Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supporting information

1.Sliding angle

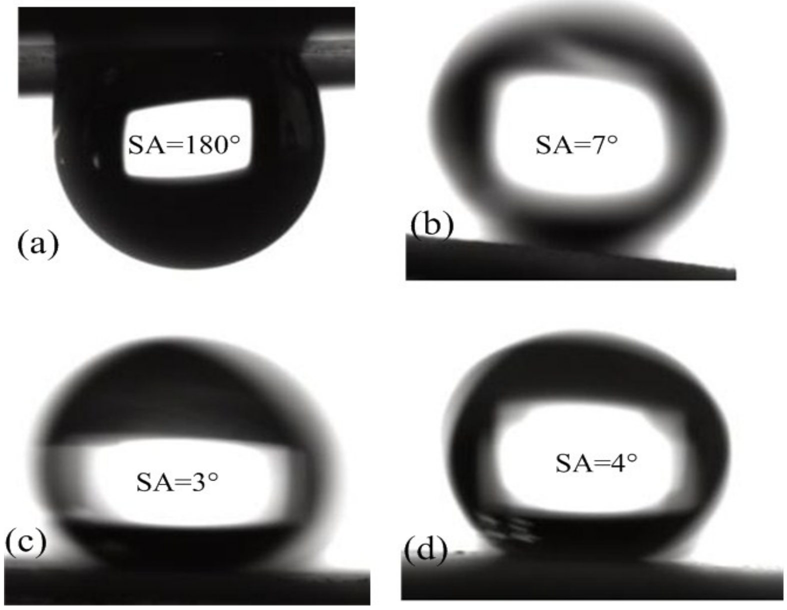

Fig.s1 SAs of (a) etched AF surface; (b) sample ZMAL7 surface; (c)sample ZMAL10 surface; (d) sample ZMAL12 surface, respectively.

Fig. s1 shows the SAs of etched AF surface, sample ZMAL7 surface, sample ZMAL10 surface and sample ZMAL12 surface, respectively. It is clear to see that the water droplet sticks on the surface of etched AF surface and can not roll. In contrast, all the other samples ZMAL7, ZMAL10 and ZMAL12 showed lower SAs of water, which are about 7°, 3° and 4°, respectively. Combine with the WCAs of the samples, it can be concluded that the samples ZMAL# possessed of good superhydrophobicity.

2. Cross-sectional morphology

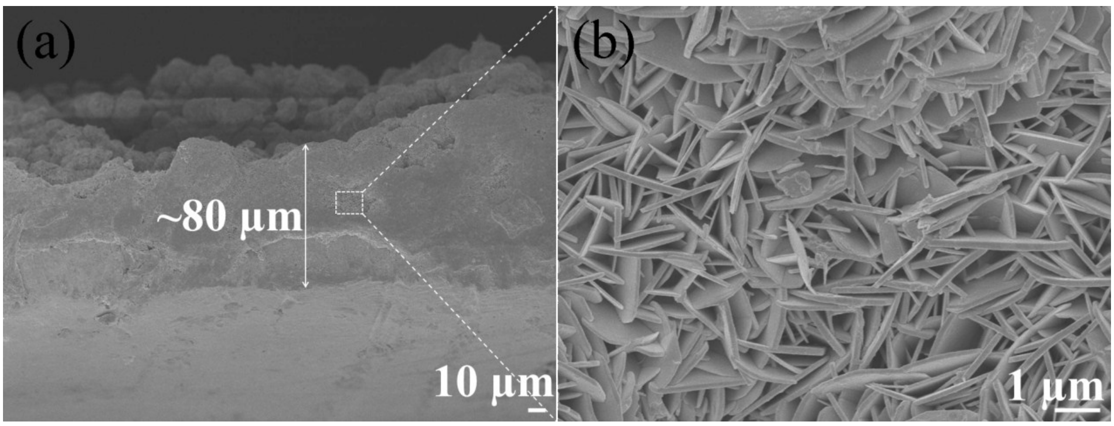

Fig.s2 Cross-sectional morphologies of sample ZMAL12 surface with low and high magnification, respectively.

Fig. s2 shows the Cross-sectional morphologies of sample ZMAL12 surface. The LDH film and Al substrate can be easily distinguished and the thickness of the coating is about 80 μm.

3. Mechanical durable tests

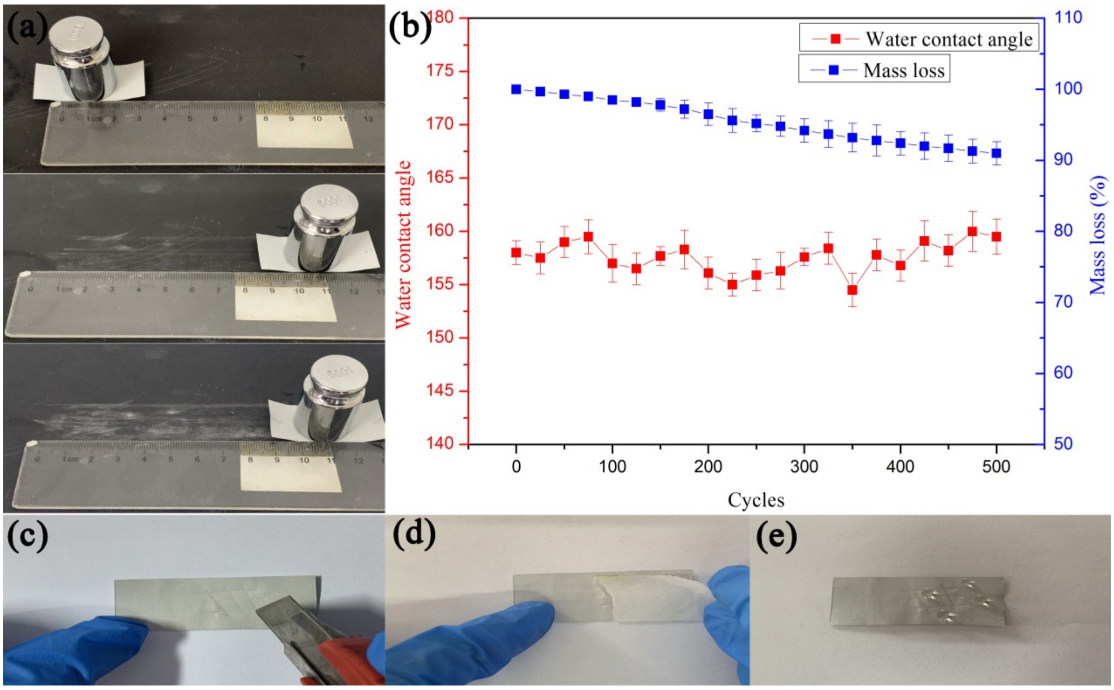

Fig.s3 Mechanical damages induced on ZMAL12 surface. (a) Sand paper abrasion with 50 g of load, (b) change in WCA and mass loss during multiple abrasion cycles, (c) scratching with a knife, (d) tape adhesion test and (e) Durability test for the water repelling surface after scratching and tape test.

The mechanical durable performance of superhydrophobic ZMAL12 surfaces was tested by knife-scratching test, tape adhesion test and abrasion test using 400# meshes of sandpapers under a 100 g loading. As shown in Fig.s3 a, durability of ZMAL12 surface was tested against sand paper abrasion, wherein the surfaces were abraded for a length of 10 cm, back and forth. As is shown in Fig. s3 b, sample ZMAL12 showed a durable surface and a constant superhydrophobicity for the results that the water contact angles after each 25 cycles were all above 150° and the mass loss after 500 cycles was about 9%. The ZMAL12 surfaces were further subjected to knife scratch and tape adhesion tests (Fig.s3 c, d). Despite having a few scratches on the surface, the exposed underlying layers of the coating recover/retain a superhydrophobic nature of the surface (Fig.s3 e) through the damaged areas, which showed excellent mechanical durability.

4. Bode phase angle diagrams

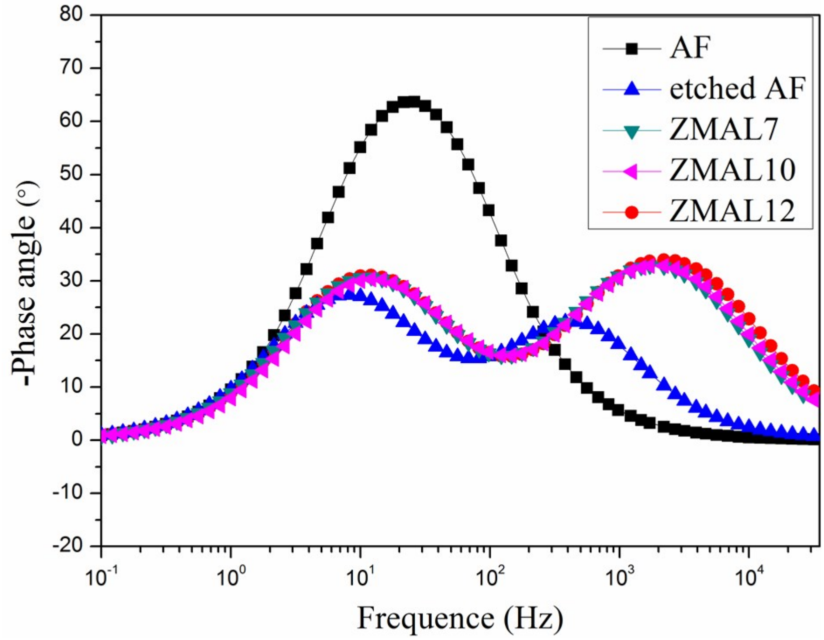

Fig.s4 Bode phase angle diagrams of as-prepared aluminum substrate and superhydrophobic aluminum substrate ZMAL#.

Fig.s4 showed Bode phase angle diagrams of samples AF, etched AF, ZMAL7, ZMAL10 and ZMAL12, respectively. Two time constants can be observed on the diagrams of superhydrophobic samples etched AF, ZMAL7, ZMAL10 and ZMAL12. At the frequency of 26 Hz, the phase angle of sample AF showed a maximum of 66° while the phase angle of sample ZMAL12 showed a minimum of 15° at the frequency of 122 Hz. In the current results from the Bode plots, the obtained phase angle indicates that the superhydrophobic aluminum substrates ZMAL# possessed larger value of Z_{real} and showed better corrosion resistance than the bare aluminum substrate.