LASER INDUCED FLUORESCENCE STUDIES OF JET-COOLED CF_2: DETERMINATION OF $\widetilde{A}$-STATE STRETCHING FREQUENCIES

CHUJI WANG, CONGXIANG CHEN, JINGHUA DAI, and XINGXIAO MA, *Department of Chemical Physics, University of Science and Technology of China, Hefei, Anhui 230026, P. R. China*.

Laser induced fluorescence (LIF) excitation spectra of $CF_2\,\widetilde{A}^1B_1 \leftarrow \widetilde{X}^1A_1$ system around 250 nm has been measured under supersonic free-jet conditions. CF_2 radical was produced by DC-discharge of CF_4 seeded in argon. The spectra present the overall spectral features of this system, from the band origin to $\widetilde{A}$ -state predissociation threshold that is measured to be 5.4eV. The previously ambiguous assignments of $\widetilde{A}$-state stretching frequencies have been experimentally determined to be $\nu_1' = 1012.1\,\mathrm{cm}^{-1}, \nu_3' = 1180.2\,\mathrm{cm}^{-1}$, by analyzing the rotational subband spectra attributed to some of the observed progressions $(2_0^n\,, 1_0^1 2_0^{n-2}$ and $2_0^n 3_1^1\ (n \leq 11))$ in which 30 vibronic bands were first unambiguously labeled. The measured $\widetilde{A}$-state stretching frequencies do not support King's [*J. Mol. Spectry*, 1, **78**(1979)] tentative assignments, but are in good agreement with Cameron's [*J. Chem. Phys.* 4475, **103**(1995)] theoretical assertions. Furthermore, the systematic and detail measurements of the rotationally resolved LIF spectrum of this system for all the transitions in 2_0^n and $1_0^1 2_0^{n-2}$ progressions have been conducted. The rotational and centrifugal constants of all $(0, n, 0)$ and $(1, n-2, 0)$ vibrational levels in $\widetilde{A}$-state are derived by least-squares fit. Some negative inertial defects are tentatively explained resulted from local perturbation.