**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 \(^1\text{H}\)-NMR and ESI-HRMS spectra of compound (I). \(^1\text{H}\)-NMR (DMSO-\(d_6+D_2O\)): \(\delta/\text{ppm}: 8.42–7.92 \text{ (m, 9H)}, 4.37 \text{ (m, 2H)}, 3.63 \text{ (m, 2H)}, 3.27–3.13 \text{ (m, 4H)}, 2.66–2.52 \text{ (m, 4H)}. \) ESI-HRMS: Calcd: 308.1862 (1·H\(^+\)). Found: \(m/z = 308.1861\).

![Fig. S1 \(^1\text{H}\) NMR spectrum of compound 1](image)
Fig. S2 ESI-HRMS spectrum of compound 1

Fig. S3 and S4 are the $^1$H-NMR and ESI-HRMS spectra of final tetrafunctional initiator (2). $^1$H-NMR (CDCl$_3$): $\delta$/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$\cdot$H$^+$$)$. Found: m/z = 975.9928.

Fig. S3 $^1$H NMR spectrum of tetrafunctional initiator 2
Figs. S5 and S6 are the $^1$H-NMR and ESI-HRMS spectra of mono-functional initiator (3). $^1$H-NMR (CDCl$_3$): $\delta$/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 $^1$H NMR spectrum of mono-functional initiator 3](image-url)
Fig. S6 $^1$H NMR spectrum of one-functional initiator 3

Fig. S7 is the $^1$H-NMR spectrum of star p-SPNIPAM. $^1$H-NMR (D$_2$O): $\delta$/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 $^1$H NMR spectrum of p-SPNIPAM in D$_2$O](image)

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-SNIPAM

Displayed in Fig. S9 is the $^1$H-NMR spectrum of linear p-PNIPAM. $^1$H-NMR (D$_2$O): 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 $^1$H NMR spectrum of p-PNIPAM in D$_2$O

Fig. S10 is the $^1$H-NMR spectrum of PNIPAM without pyrene group. $^1$H-NMR (D$_2$O): δ/ppm: 3.90 (br s), 2.20–1.40 (br m), 1.19 (br s).
Fig. S10 $^1$H NMR spectrum of PNIPAM in D$_2$O

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.