Electronic Supplementary Information

Fabrication of Raspberry SiO_2/Polystyrene Particles and Superhydrophobic Particulate Film with High Adhesive Force

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Table S1. Advancing and receding angles of the particulate films fabricated with different SiO_2/PS hybrid particles samples.

Runs	Contact Angle (°)	Advancing Contact Angle (°)	Receding Contact Angle (°)	Contact Angle Hysteresis (°)
A	70	140	6	134
B	151	157	41	116
E	115	154	4	150

Advancing and receding water contact angles on the SiO_2/PS particulate films were measured with Contact Angle Meter SL200B (Solon Tech. Co., Ltd.) by the dynamic sessile drop method. Dynamic advancing and receding angles were recorded while the probe liquid was added to and withdrawn from the drop, respectively. The difference between the advancing and receding angle is the contact angle hysteresis. For each experimental condition, three specimens were analyzed, and the mean value was taken as the final result. Doubly distilled water with a measured surface tension of 72 mN/m was used in this analysis. From Table S1, the advancing and receding contact angles measured for the particulate film of Run B were 157° and 41°, respectively, thus the contact angle hysteresis is 116°.

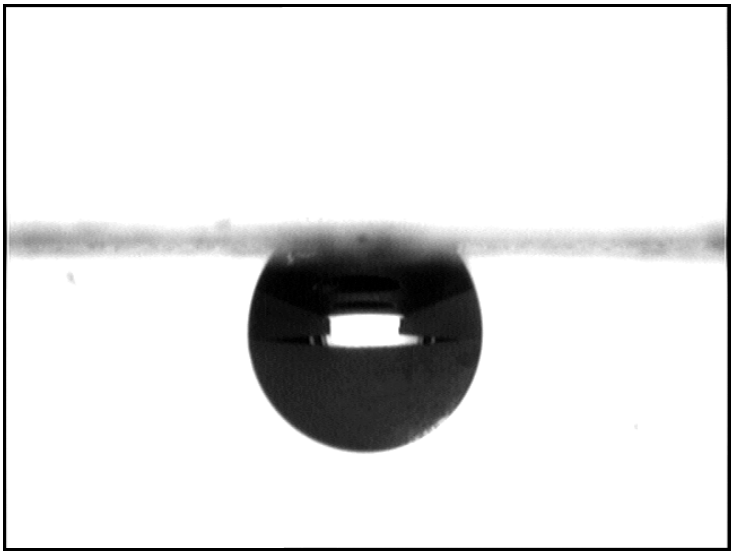

Figure S1. Shape of water on the superhydrophobic SiO_2/PS particulate film surface upside down.

The water droplets (2μl) stay pinned to the surface of the superhydrophobic SiO_2/PS particulate film when the surface is turned upside down (Figure S1), thus the superhydrophobic SiO_2/PS particulate film provides a high adhesive force to water.

The estimation process for the density of the SiO_2/PS hybrid particles on the superhydrophobic particulate film (shown in Figure 2a).

$D=N_{SiO_2/PS}/A$

D: density of the SiO_2/PS hybrid particles on the surface of particulate film, particles/ mm^2

$N_{SiO_2/PS}$: number of the SiO_2/PS hybrid particles in one layer the film (Figure 2a), $N_{SiO_2/PS}=27$ particles

A: the actual layer area of Figure 2a. $A=1.74\times10^6\ nm^2=1.74\times10^{-6}\ mm^2$

Thus, $D=1.55\times10^7$ particles/ mm^2

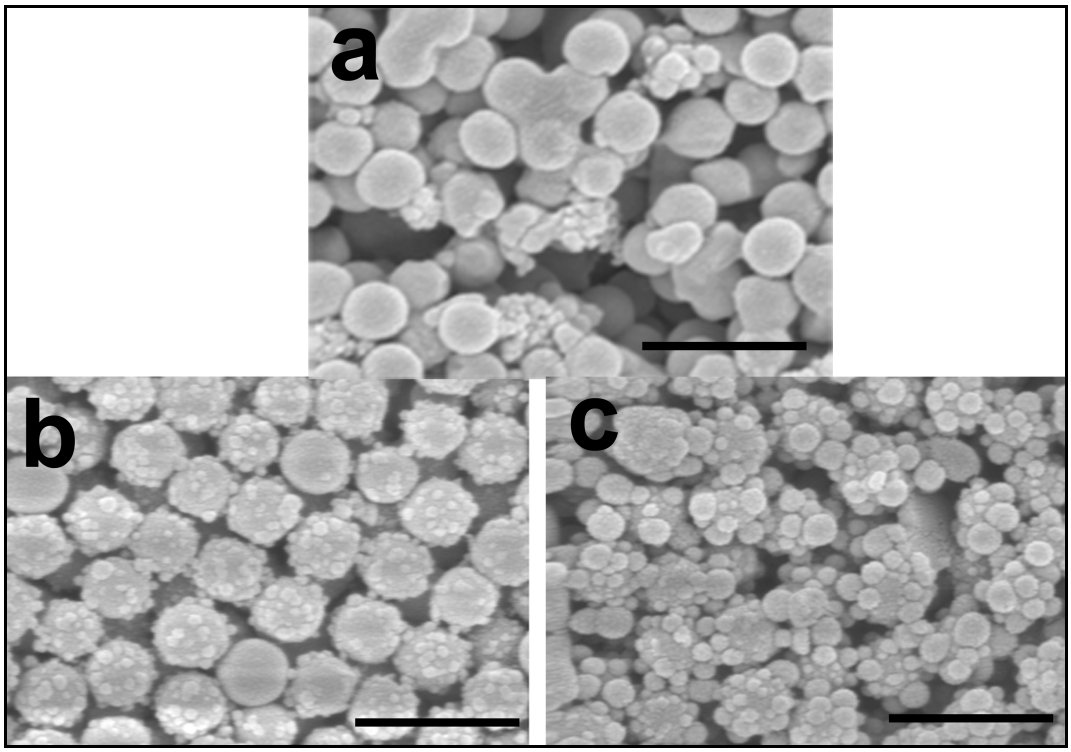

Figure S2. SEM images of the particulate film composed of (a) the core-shell SiO_2/PS hybrid particles, (b) Sample A and (c) Sample E. All scale bars are 500nm.

The adhesive property of the superhydrophobic SiO_2/PS particulate film

The adhesive property of the superhydrophobic SiO_2/PS particulate film was assessed by a high-sensitivity microelectromechanical balance system (Data-Physics DCAT 11, Germany). First, the glass slide coated with the SiO_2/PS particulate film (20mm×20mm) was held in a special sample holder (PSH 11). The balance system was initialized to zero at beginning. Secondly, the clamped slide was dipped into (immersion depth is 5mm) and then pulled out of water vessel at a lift motor rate of 0.05 mm/s. Figure S3 recorded the change of the balance force at different position during the pulling process. The balance force increased gradually and reached its maximum (approximately 0.24g×9.8mN/g=2.35 mN) at the end of the pulling process. At this point, the buoyancy exerted by water is zero. Thus, the maximum balance force can be regarded approximately as the adhesive force between the SiO_2/PS particulate film and water. For comparison, the adhesion between water and the pure glass slide (20mm×20mm) was also

assessed (see Figure S3). The adhesive force is 0.36 mN (i.e., 0.037g×9.8mN/g=0.36mN), which is much lower than that between water and the surface composed by SiO_2/PS particles. This result indicates that a strong adhesion exists between the superhydrophobic particulate film and water.

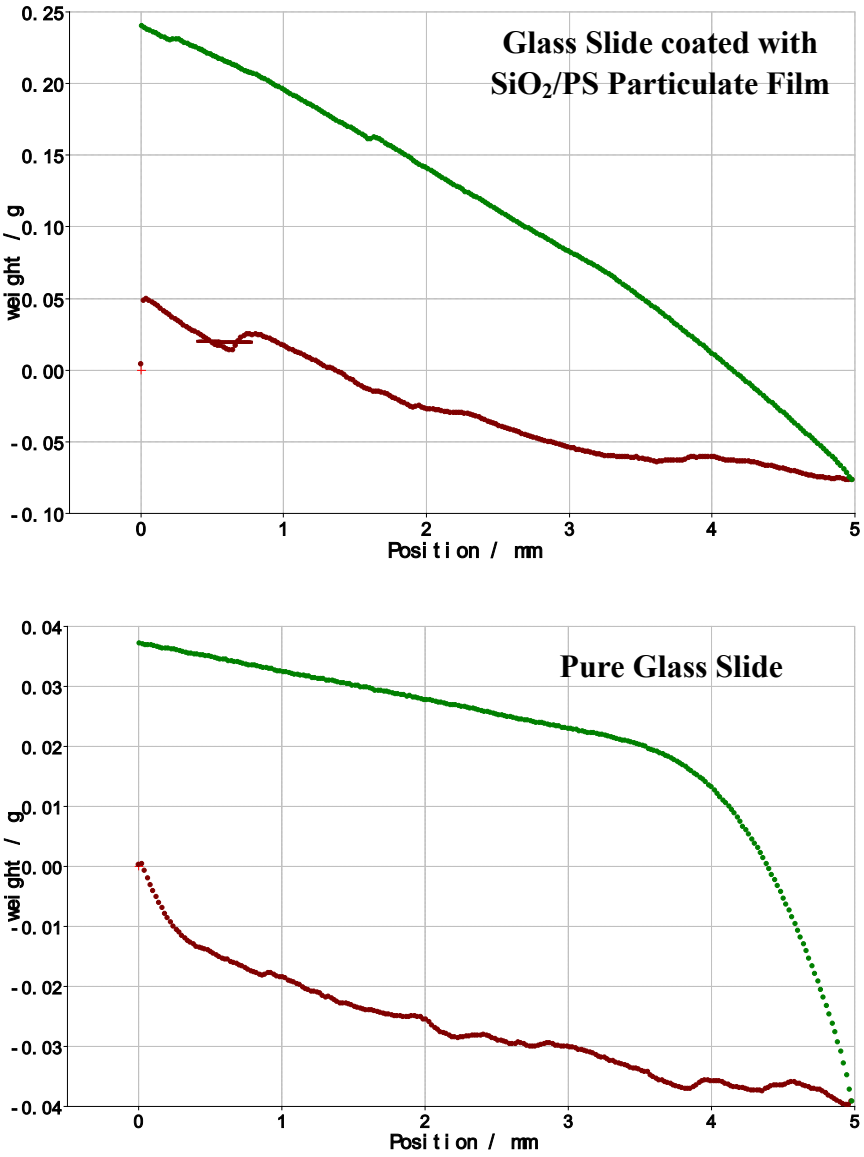

Figure S3. Force-position curves recorded when the glass slide was immersed into (Red curves) and pulled out of water (Green curves).