

## TRIPLE-SINGLET MIXING in Si<sub>3</sub>: the $1^3A_1'' - \tilde{a}^3A_2'$ TRANSITION<sup>a</sup>

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The electronic spectrum of the triplet states of the D<sub>3h</sub> isomer of Si<sub>3</sub> recorded using both mass selected REMPI and LIF spectroscopy was recently reported<sup>b</sup>. In that same study the dispersed laser induced fluorescence (DLIF) spectra resulting from excitation of various bands in the visible range were recorded. The DLIF spectra exhibited a progression with a 505 cm<sup>-1</sup> spacing, which was assigned to the breathing mode of the D<sub>3h</sub>, equilateral triangle, Si<sub>3</sub> molecule. In addition, and quite unexpectedly, the DLIF spectra exhibited a progression having a spacing of 173 cm<sup>-1</sup>. This progression was tentatively assigned to transition involving the bending mode of the  $^1A_1$  state of the C<sub>2v</sub> isomer. A possible explanation for the observation of transitions in the singlet manifold is that upon laser excitation in the D<sub>3h</sub> triplet manifold there is rapid intersystem crossing to the singlet manifold followed by fluorescence to the ground state of C<sub>2v</sub> isomer. Here we address the issue of possible intersystem crossing by recording the excitation on DLIF spectra in the presence of a static magnetic field. Magnetic fields are known to enhance the singlet-triple mixing<sup>c</sup>. Si<sub>3</sub> was produced using a supersonic pulsed discharge source (900 V, 20 μs, 6kΩ) with a 1% SiH<sub>4</sub> in argon mixture. Magnetic fields of approximately 500 and 950 Gauss were applied. We will report the interpretation of the magnetic field induced changes to the LIF and DLIF spectra and the implications for the singlet-triple mixing process.

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<sup>b</sup>N. J. Reilly, X. Zhuang, V. Gupta, R. Nagarajan, R. C. Fortenberry, J. P. Maier, T. C. Steimle, J. F. Stanton, M. C. McCarthy; *J. Chem. Phys.*, **136**(19), 194307, (2004).

<sup>c</sup>V. I. Makarov, I. V. Khmelinskii; *Advances in Chemical Physics*, **Volume 118**, 45-98, (2001).