STIMULATED EMISSION PUMPING SPECTROSCOPY OF THE FIRST EXCITED SINGLET STATE OF GERMYLIDENE ($H_2C{=}Ge$)

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The $\tilde{A}\ ^1A_2$ states of H_2CGe and D_2CGe have been explored for the first time by $\tilde{A}$ - $\tilde{X}$ laser-induced fluorescence (LIF) spectroscopy of the orbitally forbidden S_1 - S_0 transition and stimulated emission pumping (SEP) and wavelength resolved fluorescence studies of the allowed $\tilde{B}$ - $\tilde{A}$ electronic transition. Medium-resolution SEP studies gave the excited $\tilde{A}$ state ν_2, ν_3, ν_4, and ν_6 vibrational frequencies for $H_2C^{74}Ge$ and $D_2C^{74}Ge$. The 4^1 and 6^1 levels and higher combination and overtone states are strongly Coriolis coupled, which perturbs the rotational subband structure, limiting the accuracy of the determination of the vibrational frequencies. High-resolution SEP studies of the $\tilde{B}$ - $\tilde{A}$ 0_0^0 band have allowed us to determine the rotational constants of the $\tilde{A}$ state of $H_2C^{74}Ge$, from which we were able to calculate an approximate r_0 structure with the CH bond length constrained to the ground state value. The zero-point level of $D_2C^{74}Ge$ is substantially perturbed, most plausibly by interaction with an excited vibrational level of the nearby triplet ($\tilde{a}\ ^3A_2$) state.