Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supporting Information

Dynamic Mechanism of Halide Salts on the Phase Transition of Protein Models Poly(*N*-isopropylacrylamide) and Poly(*N*,*N*-diethylacrylamide)

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Table S1. The lower critical solution temperature (LCST) values of PNIPAM and PDEA in NaI, NaBr/NaI, NaCl/NaI, NaBr, NaCl and salt free aqueous solutions.

	PNIPAM(°C)	PDEA(°C)
NaI	35.9	36.5
Salt Free	35.6	35.9
NaBr/NaI	35.2	35.6
NaCl/NaI	34.7	35.4
NaBr	34.9	34.1
NaCl	34.4	33.8

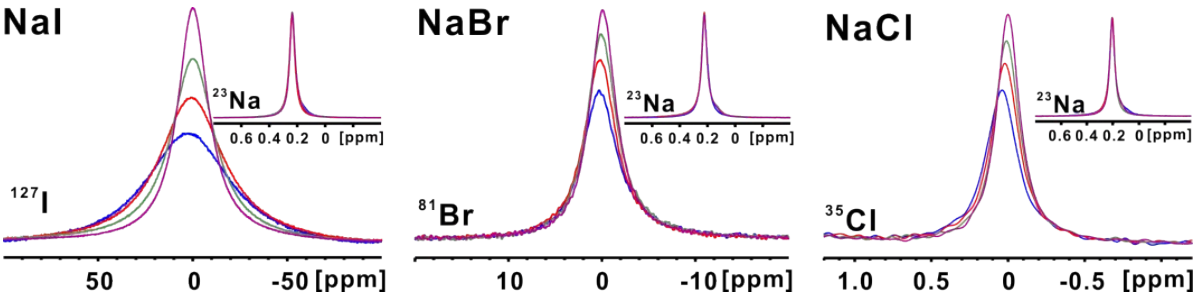

Figure S1. ^{23}Na, ^{127}I, ^{81}Br and ^{35}Cl NMR spectra of 0.1 M NaI, NaBr and NaCl aqueous solutions containing varied concentration of PDEA at room temperature (0.00 *w*/*w* % violet), (0.25 *w*/*w* % green), (0.60 *w*/*w* % red), (1.00*w*/*w* % blue).

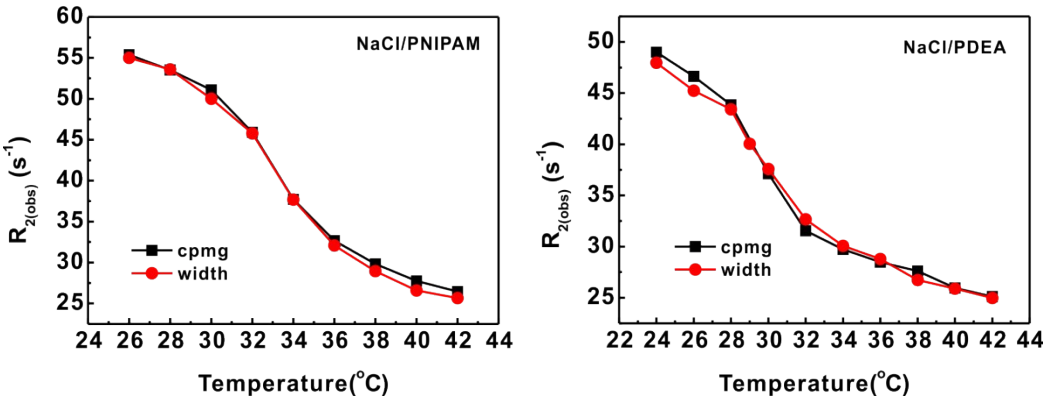

Figure S2. The $R_{2(obs)}$ ~ T curves of Cl^- in PNIPAM/NaCl (a) and PDEA/NaCl (b) solutions obtained using the Carr-Purcell-Meiboom-Gill (CPMG) pulse sequence and the full widths at half-maximum ($v_{1/2}$) of ^{35}Cl spectra respectively.

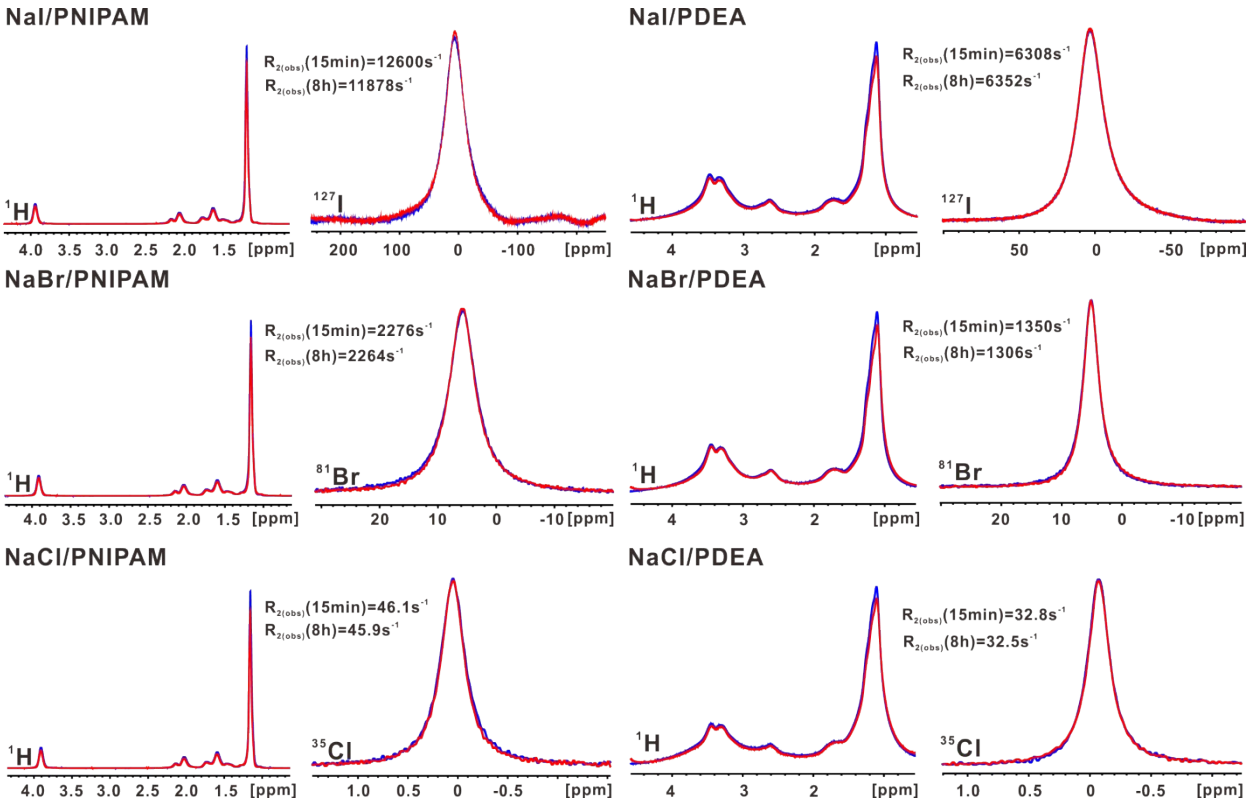

Figure S3. The ^{1}H, ^{127}I, ^{81}Br and ^{35}Cl NMR spectra, the observed relaxation rates of anions in salt aqueous solutions of NaI/PNIPAM and NaI/PDEA at 34 ^{o}C and NaBr/PNIPAM, NaCl/PNIPAM, NaBr/PDEA and NaCl/PDEA at 32 ^{o}C respectively. The blue and red spectra correspond to 15 min and 8 h equilibrium time respectively.

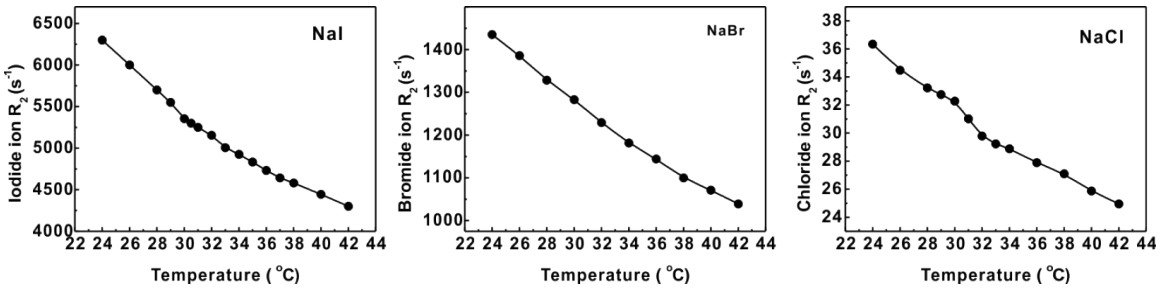

Figure S4. The temperature dependence of R_f of iodide ion in NaI, bromide ion in NaBr and chloride ion in NaCl aqueous solution.

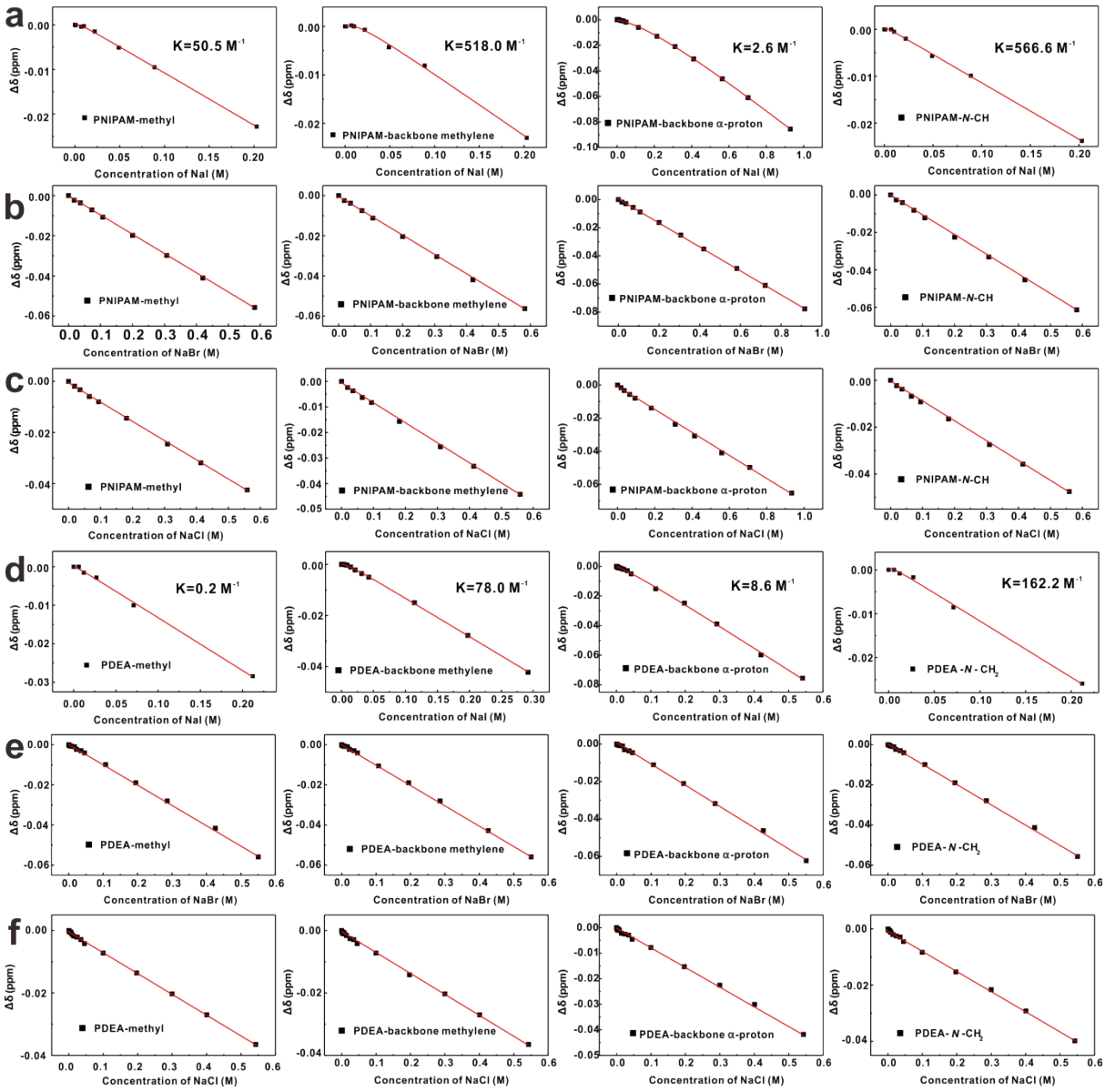

Figure S5. Variation of chemical shift of the methyl protons, the backbone methylene protons, backbone α-proton and *N*-CH proton of PNIPAM with the addition of NaI (a), NaBr (b) and NaCl (c) at 25 °C. Variation of chemical shift of the methyl protons, the backbone methylene protons, backbone α-proton and *N*-CH_2 protons of PDEA with the addition of NaI (d), NaBr (e) and NaCl (f) at 25 °C. Fitting the curve $\Delta\delta=-c[M]+\Delta\delta_{max}K[M]/(1+K[M])$ gives the binding constant *K* for the protons of PNIPAM and PDEA in NaI aqueous solutions.[1]

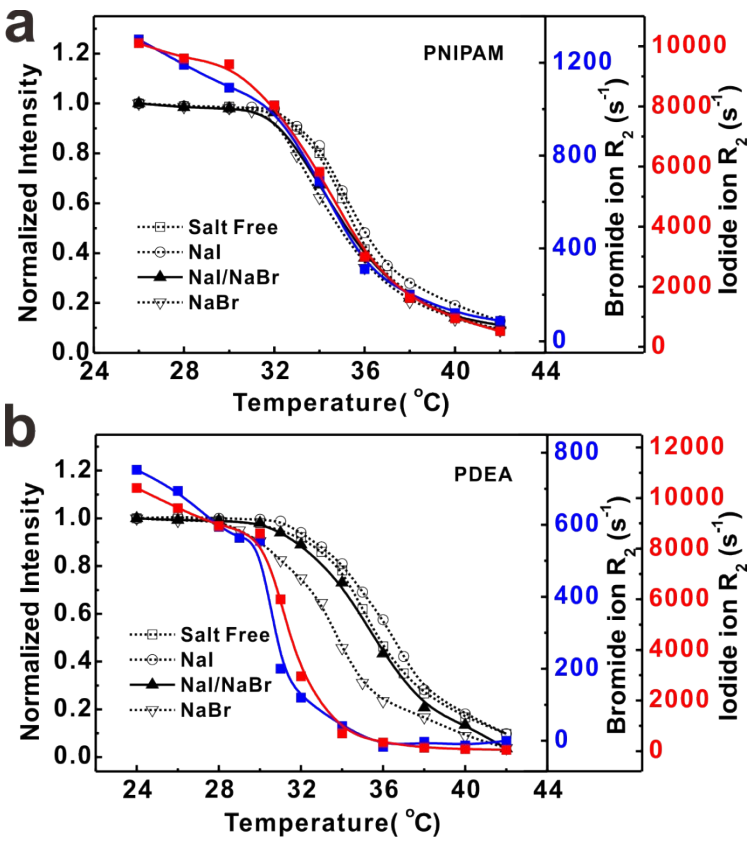

Figure S6.The phase transition curves of PNIPAM (a) and PDEA (b) in NaBr, NaI/NaBr, NaI and salt free aqueous solvent respectively; the corresponding R_2 ~ T curves of iodide ions (red) and bromide ions (blue) in PNIPAM/NaI/NaBr and PDEA/NaI/NaBr solution are also displayed.

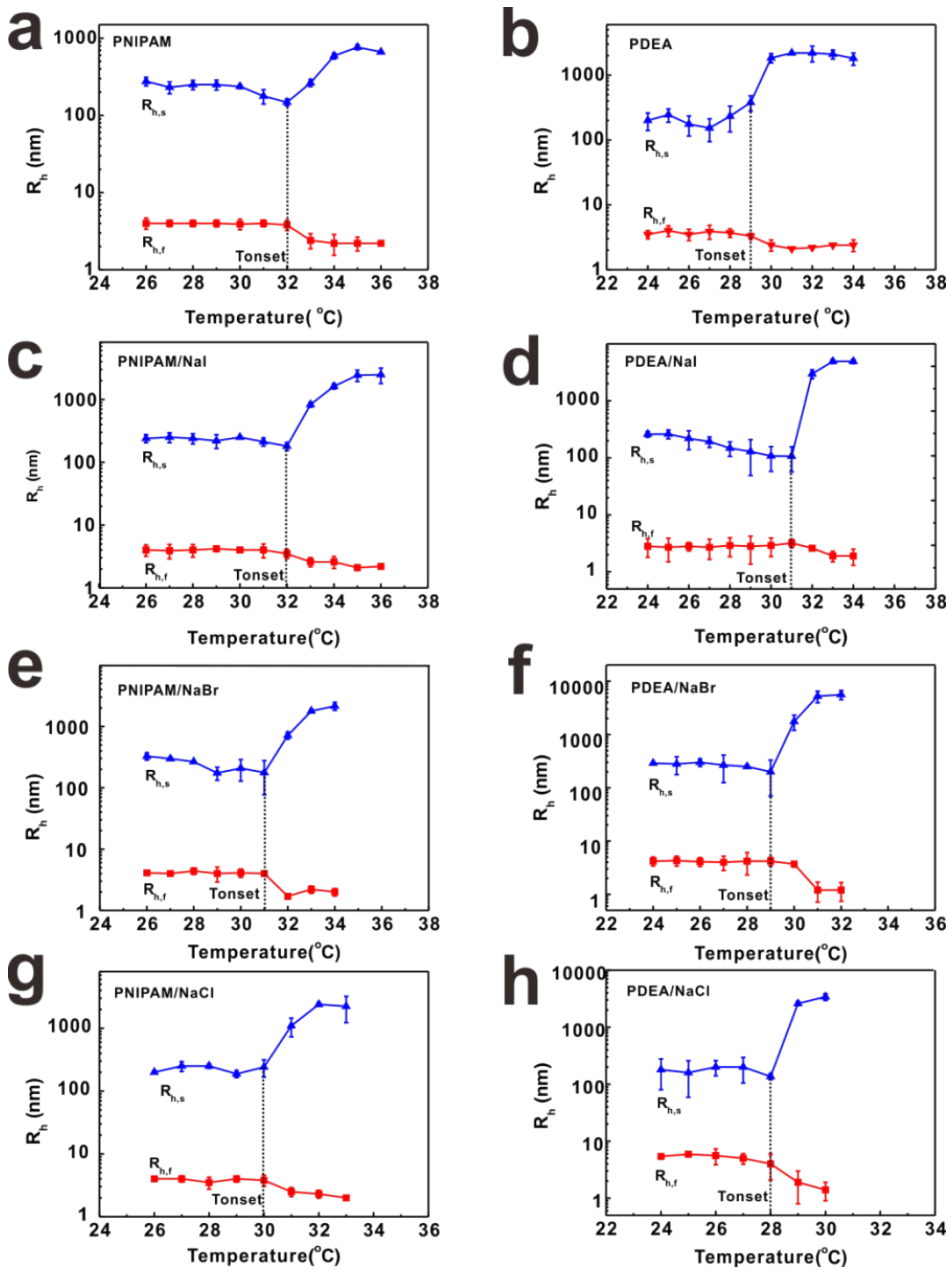

Figure S7. Temperature dependencies of the hydrodynamic radii obtained from the fast relaxation time ($R_{h,f}$) and the slow relaxation time ($R_{h,s}$) of PNIPAM in salt free (a), NaI (c), NaBr (e) and NaCl (g) and PDEA in salt free (b), NaI (d), NaBr (f) and NaCl (h) solutions.

1 L.-H. Wang, T. Wu, Z. Zhang and Y.-Z. You, *Macromolecules*, 2015, **49**, 362-366.