Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Fabrication of Superhydrophilic-underwater Superoleophobic Inorganic anti-corrosive Membranes for High-efficiency oil/water Separation

Supporting information

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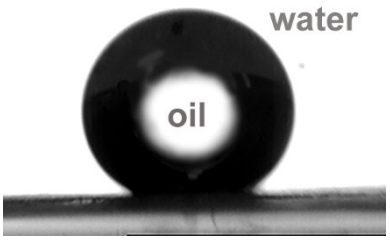


Fig. S1 Underwater oil CA after the membrane is placed in air for one week at ambient temperature.

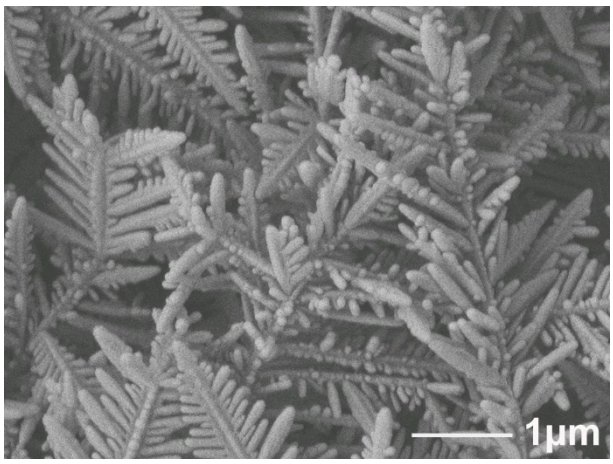
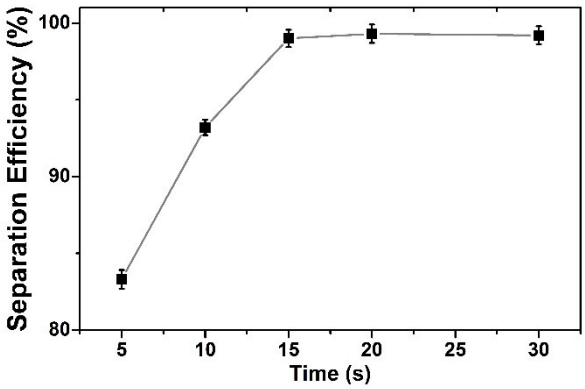


Fig. S2 SEM image of the membrane coated with silver coating after thirty



repetitions.

Fig. S3 The influence of immersion time on the separation efficiency.

The water flux (**F**) was also measured under a fixed column of water and the value were calculated using equation [1]:

$$F = V / St \qquad [1]$$

Where V is the volume of water that permeates through the membrane, here we fixed V to 0.1L, and S is the effective area of the mesh and t is the required time for the permeation of 0.1L water. The experimental results in Fig. S4 demonstrate the influence of mesh number on water flux and it can be found that larger pore size of membrane is more favourable for the permeation of water.

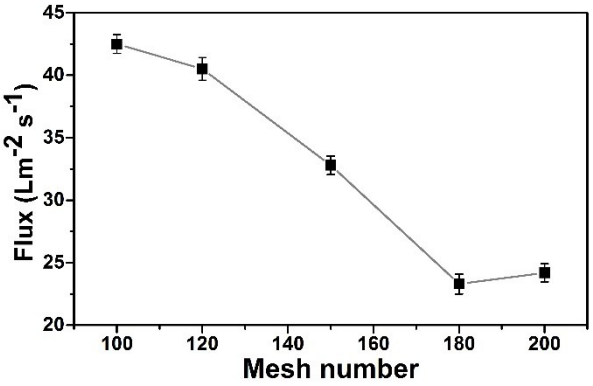


Fig. S4 The influence of mesh number on the water flux.

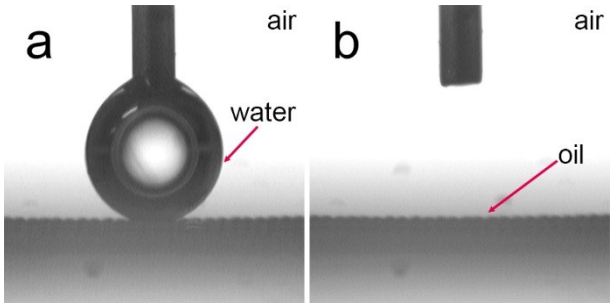


Fig. S5 Photograph of (a) water droplet (4ul) and (b) oil droplet (1,2-dichloroethane, 4ul) on the "after-exposed under infrared lamp" mesh in air.

To investigate the determinant causing the "unmodified surface" superrepellent, the surface chemical components and their status on this Ag-coated copper mesh were examined. Easily to observe that element silver, carbon, copper, and oxygen were detected by XPS and corresponding core-level XPS spectrum of C 1s, O 1s and Ag 3d are displayed respectively. From **Fig.S2** we discovered that the peaks centered at 368.6 and 374.6ev can be assigned to Ag_0 [1] and element silver is derived from a displacement reaction between the copper mesh and the $AgNO_3$ solution. O1s spectrum is resolved into three peaks located at 533.18, 531.97, 533.18eV, which belongs to C=O, -OH, CuO species,[2, 3] it means that besides copper oxides generated from the oxidation of copper in the drying process when exposed under the infrared lamp, there were organic contaminations on the surface. Notably, C 1s peaks located at binding energies of 284.8, 286.6, 288.67ev can be assigned to C=C/C-C (86.87%), C-O-C/C-O (5.26%), COOH/C=O(7.87%) bonds [4, 5], where the nonpolar group of C-C/C=C predominate, and it means element carbon stems from organic molecules contaminants containing carbon in air which are deposited onto the top surface of the mesh spontaneously. The preparation of a superhydrophobic surface on silver through spontaneous modified with ambient airborne organic compounds combining with the rough surface has rarely reported

and made an effort to construct the “oil-absorbing boat”. [6]

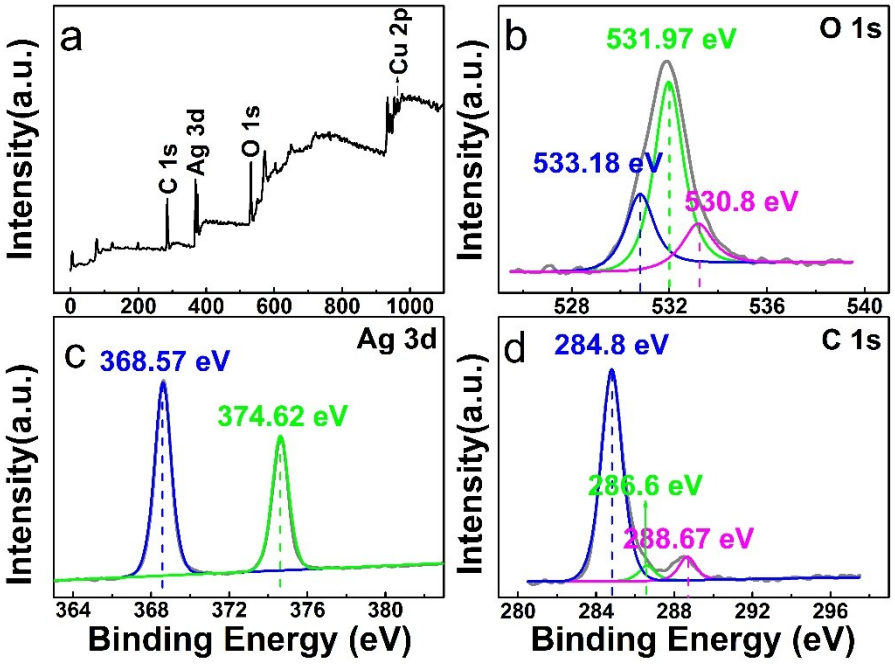


Fig. S6 XPS measurements for the superhydrophobic Ag-coated copper mesh(a) XPS survey spectrum.(b)O1s XPS spectrum.(c)Ag 3d XPS spectrum. (d) C1s XPS spectrum.

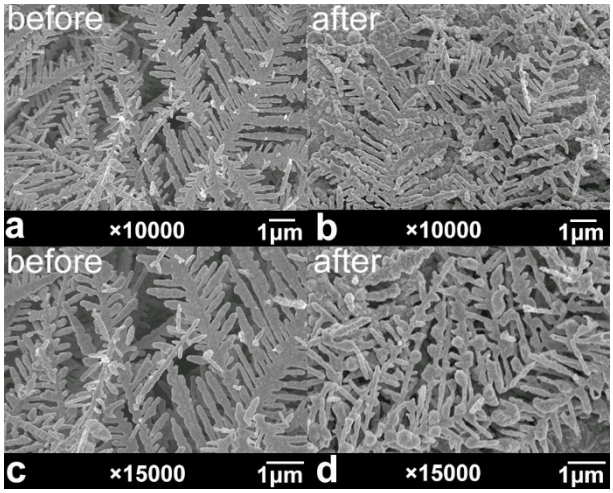


Fig. S7 SEM image of the membrane coated with silver coating before and after thermal treatment with different magnification, (a) before ,×10000,(b) after,×15000, (c) before,×10000 and (d) after,×15000.

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