SPECTROSCOPY OF THORIUM MONOXIDE, ThO; E(O^+),F(O^+),-$X^1\Sigma^+$ BANDS

FANG WANG AND TIMOTHY C. STEIMLE , *Department of Chemistry and Biochemistry, Arizona State University, Tempe,AZ 85287*; MICHAEL HEAVEN, *Department of Chemistry, Emory University, Atlanta,GA 30322*.

Thorium monoxide, ThO, has recently attracted interest as a possible venue for the determination of the electric dipole moment of the electron, d_e[a]. Here we report on the results of an optical Stark study of the $E(O^+)$-$X^1\Sigma^+$(1,0) band and the field-free study of the $F(O^+)$-$X^1\Sigma^+$(0,0) band[b]. A supersonic molecular beam of ThO was generated using a laser ablation technique and probed using laser excitation spectroscopy. The determined values for the permanent electric dipole moments, μ_{el}, for the $E(O^+)(v = 1)$ and $X^1\Sigma^+(v = 0)$ vibronic states were determined to be 3.534$\pm$0.010 D and 2.782$\pm$0.012 D, respectively [c]. The dispersed laser induced fluorescence resulting from the excitation of the $E(O^+)$-$X^1\Sigma^+$(1,0) and $F(O^+)$-$X^1\Sigma^+$(0,0) bands have been recorded and the results are compared to Franck-Condon predictions. The radiative lifetimes for the $E(O^+)$-$X^1\Sigma^+$(1,0) band $F(O^+)$-$X^1\Sigma^+$(0,0) bands were determined.

[a] A. C. Vutha, W. C. Campbell, Y. V. Gurevich, N. R. Hutzler, M. Parsons, D. Patterson, E. Petrik, B. Spaun, J. M. Doyle, G. Gabrielse, and D. DeMille, *J. Phys. B: At., Mol. Opt. Phys.*,**43** 074007/1 2010.

[b] G. Edvinsson and A. Lagerqvist, *Physica Scripta*, **32** 602 1985.

[c] F. Wang, T. C. Steimle and M.C. Heaven, *J. Chem. Phys.*,**134** 031102 2011.