HIGH RESOLUTION FOURIER TRANSFORM UV EMISSION SPECTROSCOPY OF THE 407 NM BAND OF THE TiF RADICAL

TAKASHI IMAJO, YUKI KOBAYASHI, YOSHIHIRO NAKASHIMA, KEIICHI TANAKA, AND TAKEHIKO TANAKA, *Department of Chemistry, Faculty of Science, Kyushu University 33, Hakozaki, Higashi ku, Fukuoka 812-8581, Japan.*; ,.

High resolution UV emission spectrum of the 407 nm band of the TiF radical was measured by a Fourier transform spectrometer (Bruker IFS120HR) with the resolution of 0.04 cm^{-1}. This band was formerly assigned as the electronic transition $^2\Phi -^2 \Delta$ of the TiF radical by Shenyavskaya and Dubov [1], but recent a study of ZrCl[2] suggested that this band might be $^4\Gamma - X^4\Phi$ or $^4\Phi - X^4\Phi$. In the present work a new electronic assignment of $^4\Gamma$ - $X\,^4\Phi$ was proposed. The (0-0) band was rotationally analyzed for each of the $^4\Gamma_{5/2} -^4 \Phi_{3/2}$, $^4\Gamma_{7/2} -^4 \Phi_{5/2}$, $^4\Gamma_{9/2} -^4 \Phi_{7/2}$, and $^4\Gamma_{11/2} -^4 \Phi_{9/2}$ components.

The TiF radical was produced in an ac discharge of He/TiF$_4$. Ultraviolet emission from the discharge was focused onto the input aperture of the FTS. Unwanted emission from the discharge was filtered by an optical interference filter centered at 410 nm with the bandwidth of 10 nm. Total accumulation time was 7 hours.

The band origins, rotational constants, and centrifugal distortion constants were determined by the least squares method. The rotational constants were consistent with those reported by Ram and Bernath [3] within the experimental error. Line intensities of the *P*- and *R*-branch lines showed that $\Delta\Lambda = +1$, and therefore the upper state was assigned to $^4\Gamma$.

1. Phillips and Davis, Astr. Phys. J. Suppl. Ser **71**, 163-172 (1989).
2. Ram and Bernath, J. Mol. Spectrosc. **186**, 335-348 (1997).
3. Ram *et al*, J. Mol. Spectrosc. **184**, 186-201 (1997).