Electronic Supplementary Information (ESI)

Fabrication of biomimetic superhydrophobic surfaces
inspired from lotus leaf and silver ragwort leaf †

Jinyou Lin, Yu Cai, Xianfeng Wang, Bin Ding, Jianyong Yu, and Moran Wang

State Key Laboratory for Modification of Chemical Fibers and Polymer Materials, Donghua University, Shanghai 201620, China. E-mail: binding@dhu.edu.cn
Nanomaterials Research Center, Research Institute of Donghua University, Shanghai 201620, China
College of Textiles, Donghua University, Shanghai 201620, China
Los Alamos National Laboratory, Los Alamos, NM 87545, USA

Materials. The starting materials were used in this study including PS (M_w=208 000, Wako), tetrahydrofuran (THF) and N,N-dimethylformamide (DMF) (Shanghai Chemical Reagents Co., Ltd.), silica nanoparticles (diameter of particles: 7-40 nm, specific surface area: 120 m^2 g^-1, Aladdin). All of the materials were used without further purification. Electrospinning solutions were prepared by dispersing controlled content of silica nanoparticles (0, 7.7 and 14.3 wt.% relative to PS) into 30 wt.% PS dissolved in the THF and DMF, respectively.

Electrospinning. The electrospinning solution was placed in a syringe connected with a metal needle that was controlled by a syringe pump (LSP02-1B, Baoding Longer Precision Pump Co., Ltd., China) fixed to a support that could be moved with a speed of 6 m/min along a slipway at a flow rate 3 mL/h. A high voltage power...
supply (DW-P303-1ACD8, Tianjin Dongwen High Voltage Co., China) was used to generate a voltage of 20 kV between the needle and an aluminum foil-covered grounded metallic rotating roller placed 15 cm from the tip of the needle rotated at 100 rpm. All the experiments were carried out at 24 °C with the relative humidity of 40%.

Characterization. The morphology of the electrospun PS fibrous mats was examined by a field emission scanning electron microscopy (FE-SEM) (S-4800, Hitachi Ltd., Japan). The WCA and WCAH were observed by a contact angle meter (Contact Angle System OCA40, Dataphysics Co., Germany) at room temperature. Measurements from at least six droplets of 8 mg of freshly distilled pure water were averaged. Fourier transform infrared (FTIR) spectra were determined with Avatar 380 FT-IR spectrometer in the range 4000-500 cm⁻¹. Atomic force microscopy (AFM) images were taken with a scan size of (5 µm×5 µm) using the tapping mode of AFM (Nanoscope IV, Digital Instruments).

Fig. S1 Several water droplets placed on the PS fibrous mats formed from DMF with 7.7 wt% silica showing the superhydrophobicity.