Anchoring conductive polymeric monomers on single-walled-carbon nanotubides: towards covalently linked nanocomposites

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SUPPORTING INFORMATION

1. Characterization

The XPS chemical composition is presented on Table S1, with the percentage of each element present on the samples.

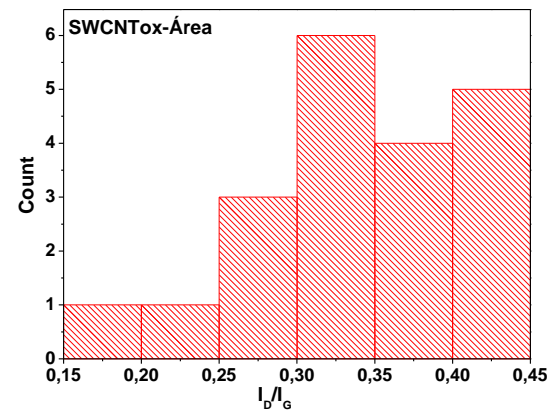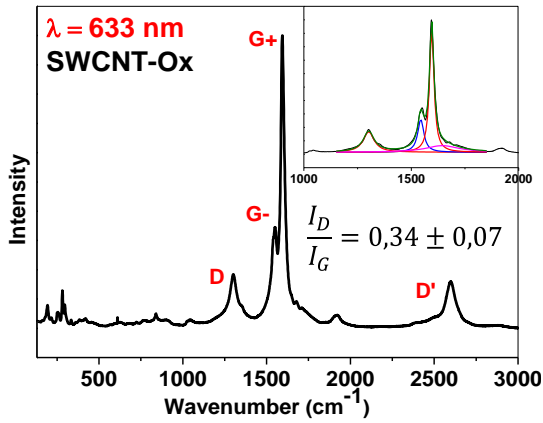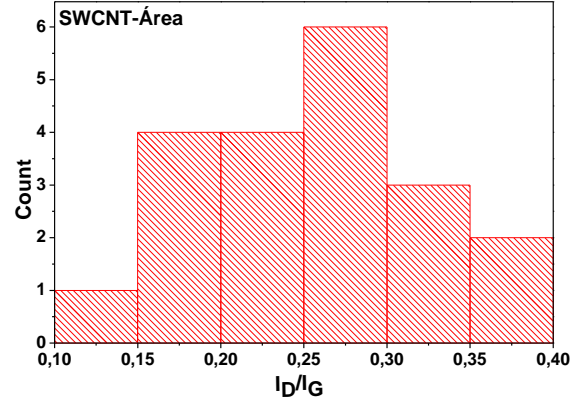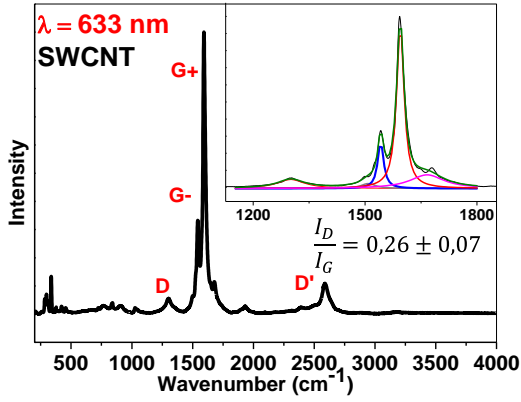**Table S1.** Surface chemical composition of the functionalized and polymerized nanocomposites, atomic percentage obtained by XPS.

	Sample	C 1s	N 1s	O 1s	S 2p	Cl 2p	Si 2p*
covalent	**SWCNT-Ox (%)**	75.2	0	21.4	0	0	3.4
	SWCNT-BPI (%)	88.7	2.4	5.4	2.0	0	0.9
	SWCNT-BATI (%)	80.8	0	15.1	1.7	0	2.4
	SWCNT-BTI (%)	83.2	0.9	11.6	2.0	0	1.6
	Poly-SWCNT-BPI (%)	69.3	11.8	17.2	0	1.6	0
non-covalent	**SWCNT-Ox-Ppy (%)**	70.8	11.2	14.8	0	1.8	1.6

* The amount of Si is attributed to the substrate used in the analysis.

Figure S1 present the Raman spectra for the pristine, oxidized and functionalized SWCNT. The features Raman bands of SWCNT are evidenced on the spectra, with the presence of G-band, G^+-band and D-band. The representative deconvolution is on the inset and the normal distribution of I_D/I_G is presented with the respective obtained values.
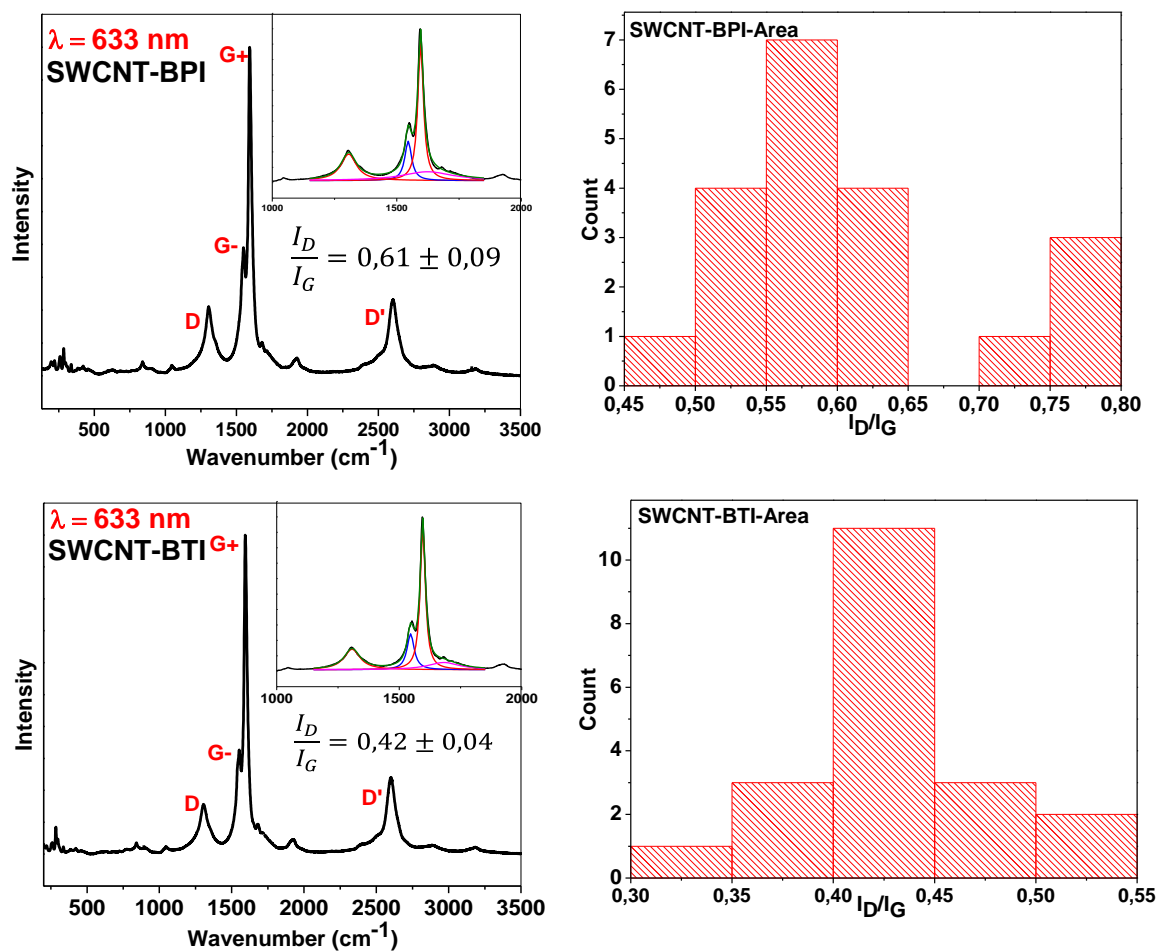
$\lambda = 633 \text{ nm}$
SWCNT

$\frac{I_D}{I_G} = 0,26 \pm 0,07$

G+
G-
D
D'

$\lambda = 633 \text{ nm}$
SWCNT-Ox

$\frac{I_D}{I_G} = 0,34 \pm 0,07$

G+
G-
D
D'

$\lambda = 633 \text{ nm}$
SWCNT-BATI

$\frac{I_D}{I_G} = 0,50 \pm 0,11$

G+
G-
D
D'

SWCNT-Área
SWCNTox-Área
SWCNT-BATI-Area
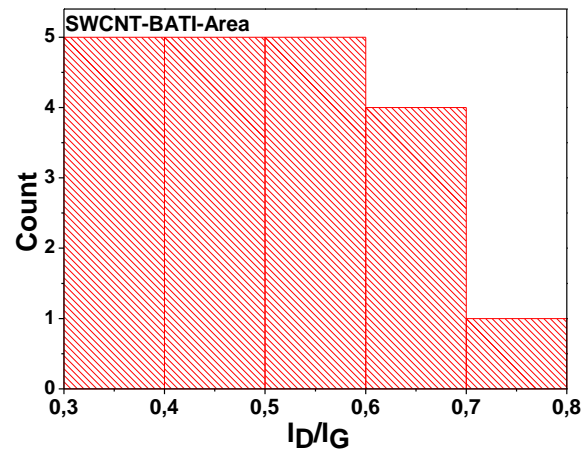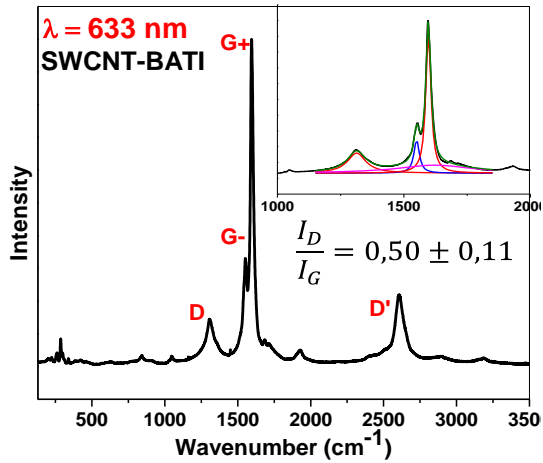
Figure S1. Representative Raman spectra of the samples with excitation at 633 nm a) showing the I_D/I_G value increases from SWCNT<SWCNTox<BTI<BATI<BPI. Insets: representative deconvolution of the bands. The spectra are normalized by the G+ band.

Detailed information related to the Raman spectroscopy of the Ppy is presented on Table S2.

Table S2. Raman bands of Ppy.

Band position (cm^{-1})	
1581	C=C stretching (carbon skeleton)
1385	antisymmetric C-N stretching
1324	C-C stretching of the neutral species
1235	antisymmetric C-H (plane) bending
1080	C-H (plane) bending of oxidized species
1045	C-H (plane) bending of neutral species
970	cationic ring deformation of Ppy
928	ring deformation associated to dication

TGA and DTG analyses are presented on Figure S2 and S3, complementing the characterization of the functionalized SWCNT samples.
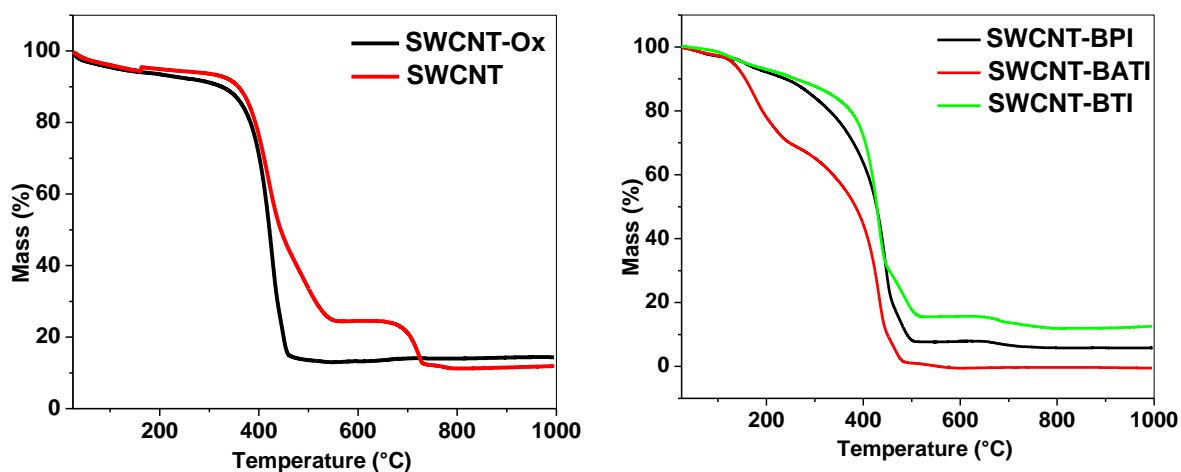

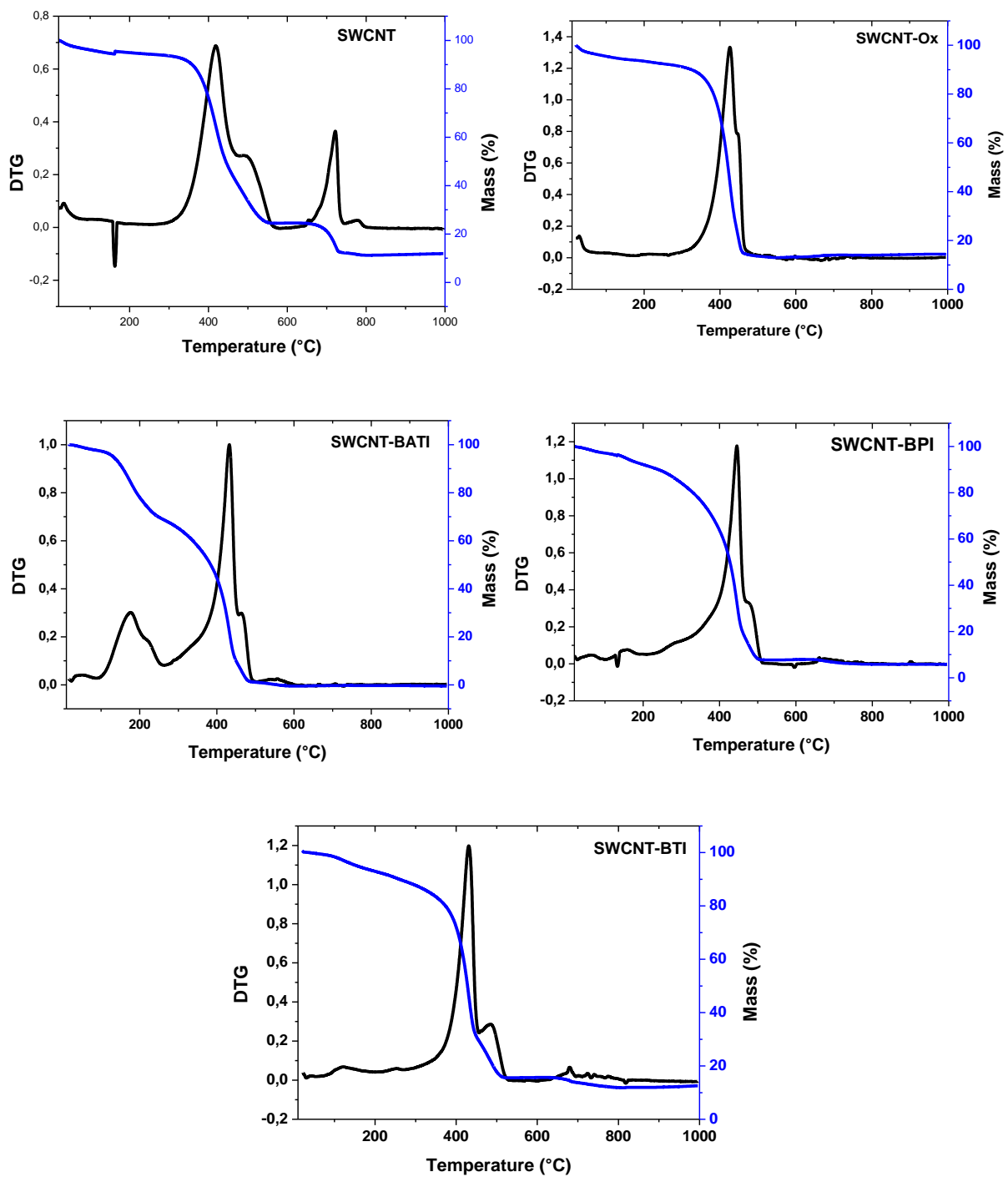**Figure S2.** TGA of the samples of the raw and functionalized SWCNTs in air.

Figure S3. DTG curves of the samples of the raw and functionalized SWCNTs in air.

More detailed information about the morphology of the covalently and non-covalent linked polymerized nanocomposites are shown in the Figure S2. The SEM images, shows

the polymer wrapping the SWCNT-BPI and the SWCNT-Ox on the covalent and non-covalent nanocomposites. Isolated globular structure of Ppy are observed on the SWCNT-Ox-Ppy sample, evidencing a heterogeneous morphology.
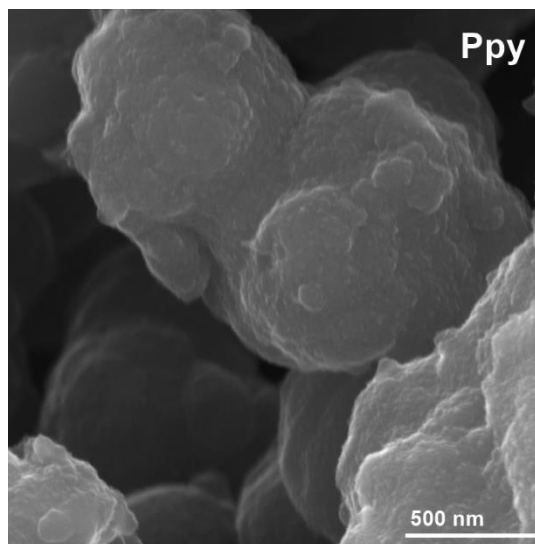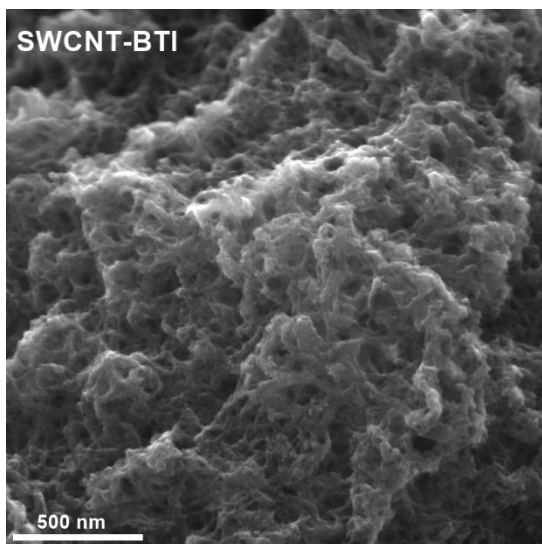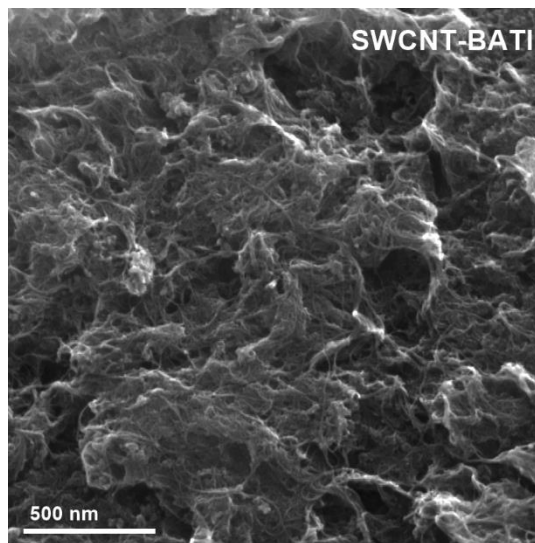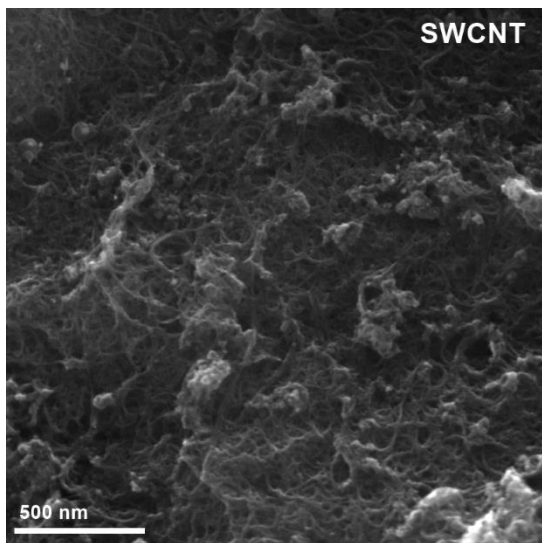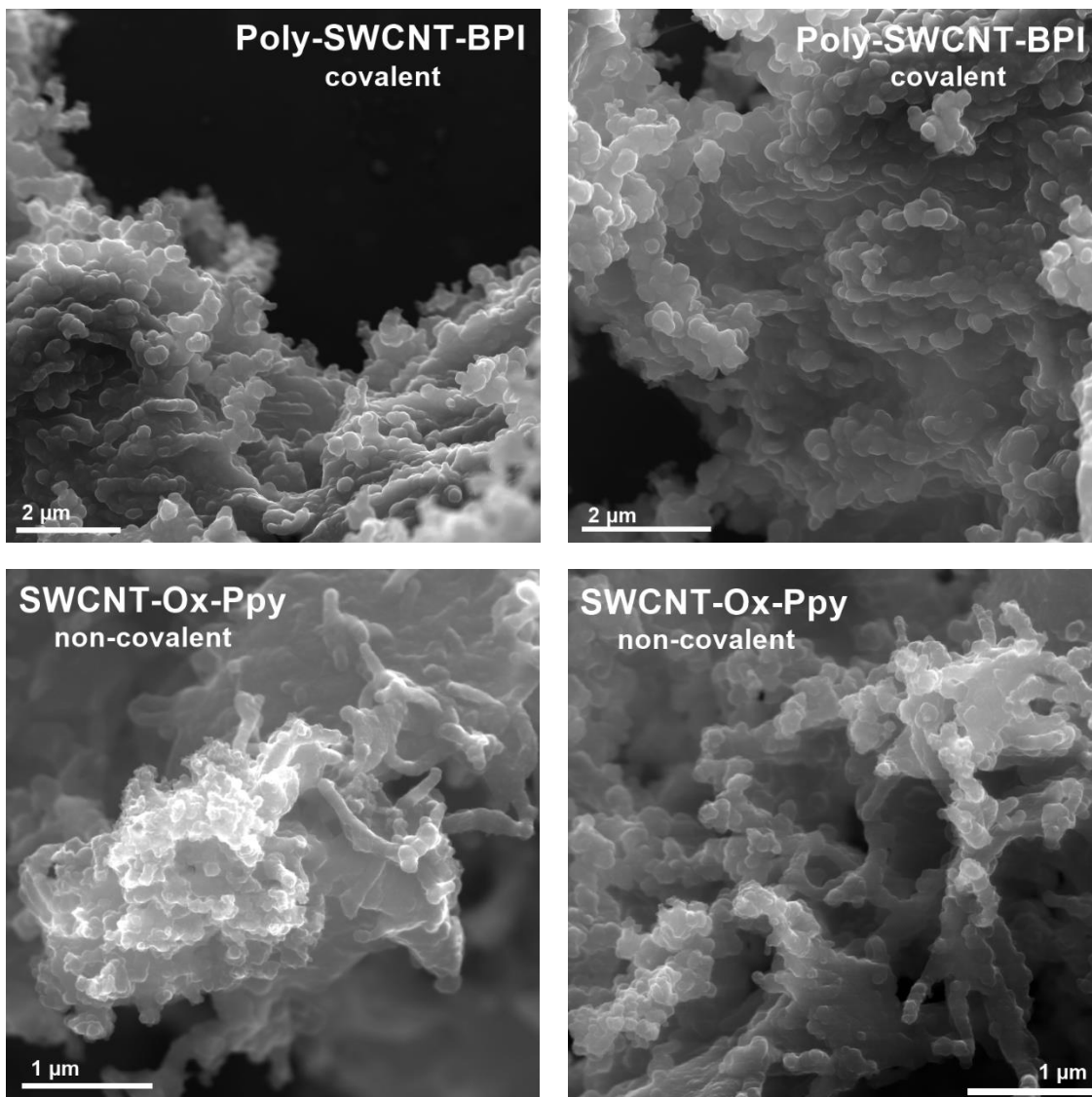
Figure S2. SEM images of the SWCNT, functionalized SWCNT, Ppy and covalently and non-covalently linked nanocomposites.