

# **Supporting Information**

**for**

## **Fluorination of vertically aligned carbon nanotubes: from CF<sub>4</sub> plasma chemistry to surface functionalization**

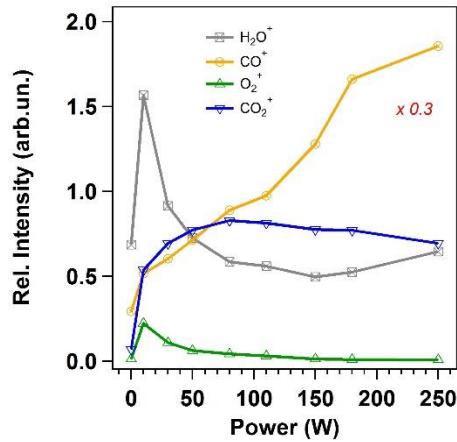
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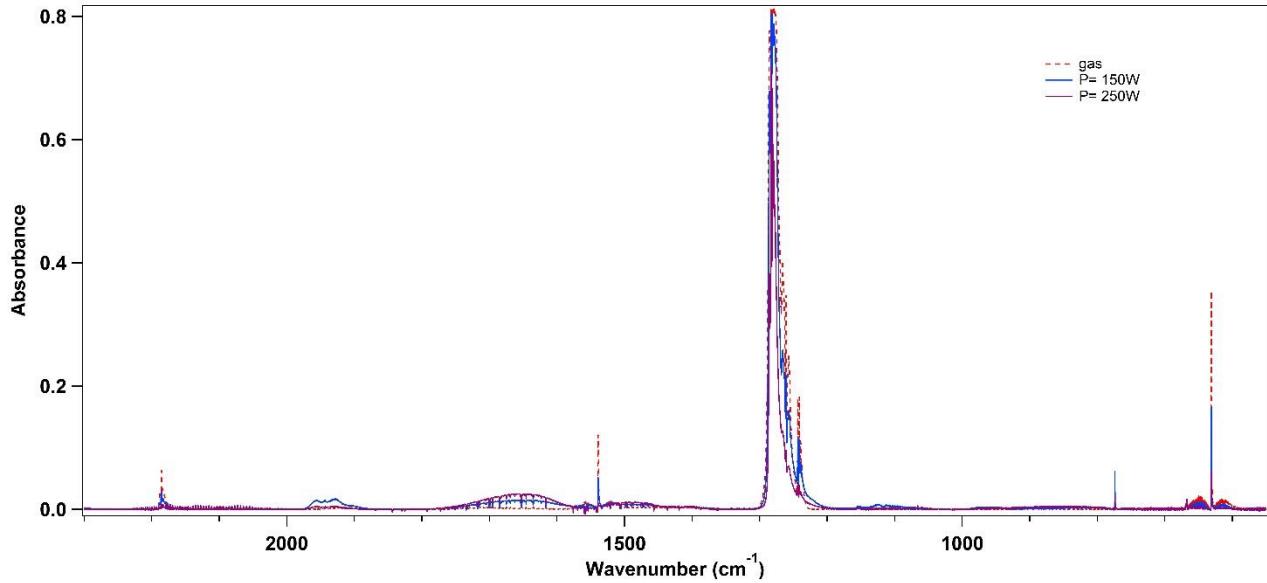
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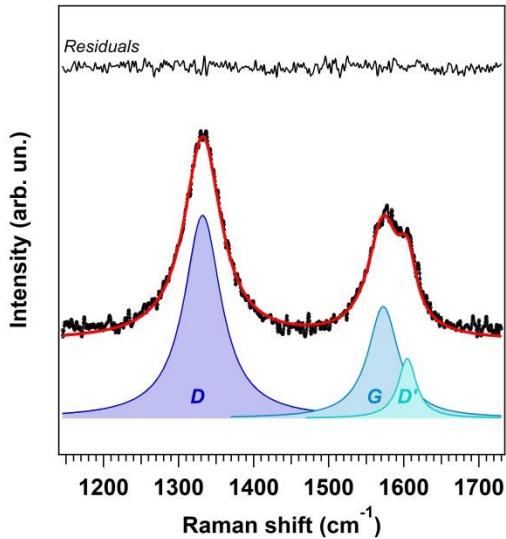
## **Additional experimental data**



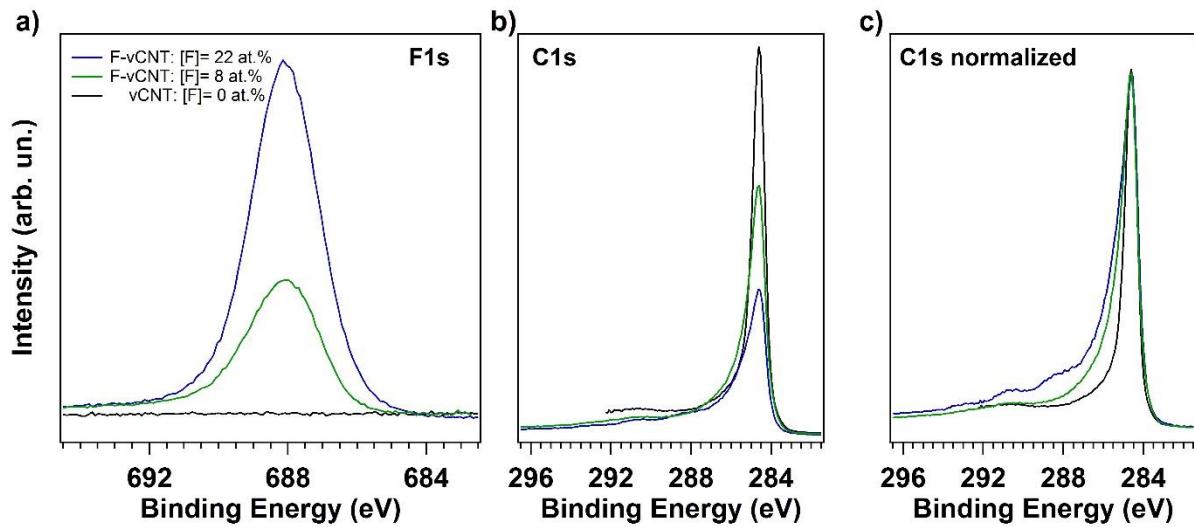
**Figure S1:** Evolution of the normalized ion signals extracted from the mass spectra at different plasma power (using 10 mTorr and 10 sccm). The masses under study are relative to the following ionized molecules:  $\text{H}_2\text{O}$  ( $m/z = 18$ ),  $\text{CO}$  ( $m/z = 28$ ),  $\text{O}_2$  ( $m/z = 32$ ), and  $\text{CO}_2$  ( $m/z = 44$ ).



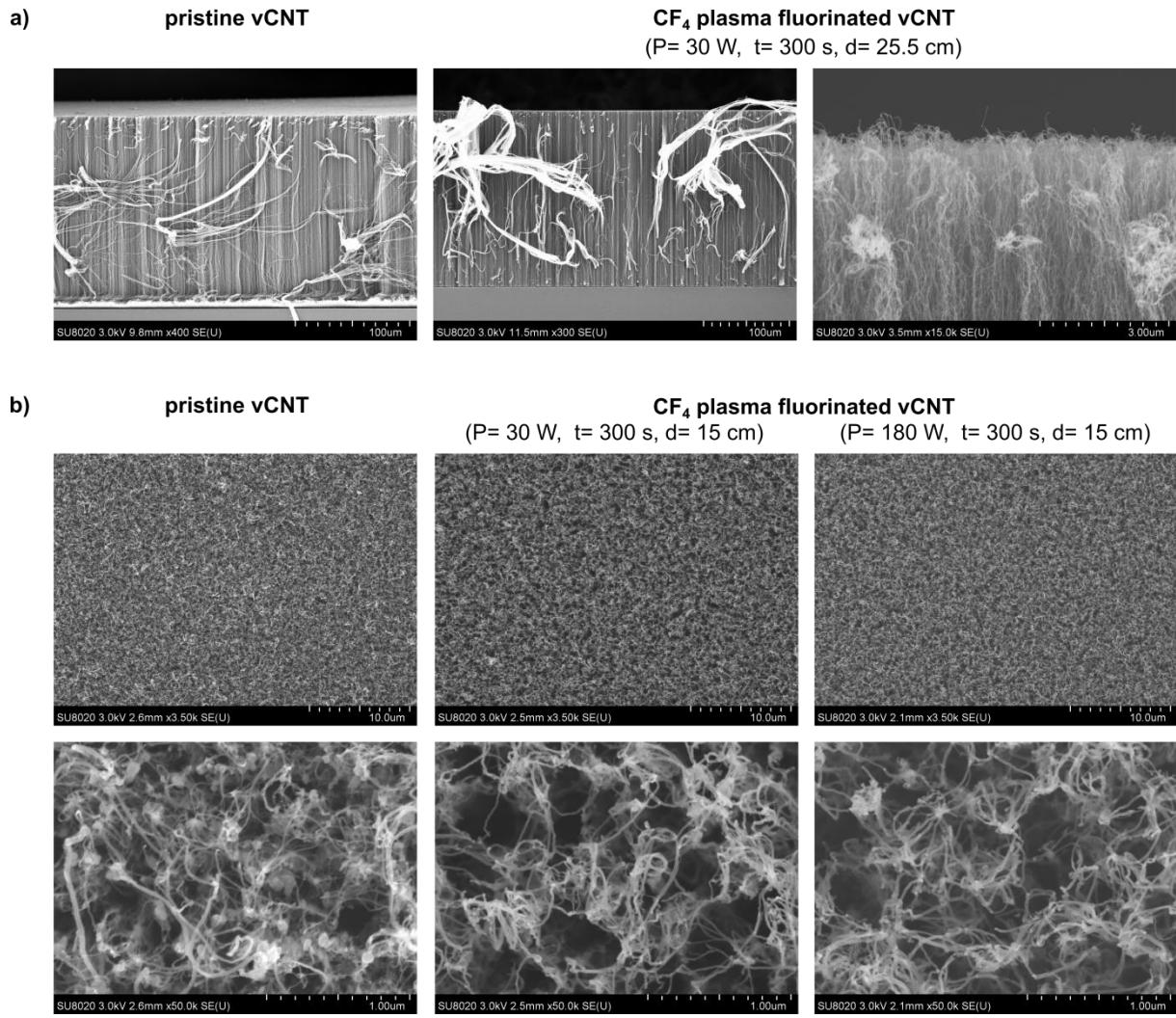
**Figure S2:** FTIR spectra acquired during pure  $\text{CF}_4$  gas phase (dotted line) and during  $\text{CF}_4$  plasma ignited at two different power values (150 and 250 W), using 10 mTorr and 10 sccm.



**Figure S3:** Representative curve fitting (red line) of Raman data (black dotted symbols) acquired from fluorinated vCNT using  $P = 30$  W. Three Lorentzian components are individuated and used (D, G and D'). On top of the graph, residuals are shown.



**Figure S4:** XPS spectra are acquired at a grazing incidence angle of  $4^\circ$  from the sample surface plane to enhance the surface sensitivity. The photon energy is 810 eV. a) F1s and b) C1s core level spectra acquired from pristine, and from two fluorinated vCNT containing different fluorine amount on the surface (8 atom % and 22 atom %). c) C1s normalized spectra are shown for the three samples for easy comparison of their line-shape.



**Figure S5:** SEM images are acquired on pristine vCNT and on CF<sub>4</sub> plasma fluorinated vCNT. Side and top views are shown in (a) and in (b), respectively.

**Table S1:** The functionalization parameters are specified for the four samples used to test ageing effect shown in Figure 6 of the manuscript.

	<b>P (W)</b>	<b>t (s)</b>	<b>d (cm)</b>
<i>sample 1</i>	30	120	39
<i>sample 2</i>	30	300	15
<i>sample 3</i>	180	300	15
<i>sample 4</i>	110	300	15