Supporting Information

Degradable and Thermosensitive Microgels with Tannic Acid as Sole Cross-Linker

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**Figure S12.** (A) UV-vis absorption spectrum of Fe₃O₄@TA composite nanoparticles dispersed in water with concentration of 0.2 mg/mL. (B) TG analysis curves of Fe₃O₄@TA composite nanoparticles and PNIPAM-Fe₃O₄@TA microgels.

**Figure S13.** Guinier-type plot of Ln I (q)⁻¹ ~ q² measured by SLS at 25 ºC for PNIPAM-Fe₃O₄@TA hybrid microgels. The solid line was linear fit.

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**Detail Synthesis Procedure of hydrophobic Fe$_3$O$_4$ nanoparticles.** Briefly, 1.589 g (4.5 mmol) of ferric acetylacetonate, 5.815 g (22.5 mmol) of 1,2-dihydroxyhexadecane, 3.813 g (13.5 mmol) of oleic acid, 3.611 g (13.5 mmol) of oleylamine, and 75 mL of benzyl ether were separately added into a four necked round-bottom flask. The mixture was mechanically stirred with nitrogen bubbling for about half an hour. The solution temperature was then heated up to 200 °C by a heating jacket and maintained for 20 min. After that, the temperature was further raised to 300 °C and maintained for 30 min with reflux. Later, the heat source was removed and the reaction mixture was cooled down to room temperature in air. The obtained black liquid was then added into 150 mL of ethanol and the mixture was centrifuged at 6000 rpm for 10 min to give a black precipitant, which was re-dispersed in 40 mL of $n$-hexane and then centrifuged at 6000 rpm for 10 min to discard the insoluble part. The remaining black solution of $n$-hexane was added into 160 mL of ethanol and then centrifuged again at 6000 rpm for 10 min to give the Fe$_3$O$_4$ precipitant. The obtained purified Fe$_3$O$_4$ precipitant was re-dispersed in ethanol for further uses. The yield of hydrophobic Fe$_3$O$_4$ nanoparticles was about 23%.
**Figure S1.** Representative TEM images of (A) PNIPAM-TA-1 microgels and (B) PNIPAM-TA-3 microgels and representative SEM images of (C) PNIPAM-TA-1 microgels and (D) PNIPAM-TA-3 microgels.
Figure S2. Guinier-type plots of $\ln I(q)^{-1} \sim q^2$ measured by SLS at 25 °C for PNIPAM-TA series of microgels. The solid line was linear fit.

The SLS data was interpreted by Guinier-type plots of $\ln I(q)^{-1} \sim q^2$, where $I$ is the scattering intensity and $q = \frac{4\pi n \lambda}{\lambda} \sin (\theta/2)$. $\langle R_g \rangle$ was determined from the slope of the plots according to the equation

$$\ln I(q)^{-1} = \ln I(0)^{-1} + \frac{\langle R_g \rangle^2}{3} q^2$$

(1)

Figure S3. Hydrodynamic diameter and distribution of the large aggregates formed in the presence of the linear PNIPAM and TA in the aqueous solution at 25 °C.
**Figure S4.** Representative TEM images of (A) PNIPAM-TA-1, (B) PNIPAM-TA-2, and (C) PNIPAM-TA-3 microgels re-dispersed in DMF.

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