INFRARED SPECTROSCOPY OF DISILICON-CARBIDE, Si_2C

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Small silicon and carbon containing molecules are thought to be important building blocks of interstellar grains. Some of them have been detected in circumstellar environments of late-type stars by means of rotational spectroscopy e.g., SiC, SiC_2, Si_2C, c-SiC_3, SiC_4, while centro-symmetric species, e.g., C_3, C_4, C_5, Si_2C_2, Si_2C_3, can only be detected by vibrational transitions, mainly in the infrared. In view of a new generation of high resolution infrared telescope instruments, e.g., EXES (Echelon-Cross-Echelle Spectrograph) onboard SOFIA (Observatory for Infrared Astronomy) and TEXES (Texas Echelon Cross Echelle Spectrograph) at the Gemini-North observatory, accurate laboratory data of small silicon-carbides in the infrared region are of high demand. In this talk we present first laboratory data of the Si_2C asymmetric stretching mode at 1200 cm^{-1}. A pulsed Nd:YAG-laser is used to vaporize a solid target of silicon exposed to a dilute sample of methane in helium buffer gas. Si_2C is formed in an adiabatic expansion of a supersonic jet and radiation of a quantum cascade laser is used to record rotationally resolved spectra. To date, 160 ro-vibrational lines and have been assigned to the asymmetric stretching vibration of Si_2C, and derived molecular parameters are in excellent agreement with ab initio calculations. In our global fit analysis recently published microwave laboratory data (McCarthy *et al.* 2015)[a] and astronomical data (Cernicharo *et al.* 2015)[b] were taken into account. Our new results allow for the identification of Si_2C by means of high resolution infrared astronomy towards the warm background of carbon-rich stars.

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[a]McCarthy M.C., Baraban J.H., Changala P.B., Stanton J.F., Martin-Drumel M.A, Thorwirth S., et al., *J. Chem. Phys. Lett.* **6**, 2107–2111 (2015).
[b]Cernicharo J., McCarthy M.C., Gottlieb C.A., Agundez M., Velilla Prieto L., Baraban J.H., et al. *Astrophys. J. Lett.* **806**,L3 (2015).