SPECTROSCOPIC RESEARCH OF Pt + NH$_3$\textsuperscript{a}

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The reaction products of laser ablated platinum with an ammonia/argon supersonic gas expansion mixture have been monitored in the 13500 cm\textsuperscript{-1} to 12400 cm\textsuperscript{-1} spectral region using laser induced fluorescence (LIF) spectroscopy. Four band features with heads near 13440 cm\textsuperscript{-1}, 13250 cm\textsuperscript{-1}, 13120 cm\textsuperscript{-1}, and 12435 cm\textsuperscript{-1} were detected. Analysis of the dispersed fluorescence suggests that the carriers of the latter three bands are Pt$_2$, PtN, and PtN. Possible electronic transition assignments for these systems based upon existing electronic structure predictions for Pt$_2$, PtN will be given. The dispersed fluorescence spectrum for the 13440 cm\textsuperscript{-1} band, which exhibits two progressions having $\Delta G_0$ of $\sim 450$ cm\textsuperscript{-1} and $\sim 650$ cm\textsuperscript{-1}, suggests that the carrier of this band is polyatomic. The excitation LIF and dispersed LIF spectra are not altered upon substitution of NH$_3$ with ND$_3$ suggesting that the carrier is PtN$_2$ with linear asymmetric geometry. The high resolution LIF spectrum (FWHM = 35 MHz) of the 13440 cm\textsuperscript{-1} band of a molecular beam sample reveals rotational structure which can be assigned to the major $^{194}$Pt, $^{105}$Pt, $^{100}$Pt, and $^{108}$Pt isotopomers. Progress on the analysis of the high resolution LIF and optical Stark measurements for the 13440 cm\textsuperscript{-1} band will be presented.

\textsuperscript{a}Funded by DoE - Basic Energy Sciences