Electronic Supplementary Material (ESI) for RSC Advances.


# Supporting Information

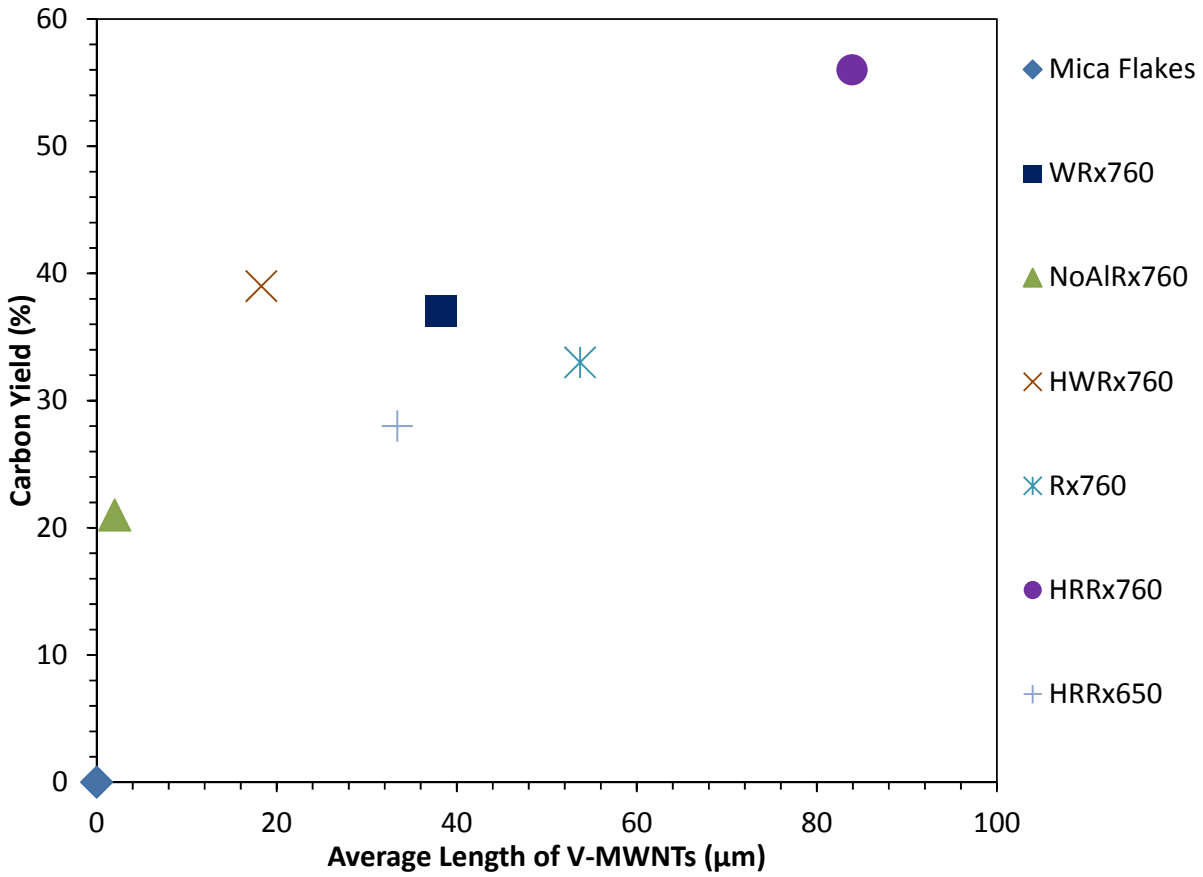



Figure S1: Carbon yield v. average length of V-MWNTs for sample where only ethylene was used during the reaction step.

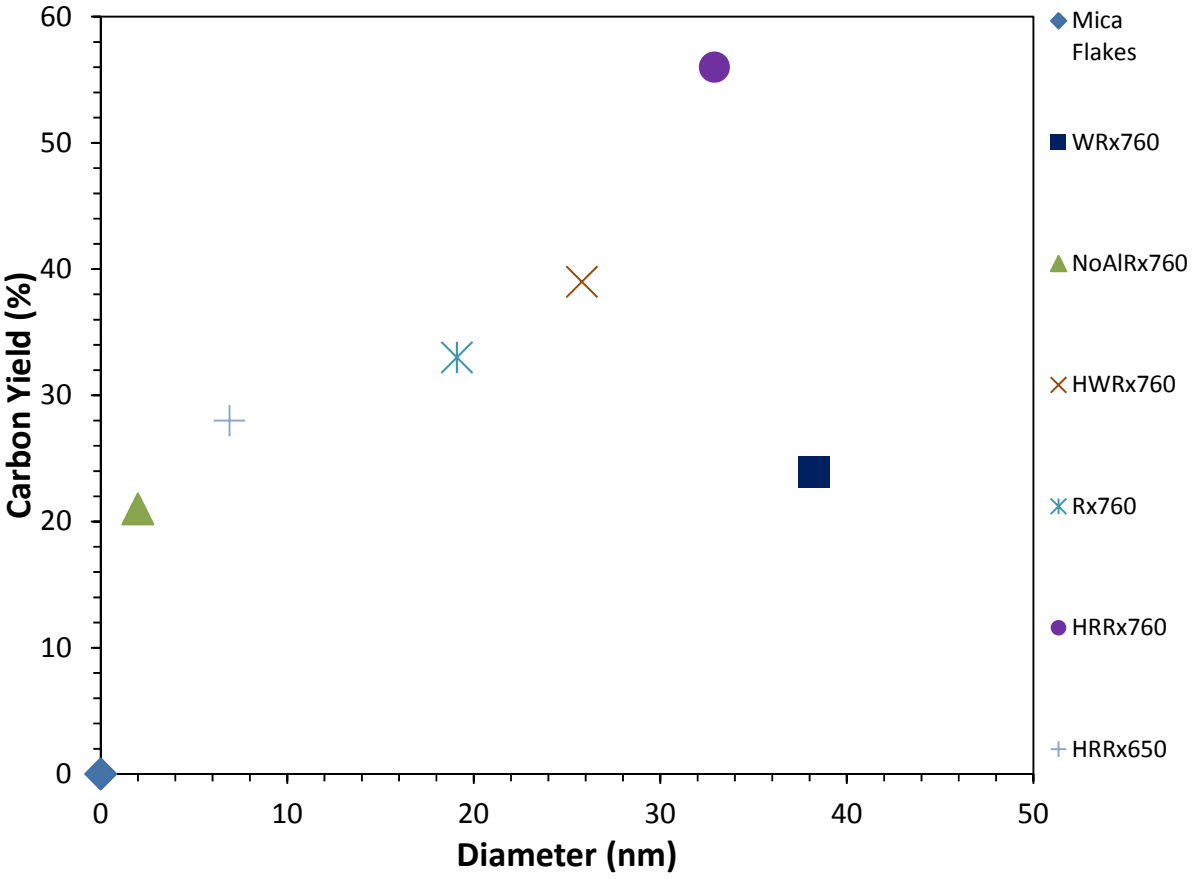



Figure S2: Carbon yield v. average length of V-MWNTs for sample where only ethylene was diluted with nitrogen during the reaction step.

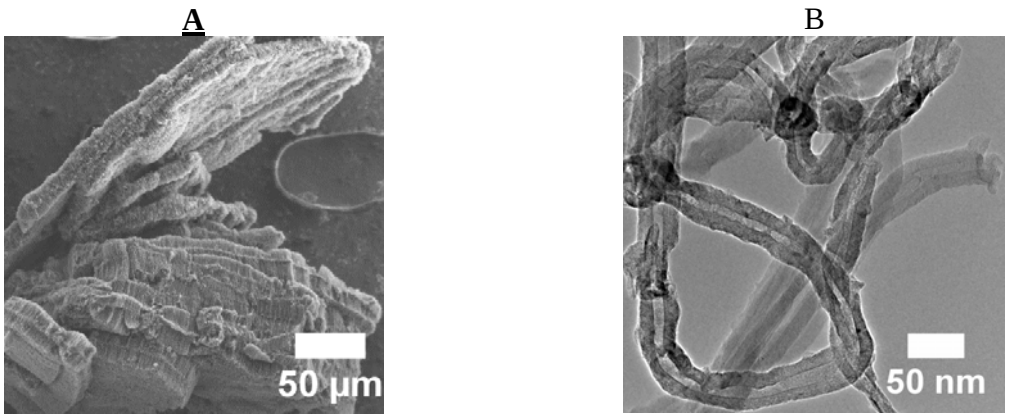



Figure S3: (a) SEM image of sample HWRx760 and (b) TEM image of sample HWRx760, showing the effect of heating the catalyst and mica during impregnation.

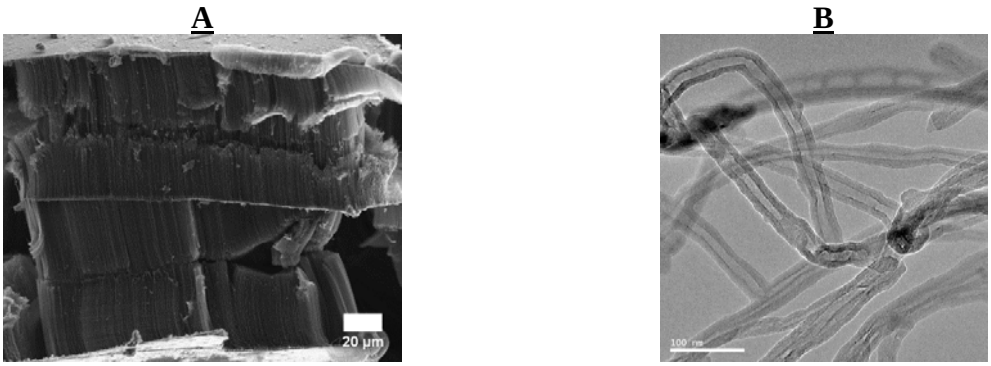


Figure S4: Water used as the solvent. (a) SEM image of sample WRx760 and (b) TEM image of sample WRx760.

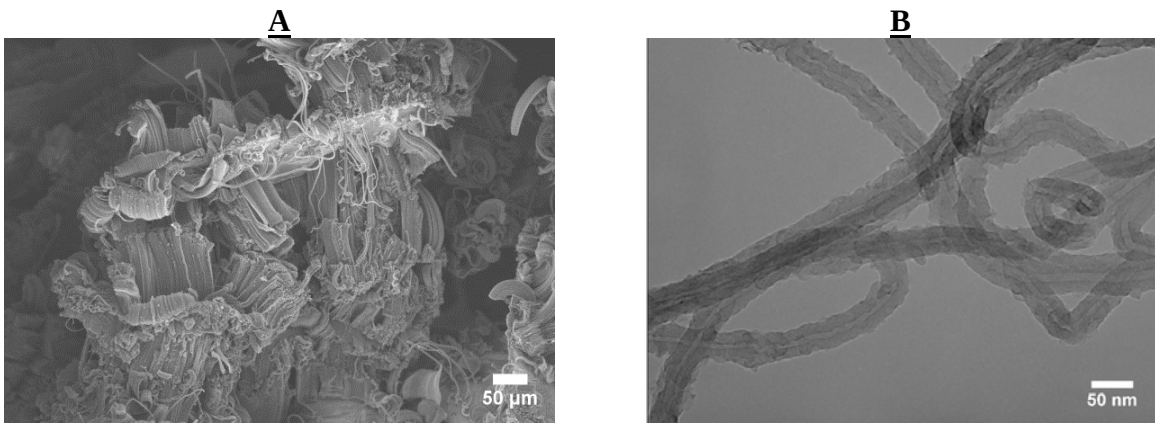


Figure S5: Sample HRRx760. (a) SEM image (b) TEM image

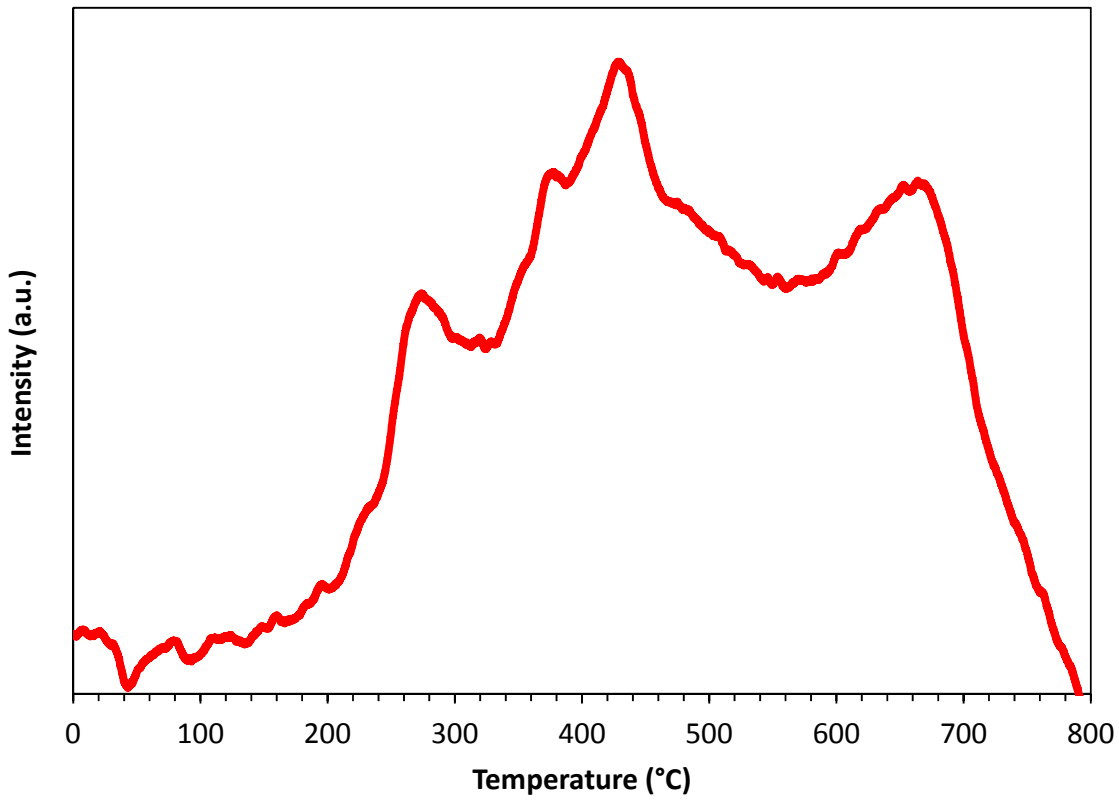



Figure S6: TPR profile for catalyst used to make sample HRRx650D-A, increased Co precursor used.

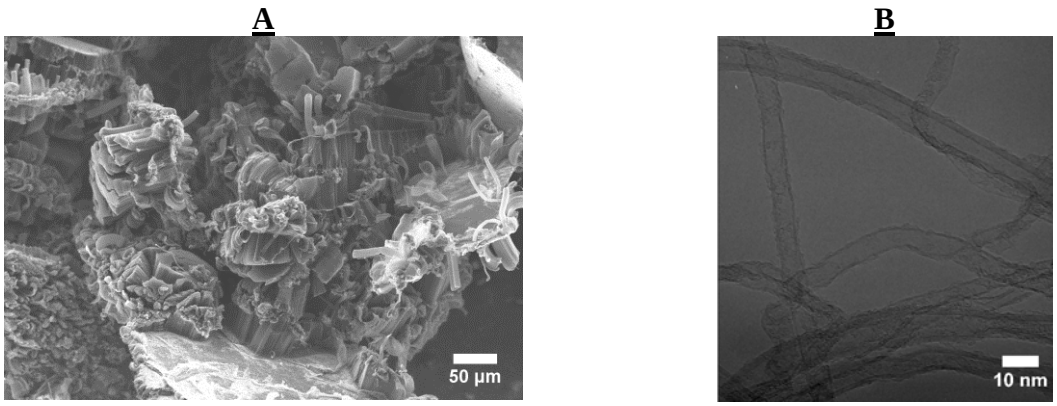



Figure S7: Sample HRRx650. (a) SEM image (b) TEM image.

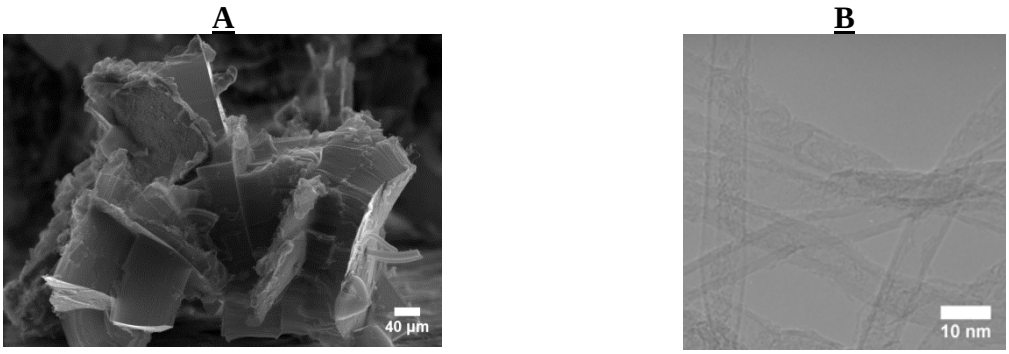


Figure S8: Sample HRRx650D-A. (a) SEM image (b) TEM image.

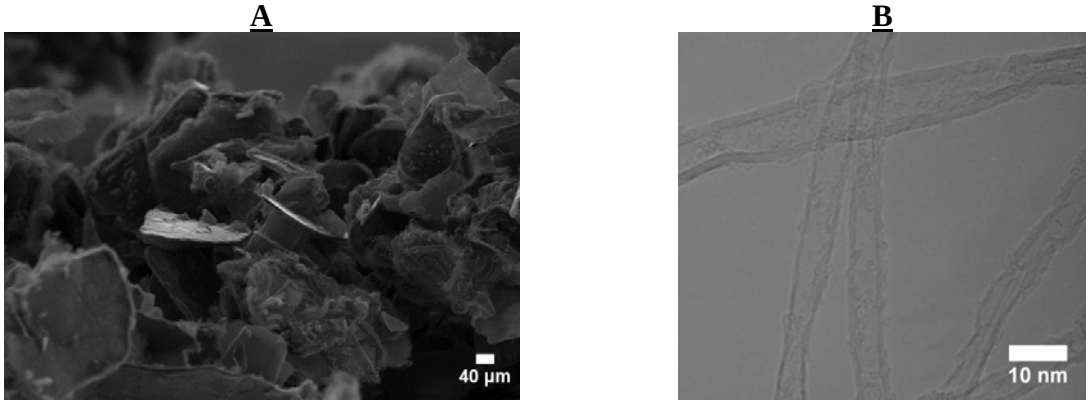


Figure S9: Sample HRRx650D-B. (a) SEM image (b) TEM image.

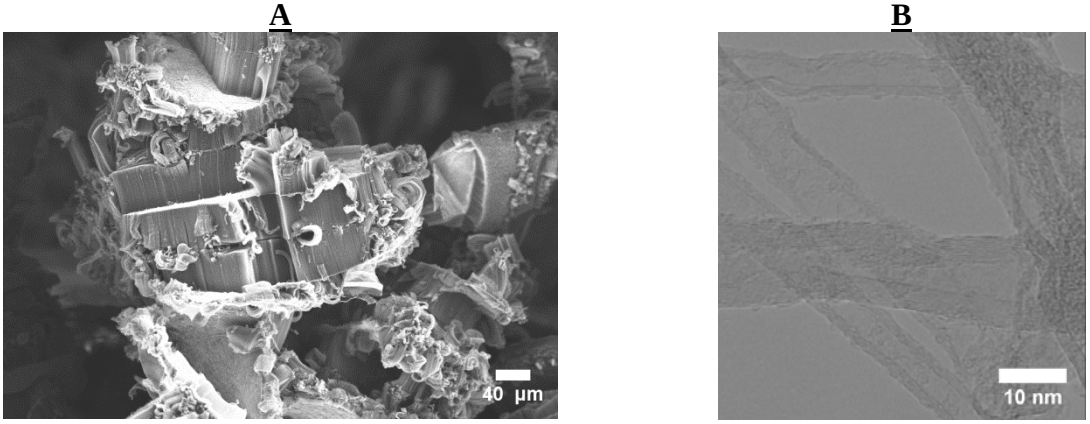
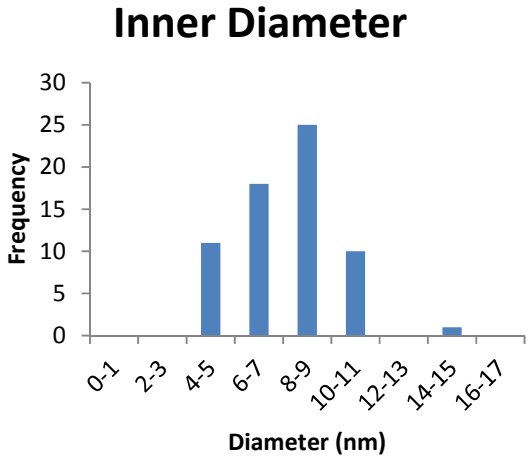


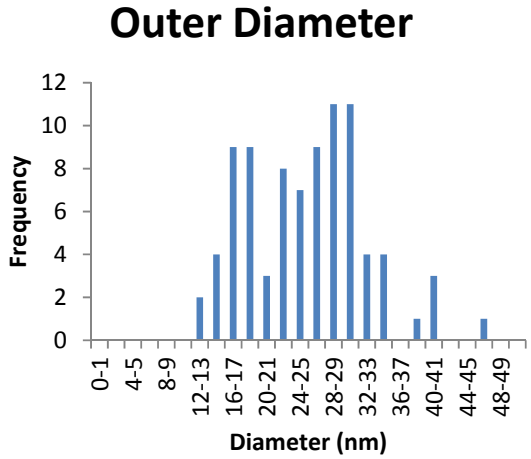
Figure S10: Sample HRRx650D-C. (a) SEM image (b) TEM image.

**Statistics and histograms for outer and inner diameters of V-MWNTs samples.**

HWRx760:



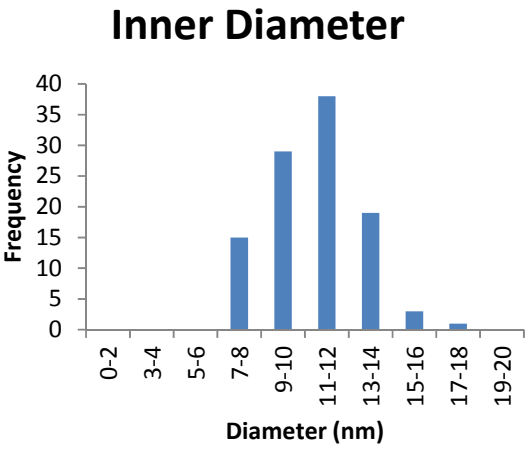

Average: 8.1 nm
Standard Deviation: 2.1 nm



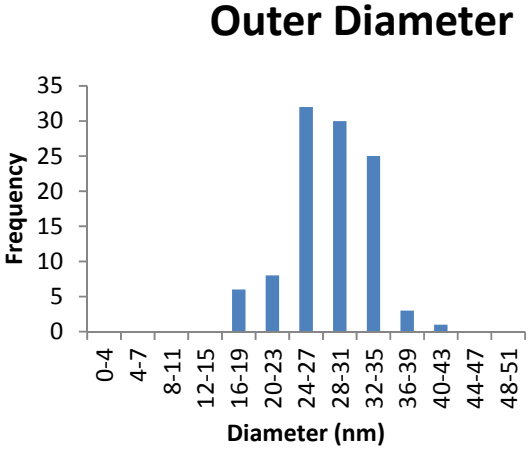

Average: 25.8 nm
Standard Deviation: 7.2 nm

Average wall number of 26. Average wall number was calculated using the average inner and outer diameters.

WRx760:



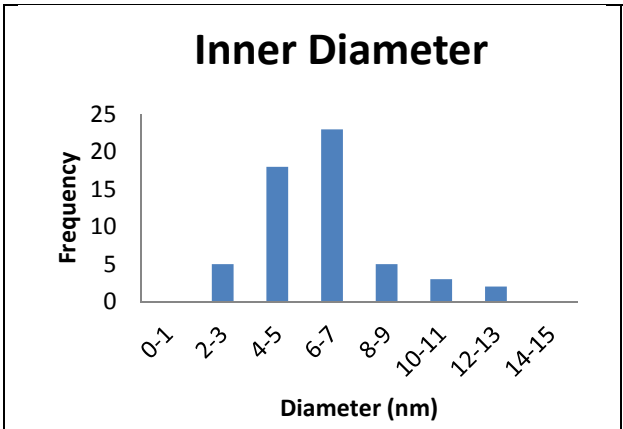

Average: 8.4 nm
Standard Deviation: 2.1 nm



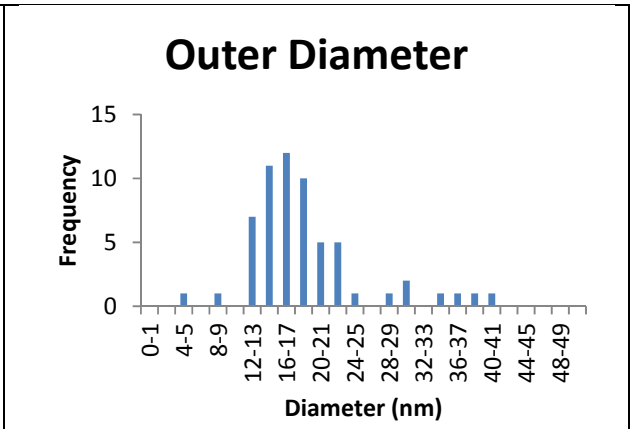

Average: 24.7 nm
Standard Deviation: 4.8 nm

Average wall number of 23. Average wall number was calculated using the average inner and outer diameters.

Rx760:



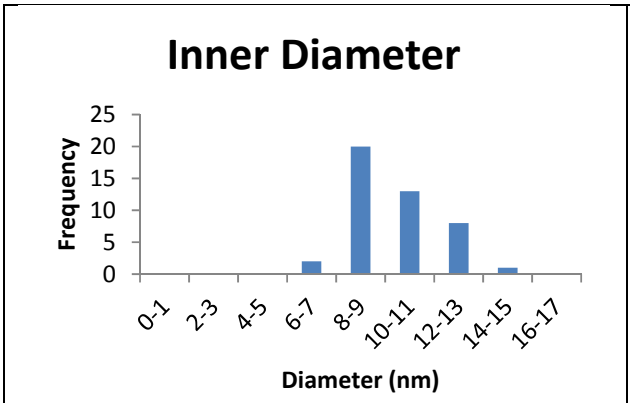

Average: 6.7 nm
Standard Deviation: 2.3 nm



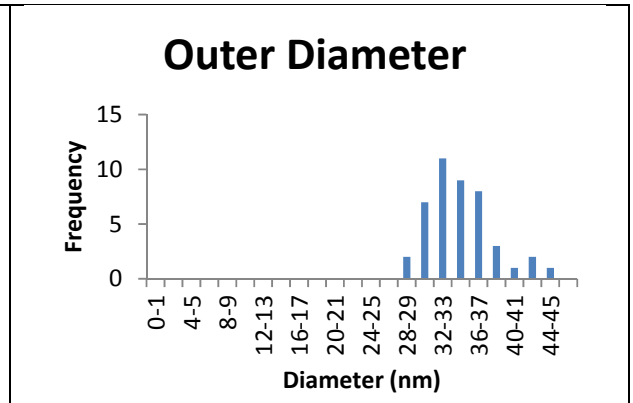

Average: 19.1 nm
Standard Deviation: 6.9 nm

Average wall number of 18. Average wall number was calculated using the average inner and outer diameters.

HRRx760:



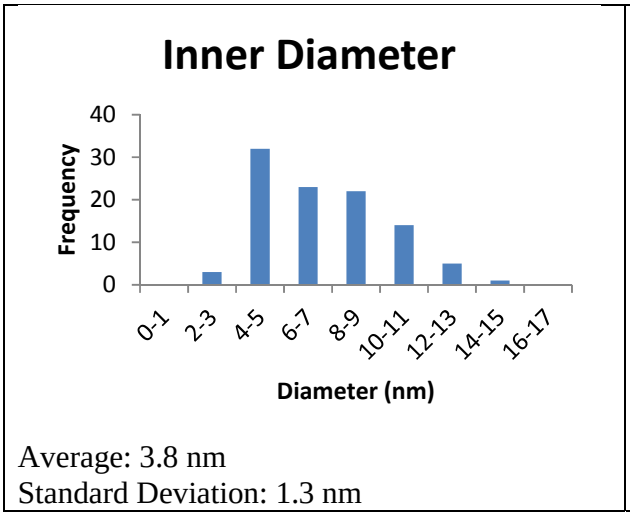

Average: 8.3 nm
Standard Deviation: 1.9 nm



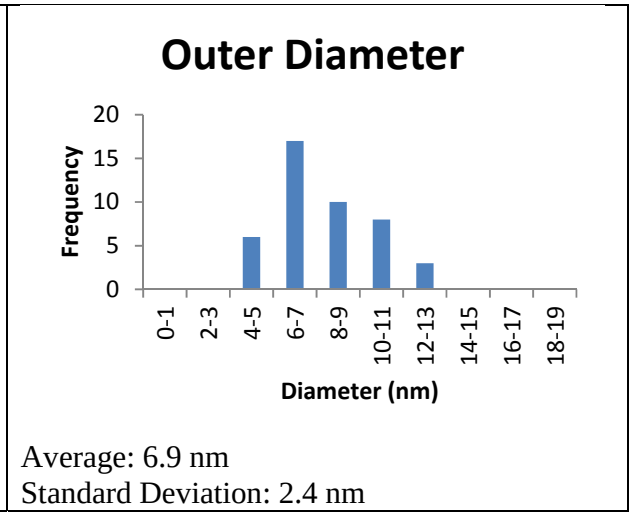

Average: 32.9 nm
Standard Deviation: 3.5 nm

Average wall number of 36. Average wall number was calculated using the average inner and outer diameters.

HRRx650:



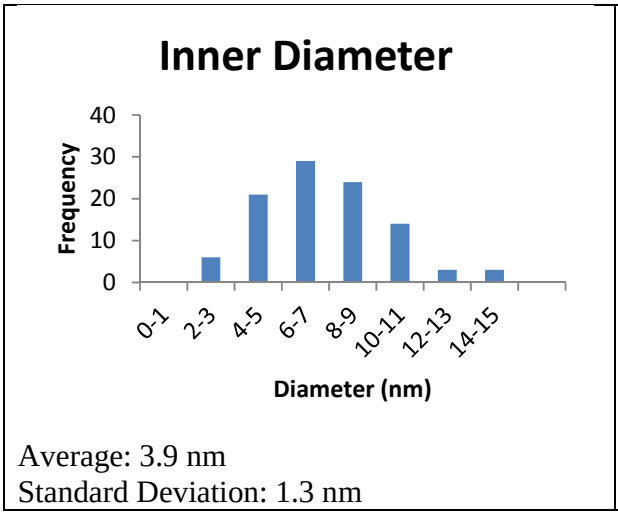

Average: 3.8 nm
Standard Deviation: 1.3 nm



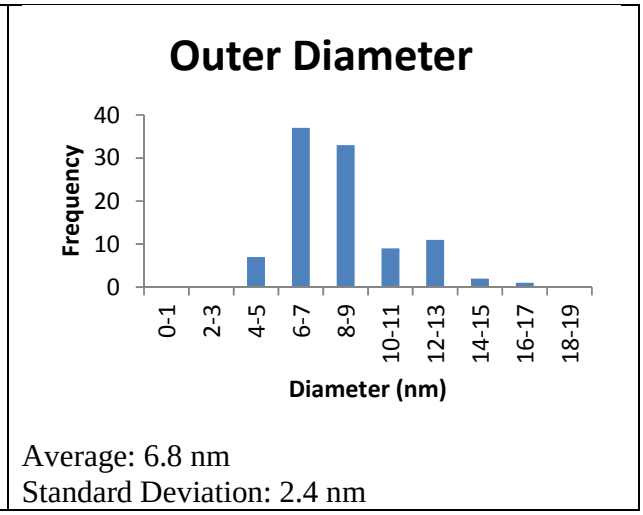

Average: 6.9 nm
Standard Deviation: 2.4 nm

Average wall number of 5. Average wall number was calculated using the average inner and outer diameters.

HRRx650D:



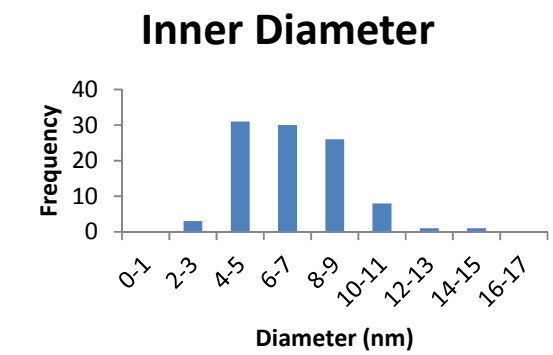

Average: 3.9 nm
Standard Deviation: 1.3 nm



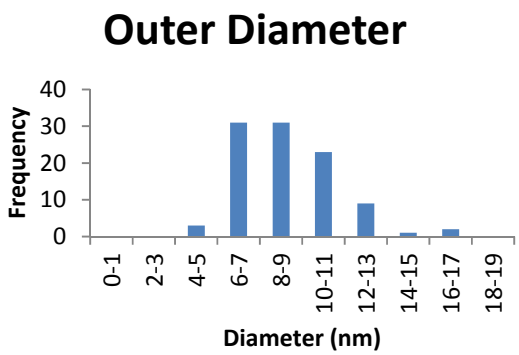

Average: 6.8 nm
Standard Deviation: 2.4 nm

Average wall number of 4. Average wall number was calculated using the average inner and outer diameters.

HRRx650D-A:



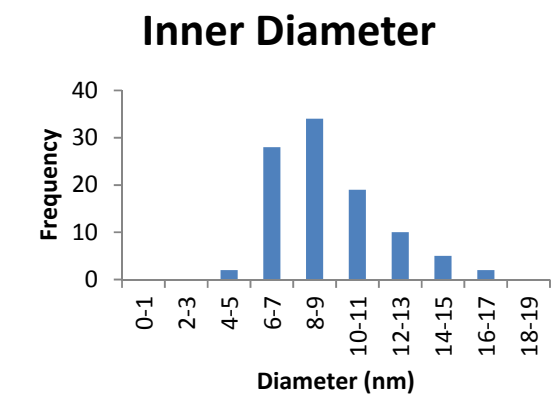

Average: 3.6 nm
Standard Deviation: 1.1 nm



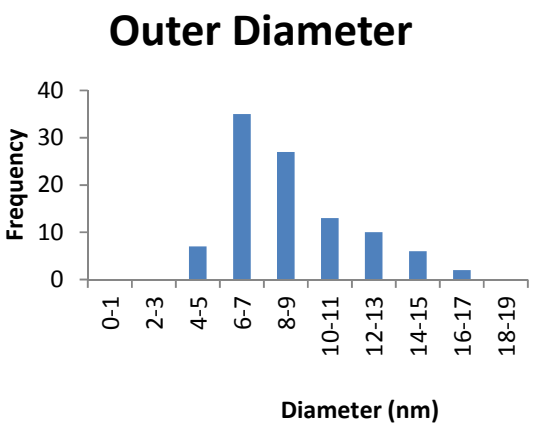

Average: 7.3 nm
Standard Deviation: 2.3 nm

Average wall number of 5. Average wall number was calculated using the average inner and outer diameters.

HRRx650D-B:



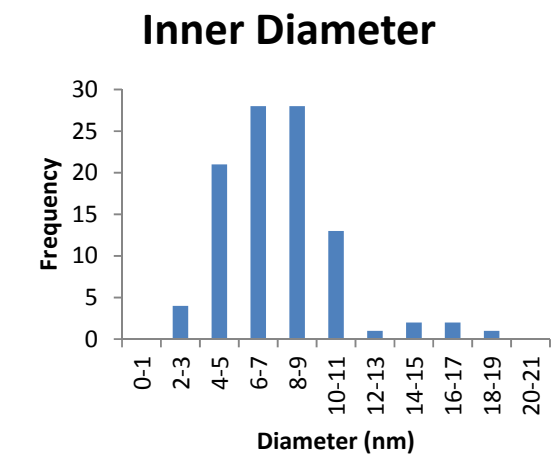

Average: 3.8 nm
Standard Deviation: 1.3 nm



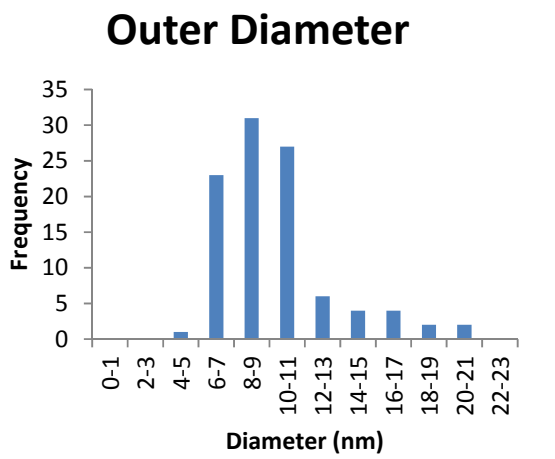

Average: 7.2 nm
Standard deviation: 2.8 nm

Average wall number of 5. Average wall number was calculated using the average inner and outer diameters.

HRRx650D-C:



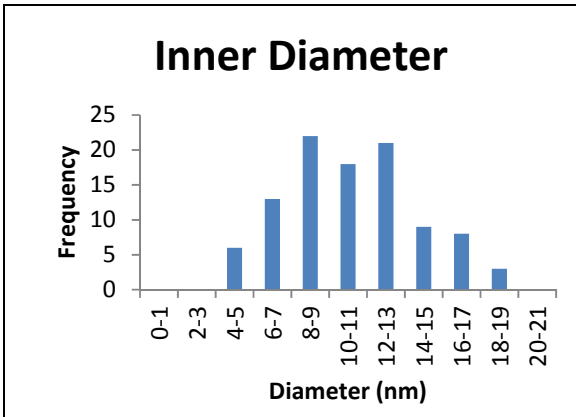

Average: 4.0 nm
Standard deviation: 1.5 nm



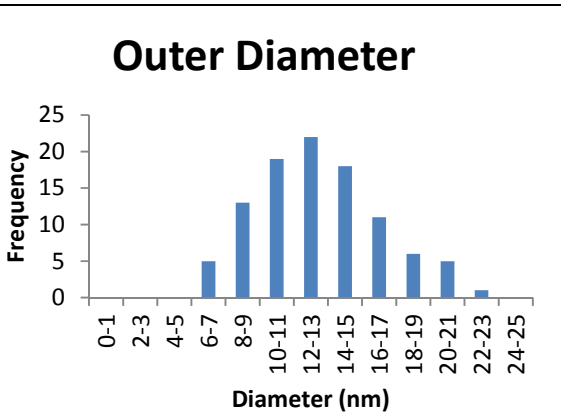

Average: 8.2 nm
Standard deviation: 3.2 nm

Average wall number of 6. Average wall number was calculated using the average inner and outer diameters.

HRRx650D-D:



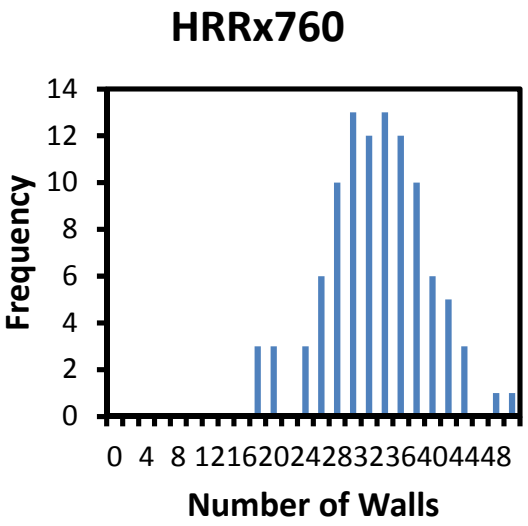

Average: 5.6 nm
Standard deviation: 1.8 nm



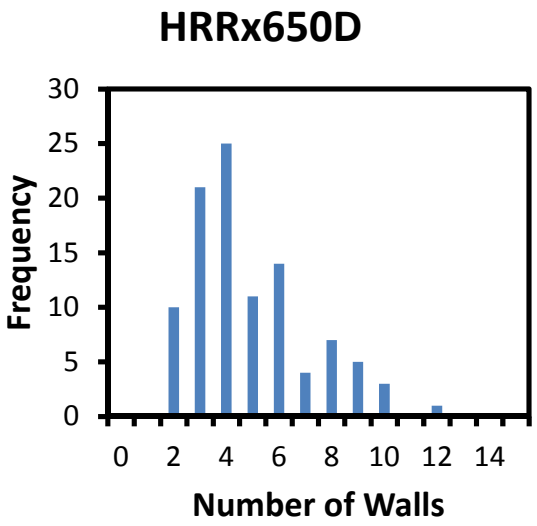

Average: 11.5 nm
Standard deviation: 3.5 nm

Average wall number of 9. Average wall number was calculated using the average inner and outer diameters.

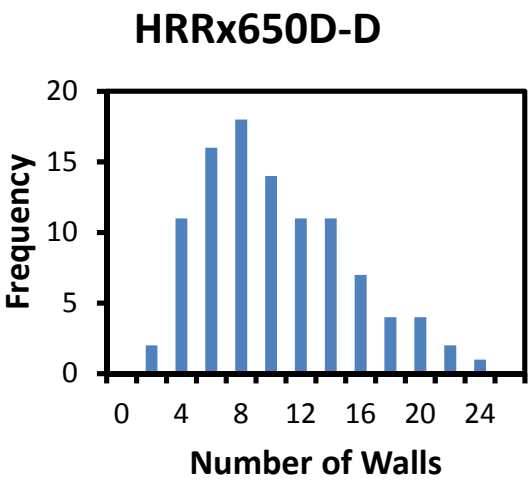
Histograms for three samples when counting the wall numbers for 100 randomly selected carbon nanotubes. The average wall numbers can be compared with the average wall numbers when calculated from the inner and outer diameters. As can be seen the average wall numbers are comparable when using either method.




Average Wall Number: 32
Standard deviation: 6




Average Wall Number: 4
Standard deviation: 2




Average Wall Number: 10
Standard deviation: 4