Wet-spinning of PEDOT:PSS/Functionalized-SWNTs Composite: a Facile Route Toward Production Strong and Highly Conducting Multifunctional Fibers

Rouhollah Jalili, Joselito M. Razal* and Gordon G. Wallace*

ARC Centre of Excellence for Electromaterials Science, Intelligent Polymer Research Institute, AIIM Facility, Innovation Campus, University of Wollongong, Wollongong, NSW 2522, Australia; E-mail: jrazal@uow.edu.au, gwallace@uow.edu.au

Supporting information

Table S1. Summary of the PEDOT:PSS/PEG-SWNTs spinning solution composition and the calculated PEG-SWNTs loading in the resultant fiber.

PEG-SWNTs * (ml)	water (ml)	PEDOT:PSS (mg)	total solid content (mg ml^{-1})	PEG-SWNTs loading** (Vf)
0	10	200	20	0
1	5.6	130	20	0.012
1	3.9	96	20	0.016
1	3	76.5	20	0.02
1	1	36.7	20	0.04
1	0	16.7	20	0.08
1	0	10	13.2	0.12

* The PEG-SWNTs stock solution concentration used was 3.2 mg ml^{-1} and was obtained after mild centrifugation (3000 g, 90 min) of an initial 5 mg ml^{-1} dispersion.

** Based on $M_{\text{Functional group}}/M_{\text{SWNT}} = 0.34$

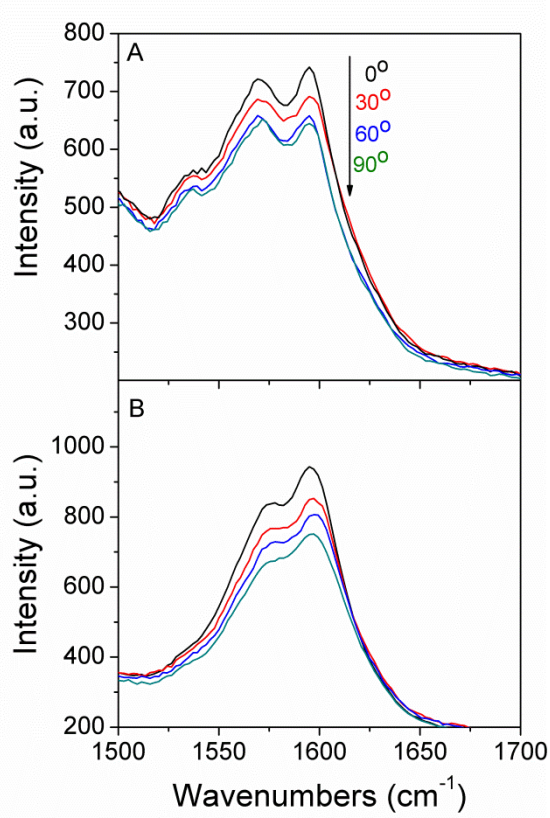

Figure S1. Polarized Raman spectra of PEDOT:PSS/PEG-SWNTs composite fibers. A) V_f =0.02 and B) V_f =0.12. A Single and straight fiber selected for the orientation-dependent measurements at different angles α_i between the polarization (electric field) of the incident laser light and the fiber axis. All measurements show maximum intensity when the polarization of the incident radiation is parallel to the fiber axis ($\alpha_i = 0^{\circ}$), while near 90° signal decreased to lowest intensity. Numbers refer to the polarization angle of the incident laser beam. The spectra are normalized to the D band which is located at 1359 cm^{-1} and is not sensitive to direction.

The intensity of tangential mode G band (1592 cm^{-1}) in the polarized Raman spectra monotonically decreased with increasing angle between the fiber axis and the polarization direction of the polarizer for PEG-SWNTs. This phenomenon confirmed the orientation of PEG-SWNTs along the fiber axis.