LASER SPECTROSCOPIC STUDY OF THE SiAr VAN DER WAALS COMPLEX

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Laser fluorescence excitation spectra of the SiAr van der Waals complex, in the vicinity of the Si $^3D^o \leftarrow {}^3P$ 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($^3D^o$)+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($3s^2 3p^2\ ^3P$) + 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.