Abstract Submitted
for the TSF06 Meeting of
The American Physical Society

FTIR Studies on Cyclic (c-$\mathbf{C}_n$, $n \leq 8$) and Linear (ℓ-$\mathbf{C}_n$, $\mathbf{n \geq 7}$) Carbon Clusters RAFAEL CARDENAS, C.M.L. RITTBY, W.R.M. GRAHAM, Texas Christian University — Carbon clusters are formed in the laboratory by trapping the products from the Nd-YAG laser evaporation of graphite in argon and neon matrices. Linear and cyclic C_n have been the subjects of extensive theoretical and experimental studies for many years and are important in several areas. Carbon chains are backbones for many molecules detected in the interstellar and circumstellar media. Carbon clusters are important in fullerene chemistry and fuel combustion. FTIR measurements of vibrational fundamentals and carbon-13 isotopic shifts, coupled with the predictions of theoretical calculations, have been successfully employed to identify and characterize the vibrational spectra of a variety of cyclic and linear chains of carbon atoms. For longer C_n ($n \geq 6$) chains, identifications are made easier if both the isotopic pattern for single ^{13}C-substituted $^{12}C^{13}C_{n-1}$ isotopomers and the "mirror" isotopic pattern for single ^{12}C-substituted $^{13}C^{12}C_{n-1}$ isotopomers can be observed. Once we established a process to produce highly enriched carbon rods ($\sim$85%,^{13}C), well-resolved isotopic spectra for cyclic $^{13}C_n$ (n=6,8) and linear $^{13}C_n$ carbon clusters (n=3-12) are now obtained routinely. Recent results for cyclic C_8, linear C_7, and longer linear C_n ($n \geq 10$) chains are discussed.

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Date submitted: 08 Sep 2006 Electronic form version 1.4