

## BARELY FLUORESCENT MOLECULES II. TWIN DISCHARGE JET SPECTROSCOPY OF HSnBr

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HSnBr and DSnBr were produced in a twin discharge jet using separate precursor streams of SnH<sub>4</sub> and HBr (DBr), both diluted in high pressure argon. The  $\tilde{A}^1A''-\tilde{X}^1A'$  band system of HSnBr consists of only three bands ( $0_0^0$ ,  $3_1^1$  and  $2_0^1$ ) with fluorescence lifetimes from 560 ns ( $0^0$ ) to 38 ns ( $2^1$   $K_a=1$ ). The DSnBr molecule shows a more extensive LIF spectrum including a weak  $1_0^1$  band, with an energy 817 cm<sup>-1</sup> above the zero-point and fluorescence lifetimes ranging from 530 ns ( $0^0$ ) to 180 ns ( $1^1$ ). The ground state vibrational energy levels of both HSnBr and DSnBr have been measured from single vibronic level emission spectra. Our own ab initio studies show that these molecules dissociate into SnBr + H on the excited state potential surface, slightly above the zero-point level, accounting for the lack of detectable fluorescence from higher vibronic levels. Similar studies predict that HSnF should not fluoresce at all and, despite extensive effort, no detectable LIF signals were found in twin discharge jet experiments designed to detect the fluorinated species.