

Supplementary Materials for
Possible interplay of tangential and perpendicular modes in
the growth of Fe-filled carbon nanotubes

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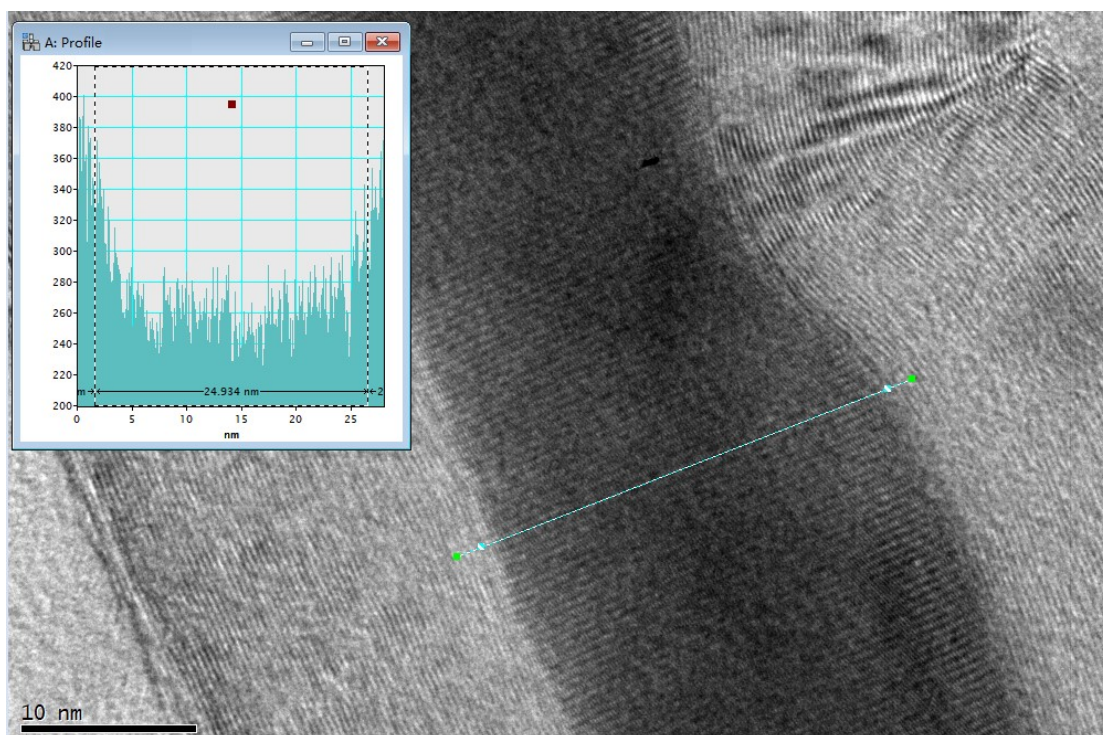


Figure S1I: Example of the statistical analyses performed on the CNT inner-cavity by employing the software Digital Micrograph.

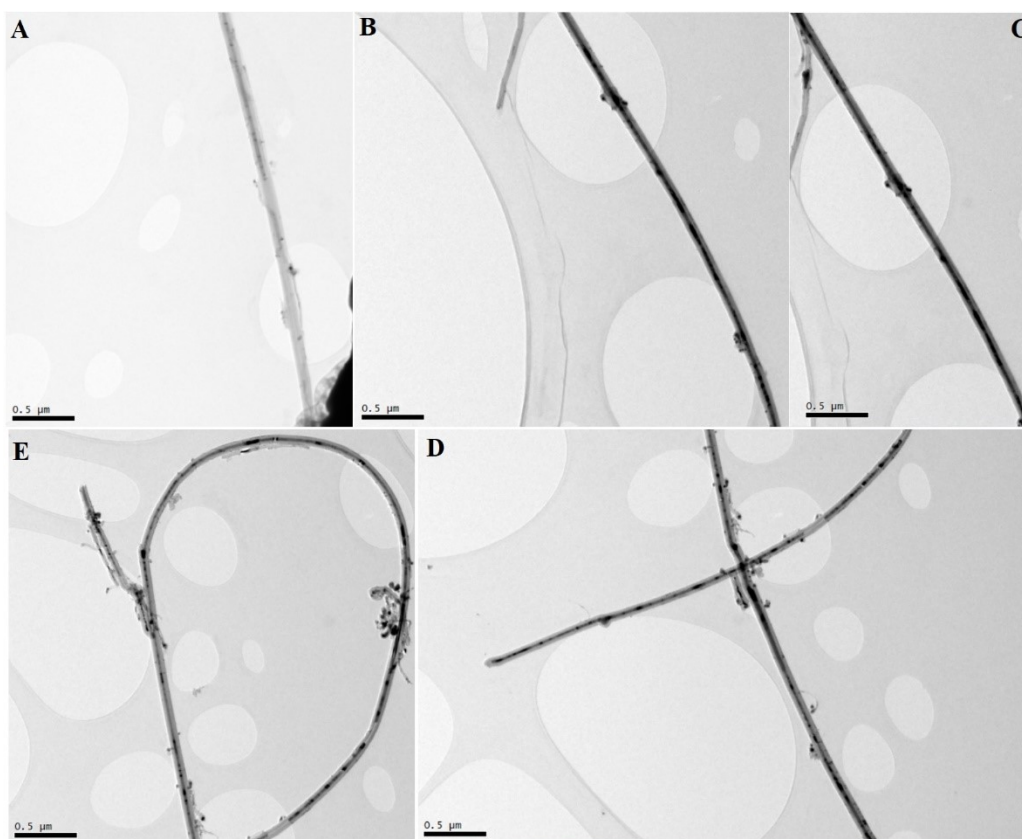


Figure S1II: Additional example of the statistical analyses performed along a CNT approximately fully filled along the inner cavity by employing the software Digital Micrograph. Noticeably, only few gaps in the nanowire continuity were identified.

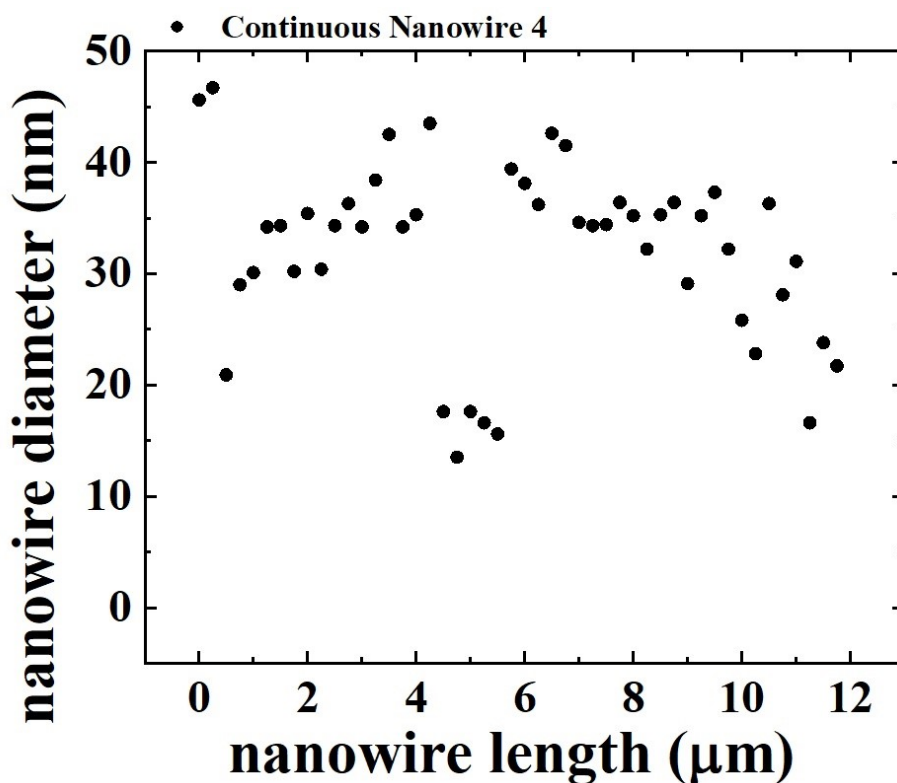


Figure S2: Plot exhibiting the systematic variation of the nanowire-diameter as a function of the nanowire-length parameter acquired from a typical CNT fully filled within the inner-cavity (obtained from statistical analyses of TEM micrographs).

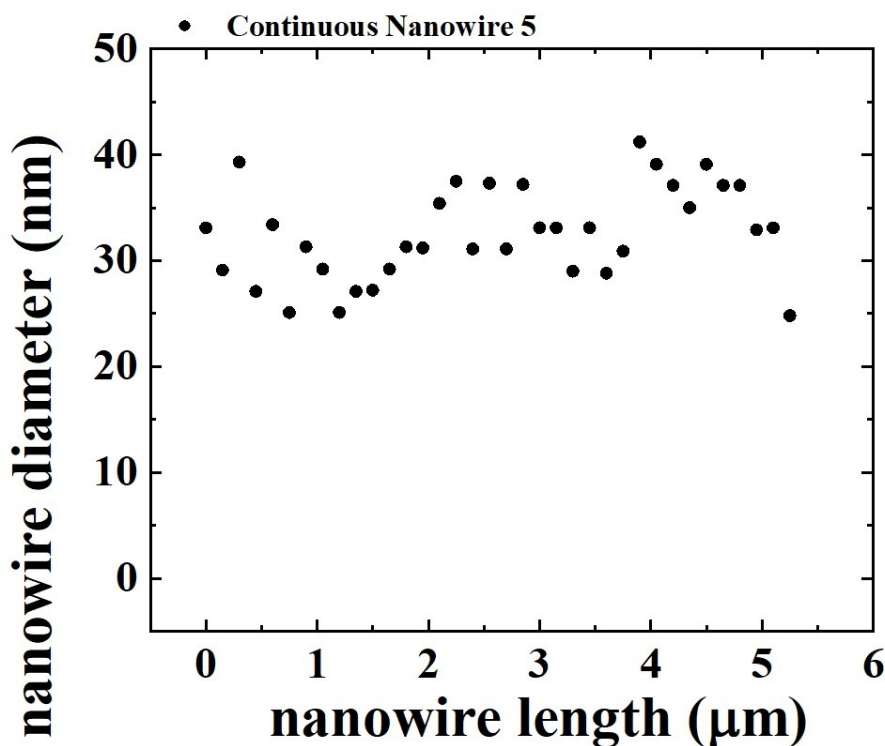


Figure S3: Plot exhibiting the systematic variation of the nanowire-diameter as a function of the nanowire-length parameter acquired from a typical CNT fully filled within the inner-cavity (obtained from statistical analyses of TEM micrographs).

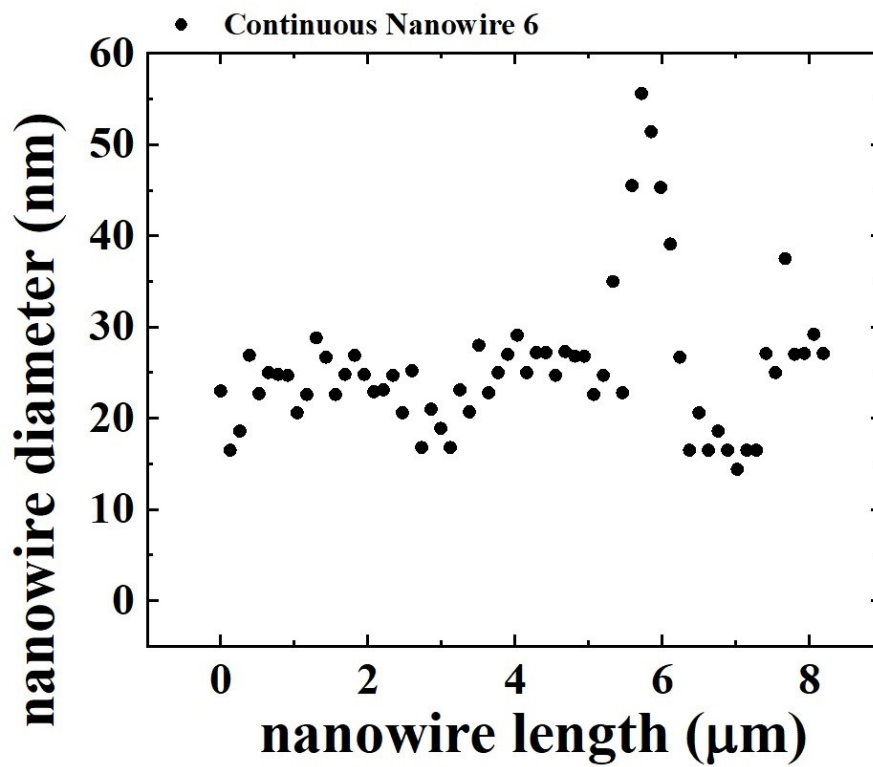


Figure S4: Plot exhibiting the systematic variation of the nanowire-diameter as a function of the nanowire-length parameter acquired from another typical CNT fully filled within the inner-cavity (obtained from statistical analyses of TEM micrographs).

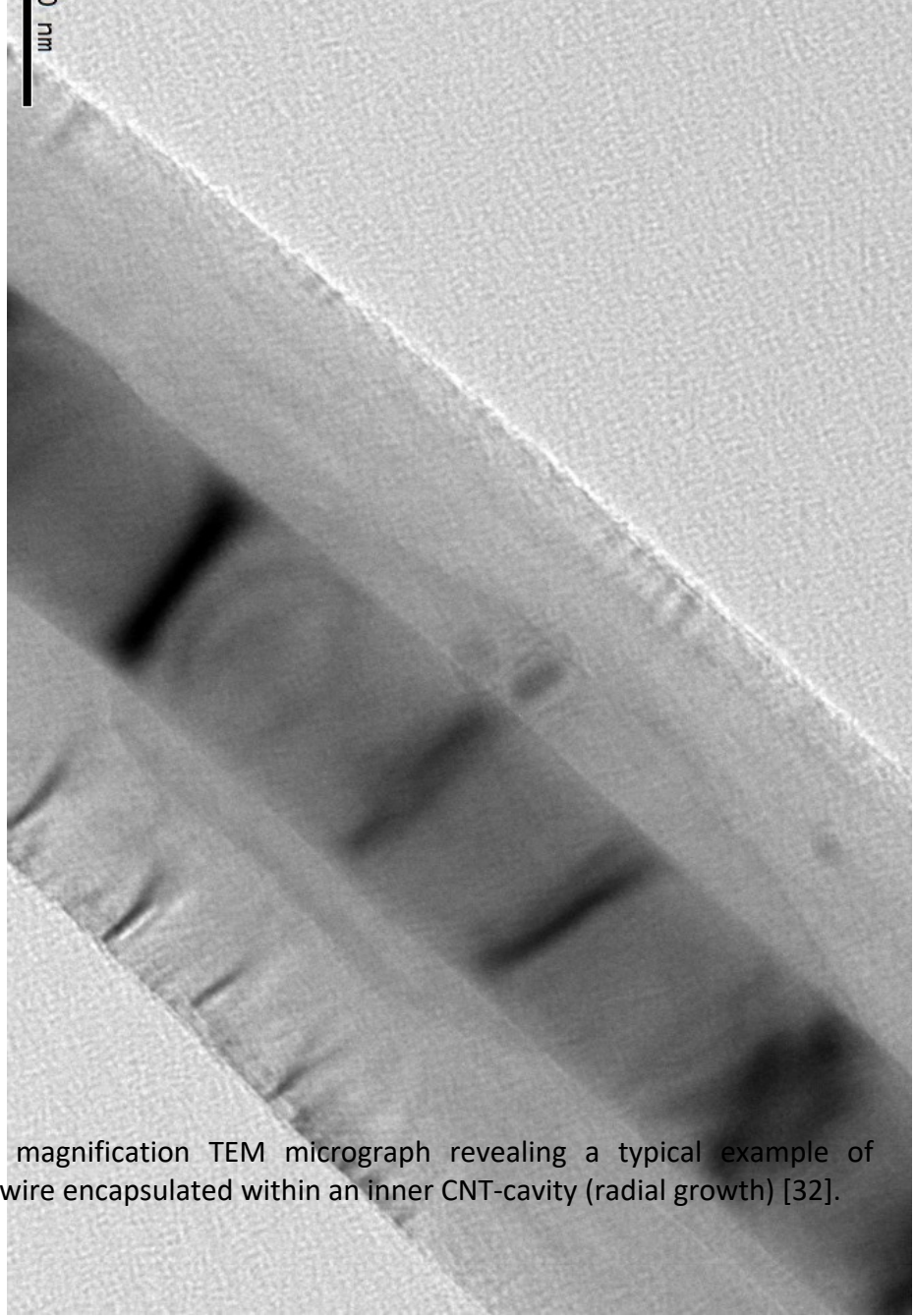


Figure S5: High magnification TEM micrograph revealing a typical example of continuous nanowire encapsulated within an inner CNT-cavity (radial growth) [32].

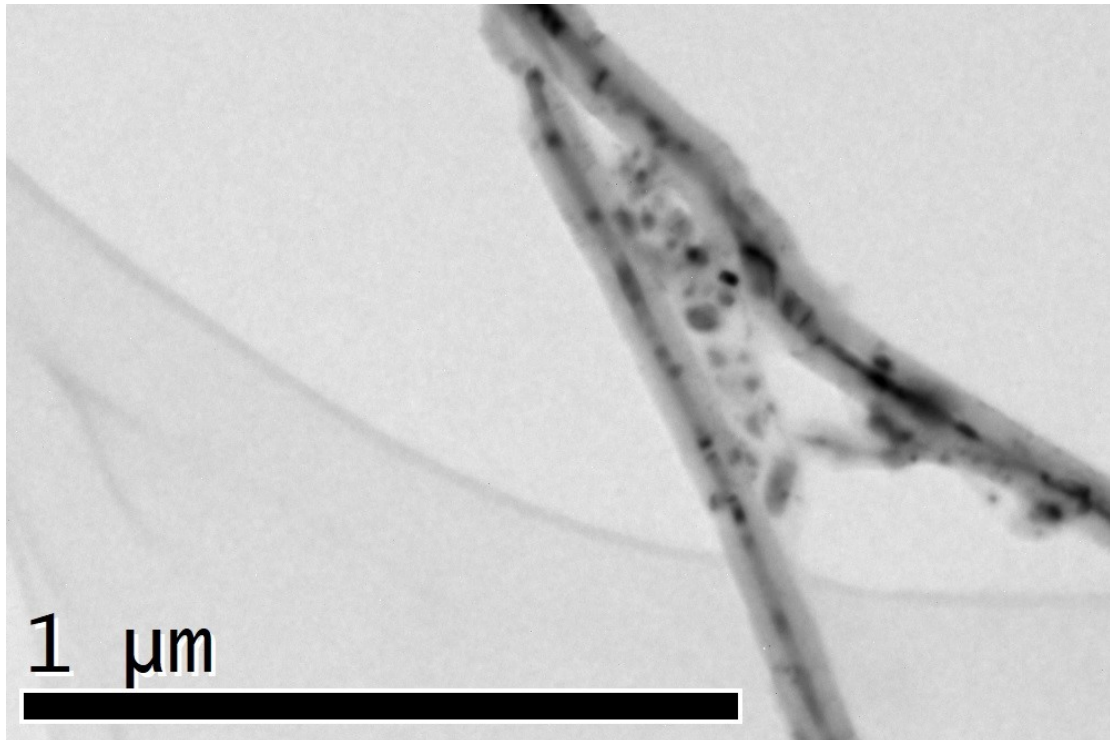


Figure S6: TEM micrograph exhibiting the top-region of the nanowire presented in Fig.15. Note the full encapsulation of the catalyst particle at the tip and base of the CNT.

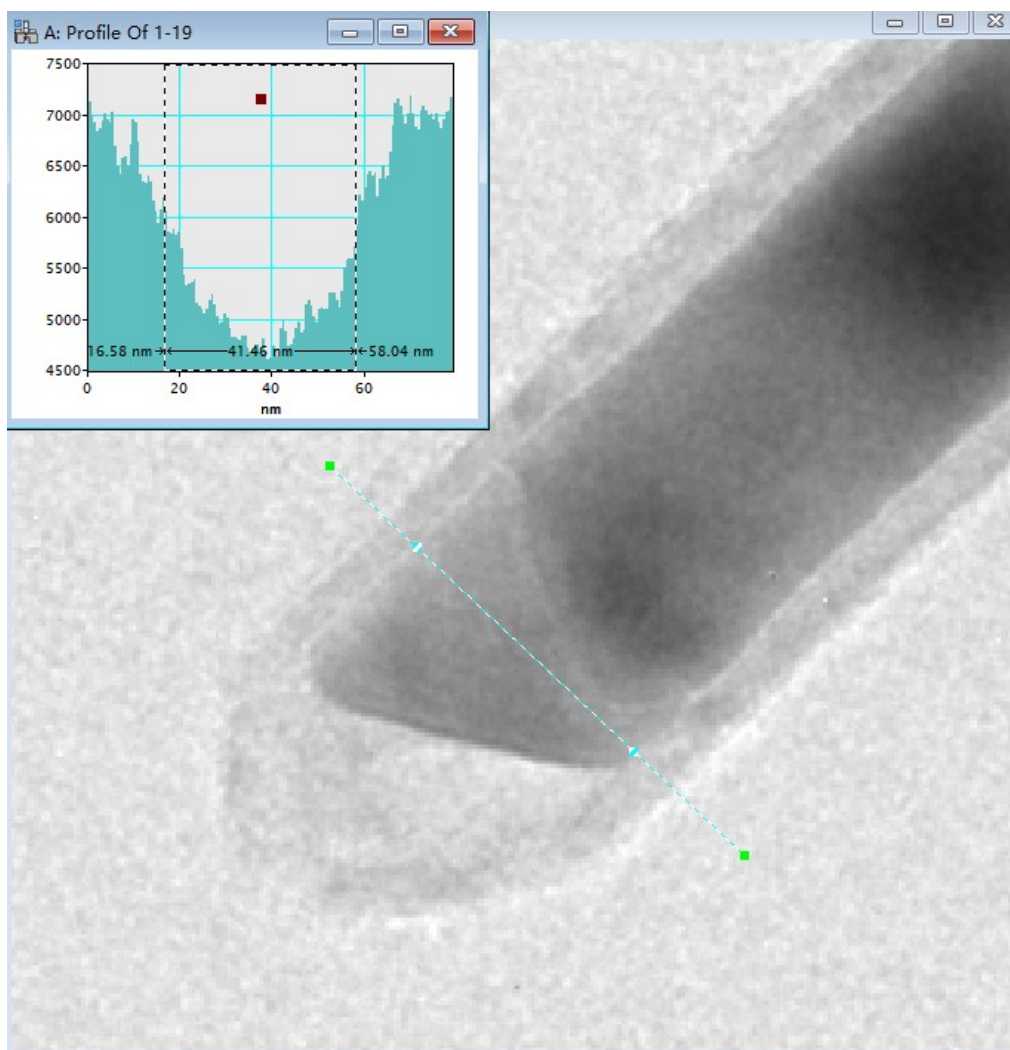


Figure S7: Example of the statistical analyses performed on the nanowire diameter by employing the software Digital Micrograph. The analysed sample resulted from pyrolysis of ferrocene/dichlorobenzene mixtures (0.05 mL of dichlorobenzene).

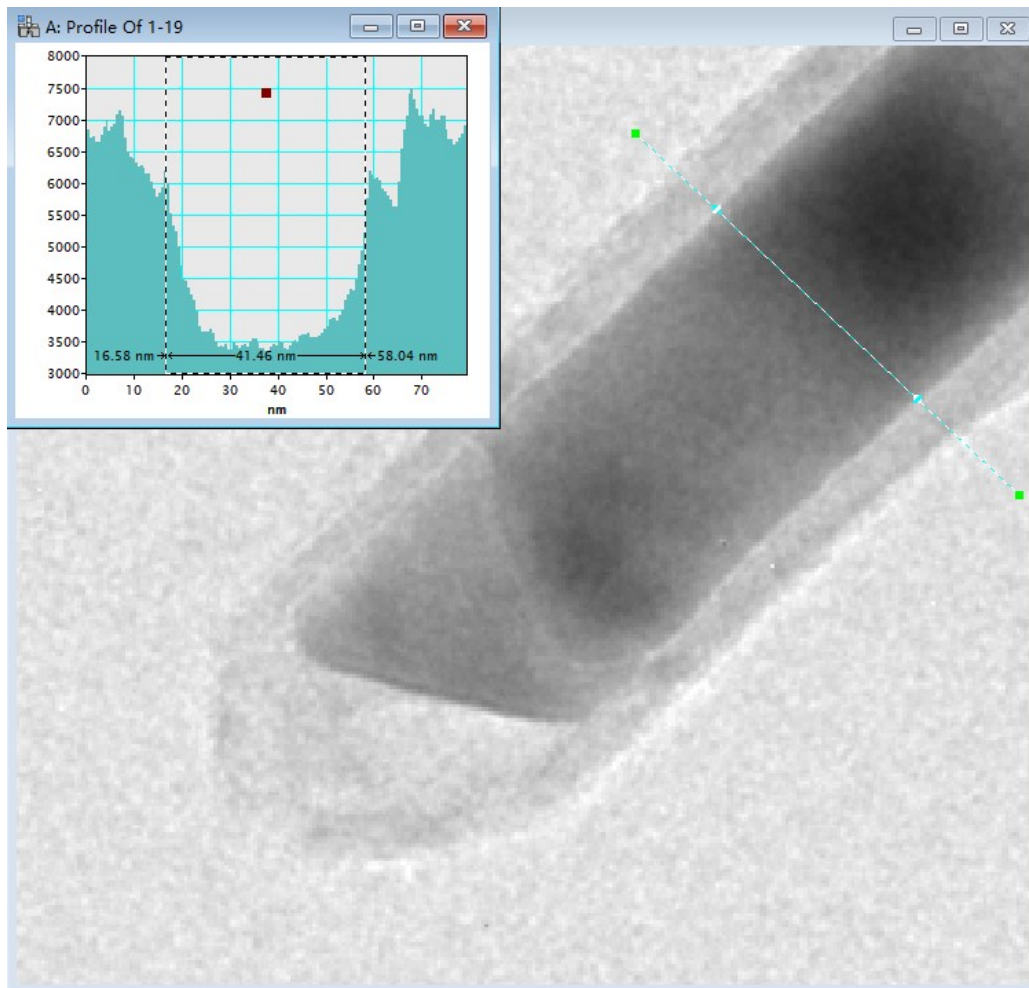


Figure S8: Example of the statistical analyses performed on the nanowire diameter by employing the software Digital Micrograph. The analysed sample resulted from pyrolysis of ferrocene/dichlorobenzene mixtures (0.05 mL of dichlorobenzene).

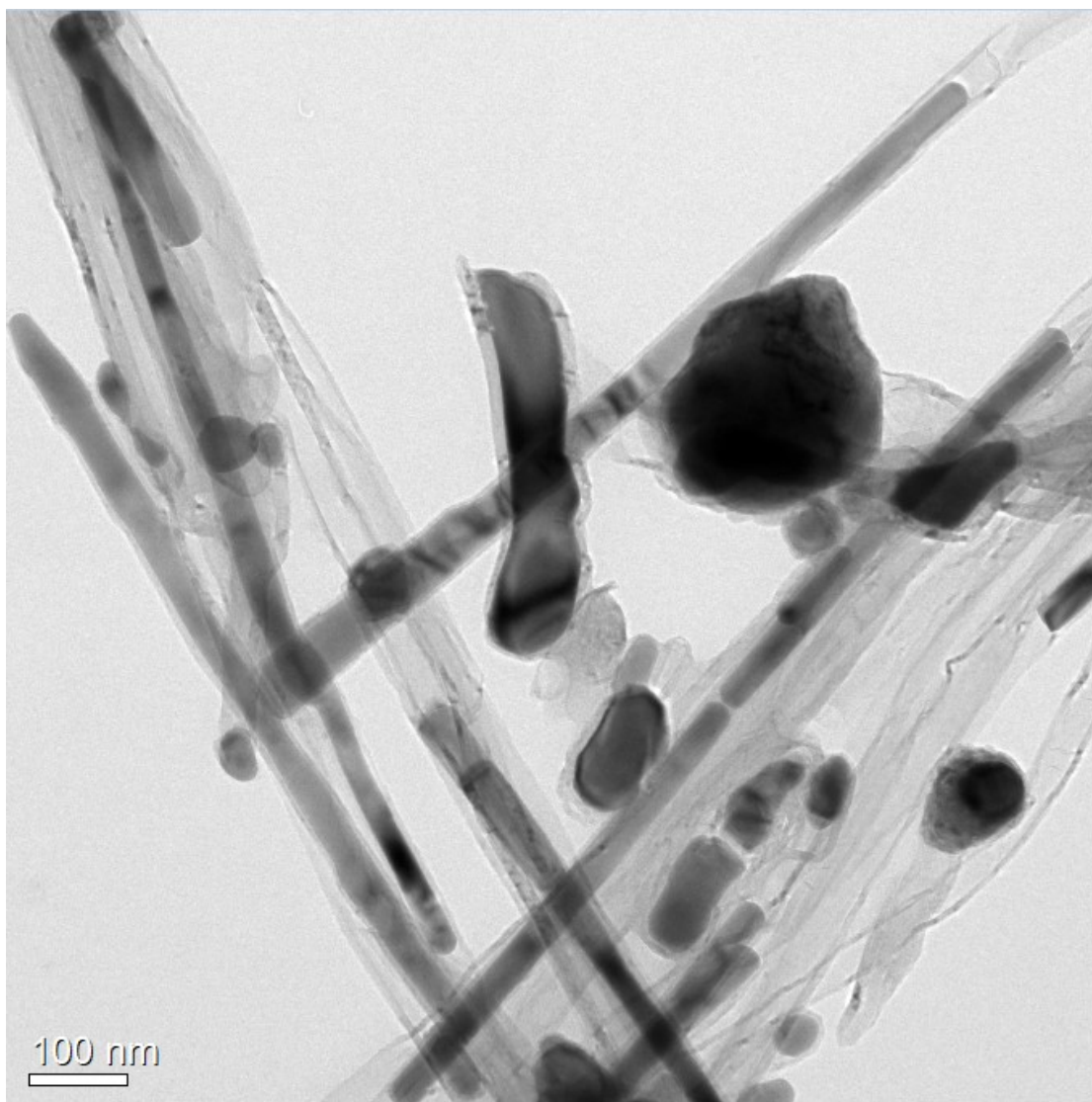


Figure S9: Additional TEM analyses of Fe-filled CNTs obtained by pyrolysis of ferrocene/dichlorobenzene and exhibiting a full nanowire encapsulation into the CNT capillary.

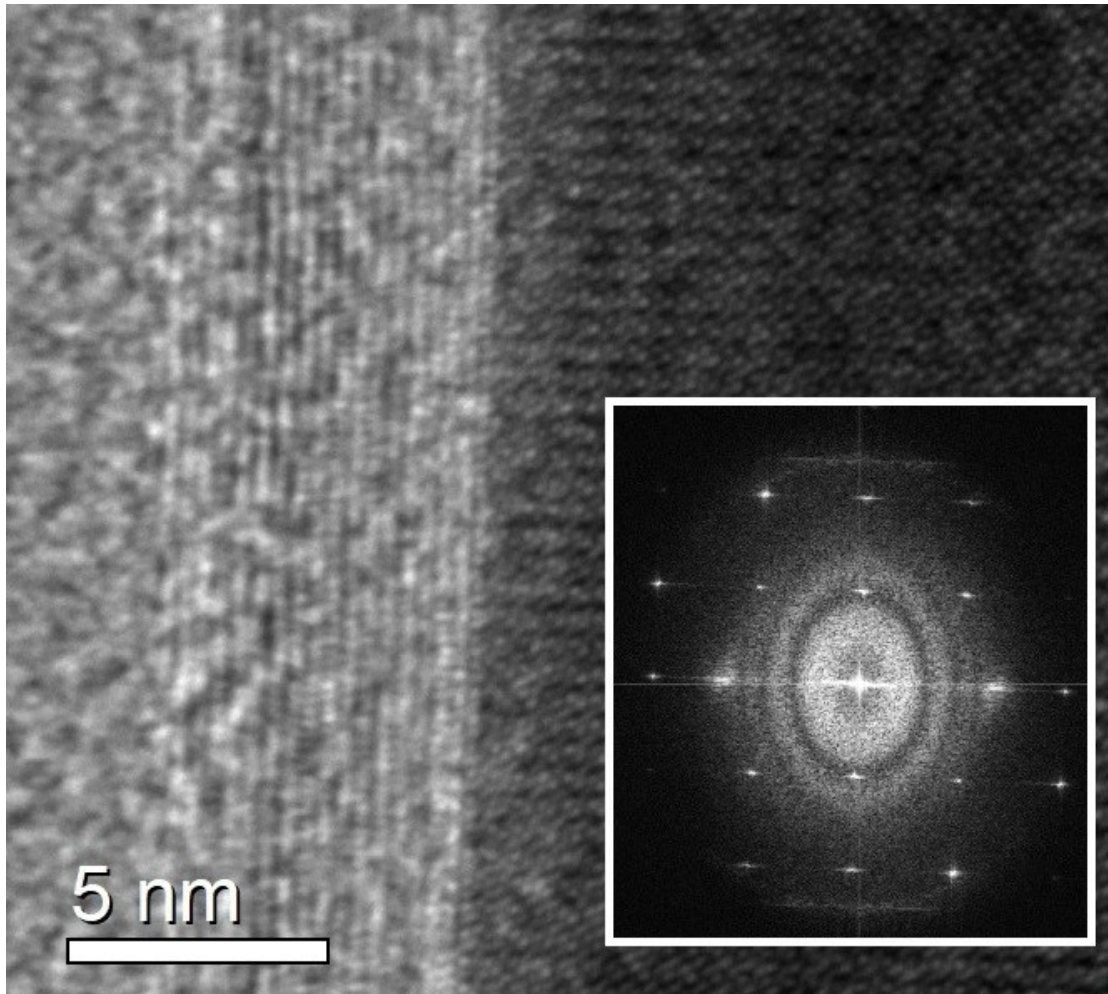


Figure S10: HRTEM micrograph and FFT analysis revealing the high quality of an encapsulated Fe₃C single crystalline nanowire (encapsulated within a CNT buckypaper produced by pyrolysis of ferrocene/dichlorobenzene mixtures).

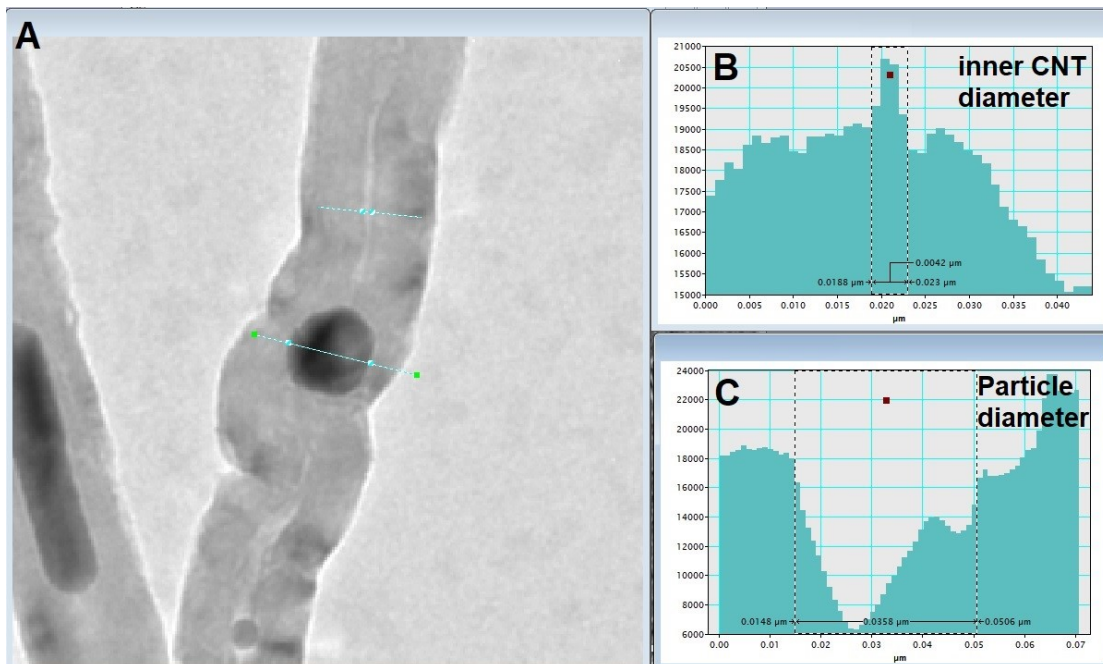


Figure S11: Example of TEM analyses of Fe-filled CNTs obtained by pyrolysis of great excess of ferrocene (i.e. ~5-10g) and small quantities of dichlorobenzene (0.15ml). In this latter case, the great excess of carbon feedstock favours a closed-tip-growth, with discontinuous encapsulation of smaller catalyst particles. It is noticeable the variable shape of the catalyst particle and the small diameter of the inner cavity evidencing a deviation from the trend presented in Figs.11-14 and Figs.18-19.

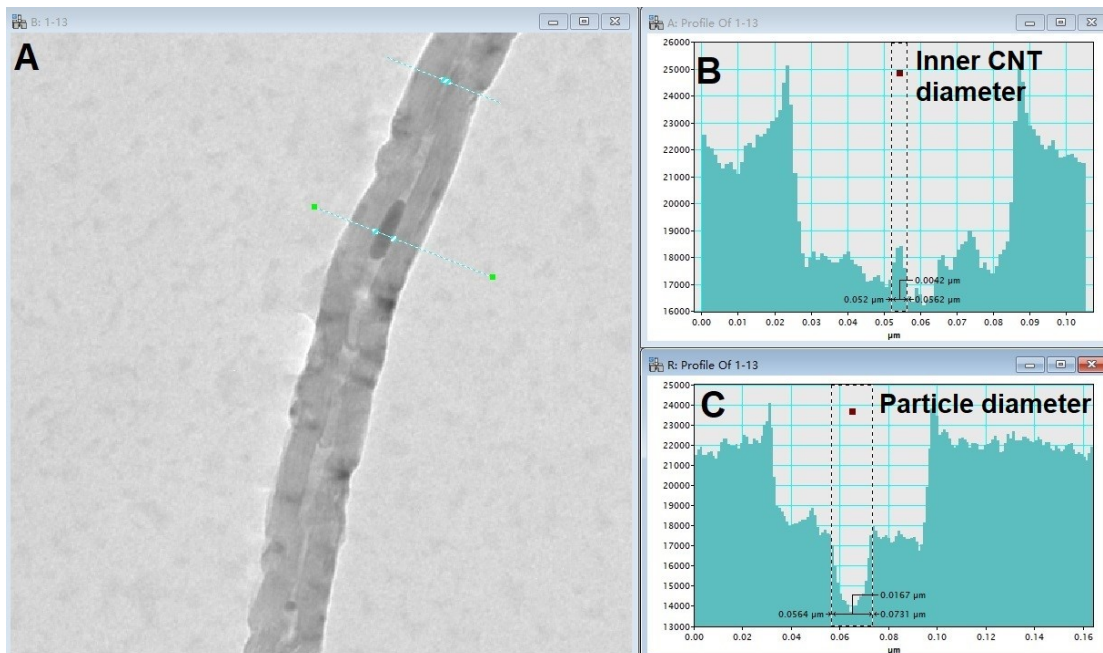


Figure S12: Additional example of TEM analyses of Fe-filled CNTs obtained by pyrolysis of great excess of ferrocene (i.e. ~5-10g) and small quantities of dichlorobenzene (0.15ml). The great excess of carbon feedstock favours a closed-tip-growth, with discontinuous encapsulation of catalyst particles with variable shape. In this category of samples, a deviation from the linear trend presented in the manuscript is observed.

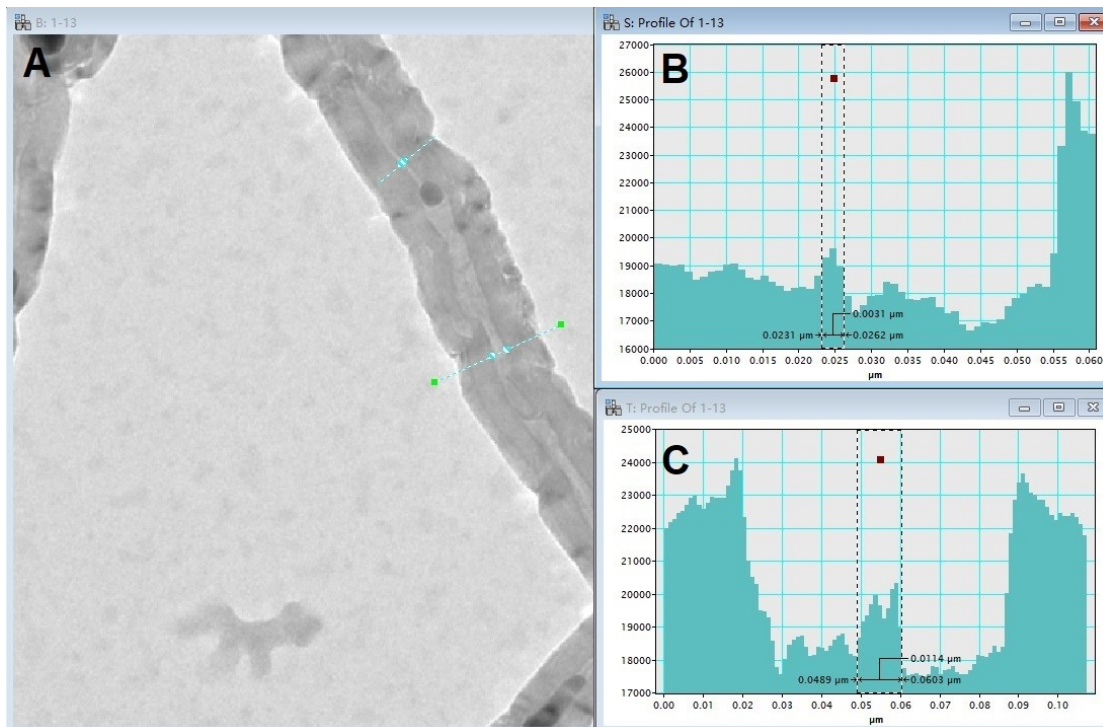


Figure S13: Additional example of TEM analyses of Fe-filled CNTs obtained by pyrolysis of great excess of ferrocene (i.e. ~5-10g) and small quantities of dichlorobenzene (0.15ml). Note the discontinuous encapsulation of catalyst particles with variable shape and the presence of a variable inner cavity diameter observed under great excess of carbon feedstock.