Abstract Submitted
for the SES13 Meeting of
The American Physical Society

Analysis of Aluminum Monoxide Emission Spectra in a Simulated Solid Rocket Propellant Flame DAVID SURMICK, CHRISTIAN PARIGGER, University of Tennessee Space Institute, AREN HAUG, A. BURL DONALDSON, New Mexico State University, WALT GILL, Sandia National Laboratories — Characterization of temperatures from an uncontrolled aluminized solid rocket propellant flame is an important aspect in developing a complete model of the propellant combustion. Emission spectra recorded from a simulated aluminized propellant flame are analyzed for the purpose of developing an experimental model of the propellant temperature in an uncontrolled burn. Due to the costs and safety issues associated with using solid rocket propellants for testing, laboratory scale simulations of the propellant flame are studied. The flame is simulated by feeding micron sized aluminum powder into an oxyacetylene torch burning vertically downward while spectral measurements are recorded along the height of the plume. Spectra are analyzed using various methods to determine the temperatures within the flame. Diatomic aluminum monoxide emissions are fit to accurate line strength files using a Nelder-Mead algorithm, while broadband spectral emissions are analyzed using Planck's radiation law for varying emissivity.

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Date submitted: 19 Sep 2013 Electronic form version 1.4