Electronic Supplementary Material (ESI) for Nanoscale.

Electronic Supplementary Information

Reactive amphiphilic hollow SiO_2 Janus nanoparticles for durable superhydrophobic coating

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1. Supporting Methods

Preparation of Amphiphilic Hollow SiO_2 Janus Particles Labeled with Ag Nanoparticles: Typically, 0.0168 g of $AgNO_3$ and 0.1 g of amphiphilic hollow SiO_2 Janus particles were dispersed in 10 mL of water at a temperature of 40°C under magnetic stirring for 2 h. Subsequently, 0.010g of $N_2H_4 \cdot H_2O$ was added into the above solution under magnetic stirring for 30 min. AgNPs were deposited on the amino side of amphiphilic hollow SiO_2 Janus particles by chemical reduction method. Finally, amphiphilic hollow SiO_2 Janus particles labeled with Ag nanoparticles were obtained by washing with ethanol, centrifugation and dry. Meanwhile, to compare the structural anisotropy of Janus particles, both sides of SiO_2 particles functionalized completely with amino were deposited by AgNPs using the same method.

Preparation of Amphiphilic Hollow SiO_2 Janus Particles Labeled with Rhodamine B: Firstly, 0.02134 g of EDCHCl, 0.00534 g of NHS and 0.0534 g of Rhodamine B were added into 20 mL of DMF. The mixture was stirred for 2 h under 80 °C. Then 0.05 g of amphiphilic hollow SiO_2 Janus particles was added and reacted for 6 h. After centrifugation, the amphiphilic hollow SiO_2 Janus particles labeled by rhodamine B were obtained.

Preparation of Pickering Emulsion using Amphiphilic Hollow SiO_2 Janus Particles as stabilizer: Soybean oil and aqueous dispersion of the amphiphilic hollow SiO_2 Janus particles (10 mL) were mixed at a given volume ratio (The ratio of oil to water is 1 to 9). Then, Pickering emulsion was obtained by ultrasonication using a SCIENTZ JTY92-IIN sonicator for 30 min. The concentration of the amphiphilic hollow SiO_2 Janus particles in water was 1 wt %.

2. Supporting Figure

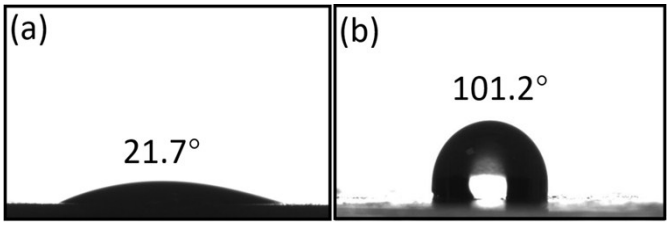

Fig. S1 Water contact angle of (a) hollow SiO_2 particles and (b) KH570-modified hollow SiO_2 particles.

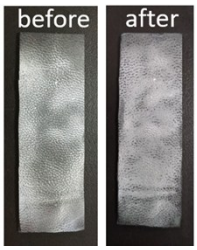

Fig. S2 Photograph of leather coating surface before and after 140 cycles of abrasion in the sandpaper abrasion test.