

# Supporting information

## Preparation and Charge-Transfer Study in a Single-Walled Carbon Nanotube Functionalized with Poly(3,4-ethylenedioxythiophene)

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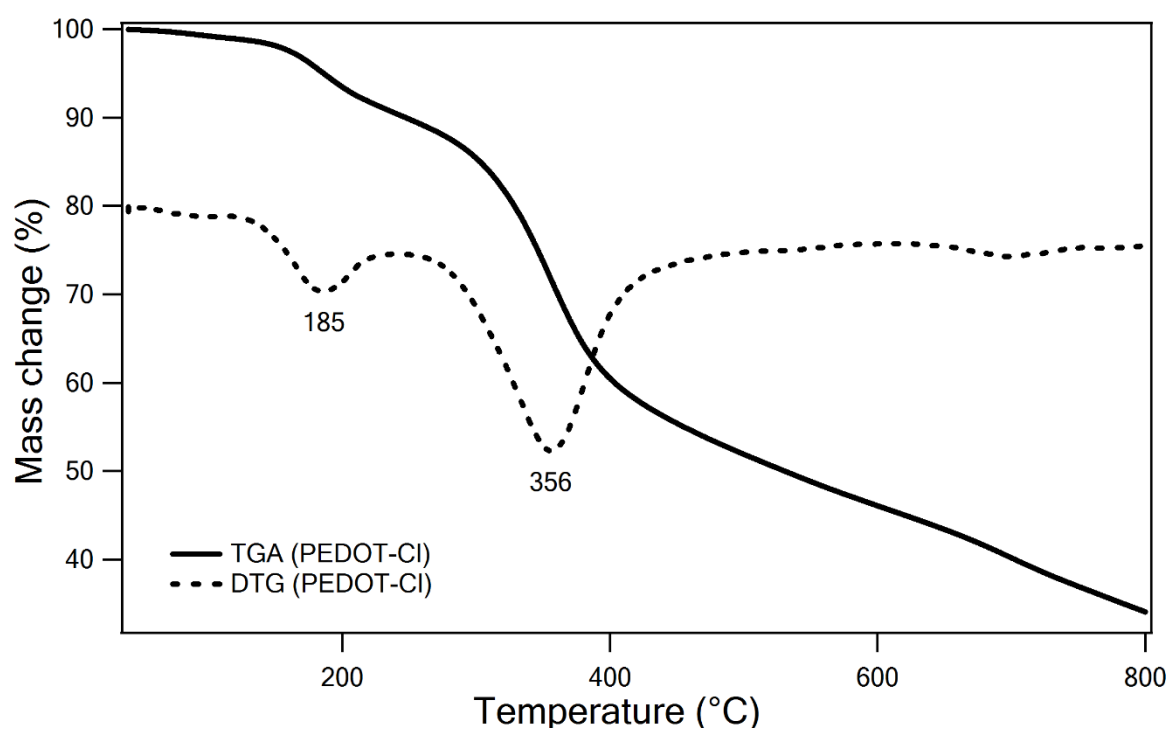
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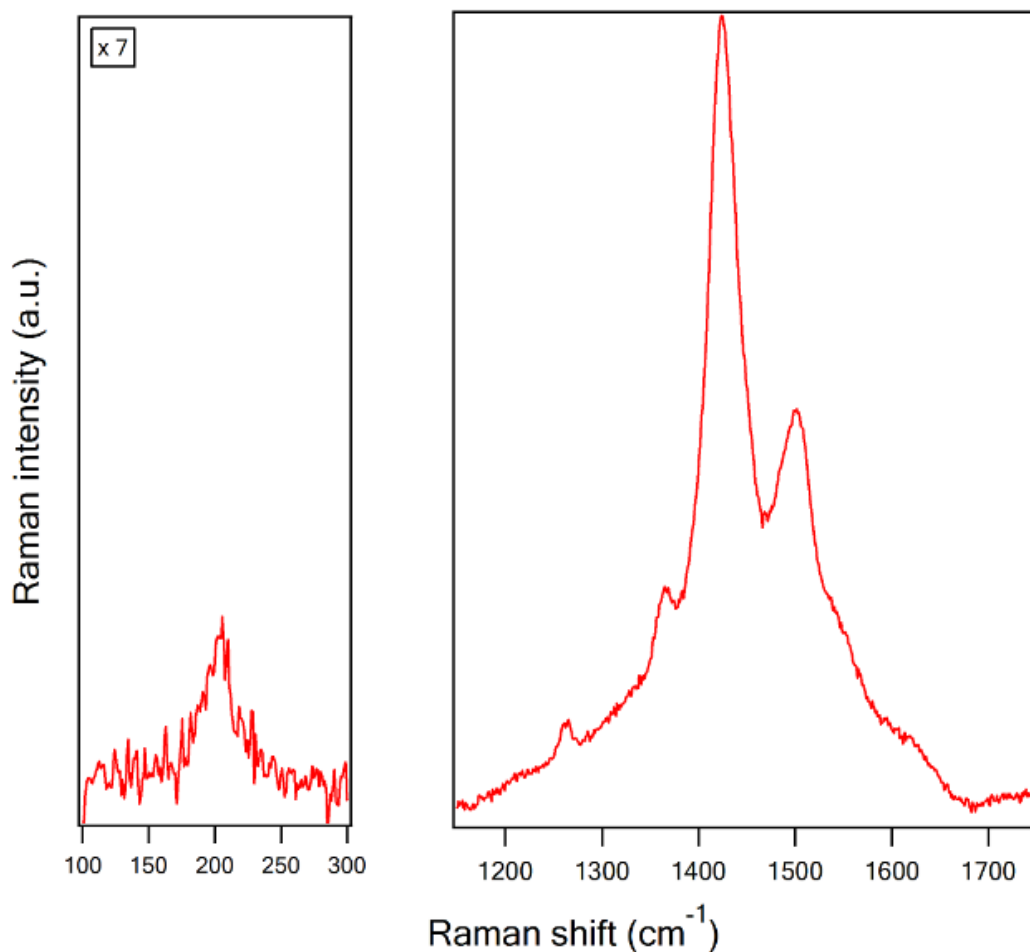
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Figure S1 shows TGA (solid) and DTG (dashed) curves of PEDOT-Cl measured in Ar atmosphere. DTG curve shows two peaks at 185°C and 356°C which correspond to decomposition of PEDOT-Cl.



**Figure S1.** TGA curve of PEDOT-Cl (solid) with its DTG curve (dashed) measured in inert Ar atmosphere.



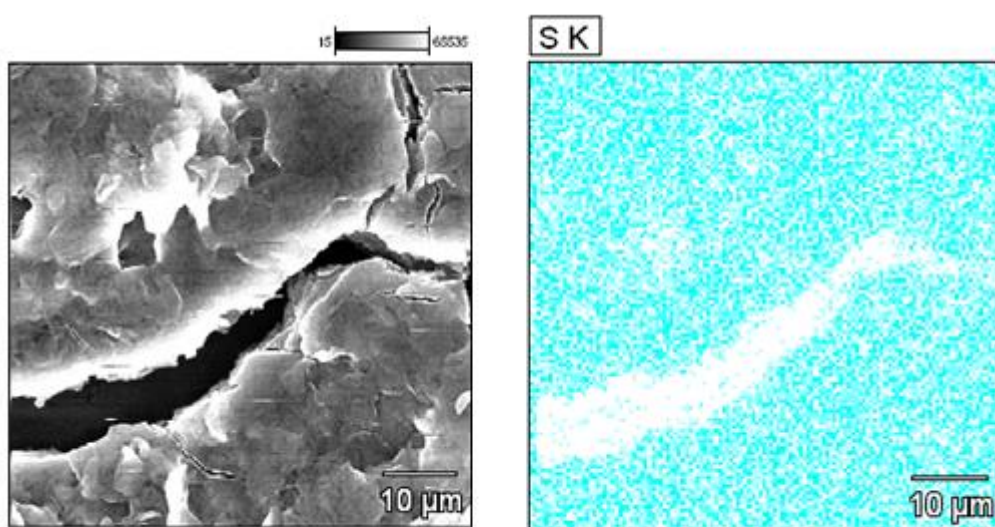
**Figure S2.** Raman spectrum of PEDOT-Cl measured at 1.96 eV excitation energy of laser.

Table S1 shows the percentage representation of S and O atoms acquired from EDX analysis of probed samples SWCNTs-SO<sub>3</sub>H and SWCNTs-SO<sub>3</sub>H/PEDOT. The SWCNTs-SO<sub>3</sub>H sample contains extra atom of sulphur after functionalization process. Increased amount of sulphur in the probed sample confirms succesful functionalization of SWCNTs. The SWCNTs-SO<sub>3</sub>H/PEDOT shows the increasing amount of S and O atoms, which confirms the succesful polymerization of EDOT on SWCNT. The percentage representation of S and O atoms for measured samples is noticed in Table S1 (values are related to C atom value).

**Table S1.** Summary of percentage representation of S and O atoms related to the value of C atom in measured samples.

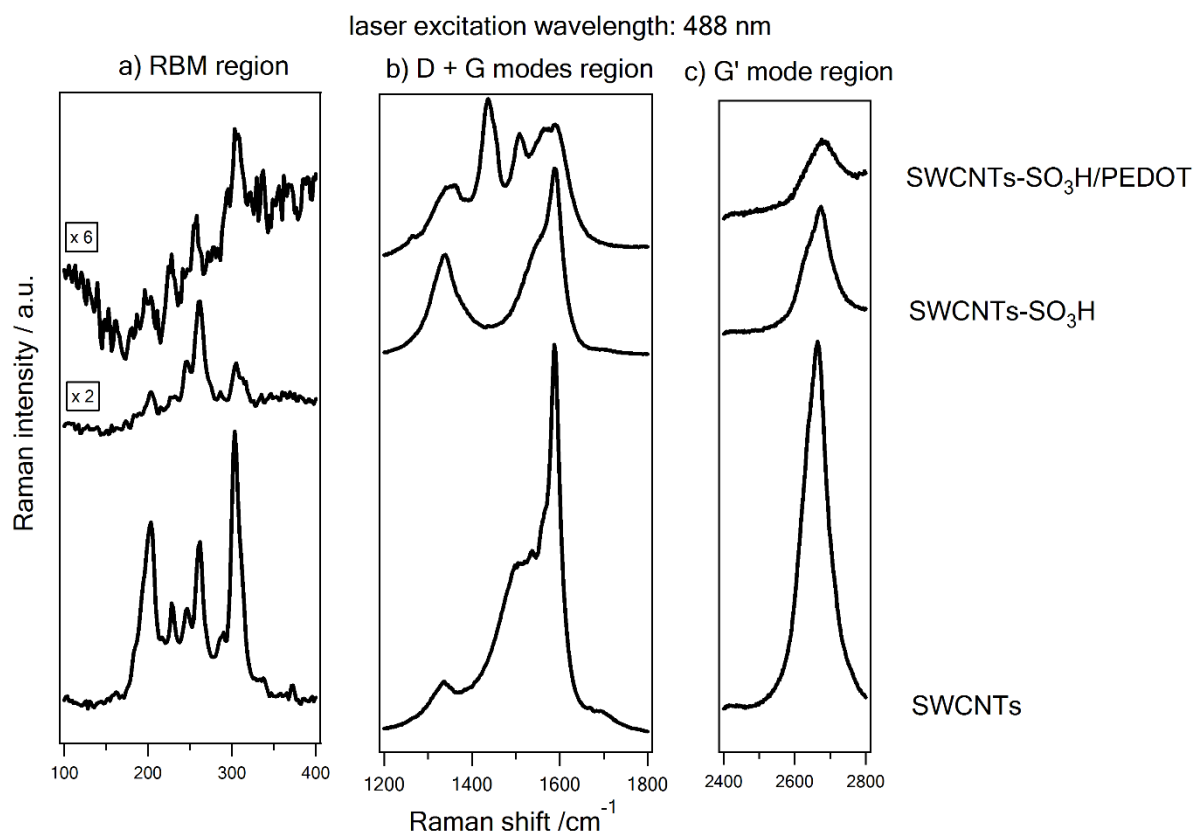
Sample	Atom (%)	
	S	O
SWCNTs-SO <sub>3</sub> H	0.004	0.109
SWCNTs-SO <sub>3</sub> H/PEDOT	0.423	3.514

For supporting evidence of homogeneity coverage of PEDOT on SWCNTs-SO<sub>3</sub>H sample, the EDX map of S atom was measured. On the Figure S3 is observed area with and without SWCNTs-SO<sub>3</sub>H/PEDOT sample.

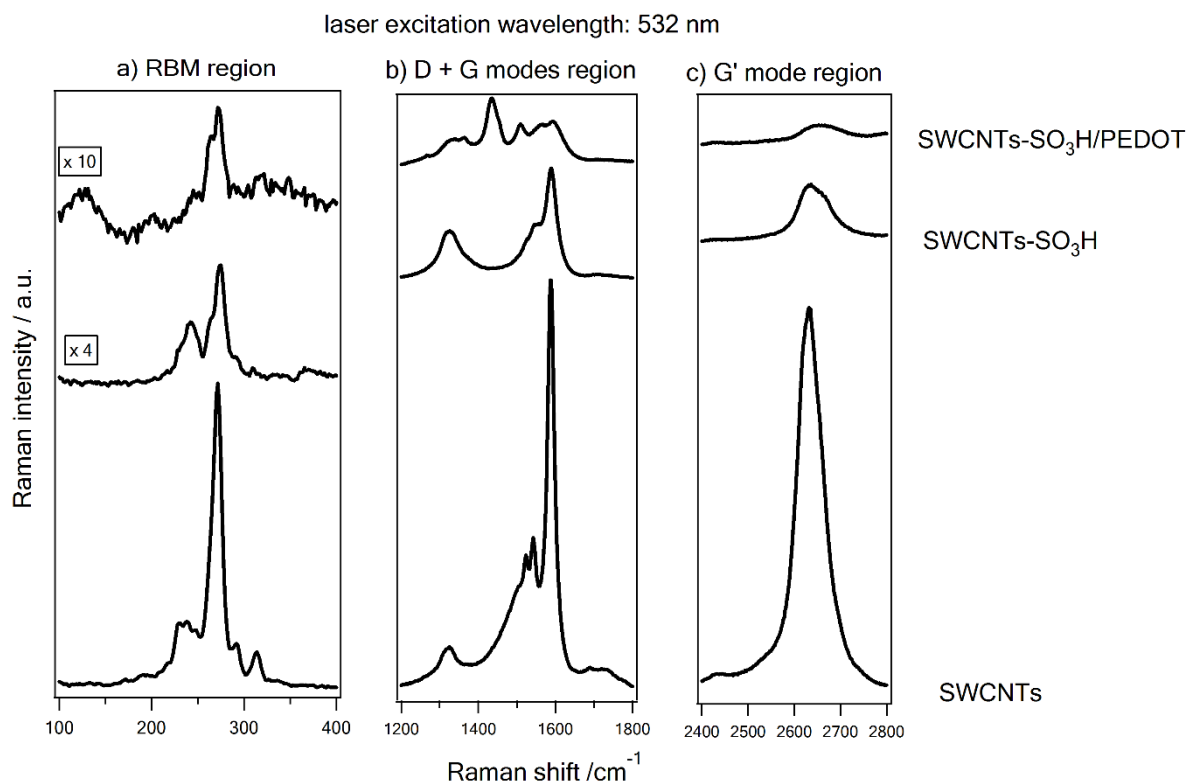


**Figure S3.** EDX map of S atom (on the right) with comparison of measured SWCNTs-SO<sub>3</sub>H/PEDOT sample image (on the left).

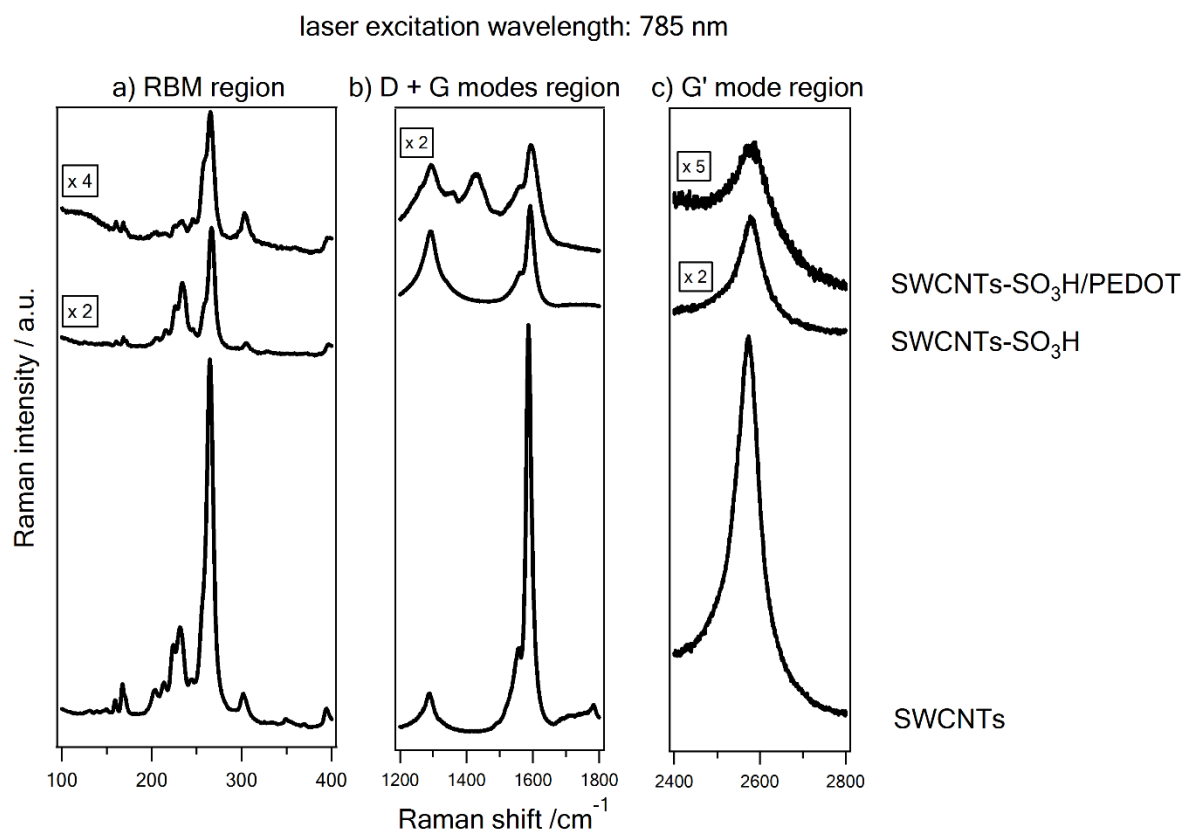
To further study functionalization of SWCNTs, we measured the Raman spectra of studied samples at three other laser excitation energies (2.54 eV, 2.33 eV and 1.58 eV). On Figures S4, S5 and S6 it is demonstrated that the Raman spectra of SWCNTs-SO<sub>3</sub>H sample show overall intensity decrease of Raman modes as compared to Raman modes of SWCNTs for all probed laser excitation energies.. Also the D mode intensity after functionalization of SWCNTs is significantly increased.



**Figure S4.** Raman spectra (excited at 2.54 eV) of SWCNTs, functionalized SWCNTs/SO<sub>3</sub>H and SWCNTs/SO<sub>3</sub>H/PEDOT sample in the RBM region (a), the D + G modes region (b) and the G' mode region (c). For clarity, the spectra are offset. The intensity scale is identical for all three spectra in the respective window.



**Figure S5.** Raman spectra (excited at 2.33 eV) of SWCNTs, functionalized SWCNTs/SO<sub>3</sub>H and SWCNTs/SO<sub>3</sub>H/PEDOT sample in the RBM region (a), the D + G modes region (b) and the G' mode region (c). For clarity, the spectra are offset. The intensity scale is identical for all three spectra in the respective window.



**Figure S6.** Raman spectra (excited at 1.58 eV) of SWCNTs, functionalized SWCNTs/SO<sub>3</sub>H and SWCNTs/SO<sub>3</sub>H/PEDOT sample in the RBM region (a), the D + G modes region (b) and the G' mode region (c). For clarity, the spectra are offset. The intensity scale is identical for all three spectra in the respective window.