Electronic Supplementary Information (ESI) for

Functionalization of single-walled carbon nanotubes with thermo-responsive poly(*N*-isopropylacrylamide): impact of the polymer architecture

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Characterizations

Figs. S1 and S2 are the ¹H-NMR and ESI-HRMS spectra of compound (1). ¹H-NMR (DMSO- d_6 +D₂O): δ /ppm: 8.42–7.92 (m, 9H), 4.37 (m, 2H), 3.63 (m, 2H), 3.27–3.13 (m, 4H), 2.66–2.52(m, 4H). ESI-HRMS: Calcd: 308.1862 (1·H⁺). Found: m/z = 308.1861.



Fig. S1 ¹H NMR spectrum of compound 1



Fig. S2 ESI-HRMS spectrum of compound 1

Fig. S3 and S4 are the ¹H-NMR and ESI-HRMS spectra of final tetrafunctional initiator (**2**). ¹H-NMR (CDCl₃): δ /ppm: 8.42–7.92 (m, 9H), 5.30 (m, 2H), 4.51–4.39 (m, 4H), 4.11–4.07 (m, 2H), 3.02–2.95 (m, 4H), 2.66–1.96 (m, 24H). ESI-HRMS: Calcd: 975.9916 (**2**·H⁺). Found: m/z = 975.9928.



Fig. S3 ¹H NMR spectrum of tetrafunctional initiator 2



Fig. S4 ESI-HRMS spectrum of tetrafunctional initiator 2

Figs. S5 and S6 are the ¹H-NMR and ESI-HRMS spectra of mono-functional initiator (**3**). ¹H-NMR (CDCl₃): δ /ppm: 8.42–7.92 (m, 9H), 5.92 (m, 2H), 1.93 (s, 6H). ESI-HRMS: Calcd: 403.0310 (**3**·Na⁺). Found: m/z = 403.0313.



Fig. S5 ¹H NMR spectrum of mono-functional initiator 3



Fig. S6 ¹H NMR spectrum of one-functional initiator 3

Fig. S7 is the ¹H-NMR spectrum of star p-SPNIPAM. ¹H-NMR (D₂O): δ /ppm: 8.42–7.92 (br m), 7.92–7.4 (br s), 3.90 (br s), 2.20–1.40 (br m), 1.19 (br s).



Fig. S7 ¹H NMR spectrum of p-SPNIPAM in D₂O

Compared in Fig. S8 are the FT-IR spectra of p-SPNIPAM and p-PNIPAM, respectively. The p-SPNIPAN shows characteristic bands for PNIPAM (in KBr): 3298 cm⁻¹ (NH, amide valence), 2970 cm⁻¹ (C-H, valence), 1642 cm⁻¹ (C=O amide band I), 1540 cm⁻¹ (C=O amide band II); p-PNIPAM shows a similar spectrum of p-SPNIPAM as both polymers have the similar structures.



Fig. S8 FT-IR spectra of p-PNIPAM and p-SPNIPAM

Displayed in Fig. S9 is the ¹H-NMR spectrum of linear p-PNIPAM. ¹H-NMR (D₂O): δ /ppm: 8.42–7.92 (br m), 7.72 (br s), 3.90 (br s), 2.20–1.40 (br m), 1.19 (br s).



Fig. S9 ¹H NMR spectrum of p-PNIPAM in D₂O

Fig. S10 is the ¹H-NMR spectrum of PNIPAM without pyrene group. ¹H-NMR (D₂O): δ /ppm: 3.90 (br s), 2.20–1.40 (br m), 1.19 (br s).



Fig. S10 ¹H NMR spectrum of PNIPAM in D_2O

Displayed in Fig. S11 are the fluorescence emission spectra of p-SPNIPAM (a) and p-PNIPAM (b) at different concentrations, respectively. One can find that p-SPNIPAM exhibits monomer and excimer emission peaks in the concentration range measured, whereas the emission peaks of p-PNIPAM are mainly monomer.



Fig. S11 Fluorescence emission spectrum of p-SPNIPAM (a) and p-PNIPAM (b) at different concentrations

Fig. S12 shows the viscosity as a function of shear rate for 0.083 mM polymer solution at 25 °C. One can find that the viscosity of p-PNIPAM is higher than that of p-SPNIPAM within the shear rate range investigated, and the viscosity of both dispersions remained unchanged regardless of the shear rate, suggesting typical Newtonian fluids.



Fig. S12 Viscosity as a function of shear rate of p-SPNIPAM (0.83 mM) and p-SPNIPAM (0.83 mM) at 25 °C.