The synergistic effects of stimuli-responsive polymers with nano- structured surfaces: wettability and protein adsorption

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1. Preparation of silicon nanowire arrays

The silicon nanowire arrays (SiNWAs) were prepared by chemical etching of crystalline silicon in HF/$AgNO_3$ aqueous solution. Briefly, silicon wafers were cleaned in a freshly prepared piranha solution (H_2SO_4:H_2O_2=7:3(v/v) **Caution: piranha solution reacts violently with organic materials and should be handled carefully!**) at 90°C for 2 h and were then rinsed with distilled water and dried in a stream of argon. The cleaned silicon wafers were immersed in the etching solution containing 5.0 mol·L^{-1} HF and 0.015 mol·L^{-1} $AgNO_3$ at 50°C for 10 min, 30 min and 50 min. The resulting surfaces were immersed in 20% nitric acid for 1 min and then rinsed copiously with deionized water.

2. Optimizing reaction condition for preparation of homogeneous SiNWAs

The morphologies of SiNWAs prepared under different etching times were shown in **Figure S1**. By comparison of morphology and size of these samples, we choose 30 min as the optimized reaction time to prepare SiNWAs for the further polymer modification.

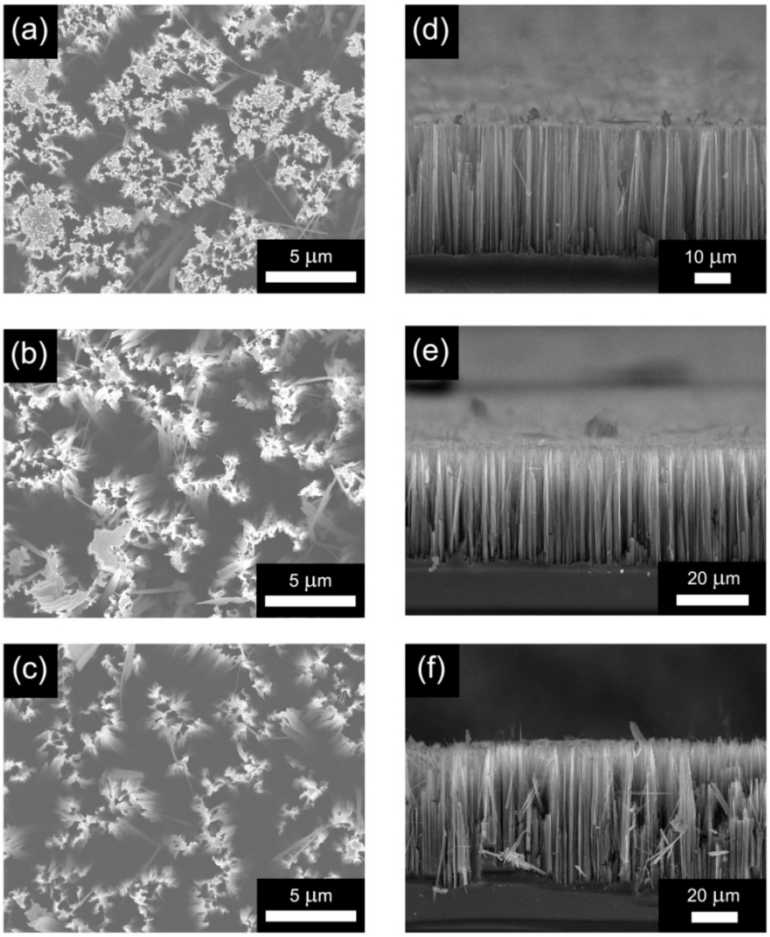

Figure S1 Top view (left) and cross-sectional view (right) of the as-prepared SiNWAs under different etching times. (a) and (d): 10 min; (b) and (e): 30 min; (c) and (f): 60 min.

3. Contact angle measurement on SiNWAs-poly(MAA) surfaces

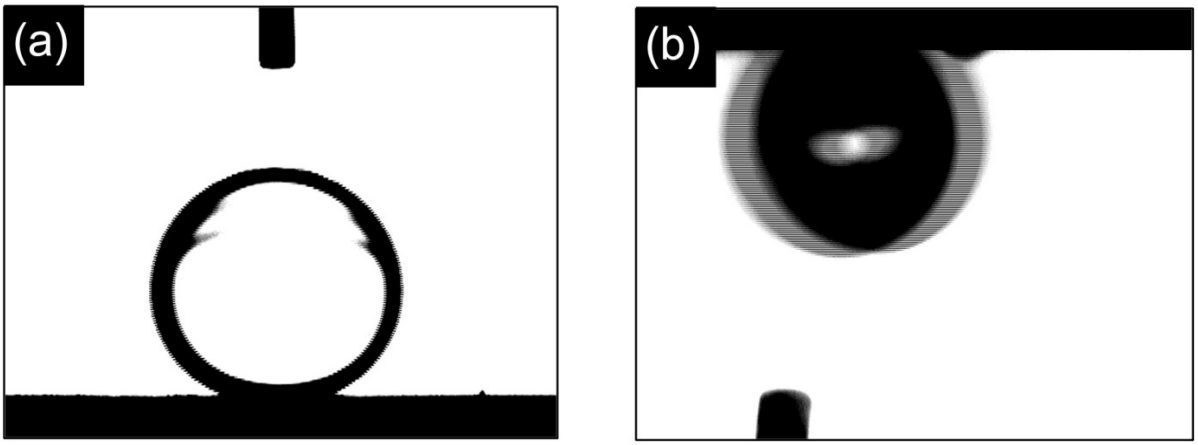

Figure S2. Contact angle images of (a) oil (CH_2Cl_2) drop and (b) air bubble on SiNWAs-poly(MAA) surfaces in PBS. The contact angles are independent of pH.

4. Protein adsorption on SiNWAs-poly(NIPAAm) surfaces

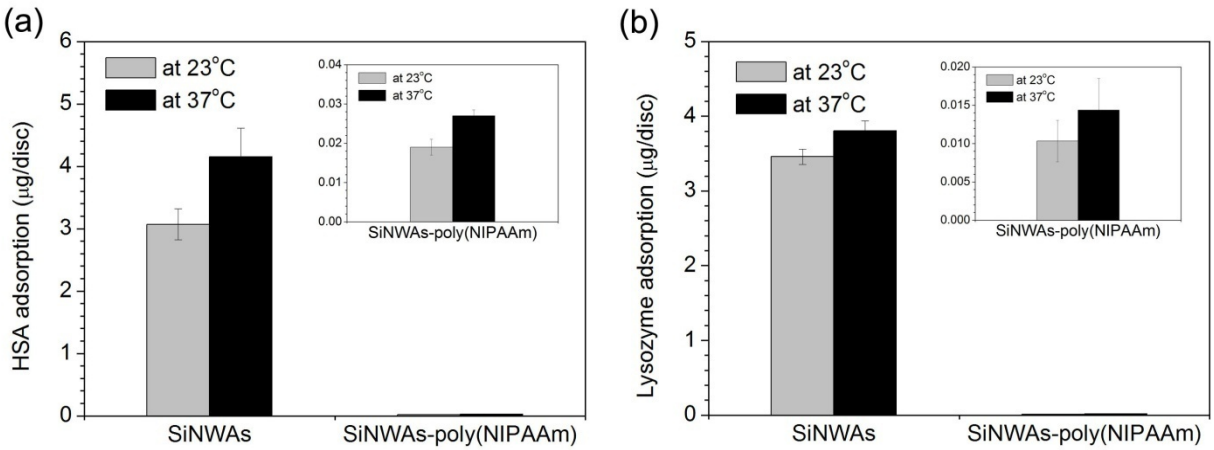

Figure S3. Adsorption of 1mg/mL (a) HSA and (b) lysozyme from PBS solution over a 3-h period on pristine and poly(NIPAAm) modified SiNWAs surfaces at 23 and 37°C. The "apparent" surface area of one disc is 0.5 cm^2. Data consist of the mean ± standard error (n=3).