Supporting information

Imidazolium end-functionalized poly(L-lactide) for Efficient Carbon Nanotube Dispersion.

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Experimental Section

Materials. Multi wall carbon nanotubes (MWCNTs) are Grade 7000 from Nanocyl (Belgium): (average diameter: 9.5nm; average length: 1.5µm; carbon purity: 90%; metal oxide: 10%). 1,8-diazabicyclo[5.4.0]undec-7-ene (DBU) was purchased from Aldrich. DBU and dried on a 4A molecular sieves. Chloroform (CHCl₃, Labscan, 99%) was dried using an MBraun solvent purification system under N₂. L-lactide was gratefully gifted by Purac. 1-pyrenemethanol (98%), 9-anthracenemethanol (97%), 1-methylimidazole (99%) and 11-Bromoundecanol (98%) were purchased from Aldrich.

Instrumental. Size exclusion chromatography (SEC) was performed in THF/NEt₃ (2wt%) at 35°C using a Polymer Laboratories liquid chromatograph equipped with a PL-DG802 degasser, an isocratic HPLC pump LC 1120 (flow rate = 1 mL/min), a Marathon autosampler (loop volume = 200 µL, solution conc. = 1 mg/mL), a PLDRI refractive index detector and three columns: a PL gel 10 µm guard column and two PL gel Mixed-B 10 µm columns. Centrifugations were made with a HETTICH Universal 16 Centrifuge. ¹H NMR spectra were recorded at ambient temperature with Bruker AV500 spectrometer. Thermal gravimetric analyses (TGA) were recorded on a TA Instrument Q500 under helium. Transmission electron microscopy (TEM) was performed with a Philips CM200 with an acceleration voltage of 200 kV. MALDI mass spectra were recorded using our Waters QToF Premier mass spectrometer equipped with a nitrogen laser, operating at 337 nm with a maximum output of 500 J/m² delivered to the sample in 4 ns pulses at 20 Hz repeating rate. Time-of-flight mass...
analysis were performed in the reflectron mode at a resolution of about 10000. The matrix, trans-2-[3-(4-t-Butyl-phenyl)-2-methyl-2-propenylidene]malononitrile (DCTB), was prepared as 20 mg/mL solution in chloroform. The matrix solution (1 µL) was applied to a stainless steel target and air dried. Polymer samples were dissolved in Chloroform to obtain 1mg/mL solutions. 1µL aliquots of these solutions were applied onto the target area already bearing the matrix crystals, and then air dried.

**Typical synthesis of PyPLLA 1, AntPLLA 2 and ImPLLA 3**

L-lactide (5.8 g, 40.3 mmol) and ionic liquid 4 (192 mg, 0.57 mmol) are stirred in 20 mL of chloroform. DBU (21 µl, 0.15 mmol) is added and the solution is stirred at room temperature for 5 mn. Then, three drops of acetic acid are added and PLLA is precipitated in hexane. After filtration, the white powder is dried at 70°C under vacuum overnight. Yield = 95%.

**PyPLLA 1**: $M_n$ determined by SEC (universal calibration) = 9400 g mol⁻¹, PDI = 1.10, $^1$H NMR (CDCl₃): δ 8.15 (m, CH Arom.), 5.94 (d, $J = 12.6$, CH₃), 5.83 (d, $J = 12.6$, CH₃Ph) 5.15 (q, $J = 7.1$ Hz, CH), 1.57 (d, $J = 7.1$ Hz, CH₃).

**AntPLLA 2**: $M_n$ determined by SEC (universal calibration) = 10100 g mol⁻¹, PDI = 1.13, $^1$H NMR (CDCl₃): δ 8.53 (s, CH Arom.), 8.25 (d, $J = 8.6$ Hz, CH Arom.), 8.04 (d, $J = 8.6$ Hz, CH Arom.), 7.57 (t, $J = 7.2$ Hz, CH Arom.), 7.50 (t, $J = 7.2$ Hz, CH Arom.), 6.25 (d, $J = 12.6$, CHH), 6.13 (d, $J = 12.6$, CH₃Ph) 5.15 (q, $J = 7.1$ Hz, CH), 1.57 (d, $J = 7.1$ Hz, CH₃).

**ImPLLA 3**: $M_n$ determined by SEC (universal calibration) = 8500 g mol⁻¹, PDI = 1.18, $M_n$ determined by MALDIToF = 9500 g mol⁻¹, $^1$H NMR (CDCl₃): δ 10.60 (s, CH), 7.18 (s, CH=CH), 7.16 (s, CH=CH), 5.15 (q, $J = 7.1$ Hz, CH), 4.28 (t, $J = 7.4$ Hz, OCH₂), 4.09 (s, NCH₃), 1.62 (m, CH₂), 1.57 (d, $J = 7.1$ Hz, CH₃), 1.30 (m, CH₂).

**Synthesis of 1-(11-hydroxy-undecyl)-3-methylimidazolium bromide 4**: Methyl imidazole (2.3 mL, 29 mmol) and bromoundecanol (8 g, 31.8 mmol) are stirred in 4 mL of refluxing chloroform overnight. Then, the oily residue is washed 3 times with ether to give the ionic liquid 4 in 95% yield. $^1$H NMR (CDCl₃): δ 9.83 (1H, s, CH), 7.42 (1H, s, CH=CH), 7.37 (1H, s, CH=CH), 4.06 (2H, t, $J = 7.4$ Hz, OCH₂), 3.83 (3H, s, NCH₃), 3.28 (2H, t, $J = 6.3$ Hz, NCH₂), 2.93 (1H, br s, OH), 1.64 (2H, m, CH₂), 1.24 (2H, m, CH₂), 0.96 (14H, m, CH₂).

**Typical procedure for the preparation of MWCNTs dispersion with PyPLLA 1, AntPLLA 2 and ImPLLA 3 in chloroform**: 100 mg of PLLA derivative and 5 mg of MWCNTs are stirred in 10mL of chloroform overnight. Then, the mixture was centrifugated at 4000 rpm for 10 mn.
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**Figure S1.** SEC traces of PyPLLA 1 showing the correlation between the molecular weight (blue) and the signal at 260 nm (red)

**Figure S2.** SEC traces of AntPLLA 2 showing the correlation between the molecular weight (blue) and the signal at 260 nm (red)
Figure S3. $^1$H NMR spectrum of PyPLLA 1 in the 5.00-8.50 ppm region revealing the presence of pyrene aromatic group.

Figure S4. $^1$H NMR spectrum of AntPLLA 2 in the 4.90-8.60 ppm region revealing the presence of anthracene aromatic group.
Figure S5. $^1$H NMR spectrum of ImPLLA 3 in the 4.00-10.60 ppm region attesting for the presence of the imidazolium ring

Figure S6. MALDI ToF spectrum of PyPLLA 1 after 30 mn
Figure S7. MALDI ToF spectrum of AntPLLA 2 after 30 mn

Figure S8. MALDI ToF spectrum of ImPLLA 3 after 10 mn
Figure S9. MALDI ToF spectrum of ImPLLA 3 after 20 mn