Supporting Information: The Raman spectra of has 3 features below 2000 cm^{-1}, the disorder induced D bands, the graphite like G bands related to the E_{2g2} graphite mode, and the D' bands which is also disorder induced and related to the maximum of the graphite 2D phonon density of states[20]. Normally, the G band can be decomposed into two close modes for the vibrations along the nanotubes axis and in circumferential direction[21], but here we will consider it as only one band since we have not been able to observe this decomposition clearly. At higher frequencies than 2000 cm^{-1}, overtones of these bands are seen. 2xD, D+G and 2xG are the overtones of D/D, D/G and G/G modes respectively.

Table 1. Experimentally measured Raman modes of pure ^{12}C and pure ^{13}C multi-walled carbon nanotube arrays.

Raman modes[22]	D	G	D'	[a]	2×D	D+G	2×G
^{13}C MWNT (cm^{-1})	1298	1526	1558	2345	2590	2833	3099
^{12}C MWNT (cm^{-1})	1350	1585	1620	2452	2700	2947	3232
Ratio of ^{13}C / ^{12}C[b]	0.961	0.963	0.962	0.956	0.959	0.961	0.959

a This band has no explicit name in the graphitic Raman spectrum.

b The ratio of the Raman frequencies of ^{13}C nanotubes over the corresponding frequencies of ^{12}C nanotubes.