

SAND IN THE LABORATORY. PRODUCTION AND INTERROGATION OF GAS PHASE SILICATES^a.

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Given its technological importance, the literature abounds with models for plasma enhanced chemical vapor deposition of the SiH₄/O₂/Ar system. In a continuing effort to identify and characterize the optical spectra of Si₃ generated in a SiH₄/Ar pulsed discharge source^b, we detected, via two dimensional (2D) LIF, a relatively strong electronic transition in the 570-600 nm region that is strongly enhanced by the addition of a small amount of O₂. The excitation spectrum shows resolved band structure at the pulsed laser resolution of 0.5 cm⁻¹ and exhibits a radiative lifetime of 1.97 μs. The dispersed fluorescence exhibits three vibrational progressions and an unusually small splitting of approximately 50 cm⁻¹. Here we report on efforts to identify the molecular carrier of these bands, with particular interest paid to species resulting from oxygen impurities in the silane discharge.

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^bThe electronic spectrum of Si₃ I: the triplet D_{3h} system” Reilly, N. J.; Kokkin, D. L.; Zhuang, X.; Gupta, V.; Nagarajan, R.; Fortenberry, R. C.; Maier, J. P.; Steimle, T. C.; Stanton, J. F.; McCarthy, M. C., *J. Chem. Phys.* 136(19), 194307, 2012.