

BONDING AT THE EXTREME. DETECTION AND CHARACTERIZATION OF THORIUM DIMER, Th₂

TIMOTHY STEIMLE^a, SETH MUSCARELLA, DAMIAN L KOKKIN, *Department of Chemistry and Biochemistry, Arizona State University, Tempe, AZ, USA.*

Due to the difficulty of working with actinides (radioactive, short lifetimes) and the number of electrons in these systems our chemical understanding either experimentally or theoretically on these systems is very limited. The electronic spectrum of thorium dimer, Th₂, is expected to be heavily congested due to the predicted twelve electronic states within an energy less than 1 eV of the calculated ³Δ_g ground state. The chemical bond is predicted to be a quadruple bond in both the ground state and low lying ¹Σ_g⁺ state (T_e=400 cm⁻¹)^b. Experimentally Th₂ was been detected in the gas phase by mass spectrometry^c. Here we report on the detection of the gas fluorescence spectrum of Th₂ in the 495-560 nm range via application of 2D LIF spectroscopy and attempts to record high resolution field free and Zeeman spectra.

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