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 $SiH_4/O_2/Ar$ system. In a continuing effort to identify and characterize the optical spectra of Si_3 generated in a SiH_4/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 O_2. 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.

[a]NSF CHE-1265885

[b]The electronic spectrum of Si_3 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.