THE ELECTRONIC SPECTRUM AND MOLECULAR STRUCTURE OF THE JET-COOLED SILICON METHYLIDYNE (SiCH) RADICAL

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Small hydrogen-containing silicon-carbon compounds are important as potential precursors to the SiC_n clusters found in stellar atmospheres. In this work, we have observed the $\tilde{\mathrm{A}}\,^2\Sigma^+$ - $\tilde{\mathrm{X}}\,^2\Pi_i$ electronic transition of the jet-cooled silicon methylidyne radical, produced by fragmentation of tetramethylsilane in a pulsed discharge jet. Extensive systems of rotationally discrete bands of both SiCH and SiCD have been observed in the 855 - 605 nm region. Use of a "reheat tube" at the exit of the jet has allowed us to observe both spin-orbit components, which have a $70\mathrm{cm}^{-1}$separation. High resolution spectra have been obtained for both SiCH and SiCD, providing rotational constants and molecular structures for the ground and excited states.