Supporting Information for:
Tailoring Organic-Organic Poly(vinylpyrrolidone) Microparticles and Fibers with Multi-Walled Carbon Nanotubes for Reinforced Composites

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XRD

X-ray Diffraction analyses were performed in an XRD Bruker diffractometer D8I-90 by standard powder method (Cu-Kα radiation, λα1=0.154 nm), from 10.00º to 70.00º (Δ(2θ) = 0.015º, counting time = 80 s)

SEM

Scanning Electron Microscopy images were taken in a HITACHI S5200 using an acceleration voltage of 5 kV. No metallic coating was used. Nanotube widths were measured using ImageJ software: nanotube diameter = 18 ± 7 nm. Typically, MWNT powder were poured onto a double face and conductive scotch, and imaged without further metallization.

TEM

Transmission electron microscopy was performed in a Philips CM200 working at an acceleration voltage of 200 kV. In a typical procedure, MWNT powder was dispersed in ethanol, and subsequently a drop of the MWNT-ethanol dispersion was casted onto a TEM grids.

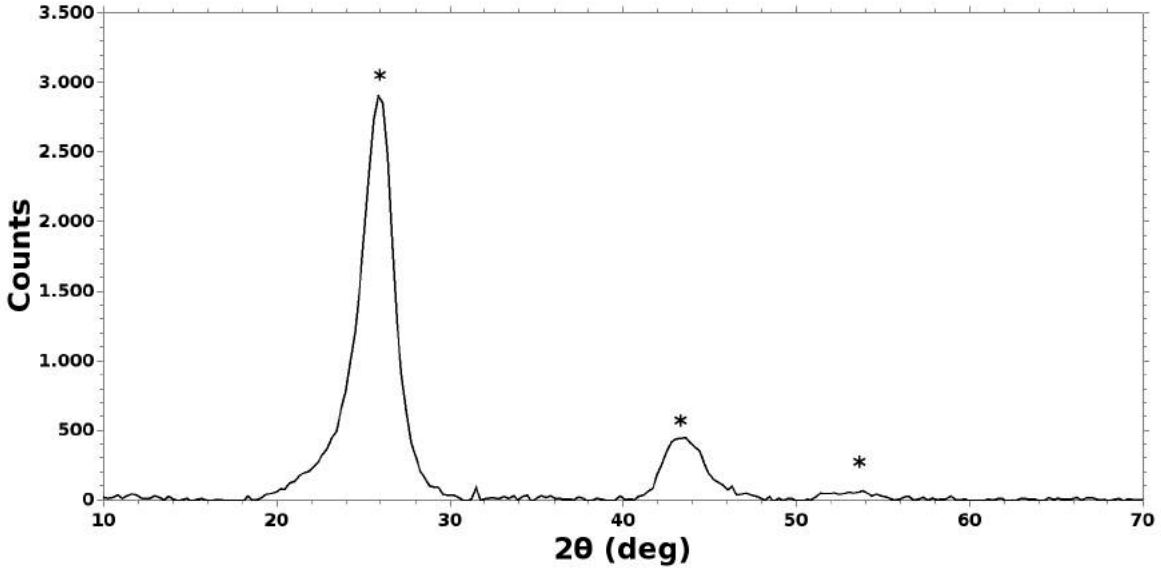

Figure S1. XRD pattern of as-received MWCNT where typical graphite pattern is remarked by the stars (Reference pattern: 0-001-0646)

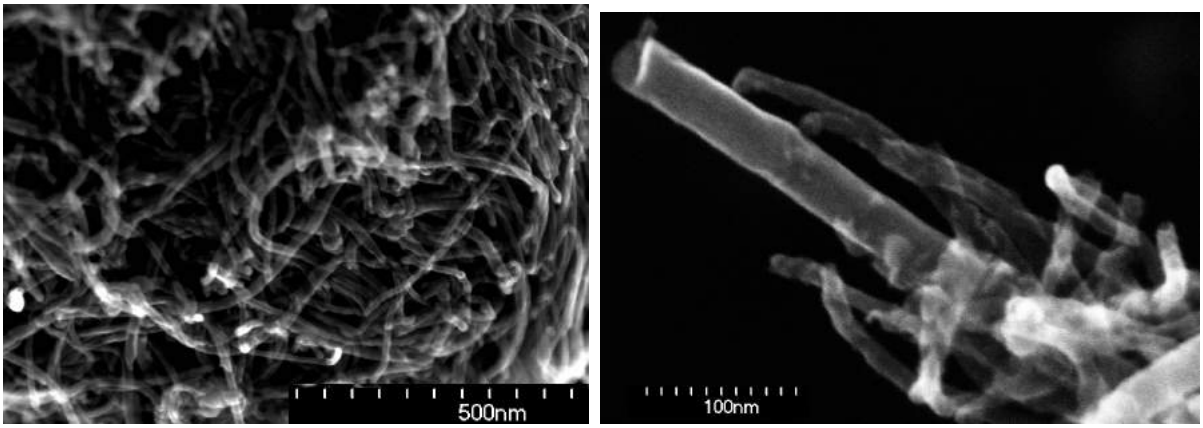

Figure S2. Typical SEM images of the as produced MWCNT powder, where the width of the tubes can be easily assessed. Besides, the open ends of the tubes can be also confirmed.

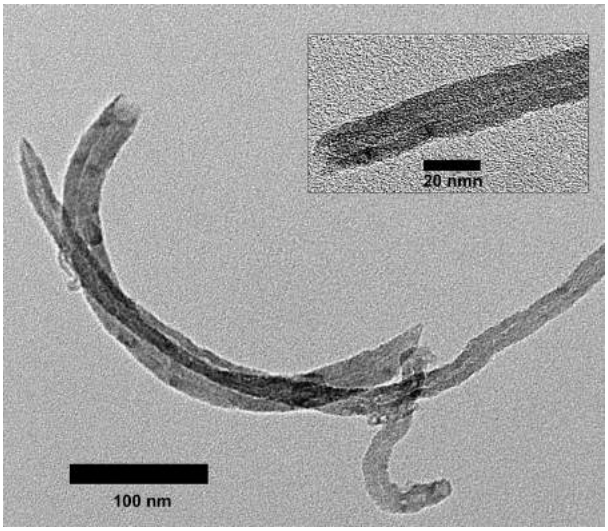

Figure S3. Typical TEM images of the as produced MWCNT reveal the width of the tubes, the open ends, and the thickness of the layered walls of the tubes.

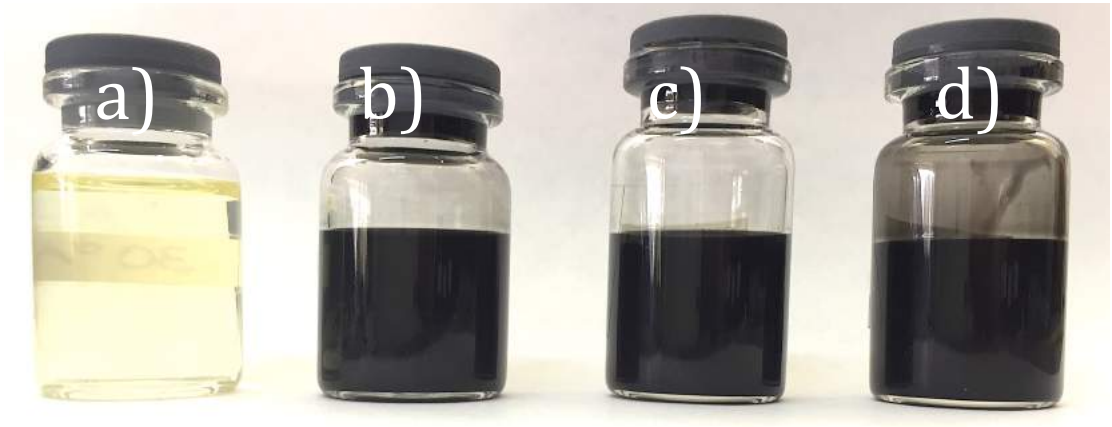

Figure S4. Macroscopic pictures of 7 ml vials: a) PVP/Ethanol 30 wt.%. (b-c) Functionalized Multi Walled Carbon Nanotubes (NanoAmor) suspensions in PVP/Ethanol at different content of nanotubes, b) 0.02 wt.%, c) 0.2 wt.% and d) 0.4 wt.%. PVP content was maintained constant at 30 wt.% in all samples.

Figure S5. Show a photograph of this experimental set up for mechanical measurements. The specimens were tested as yarns of approximate diameter df = 900 μm and length L = 3 cm by rolling flat fiber mats.

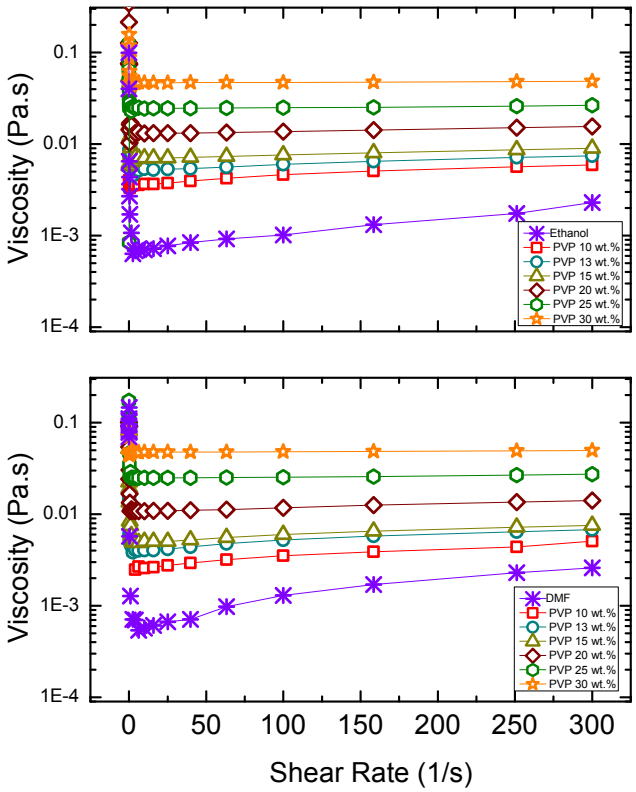

Figure S6. Viscosity vs Shear rate for PVP solutions for different content of PVP for shear rate from 0 to 300 (1/s)

Figure S7. Macroscopic pictures of 7 ml vials: a) PVP/Ethanol 30 wt.%. (b-c) pristine Single Walled Carbon Nanotubes (Elicarb) suspension in PVP/Ethanol at different content of nanotubes, b) 0.02 wt.%, c) 0.1 wt.% and d) 0.2 wt.%. PVP content was maintained constant at 30 wt.% in all samples. Single walled Carbon nanotubes (SWNT) form Elicarb "Thomas Swan" (UK) with purity > 95%, average diameter = 2 nm, average BET specific surface area > 800 m2/g, metal oxide content: maximum of 5 wt.% and moisture content: maximum of 1 wt.% are presently used.

Table S1. Experimental parameters for microparticle and fiber preparation using dimethylformamide (DMF) as solvent

DMF					
Sample	Flow Rate (mL/hr)	Distance (cm)	Voltage (kV)	Humidity (%)	Temperature (ºC)
PVP 10 %	0.1	12	8.5	56	21.3
PVP 13 %	0.1	12	8.8	53	22.3
PVP 15 %	0.1	12	8.4	56	21.1
PVP 20 %	0.1	12	9.4	45	22.3
PVP 25 %	0.1	12	8.5	45	22.5
PVP 30 %	0.1	12	7.2	45	22.7

Table S2. Experimental parameters for microparticle and fiber preparation using ethanol (EtOH) as solvent

EtOH					
Sample	Flow Rate (mL/hr)	Distance (cm)	Voltage (kV)	Humidity (%)	Temperature (ºC)
PVP 10 %	0.1	12	13.8	53	22.5
PVP 13 %	0.1	12	13.9	53	22.3
PVP 15 %	0.1	12	14.1	49	22.5
PVP 20 %	0.1	12	14.2	45	22.3
PVP 25 %	0.1	12	14.5	42	21.3
PVP 30 %	0.1	12	14.7	46	20.5