Reactive Nanorods Based on Activated Ester Polymers: A Versatile Template-Assisted Approach for the Fabrication of Functional Nanorods

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Supplementary Information

Fabrication of AAO templates. High purity aluminum (99.997 %, 0.5 mm thick) for the template fabrication was purchased from Alfa Aesar. Aluminum plates were cleaned by sonication treatment in isopropanol and acetone respectively followed by an electropolishing step in a mixture of ethanol and perchloric acid (v/v 4:1) at 0 °C. The anodization steps were performed in a self-build apparatus. Briefly, the aluminum sheets were mounted on a copper plate serving as the anode. A radial area of 2.27 cm^2 was exposed to an aqueous acidic solution. A platinum wire was used as the cathode. The apparatus was surrounded by a cryostatic bath and the electrolyte solution was rigorously stirred during anodization. The anodization voltage was controlled by a power supply unit with an integrated USB interface. Anodization was performed in an aqueous solution of phosphoric acid (c =1.0 wt%) at 195 V (for pore diameters of 200 nm) and oxalic acid (c = 0.3 mol/L) at 40.0 V (for pore diameters of 40 nm) respectively. The first anodization step was carried out for 12 h, followed by an etching step in aqueous solution of chromic acid (1.8 wt%) and phosphoric acid (6.0 wt%) at 60 °C for 18 h. The second anodization was performed under the some conditions like the first step. The length of the templates was controlled by the anodization time. A subsequent pore widening was carried out in aqueous phosphoric acid (5 wt%) at 25 °C.

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Figure S1. Scanning electron micrographs. (A) Unfilled AAO template fabricated in oxalic acid (c = 0.3 mol/L) at 40.0 V. (B) Partial etching of the AAO template images exposed arrays of polyPFPVB nanorods with a diameter of 40 nm (on the left side).



Figure S2. SEM images of polyPFPVB rods after thermal-initiated polymerization. The visualization of the wires inside of the AAO after partial mechanical scratching of the AAO (A) and after removal for the template (B) reveal the complete filling.

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Figure S3. (A) Cross-sectional scanning electron micrograph of an unfilled AAO template. Optical microscope image of the corresponding cross-linked poly(pentafluorophenylacrylate) replication after removal of the AAO template (B) and after conversion into cross-linked PNIPAM rods (C, image was taken above the LCST temperature of the rods). The length of the rods in (B) as well in (C) matched well to the pore length of the AAO template.



Figure S4. Phase contrast micrographs of an aqueous dispersion of nanorods before (A) and after (B) sonication treatment.