Supporting information

Ultra-Fast and Multi-Responsive Anisotropic Nanofibrous Actuator with Remote Control

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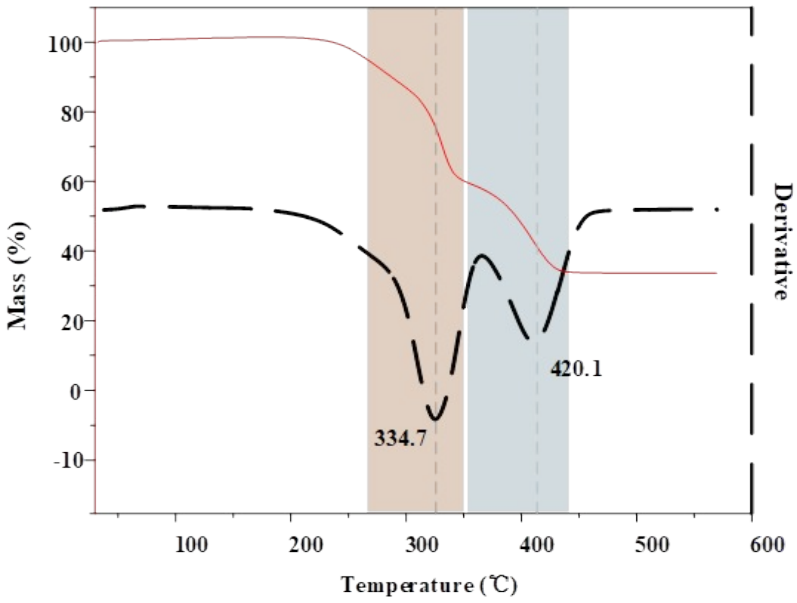

Figure S1. Thermal gravimetric analyzer curve of synthesized P(DEAEMA-*co*-MMA-*co*-ABP).

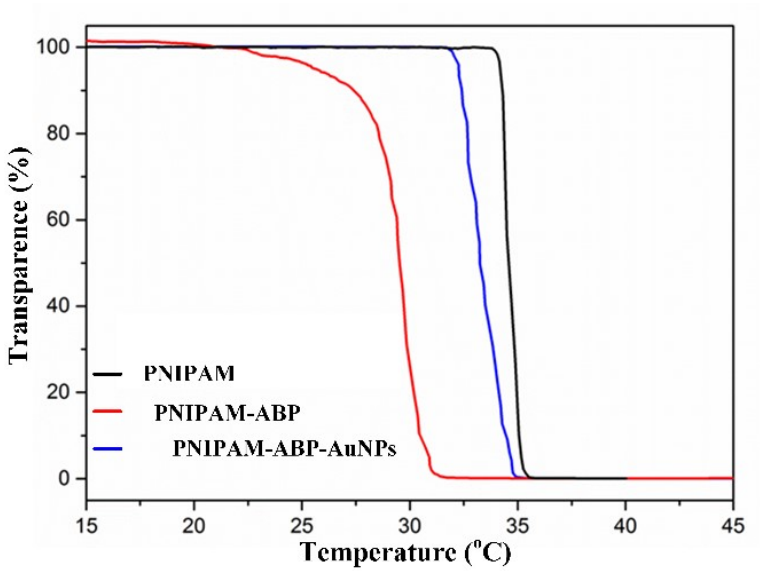

Figure S2. LCST curves of pure PNIPAM, copolymers P(NIPAM-*co*-ABP), and copolymers P(NIPAM-*co*-ABP) mixed with AuNPs.

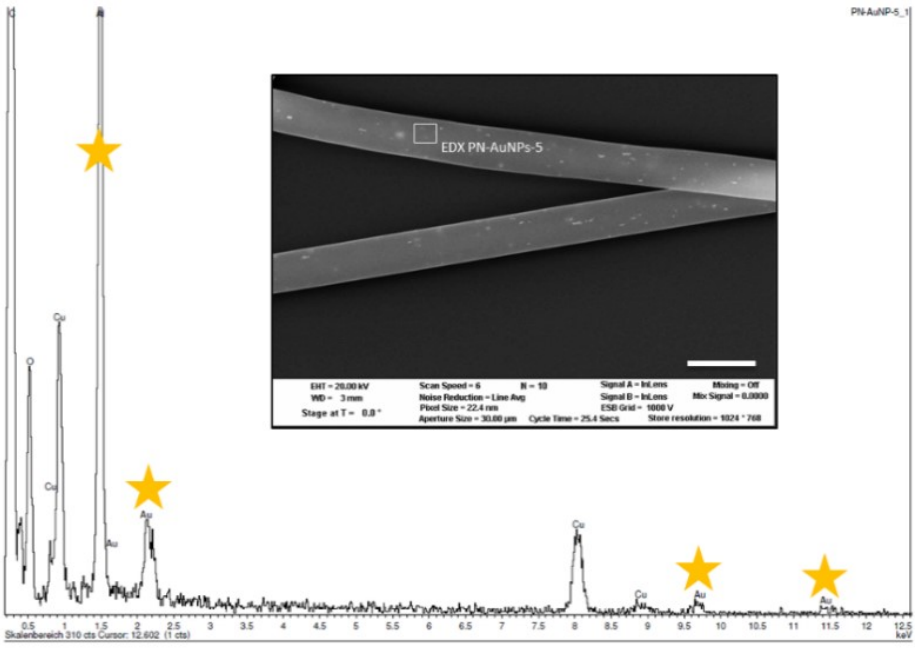

Figure S3. High-resolution SEM image of P(NIPAM-*co*-ABP) mixed AuNPs nanofibers (inserted image) and its corresponding EDX spectrum.

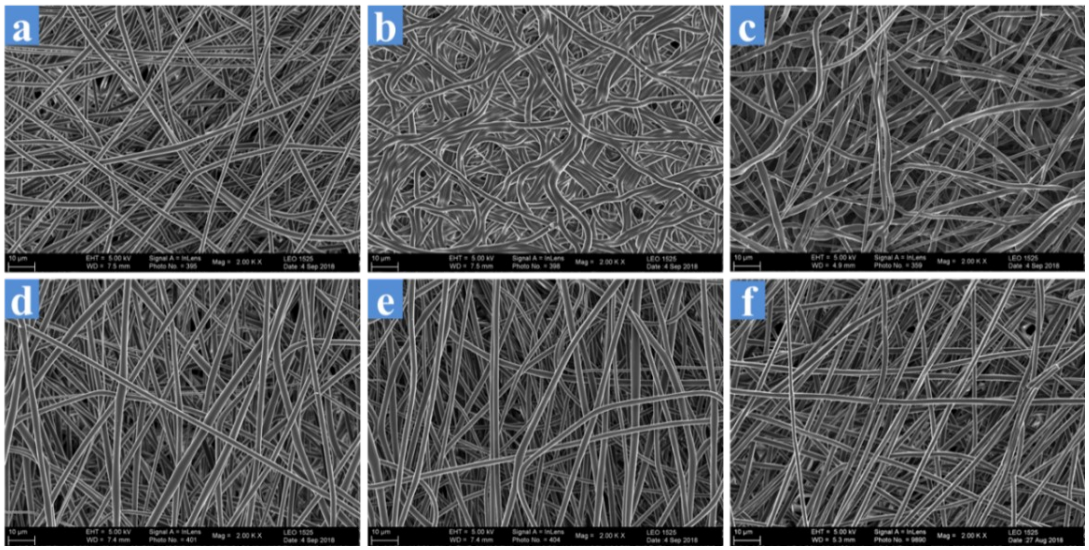

Figure S4. SEM images of the morphologies of nanofibers. (a) Crosslinked P(NIPAm-*co*-ABP) mixed AuNPs nanofibers; (b) after alternately immersing in water at 4 °C and (c) 40 °C for 1 min; (d) crosslinked P(GMA-*co*-ABP) nanofibers; (e) after alternately immersing in water at 4 °C and (f) 40 °C for 1 min.

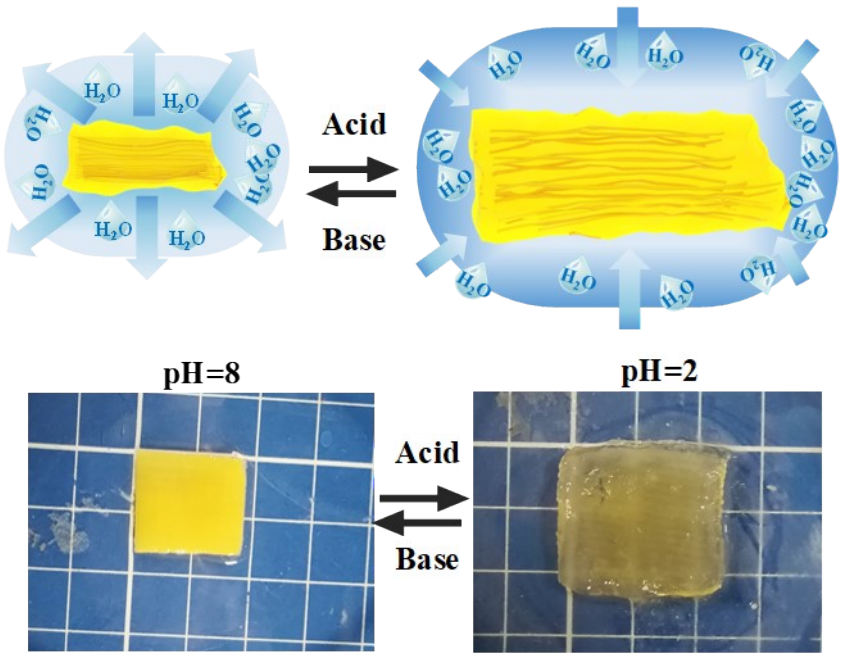

Figure S5. The scheme and photos of pH-responsive reversible deformation.

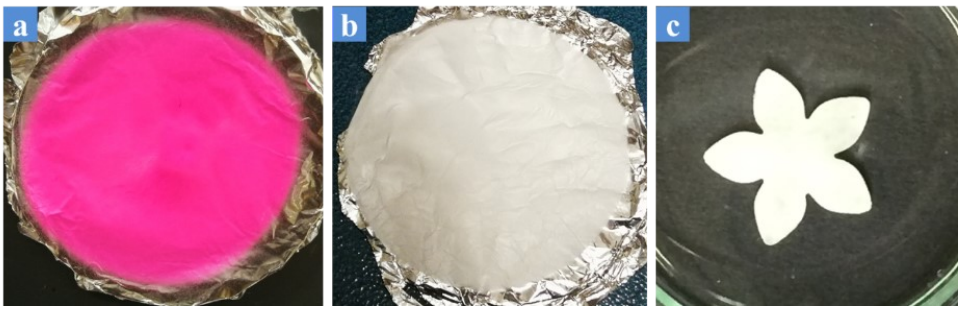

Figure S6. Photo of electrospun nanofiber membranes. (a) Passive layer fabricated from P(GMA-*co*-ABP) mixed with 0.3 wt% rhodamine B; (b) active layer spun from P(NIPAm-*co*-ABP); (c) petal-shaped bilayer actuator.

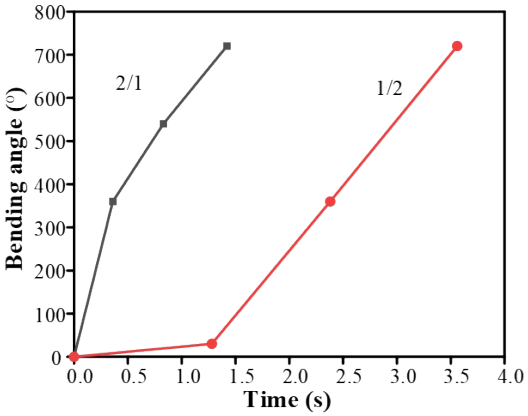

Figure S7. Time-dependent bending angle of actuator with different thickness ratio between the active layer and the passive layer .

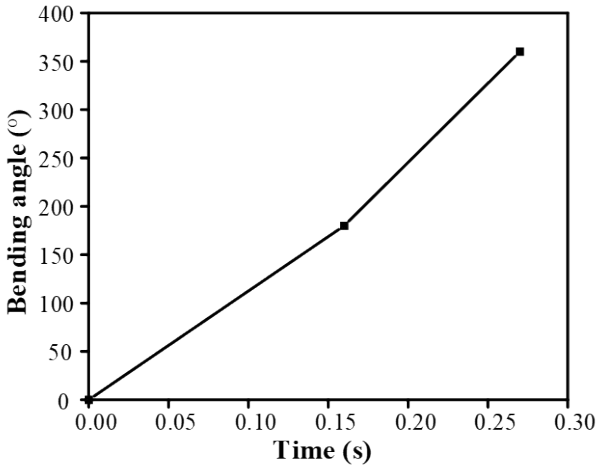

Figure S8. Time-dependent bending angle of the petal-type actuator.

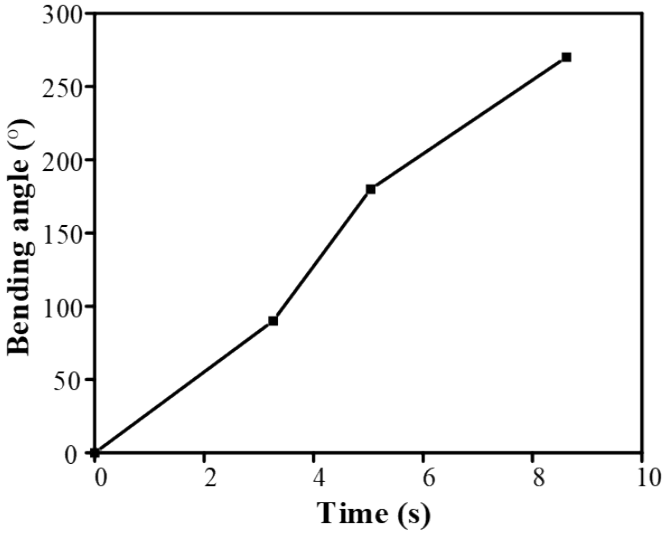

Figure S9. Time-dependent bending angle of the actuator in pH = 2.

SI Movie S1: Reversible folding/unfolding behavior of a sample with a rectangular shape.

SI Movie S2: Deformation of actuators with and without AuNPs under laser irradiation.

SI Movie S3: Reversible folding/unfolding behavior of petal-like samples.

SI Movie S4: Rapid turnover of petal-like actuators at 4°C and 40°C.

SI Movie S5: Rapid deformation of the actuator under laser irradiation.