FOURIER TRANSFORM MICROWAVE SPECTROSCOPY OF $Sc^{13}C_2$ AND $Sc^{12}C^{13}C$: ESTABLISHING AN ACCURATE STRUCTURE OF ScC_2 ($\tilde{X}^2A_1$)

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Pure rotational spectra of $Sc^{13}C_2$ and $Sc^{12}C^{13}C$ ($\tilde{X}^2A_1$) have been obtained using Fourier Transform Microwave methods. These molecules were created from scandium vapor in combination with $^{13}CH_4$ and/or $^{12}CH_4$, diluted in argon, using a Discharge Assisted Laser Ablation Source (DALAS). Transitions in the frequency range of 14-30 GHz were observed for both species including hyperfine splitting due to the nuclear spin of Sc (I = 7/2) and ^{13}C (I = 1/2). Rotational, spin-rotational, and hyperfine constants have been determined for $Sc^{13}C_2$ and $Sc^{12}C^{13}C$, as well as a refined structure for ScC_2. In agreement with theoretical calculations and previous $Sc^{12}C_2$ results, these data confirm a cyclic (or T-shaped) structure for this molecule.

Scandium carbides have been shown to form endohedral-doped fullerenes, which have unique electrical and magnetic properties due to electron transfer between the metal and the carbon-cage. Spectroscopy of ScC_2 provides data on model systems for comparison with theory.