# LASER-INDUCED FLUORESCENCE (LIF) OF JET-COOLED THORIUM NITRIDE (ThN)

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Due to their higher melting point and metal ion density compared to their oxide counterparts, actinide nitrides are promising candidates for nuclear fission sources in nuclear reactors. While thorium mononitride (ThN) is a possible fission source in thorium-based reactors, few studies on ThN have been conducted. Previous ThN studies have characterized gas-phase rovibronic transitions through resonance-enhanced multiphoton ionization (REMPI) and laser-induced fluorescence (LIF) spectroscopic methods[1]. These uncalibrated low-resolution survey spectra, however, were mostly unanalyzed. A calibrated, higher resolution spectrum was recorded for one vibronic band ([20.9]1.5-$X^2\Sigma^+$) and spectroscopic constants were reported for the ground state and the electronically excited state[1]. More recently, a second band ([18.0]1.5-$X^2\Sigma^+$) has been observed at high-resolution and used to examine the fine and hyperfine structure of ThN(X)[2]. In the present study, ThN was jet-cooled to approximately 100K and LIF spectra were recorded over the range 20,000-21,300 $cm^{-1}$. A tellurium ($Te_2$) cell was heated to 650° C and its absorbance spectrum was used for spectral calibration. Data and analyses of the observed ground state and excited states of ThN will be presented.

[1] M.C. Heaven, B.J. Barker, I.O. Antonov, J. Phys. Chem. A, 118 (2014) 10867-10881.

[2] A. T. Le, S. Nakhate, T. Nguyen, T. C. Steimle, M. C. Heaven, J. Chem. Phys., submitted