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Supporting Information for

Creating Robust Superamphiphobic Coatings for Both Hard and Soft Materials

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S1: Calculation of the impact energy of a sand grain

Here, we regarded a sand grain as a sphere with a radius of R, so the mass of a sand grain, m, can be estimated as

$m = 4/3\ \pi\ R^3\rho$ (S1)

where ρ denotes the density of silica ($\rho \approx 2$ g/cm^3). The impact energy of a sand grain, W, can be determined by

$W = mgh = 4/3\ \pi\ R^3\rho gh$ (S2)

where g is the acceleration of gravity, and h the height of the sand.

The impact velocity of a sand grain, v, can be obtained by $v = (2hg)^{-1/2}$ (S3)

In this work, the radius of the sand, R, was in the range of 300 to 800 μm, and the height of the sand, h, ranging from 0 to ~100 cm. Therefore, the impact energy, W, can be estimated as follows:

h(cm)	20	50	80	100
v(m/s)	2.0	3.16	4.0	4.47
W(J)	2.27×10^{-7} to 4.29×10^{-6}	5.65×10^{-7} to 1.07×10^{-5}	9.05×10^{-7} to 1.72×10^{-5}	1.13×10^{-6} to 2.14×10^{-5}

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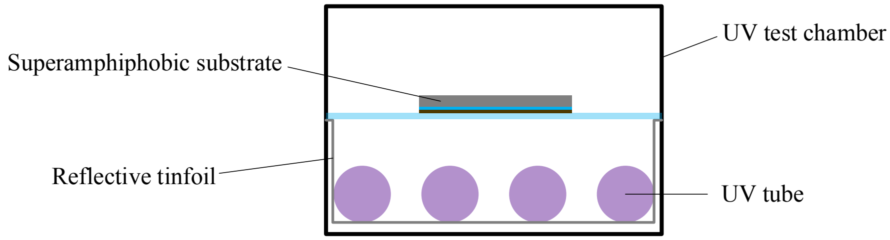

Fig. S1. Schematic diagram of UV irradiation of a coated glass slide substrate. The substrate was placed face-down to the UV light source (365 nm, 32 W) for different times, ranging from 0 to 24 hours.

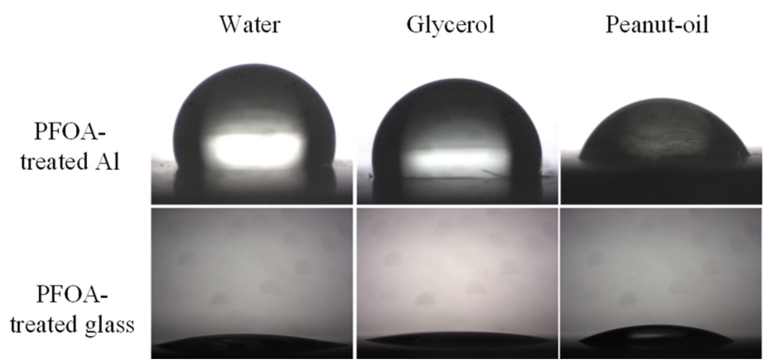

Fig. S2. Images of water, glycerol and peanut-oil droplet on the PFOA-treated smooth Al substrate and glass slide. It was demonstrated that the PFOA-treated substrates without the powder structures could not behave as super-liquid repellent surfaces, and it was impossible to generate self-cleaning surfaces.

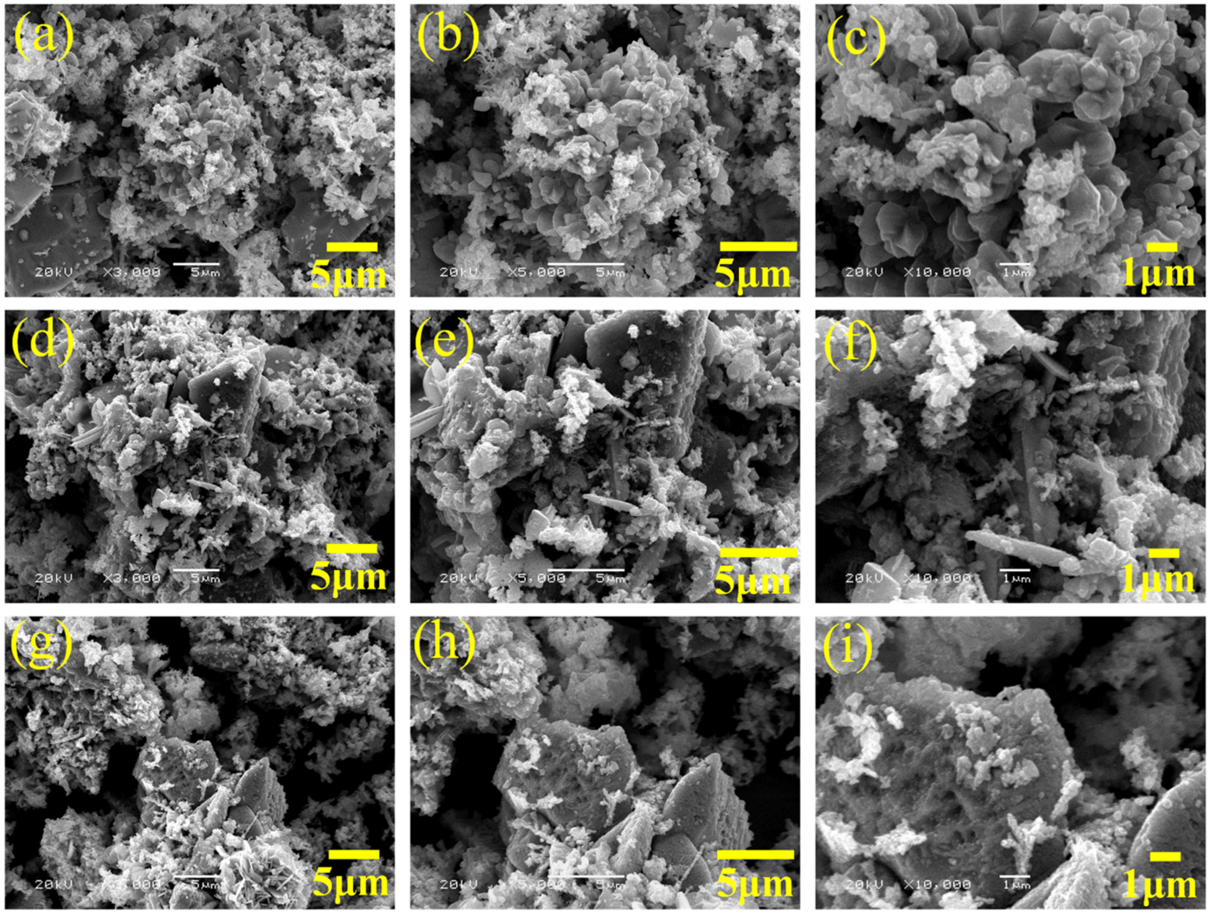

Fig. S3. The SEM images of the coatings after sand abrasion tests dropped from different heights: (a)–(c) 20 (d)–(f) 80 and (g)–(i) 100 cm. For *h* = 20 cm, the microstructures of the impinged surfaces changed little and the superamphiphobicity was maintained. When *h* = 80 and 100 cm, the impinged surfaces were covered with randomly scattered fragments of the damaged coatings. These surfaces maintain their superhydrophobic and highly oleophobic nature, however glycerol or peanut-oil can easily be "stuck" within the very rough microstructure.

Video S1

The video shows that water, glycerol and peanut-oil droplets spread onto the as-received Al substrates, exhibiting hydrophilicity and lipophilicity, while these liquid droplets can easily roll off from the coated surface (the coating was bonded by double sided tape), showing excellent superhydrophobicity and superoleophobicity.

Video S2

The video shows that water, glycerol and peanut-oil droplets wet the uncoated glass slide substrates, exhibiting hydrophilicity and lipophilicity, while these droplets cannot wet the coated surface (the coating was bonded by double sided tape), indicating the coated surface has water/oil proofing properties.

Video S3

The video shows a sand abrasion test on a spray adhesive bonded superamphiphobic glass substrate. 150 g sand grains (300 to 800 μm in diameter) fall from a height of 50 cm with a velocity of 3.2 m/s just before impinging the surface. After the sand-blast treatment, the deposited water, glycerol or peanut-oil drops easily roll off the surface, demonstrating that the surface retains superamphiphobicity.

Video S4

Water, glycerol and peanut-oil droplet repellency test on the coated sponge substrate (the coating was bonded by spray adhesives).

Video S5

Water, glycerol and peanut-oil dropped on both uncoated and coated filter paper. The left part is uncoated while the right is coated (the coating was bonded by spray adhesives).

Video S6

Water, glycerol and peanut-oil repellence tests on a coated rubber (~3 cm in length). These droplets readily roll-off from the coated rubber, even it is stretched to twice of its original length. The coated rubber maintains its superamphiphobicity after more than 50 stretch/release cycles.