LASER INDUCED FLUORESCENCE SPECTROSCOPY OF THE SiNSi RADICAL II: IDENTIFICATIONS OF THE $\widetilde{A}^2A_1$, $\widetilde{B}^2B_1$, AND $\widetilde{D}^2\Sigma_g^+$ STATES

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Among the LIF spectra of SiNSi observed in the near UV region, another band system with fluorescence lifetimes of 30 ns was identified. From detailed analyses of the rotational structures of the observed vibronic bands, they were assiged to the $\widetilde{D}^2\Sigma_g^+ - X^2\Pi_g$ band system of SiNSi, which is a symmetry forbidden transition borrowing intensity from vibronic mixings. Dispersed fluorescence spectra from SVL levels of the $\widetilde{D}$ state show distinct features around 13,000 cm^{-1} above the ground vibronic state, which were assigned to transitions to two electronic states $\widetilde{A}^2A_1$ and $\widetilde{B}^2B_1$, correlated to a $^2\Pi_u$ state at the limit of linearity. LIF spectra were observed in the corresponding region from 13,000 to 14,000 cm^{-1} to confirm the assignment. Dispersed fluorescence spectra from the visible transitions gave vibrational term energies for high lying bending vibrational levels in the ground state, showing that they are bent$-$linear transitions.