# FTIR MATRIX STUDY OF POTENTIAL CIRCUMSTELLAR MOLECULES: $TiC_3$

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Results will be presented of recently initiated studies on the structures and infrared spectra of transition metal-carbon clusters that may be of interest in circumstellar shells or other astrophysical environments. The FTIR (Fourier transform infrared) spectrum of $TiC_3$ was observed by trapping the vapor produced during dual Nd:YAG laser ablation of Ti and C rods in solid Ar at ~10 K. Measurements of frequencies and $^{13}C$ isotopic shifts have enabled the identification of the fan-like ($C_{2v}$) isomer of $TiC_3$ with vibrational fundamentals $\nu_3(a_1) = 624.3$ and $\nu_5(b_2) = 1484.2\ cm^{-1}$. The results are in good agreement with the predictions of DFT calculations at the B3LYP/6-311G(3*df*, 3*pd*) level. The observed $C_{2v}$ structure is also consistent with the results from an earlier photoelectron spectroscopy study.[a]

[a]X. B. Wang, C. F. Ding, L. S. Wang, *J. Phys. Chem. A* **101**, 7699 (1997).