Supplementary Information

Janus Interface Materials: Superhydrophobic Air/Solid Interface and Superoleophobic Water/Solid Interface Inspired by Lotus Leaf

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Experimental

Materials: All the chemicals are commercially available analytical grade reagents and were used without further purification. The poly(dimethylsiloxane) (PDMS) silicone rubber SYLGARD-184 and curing reagent were obtained from Dow Chemical. The epoxy resin system was supplied by Beijing Institute of Aeronautical Materials (BIAM), China. Lotus (*Nelumbo nucifera*) leaves were picked from the lotus pond of Tsinghua University, Beijing, China.

Fabrication process of Janus interface materials: Firstly, the mixture of liquid PDMS and its curing agent (10:1, mass proportion) was vaccumed for 30 min to remove the air bubles. Then the transparent PDMS liquid was casted onto the upper side and lower side of lotus leaf, separately. After solidification at room temperature for 24 h, the two PDMS negative replicas of upper side and lower side of lotus leaf were obtained. To obtain the artifical upper side of lotus leaf, the transparent liquid PDMS was casted onto the upper side of PDMS negative template in the same manner. After PDMS solidification, the artificial upper side of lotus leaf based on PDMS was peeled off from the PDMS negative template. Secondly, an epoxy resin system contains two standard epoxy resins, glycidyl ester (A), and resorcinol diglycidyl ethers (B), and hexahydrophthalic anhydride (C) as the curing agent. The mixed ratio of A:B:C=1:1:2 by weight. After removing air bubles by vacuuming, the transparent brown epoxy resin liquid was infiltrated into the lower side of PDMS negative replica at 60 ^{o}C. And then sample was immediately transferred to a vacuum chamber for 10 min to remove trapped air and to increase the resin infiltration through the structures. After curing at 80 ^{o}C for 2 h plus 120 ^{o}C for 12 h, the artificial lower side of lotus leaf based on epoxy resin was released from PDMS negative replica. The artificial PDMS upper side and epoxy lower side of lotus leaf were bonded together using the oxygen plasma to achieve a Janus interface materials.

Characterization: The morphology of the samples was observed by environment scanning electron microscope (ESEM, Quanta 250FEG, FEI, USA) at 10 kV in the low vacuum mode. Contact angles were

measured using an OCA20 (Data-Physics, Germany) at ambient temperature. The oil droplets (about 2.0 μL) were dropped carefully onto the surface of samples which were immersed in water. The average contact angle was obtained by measuring at five different positions of the same sample. AFM SII Seiko Instruments Inc., SPI 3800N was used in the tapping mode to characterize the morphology of lower side of fresh lotus leaf.

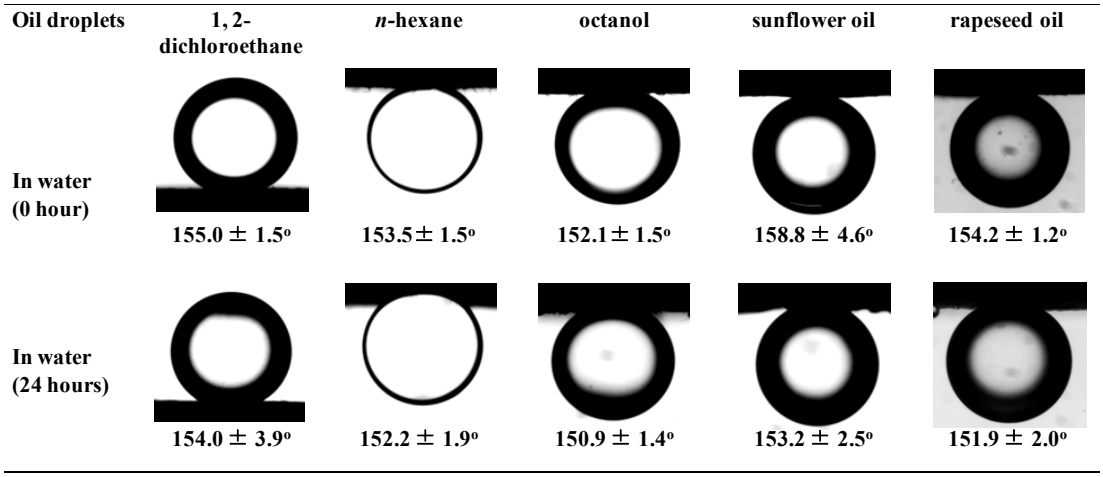

Figure S1. The oil contact angles of different kinds of oil droplets on lower side of lotus leaf with keeping different hours in water.

Figure S2. The lower side of lotus leaf shows superhydrophilic property with contact angle almost 0^{o} in air.

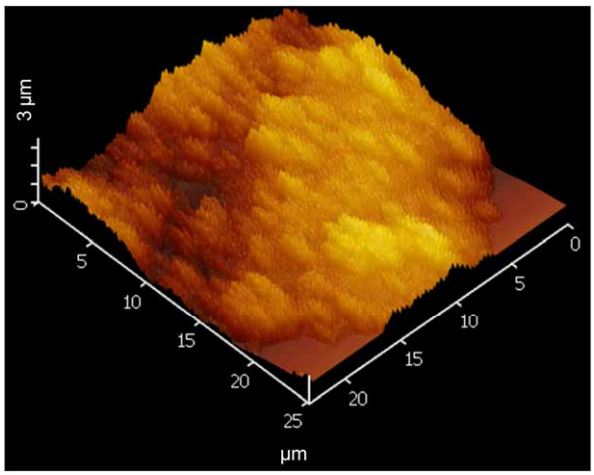

Figure S3. Atomic force microscope (AFM) image of the artificial lower side of lotus leaf based on epoxy resin replica shows the hierarchical micro/nanoscale structure is well replicated by epoxy resin.

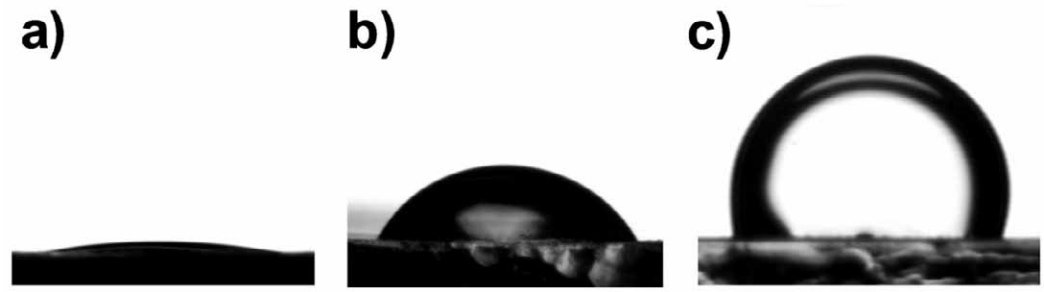

Figure S4. The contact angles of oil droplet (e.g., 1, 2-dichloroethane) and water droplet on the flat epoxy resin: a) the oil droplet of about 10^{o} in air, b) the water droplet of about 66^{o} in air, and c) the oil droplet of about 110^{o} in water.