FTIR OBSERVATION AND DFT STUDY OF THE AlC$_3$ and AlC$_3$Al LINEAR CHAINS TRAPPED IN SOLID Ar

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The vibrational spectra of linear AlC$_3$ and AlC$_3$Al were observed after trapping the products of the dual laser evaporation of aluminum and carbon rods in solid Ar at $\sim$10 K. Fourier transform infrared (FTIR) measurements of $^{13}$C isotopic shifts are in good agreement with the predictions of density functional theory (DFT) B3LYP/6-311G+(3df) calculations and have enabled the first identification of the $\nu_3(\sigma_\pi)$=1624.0 and $\nu_4(\pi_\pi)$=528.3 cm$^{-1}$ fundamentals of linear AlC$_3$Al and the tentative assignment of the $\nu_2(\sigma)=1210.9$ cm$^{-1}$ fundamental of linear AlC$_3$. 