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SUPPLEMENTARY INFORMATION

Epoxy Composites with Covalently Anchored Amino-Functionalized SWNTs: Towards the Tailoring of Physical Properties through Targeted Functionalization

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Table S1: Pristine single-walled carbon nanotubes characterization

Sample	Metal (%) (TGA) [1]	T_0 (°C) (TGA) [1]	RBM range (cm^{-1}) (Raman)	Diameter (nm) (Raman)
SWNT-asg	20	441.1	145-205	1.69-1.16

[1] Air atmosphere, from room temperature to 900 ºC at a heating rate of 5 ºC/min. T_0 corresponds to the temperature of maximum rate of weight loss.
[2] From the absorption spectrum in the Vis-NIR region. [AA(T)] Total area of the S_{22} band, [AA(S)] Area of the S_{22} band after baseline correction.[1]

[1] M. E. Itkis, D. E. Perea, S. Niyogi, S. M. Rickard, M. A. Hamon, B. Zhao, R. C. Haddon, *Nano Lett.* **2003**, *3*, 309.

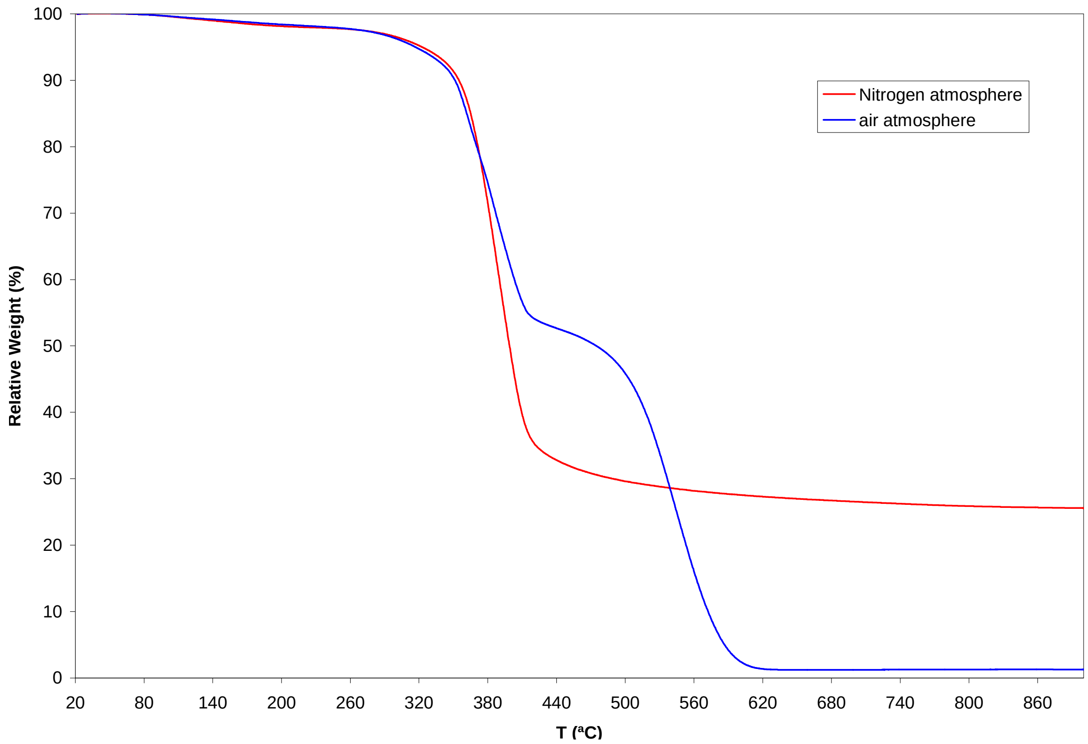


Figure S1: Thermo gravimetric analysis curves for the epoxy nanocomposite material containing 0.5 wt% SWNT-dca, under air and nitrogen atmospheres

Table S2: Reaction routes for the different amino-derivatizations applied to arc SWNTs

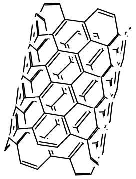
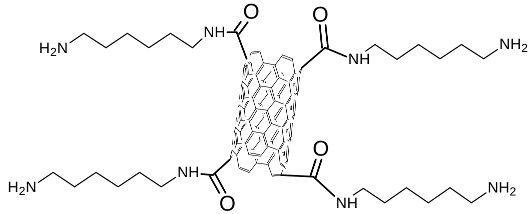
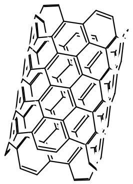
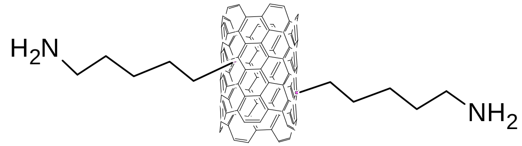
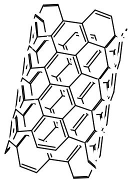
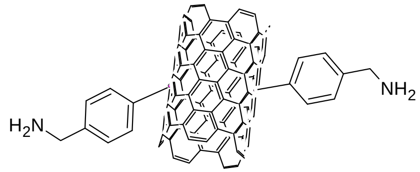
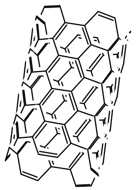
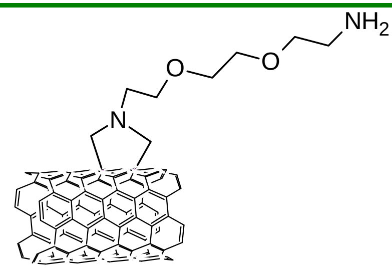
Sample Nomenclature	**Functionalization reaction**	**Experimental Procedure**
SWNT-oxa	Chemical oxidation followed by carboxylic activation and amidation	 1) HNO_3 1.5M / 2h reflux 2) $SOCl_2$ / DMF 24h reflux 3) N-Boc-1,6-diaminohexane / DMF 90ºC 72h 4) 1,4-dioxane / HCl (4%) Room T 2h (then NaOH) 
SWNT-nfp	Alkaline reduction and subsequent reaction with a diacyl peroxide	 1) Na / Naphthalene / anhidrous THF (Ar) Room T 2) N-Fmoc-6-aminohexanoyl peroxide Room T (Ar) 3) Piperidine / DMF Room T 2h 
SWNT-dba	In situ formation and reaction with an aryl diazonium salt	 4-aminobenzyl amine + isoamyl nitrite CH_3CN / DMF (1:1) 12h 60ºC 
SWNT-dca	1,3-dipolar cycloaddition reaction of an azomethine ylide	 1) N-Boc-ethyleneglycol-bis(2-aminoethylether)-N'-acetic acid Paraformaldehyde / DMF 5 days 115ºC 2) 1,4-dioxane / HCl (4%) Room T 2h (then NaOH) 

Table S3: Comparative chart between mechanical and thermomechanical properties from literature data and nanocomposites samples in the present paper.

Ref.	Type of CNTs	Amine moiety	CNT loading (wt%)	E' (25ºC) improvement*	Present Results**	T_g change*	Present Results**	YM improvement*	Present Results**	σ_y improvement*	Present Results**
8	SWNTs	Aryl-NH_2	0.5	24.6%	32.1% (SWNT-dba, 0.5 wt%)	-11.3ºC	+7.3ºC (SWNT-dba, 0.5 wt%)				
6	SWNTs	CO-NH-R-NH_2	1 and 4	~31.5% @ 1 wt%	44.3% (SWNT-dca, 1 wt%)			30.5% @ 1 wt%	54.8% (SWNT-dba 1wt%)	25% @ 1 wt%	43% (SWNT-dba, 1 wt%)
18	MWNTs	CO-NH-R-NH_2	0.5 and 1	~25% @ 1wt%						~38.5% @ 0.5wt%	30% (SWNT-dba, 0.5 wt%)
		Aryl-CO-NH-R-NH_2		~44% @ 1wt%						~30.8% @ 0.5wt%	
19[a]	MWNTs	NH-(CH_2-CH_2-NH)$_n$-CH_2-CH_3	1	~16.7%		~(-6ºC)	+12.2ºC (SWNT-dba, 1 wt%)				
22	MWNTs	CO-NH-R-NH_2	1			+8ºC					
23	SWNTs	CO-NH-R-NH_2	0.3			+2ºC	+3ºC (SWNT-nfp 0.1 wt%)				
24	MWNTs	CH(COOH)-CH_2-CO-NH-R-NH_2	0.1 – 1			+11ºC @ 1 wt%	+12.2ºC (SWNT-dba, 1 wt%)			~45% @ 1wt%	43% (SWNT-dba, 1 wt%)
27	DWNTs[b]	NH_2	0.1 – 0.5					14.9% @ 0.5 wt%	38.7% (SWNT-dba, 0.5 wt%)	8.35% @ 0.5 wt%	30% (SWNT-dba, 0.5 wt%)
	MWNTs							8.5% @ 0.5 wt%		0.27% @ 0.5 wt%	
28	DWNTs	NH_2	0.1 – 1					~6.4% @ 1wt%	54.8% (SWNT-dba 1wt%)	~1.7% @ 1 wt%	43% (SWNT-dba, 1 wt%)
29	SWNTs	CO-NH-R-NH_2	≤ 0.1							1.9% @ 0.1 wt%	5.2% (SWNT-dba, 0.1 wt%)
30	MWNTs	CO-NH-R-NH_2	0.25 - 0.75					~37.5% @ 0.5 wt%	38.7% (SWNT-dba, 0.5 wt%)	~30% @ 0.5 wt%	30% (SWNT-dba, 0.5 wt%)

31	SWNTs	NH-R-NH_2	0.5		+10ºC	+7.3ºC (SWNT-dba, 0.5 wt%)	31.6%	38.7% (SWNT-dba, 0.5 wt%)	24.7%	30% (SWNT-dba, 0.5 wt%)
32	MWNTs	R-CO-NH-R-NH_2	0.1 – 2						~31.5% @ 1 wt%	43% (SWNT-dba, 1 wt%)

* Referred to their respective baseline epoxy matrices

** Compared to the best results obtained for the epoxy composites in the present study, with respect to the TGAP/DDS neat matrix. In parenthesis, the compared filler type and loading are specified.

[a] Data on the baseline epoxy matrix was extracted from K. C. Etika, L. Liu, L. A. Hess, J. C. Grunlan, *Carbon* 2009, **47**, 3128.

[b] Double-walled carbon nanotubes