Electronic Supplementary Information for

Facile fabrication of thermo/redox responsive hydrogels based on a dual crosslinked matrix for smart on-off switch

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Key Laboratory of Colloid and Interface Chemistry, Shandong University, Ministry of
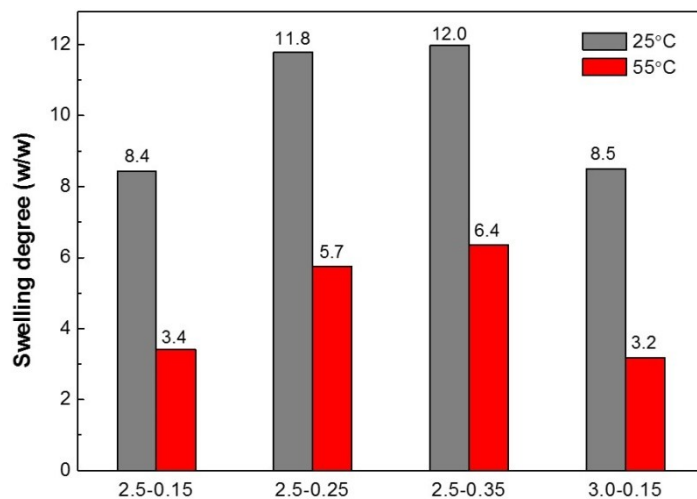
Education, Jinan, 250100, P. R. China.

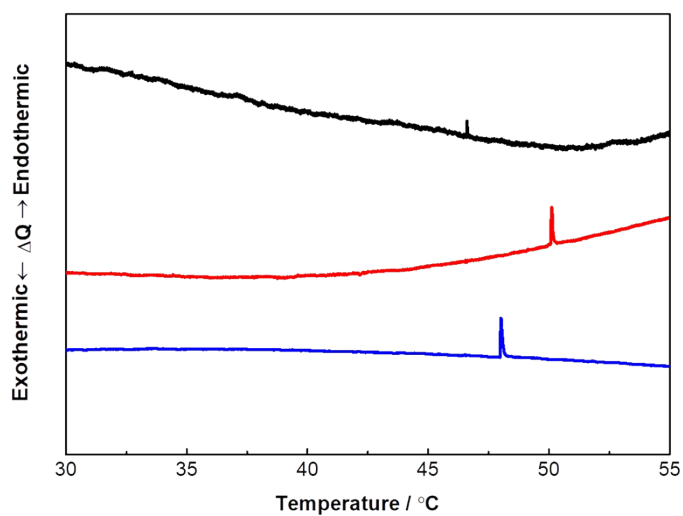**Fig. S1** Swelling ratios of poly([NIPAM]$_x$-*co*-[VmimCM]$_y$) hydrogels.

Fig. S2 DSC curves of poly([NIPAM]$_{2.5}$-*co*-[VmimCM]$_{0.15}$) hydrogel (black), poly([NIPAM]$_{2.5}$-*co*-[VmimCM]$_{0.25}$) hydrogel (red) and poly([NIPAM]$_{3.0}$-*co*-[VmimCM]$_{0.15}$) hydrogel (blue).
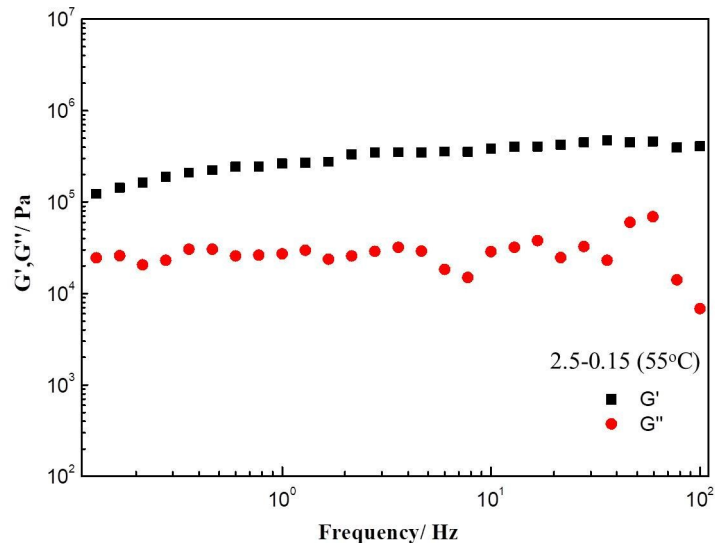
Fig. S3 The storage modulus (G') and loss modulus (G'') of poly([NIPAM]$_{2.5}$-*co*-[VmimCM]$_{0.15}$) hydrogels at 55°C.

Table S1 Dynamic rheology of poly([NIPAM]$_x$-*co*-[VmimCM]$_y$) hydrogels. The G', G'' values shown in the table are obtained from frequency sweep experiments at f=10 Hz.

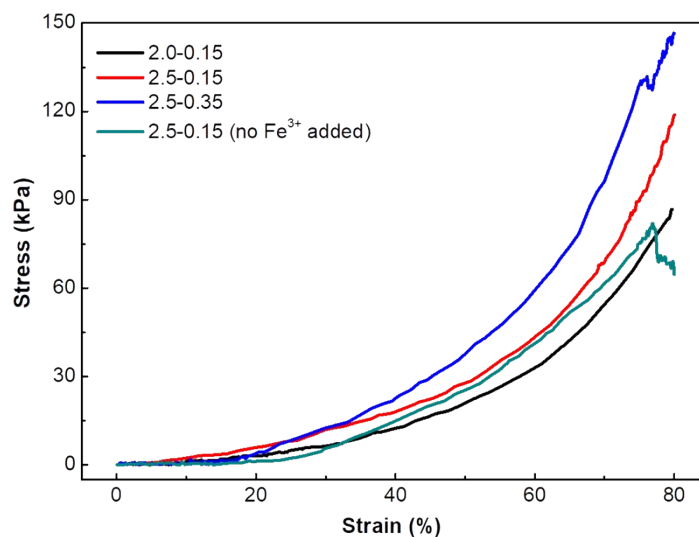| Sample	G'/Pa	G''/Pa	(G'-G'') /Pa (Elasticity)	G'/G'' (Stiffness)
2.0-0.15	3554	207.2	3346.8	17.2
2.5-0.15	10250	480.4	9769.6	21.3
2.5-0.35	11640	351	11289	33.2
2.5-0.15 (no Fe^{3+} added)	6219	319.4	5899.6	19.5
2.5-0.15 (55°C)	382200	28590	353610	13.4

Fig. S4 Stress-strain curves of compressive tests for poly([NIPAM]$_x$-*co*-[VmimCM]$_y$) hydrogels.

Table S2 Dynamic rheology of oxide and reduced poly([NIPAM]$_x$-*co*-[VmimCM]$_y$) hydrogels. The G', G'' values shown in the table are obtained from frequency sweep experiments at f=10 Hz.

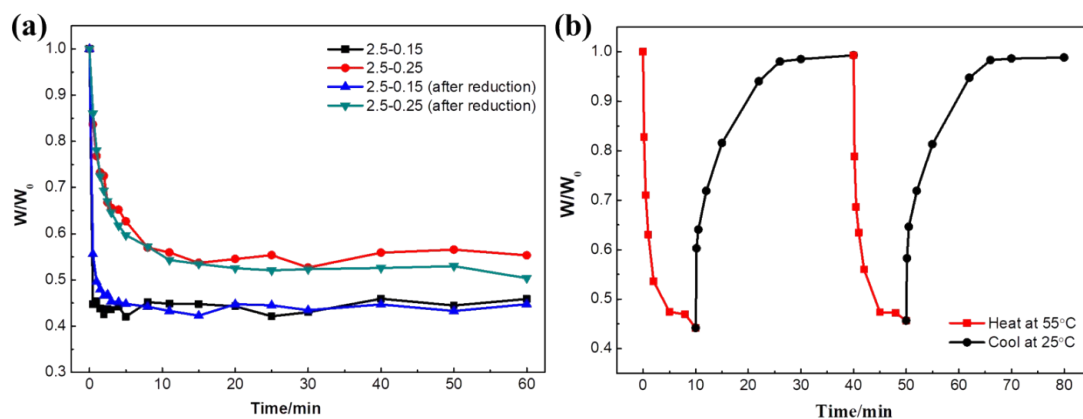| Samples	G'/Pa	G''/Pa	G'-G''/Pa (Elasticity)	G'/G'' (Stiffness)
2.0-0.25	3886	212.1	3673.9	18.32
2.0-0.25 (after reduction)	3394	359.6	3034.4	9.44

Fig. S5 (a) Dynamic weight-deswelling behavior of reduced poly([NIPAM]$_x$-*co*-[VmimCM]$_y$) hydrogels after the environmental temperature jumping abruptly from 25 °C to 55 °C; (b) the reversible swelling/deswelling behavior of the reduced poly([NIPAM]$_{2.5}$-*co*-[VmimCM]$_{0.15}$) hydrogel.
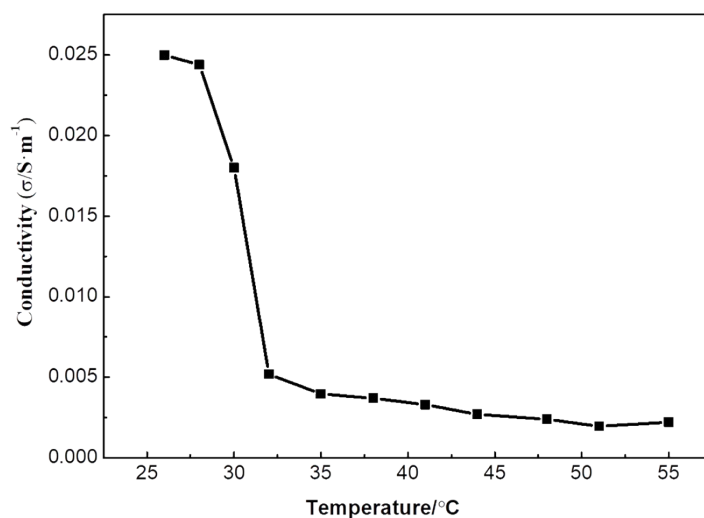

Fig. S6 The temperature-dependent conducting property for the reduced poly([NIPAM]$_{2.5}$-*co*-[VmimCM]$_{0.15}$) hydrogel.