

Supplementary Information

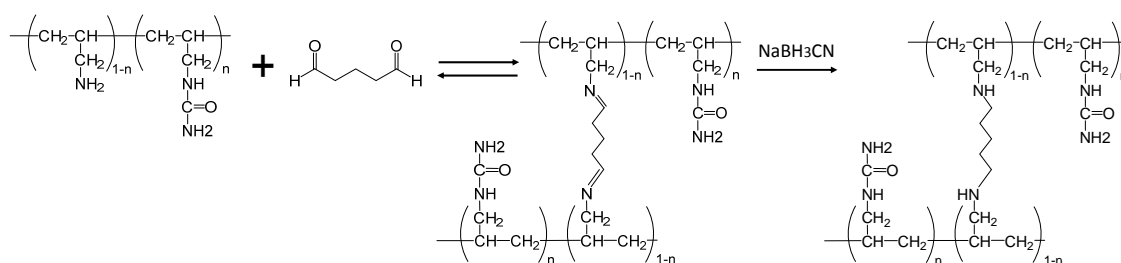
## Smart hydrogels exhibiting UCST-type volume changes under physiologically relevant conditions

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### Preparation of PAU hydrogels cross-linked by glutaraldehyde

Mixtures of PAU83 (20 wt%) and various concentrations of GA (1, 2, and 3 wt%) in water were incubated at 45 °C for 3 h in silicone tubes 3 mm in diameter. After the incubation, the gels were soaked twice for 30 min in sodium cyanoborohydride solution (10 mg/mL) with two washes with water after each soak. The gels were finally washed twice with 10 mM HEPES, pH 7.5, 150 mM NaCl. Finally, the gels incubated at 6 °C for 24 h.

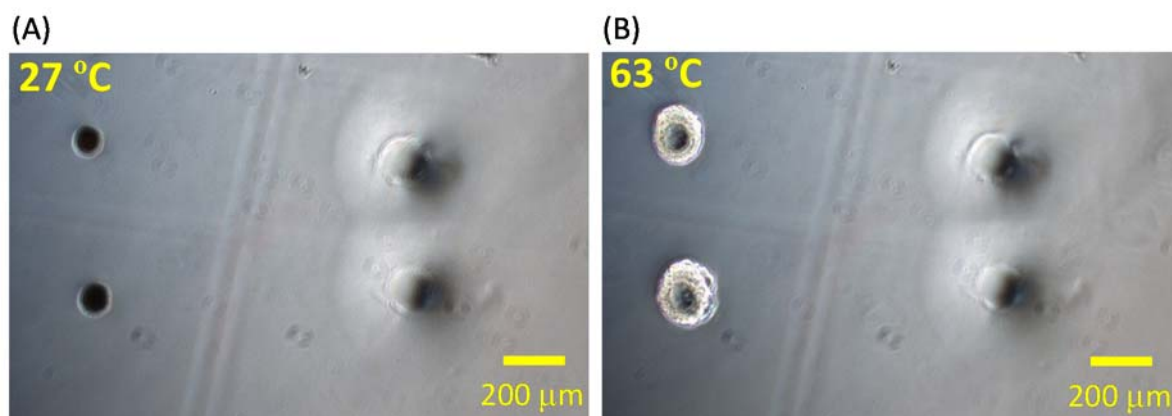
Scheme S1 Typical chemical structure of PAU hydrogel crosslinked by glutaraldehyde



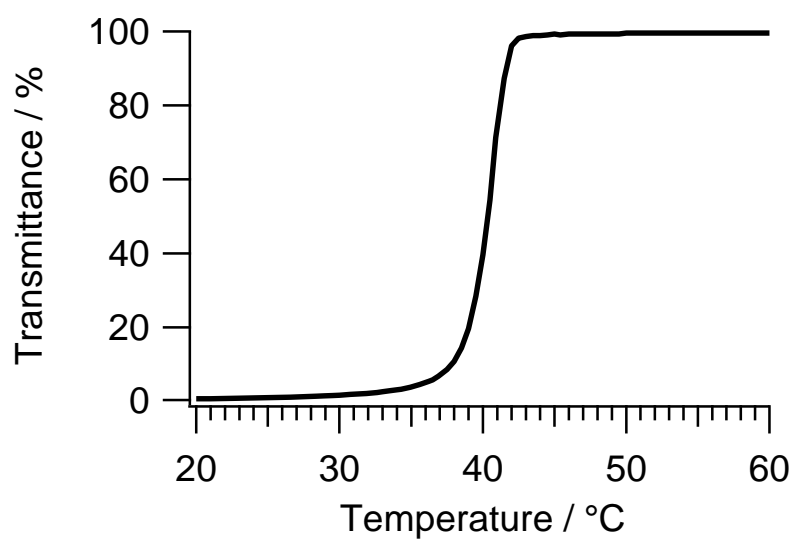
### Preparation of PAU hydrogels photo-crosslinked by UV irradiation

PAU86 (200 mg), sodium bicarbonate (3.5 mg), and azidobenzoic acid (6.9 mg) were dissolved in water (20 mL). 1-Ethyl-3-(3-dimethylaminopropyl) carbodiimide, hydrochloride (8.9 mg) and N-hydroxysuccinimide (5.3 mg) dissolved in DMF (6 mL) were added to the PAU solution. The mixture was incubated at 4 °C for 24 h. The mixture was dialyzed against water, and then lyophilized. <sup>1</sup>H NMR (400 MHz, D<sub>2</sub>O) indicated that 2 mol% of PAU86 was modified with azidophenyl groups: δ = 1.0-1.8 (polymer backbone, CH<sub>2</sub>-CH-), 2.7-3.3 (polymer side chain, -CH<sub>2</sub>-NH-R, R= NH<sub>2</sub> or NH-CONH<sub>2</sub>), 7.0-7.2 and 7.6-7.8 ppm (azidophenyl group). PA modified with azidophenyl groups (AP-PA) was prepared similarly as a control polymer. Microgels were obtained by irradiation with UV (330-385 nm) of a AP-PAU solution (20 wt%) in water. The UV

light from Hg lamp (100W) was condensed by an objective lens (x40) with field stop. After the irradiation, the gels were washed twice with water and then soaked in 10mM HEPES buffer (pH 7.5) containing 150 mM NaCl for 24 hours at room temperature.



**Fig S1.** PAU gels (left) and PAA gels (right) at 27 °C (A) and 63 °C (B) in 10 mM HEPES (pH 7.5) containing 150 mM NaCl. UV irradiation time: 20 sec.



**Fig S2.** Transmittance at 500 nm curve of AP-PAU (1 mg/mL) in 10mM HEPES (pH 7.5) containing 150mM NaCl