NEW LABORATORY MEASUREMENTS OF RHOMBOIDAL SiC_3

CARL A. GOTTLIEB and PATRICK THADDEUS, *Harvard-Smithsonian Center for Astrophysics, 60 Garden St., Cambridge, MA 02138, and School of Engineering & Applied Sciences, Harvard University, 29 Oxford St., Cambridge, MA 02138*.

Rhomboidal SiC_3, the highly polar planar ring with C_{2v} symmetry and a transannular C—C bond, was detected in our laboratory about 10 years ago,[a] and soon afterwards was identified with a radio telescope in the expanding envelope of IRC+10216.[b] Recently a sensitive spectral line survey of IRC+10216 was made with the Submillimeter Array (SMA) in the $300 - 355$ GHz range with a $3'' \times 2''$ synthesized beam. Many new lines were detected in this survey. Most are from high rotational transitions of molecules that are known in IRC+10216, but some of the lines are quite narrow and more than 10 of these are unassigned.[c] In support of the SMA observations we have extended the earlier laboratory measurements by Apponi *et al.* from 286 GHz and $K_a \leq 6$, to 450 GHz and $K_a \leq 20$ from rotational levels as high as 825 K above ground. As a result uncertainties in the predicted spectrum for lines with high K_a have been reduced by as much as two orders of magnitude, which should aid the assignment of SiC_3 in the SMA survey and in future observations with ALMA.

[a] A. J. Apponi, M. C. McCarthy, C. A. Gottlieb, and P. Thaddeus, *Journ. Chem. Phys.* **111**, 3911 (1999).

[b] A. J. Apponi, M. C. McCarthy, C. A. Gottlieb, and P. Thaddeus, *Astrophys. Journ. Lett.* **516**, L103 (1999).

[c] N. A. Patel, K. H. Young, S. Brünken, R. W. Wilson, P. Thaddeus, K. M. Menten, M. Reid, M. C. McCarthy, Dinh-V Trung, C. A. Gottlieb, and A. Hedden, *Astrophys. Journ.*, in press (2009).