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Spatially and Temporally Resolved Aluminum Laser-Induced Breakdown Spectroscopy Measurements DAVID SURMICK, CHRISTIAN PARIGGER, University of Tennessee Space Institute — Laser-induced breakdown spectroscopy measurements of a laser ablated aluminum sample are analyzed to determine the temporal evolution of aluminum containing plasma from atomic and molecular emissions. These studies facilitate the understanding of key characteristics of plasma/metal interactions. Optical breakdown is initiated by tightly focusing 12 nanosecond pulsed laser radiation onto the surface of an aluminum alloy target. Spatially and temporally resolved emission spectra are recorded with an ICCD. Aluminum atomic emissions at 396.15 and 394.4 nm are used to infer the electron density of the plasma from 0.2 to 1 μs following optical breakdown. At corresponding time delays, the plasma temperature is determined from aluminum 308.24, 309.27, 394.4 and 396.15 nm emissions using Boltzmann plot methods. At later times, from 4 to 20 μs following breakdown, atomic hydrogen Balmer series H_α and H_β emissions are used to evaluate the electron density. The plasma temperature is further compared with results from fitting to aluminum monoxide emissions superimposed with H_β spectra that are recorded for time delays longer than 10 μs after optical breakdown.

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