LASER SPECTROSCOPIC STUDY OF THE SiAr VAN DER WAALS COMPLEX

CHONG TAO, ALEXEY TESLJA, and PAUL J. DAGDIGIAN, *Department of Chemistry, The Johns Hopkins University, Baltimore, Md 21218-2685*; SULE ATAHAN and MILLARD H. ALEXANDER, *Department of Chemistry and Biochemistry, The University of Maryland, College Park, MD 20742-2021*.

Laser fluorescence excitation spectra of the SiAr van der Waals complex, in the vicinity of the Si ^{3}D$^o \leftarrow {}^3$P atomic resonance transition near 220.7 nm are reported. At low resolution, a single excited state (v$'$,0) progression of bands terminating in a dissociation continuum is observed. Several weaker bands associated with many of these strong bands are found in scans at higher resolution. A transition to an excited $^3\Sigma^-$ state which correlates with the excited Si(^{3}D^o)+Ar asymptote was assigned, and a rotational and vibrational analysis of the observed bands was carried out. The dissociation energies of the $\Omega = 0^+$ components of the ground $X^3\Sigma^-$ and excited $^3\Sigma^-$ states were determined [D$''_0 = 178.8 \pm 0.4$ and D$'_0 = 122.5 \pm 0.4$ cm^{-1}]. *Ab initio* calculations of the SiAr $X^3\Sigma^-$ and $A^3\Pi$ electronic states correlating with the ground-state Si(3s^{2}3p^2 ^{3}P) + Ar asymptote were also carried out. The potential energy curves of the definite-Ω states were computed and used to estimate the dissociation energy, rotational constant, and phenomenological spin-spin interaction in the $X^3\Sigma^-$ state. These parameters were found to be in resonable agreement with the experimental determinations.