LOW- AND HIGH-RESOLUTION LASER-INDUCED FLUORESCENCE (LIF) OF JET-COOLED SmO

JOEL R SCHMITZ, ARIANNA RODRIGUEZ, *Department of Chemistry, Emory University, Atlanta, GA, USA*; TIMOTHY STEIMLE, *School of Molecular Sciences, Arizona State University, Tempe, AZ, USA*; MICHAEL HEAVEN, *Department of Chemistry, Emory University, Atlanta, GA, USA*.

The chemi-ionization reactions of atomic lanthanides M+O $\rightarrow$ MO^+ + e^- are currently being investigated as a method to artificially increase the localized electron density in the ionosphere for uniform radio wave propagation. Recent experiments involving the release of atomic samarium (Sm) into the upper atmosphere have resulted in the production of a cloud with blue and red emissions[1]. Spectroscopic characterization of SmO is required to accurately determine the fraction of SmO present in the release cloud. While the low-lying states of SmO have been previously spectroscopically characterized, the analysis was hindered due to the production of SmO under high temperature conditions[2,3]. In this work, jet-cooled SmO was produced and low- and high-resolution laser-induced fluorescence (LIF) as well as dispersed laser-induced fluorescence (DLIF) techniques were employed for electronic structure characterization. For the first time, vibrational constants for several low-lying states have been determined. Using high-resolution LIF, the hyperfine structure of the (1)1 v = 0 and [15.35]1 v = 0,1 states was recorded. Data and analysis of ground and low-lying excited states of SmO will be presented.

[1] Ard, S.G. et al. J. Chem. Phys.2015, 143, 204303.
[2] Hannigan, M. C. J. Mol. Spec. 1983, 99, 235-238.
[3] Linton, C. et al. J. Mol. Spec. 1987, 126, 370-392.