Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.
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Supporting information

Biomimetic layered structure nonflammable superhydrophobic paper with boiling-resistant and repairable properties for emulsion separation

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Flexible test of superhydrophobic paper. (Movie S1)

Liquid repellency tests including black tea, milk, green tea, and coffee. (Movie S2-S5)

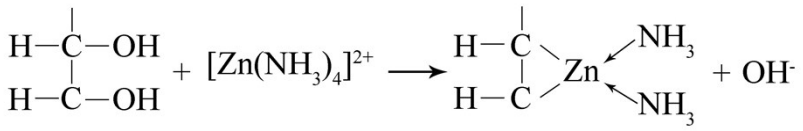
Demonstration of self-cleaning properties of superhydrophobic paper. (Movie S6)

Fire-resistant property of superhydrophobic paper. (Movie S7)

Abrasion test of superhydrophobic paper. (Movie S8)

Surfactant-stabilized oil-in-water emulsion separation. (Movie S9)

$$ZnO + 3NH_3 + H_2O \longleftrightarrow [Zn(NH_3)_3OH]^+ + OH^- \qquad \text{Equation S1}$$



Equation S2

Fig. S1 Photograph showing a wood-like suspension of the well-dispersed HAP nanowires.

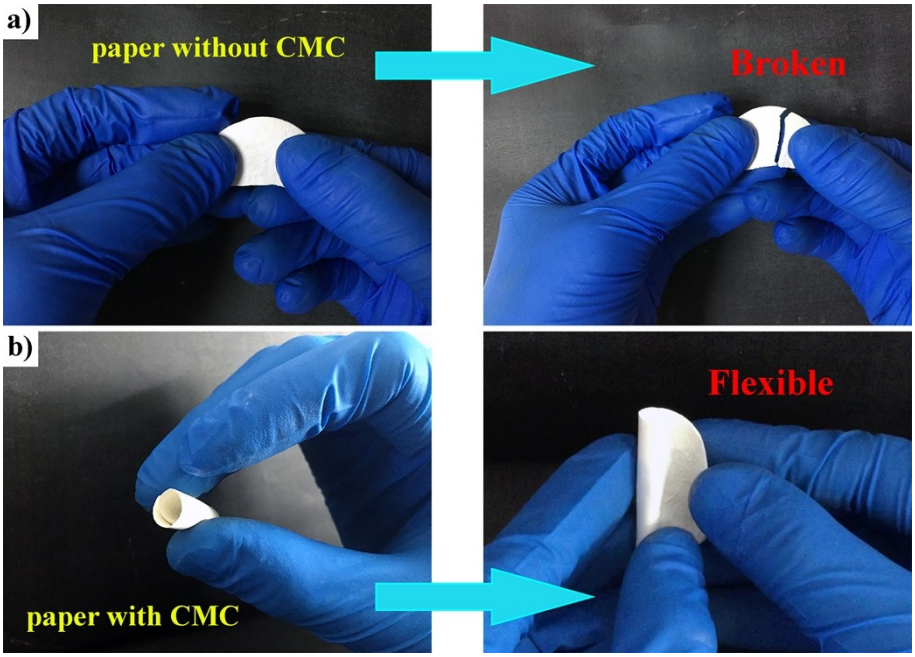


Fig. S2 Photographs showing a) paper without CMC and b) paper with CMC. The paper without CMC becomes scattered. The paper with CMC is flexible and can be rolled up or folded easily.

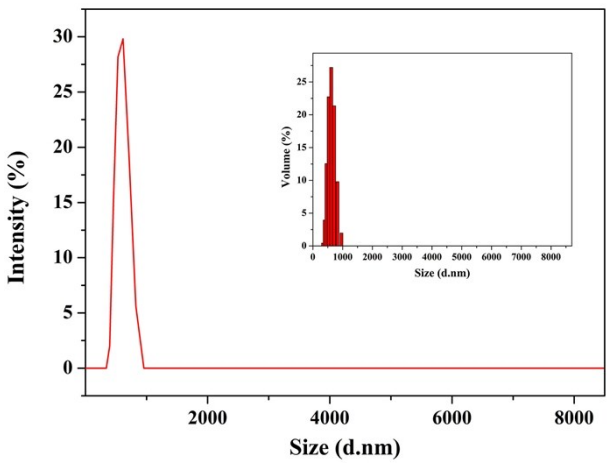


Fig. S3 Sizes distribution of pure ZnO particles.

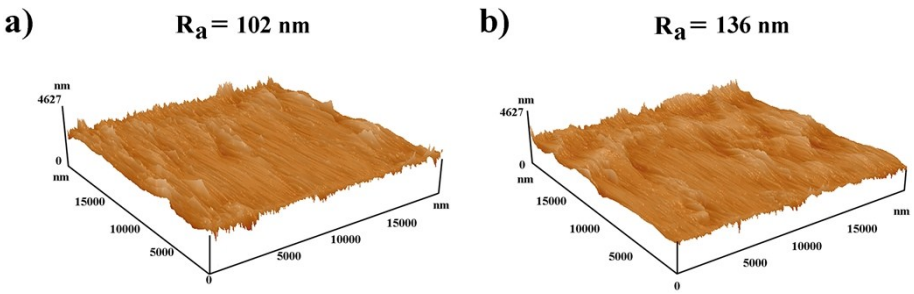


Fig. S4 AFM images of a) raw paper and b) PFDS-paper@ZnO.

Fig. S5 Photographs showing physical features of PFDS-paper@ZnO. The paper is about 3.9 cm in diameter, 0.48 mm in thickness and 0.4 g in weight.

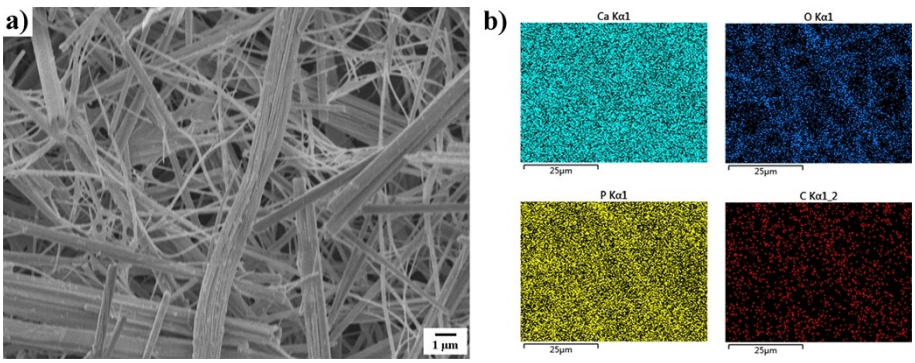


Fig. S6 a) SEM and b) FESEM-EDS mapping of the raw paper.

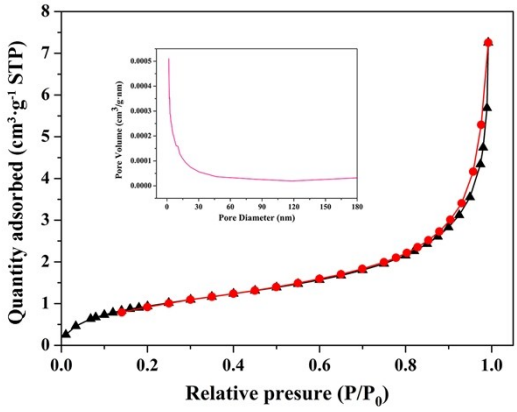


Fig. S7 N_2 adsorption/desorption isotherms and pore sizes distribution curve (inset) of PFDS-paper@ZnO.

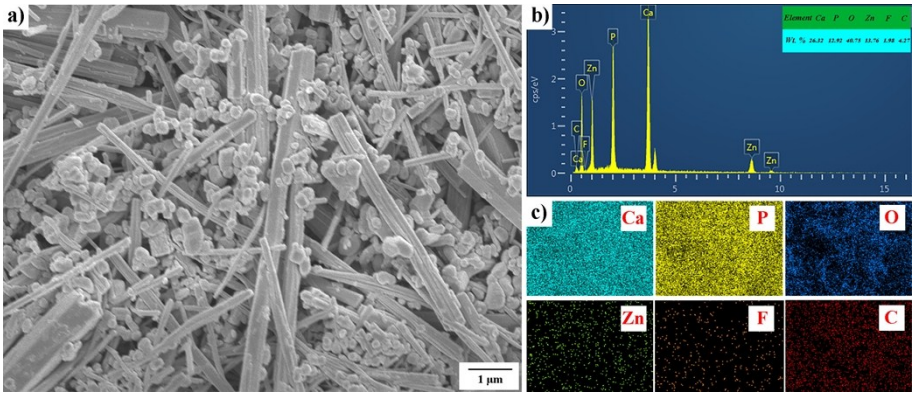


Fig. S8 a) SEM, b) EDS spectra and c) FESEM-EDS mapping of the PFDS-paper@ZnO after the treatment of water droplet at pH = 3.

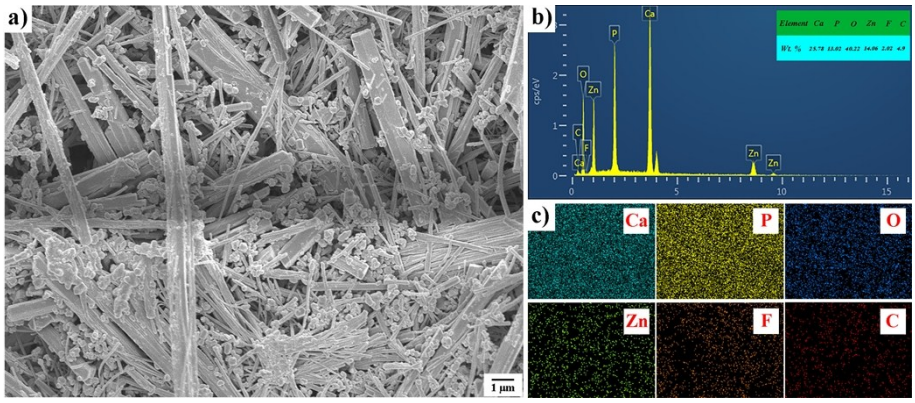


Fig. S9 a) SEM, b) EDS spectra and c) FESEM-EDS mapping of the PFDS-paper@ZnO after the treatment of water droplet at pH = 11.

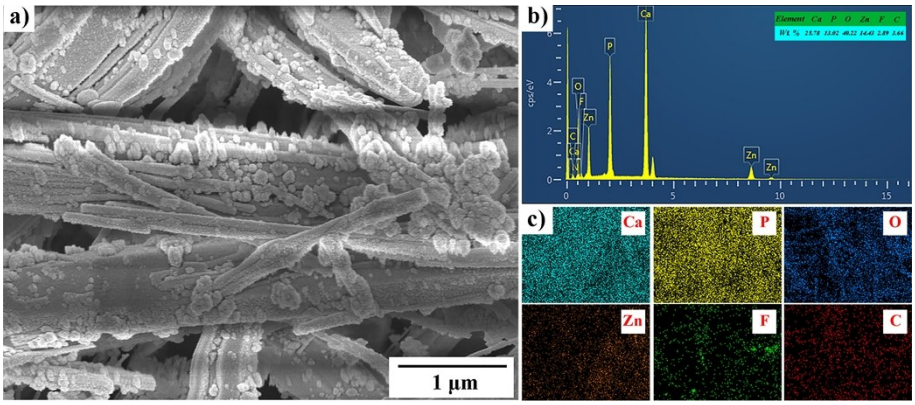


Fig. S10 a) SEM, b) EDS spectra and c) FESEM-EDS mapping of the PFDS-paper@ZnO after the treatment of boiling water.

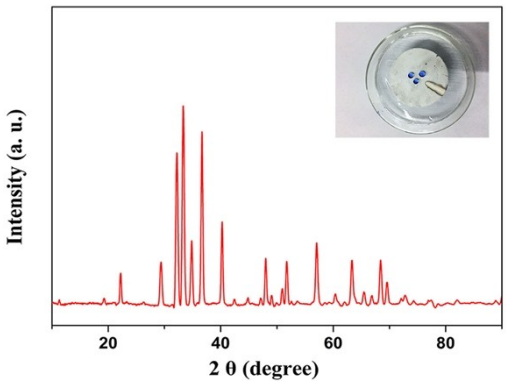


Fig. S11 XRD pattern of PFDS-paper@ZnO after treated with oil adsorption-combustion and immersed in PFDS ethanol solution. The burnt paper modified with PFDS still performs superhydrophobicity (inset).

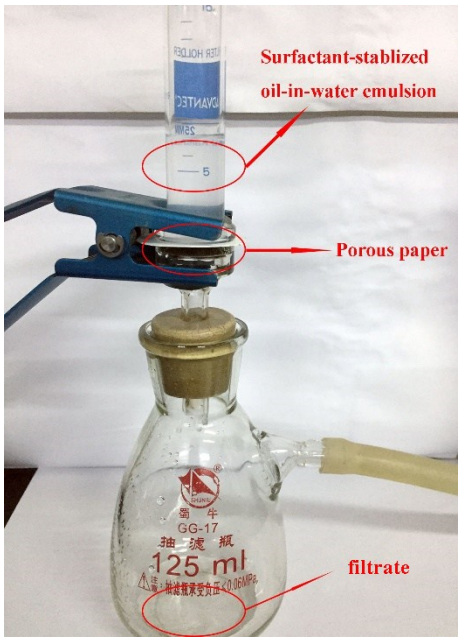


Fig S12 Separation process of surfactant-stabilized oil-in-water emulsion under 0.18 bar.

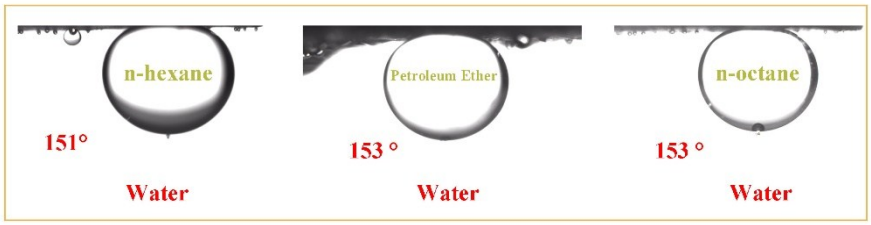


Fig. S13 OCA of n-hexane, petroleum ether, and n-octane in water, respectively.

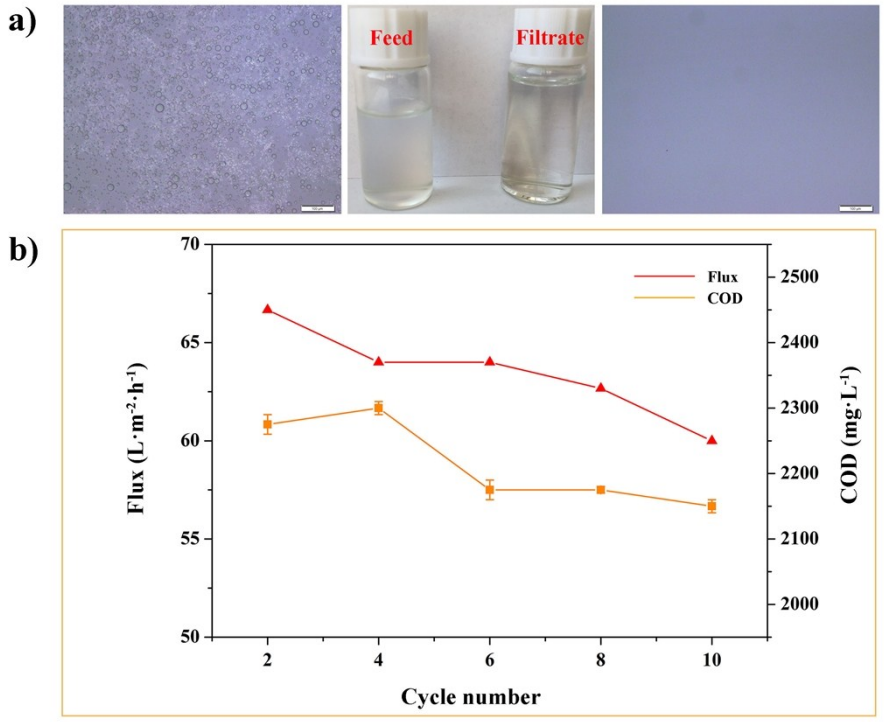


Fig. S14 a) Optical and microscopy images of n-hexane-in-water emulsion (left) and the collected filtrate (right). b) Flux of n-hexane-in-water emulsion separation and COD values in the collected filtrates. One experiment consists of 2 complete cycles.

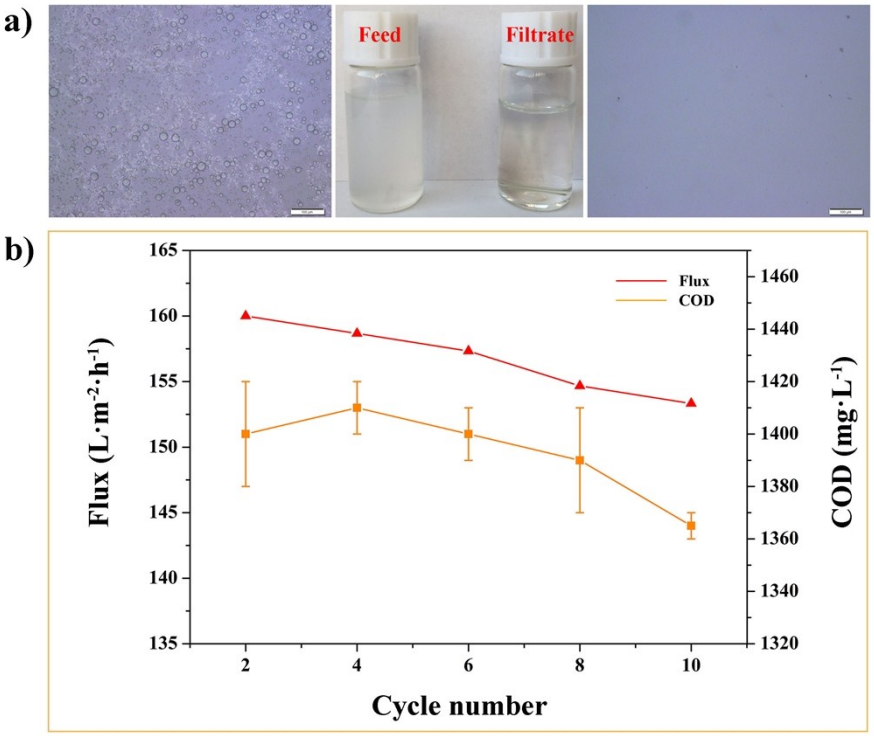


Fig. S15 a) Optical and microscopy images of petroleum ether-in-water emulsion (left) and the

collected filtrate (right). b) Flux of petroleum ether-in-water emulsion separation and COD values in the collected filtrates. One experiment consists of 2 complete cycles.