LIF SPECTROSCOPY OF SiCN/SiNC IN SUPERSONIC FREE JET EXPANSION

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We have generated SiNC and SiCN in supersonic free jet expansions, and measured the laser induced fluorescence (LIF) spectra. Prior to our experiments, *ab initio* calculations were carried out to elucidate the molecular and electronic structures of both the ground and excited states of SiCN and SiNC for the spectroscopic searching. As reported by Richardson *et al.* [a], SiCN was predicted to be the lower lying species in the ground state, at about 540 cm^{-1} below SiNC. Guided by the predictions, we started the search of the signals of the electronic transition of these species, and found the LIF signals in the near UV region. We measured the LIF excitation spectrum consisting of some vibronic bands with about 650 cm^{-1} intervals. Exciting some of the vibronic bands, we also measured the LIF dispersed spectra from the single vibronic levels (SVL). The SVL dispersed spectrum obtained by the excitation of the vibronic band at the relatively low energy region in the excitation spectrum shows the vibrational structure corresponding to the characters predicted for SiCN. The other dispersed spectrum shows the structure corresponding to those predicted for SiNC. Although the precise analysis of the rotational structures are now underway, the preliminary analysis indicates the electronic spectrum of the $^2\Delta - \tilde{X}\ ^2\Pi$ transition for both the species, SiCN and SiNC.

[a] N. A. Richardson, Y. Yamaguchi, and H. F. Schaefer III, *J. Chem. Phys.* **119**, 12946 (2003).