LASER-INDUCED FLUORESCENCE (LIF) OF JET-COOLED NdO AND NdO^+

JOEL R SCHMITZ, ARIANNA RODRIGUEZ, 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 ion density in the ionosphere for uniform radio wave propagation. Recent experiments involving the release of atomic neodymium (Nd) into the upper atmosphere have resulted in the production of a cloud with green emission[1]. Based on the cloud emission, it is believed that NdO was the primary product, but spectroscopic characterization of NdO and NdO^+ is needed to properly identify the emitting species. While NdO is well characterized above 590 nm, little spectroscopic data exits at emission wavelengths below 590 nm[2,3]. Recently, the ionization energy of NdO was determined by REMPI and PIE methods[4], as well as the ion ground state vibrational separation $\Delta G_{1/2}{}^+$ but there exists no experimental rotational characterization of the low-lying states of NdO^+. In this experiment, NdO was supersonically expanded and then ionized at 193 nm. Laser-induced fluorescence (LIF) spectra of both NdO and NdO^+ was obtained at 16,650-20,000 cm^{-1}. Electronic states were vibrationally characterized using dispersed laser induced fluorescence (DLIF) techniques. Data and analysis of the ground and low-lying states of NdO and NdO^+ will be presented.

[1] Ard, S.G. et al. J. Chem. Phys.2015, 143, 204303.
[2] Kaledin, L.A. et al. Acta Physica Hungarica 1983, 54, 189-212.
[3] Linton, C. et al. J. Mol. Spec. 2004, 225, 132-144.
[4] VanGundy, R.A. et al. J. Chem. Phys. 2019, 114302