

SPECTROSCOPIC RESEARCH OF Pt + NH₃^a

JAMIE GENGLER, TIMOTHY STEIMLE, and JINHAI CHEN, *Department of Chemistry and Biochemistry, Arizona State University, Tempe, AZ 85287.*

The reaction products of laser ablated platinum with an ammonia/argon supersonic gas expansion mixture have been monitored in the 13500 cm⁻¹ to 12400 cm⁻¹ spectral region using laser induced fluorescence (LIF) spectroscopy. Four band features with heads near 13440 cm⁻¹, 13250 cm⁻¹, 13120 cm⁻¹, and 12435 cm⁻¹ were detected. Analysis of the dispersed fluorescence suggests that the carriers of the latter three bands are Pt₂^b, PtN, and PtN. Possible electronic transition assignments for these systems based upon existing electronic structure predictions for Pt₂^c and PtN^d will be given. The dispersed fluorescence spectrum for the 13440 cm⁻¹ band, which exhibits two progressions having ΔG_v of $\sim 450\text{cm}^{-1}$ and $\sim 650\text{cm}^{-1}$, suggests that the carrier of this band is polyatomic. The excitation LIF and dispersed LIF spectra are not altered upon substitution of NH₃ with ND₃ suggesting that the carrier is PtN₂ with linear asymmetric geometry^{e,f}. The high resolution LIF spectrum (FWHM = 35 MHz) of the 13440 cm⁻¹ band of a molecular beam sample reveals rotational structure which can be assigned to the major ¹⁹⁴Pt, ¹⁹⁵Pt, ¹⁹⁶Pt, and ¹⁹⁸Pt isotopomers. Progress on the analysis of the high resolution LIF and optical Stark measurements for the 13440 cm⁻¹ band will be presented.

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