SPECTROSCOPIC RESEARCH OF Pt + NH_3[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^{-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 Pt_2[b], PtN, and PtN. Possible electronic transition assignments for these systems based upon existing electronic structure predictions for Pt_2[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 $\sim 450cm^{-1}$ and $\sim 650cm^{-1}$, 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[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 ^{194}Pt, ^{195}Pt, ^{196}Pt, and ^{198}Pt 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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