the spectroscopic techniques presented toward the measurement of a dynamic chemical process such as a detonating fuel-rich explosive formulation will also be discussed.

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