

**Vibrational Predissociation of the \tilde{A} state of the C_3Ar complex
in the excitation energy region of 25410-25535 cm^{-1}**

(Institute of Atomic and Molecular Sciences) Yi-Jen Wang, Yen-Chu Hsu

About 11 C_3Ar bands near the $0\ 4^- \ 0^- \ 000$ and $0\ 2^+ \ 0^- \ 000$ transitions of the $\tilde{A}\ ^1\Pi_u - \tilde{X}\ ^1\Sigma_g^+$ system of C_3 have been studied by both laser-induced fluorescence and wavelength-resolved emission(WRE) techniques. Two prominent pairs of C_3Ar features were observed to the red of each of these two C_3 transitions. Each pair consists of a type A band and a type C band, with the type C band lying about 3 cm^{-1} above the type A band. Rotational analysis showed that three of the bands are comparatively sharp, with line widths of 0.035 cm^{-1} , but the pair at 25504 and 25507 cm^{-1} shows clear evidence of diffuseness. The spectral widths of the rotational lines do not depend on the excitation energies in any simple way. Most of the spectral features in the WRE spectra can be assigned as emission from vibrationally excited levels of the \tilde{A} state of the C_3 fragments down to the ground electronic state. Two different types of vibrational excitation of the C_3 fragments have been found: pure C_3 -bending and antisymmetric C-C stretching. The branching ratios of the C_3 product states, the C_3Ar vdW binding energy, and propensity rules for vibrational predissociation processes will be presented.