Supplementary Information

Hierarchical flower like double layers superhydrophobic films fabricated on AZ31 for corrosion protection and self-cleaning

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Fig. S1 SEM images of the silane single layer (a) and the outer layer (b).

Fig. S2 XPS Survey, C1s and Si2p of Aluminum alloy after immersing in OTS

Fig. S3 FT-IR spectrum of the as-prepared surface and stearic acid.

Fig. S4 Relationship between the contact angle and the pH value of the liquid drop on (a) the first-layer superhrdrophobic surface and (b) dual-layer superhydrophobic surfaces.

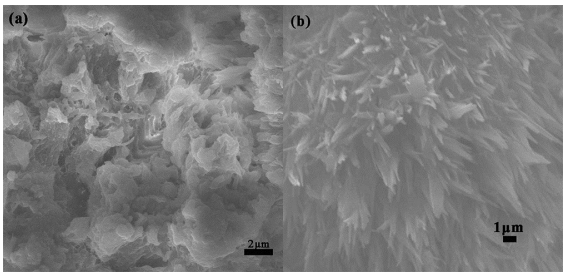

Fig. S1 SEM images of the silane single layer (a) and the outer layer (b).

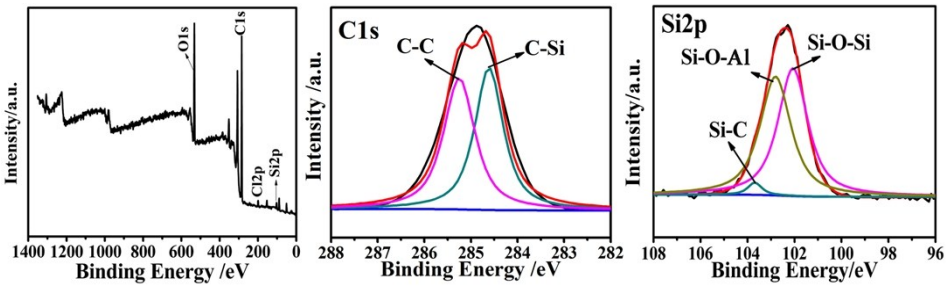

Fig. S2 XPS Survey, C1s and Si2p of Aluminum alloy after immersing in OTS.

There are four obvious signals in the XPS survey image: C1s, O1s, Cl2p and Si2p. We analyzed C1s and Si2p special peaks, respectively. The peaks at 285.43eV and 284.41eV are assigned to C-C and C-Si bonds, [1] respectively. In the XPS results of Si2p, the special peaks at 102.06eV and 103.81eV represent the bonds of Si-O-Al and Si-O-Si, [2] respectively. According to the above analysis, the Al alloy has been modified by OTS.

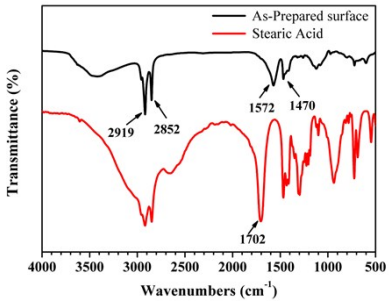

Fig. S3 FT-IR spectrum of the as-prepared surface and stearic acid.

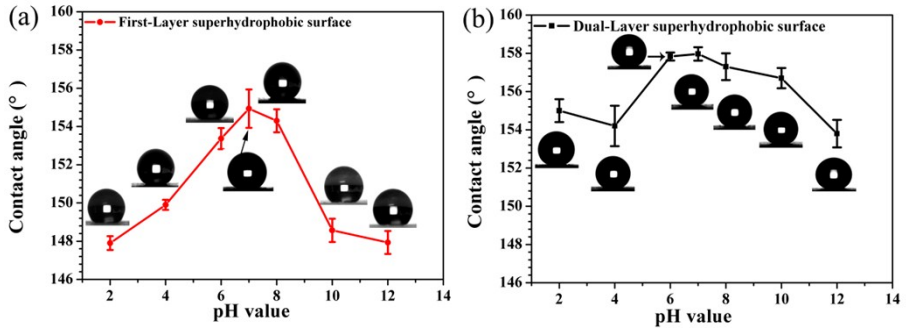

Fig. S4 Relationship between the contact angle and the pH value of the liquid drop on (a) the first-layer superhrdrophobic surface and (b)dual-layer superhydrophobic surface.

To investigate the chemical stability of the dual-layer superhydrophobic aluminium alloy surfaces, the CA values of different pH droplet on the first-layer coating and on the second-layer coating were also evaluated in Fig. S4. The CA on the dual-layer superhydrophobic surfaces were all above 150º and more stable than that on the first-layer superhydrophobic coating. It also proved that the dual-layer superhydrophobic aluminium alloy surfaces possess better chemical durability at acidic and basic environment.

[1] S. Sharadha, D. Fischer, S. Hsu and S. Hsieh, Surfactants in Tribology, 2008, 1, 173-187.

[2] S. L. Favaro, A. F. Rubira, E. C. Muniz and E. Radovanovic, Polym. Degrad. Stab, 2007, 92, 1219-1226.