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# Controllable Water Penetration through a Smart Brass Mesh Modified by Mercaptobenzoic Acid and Naphthalenethiol

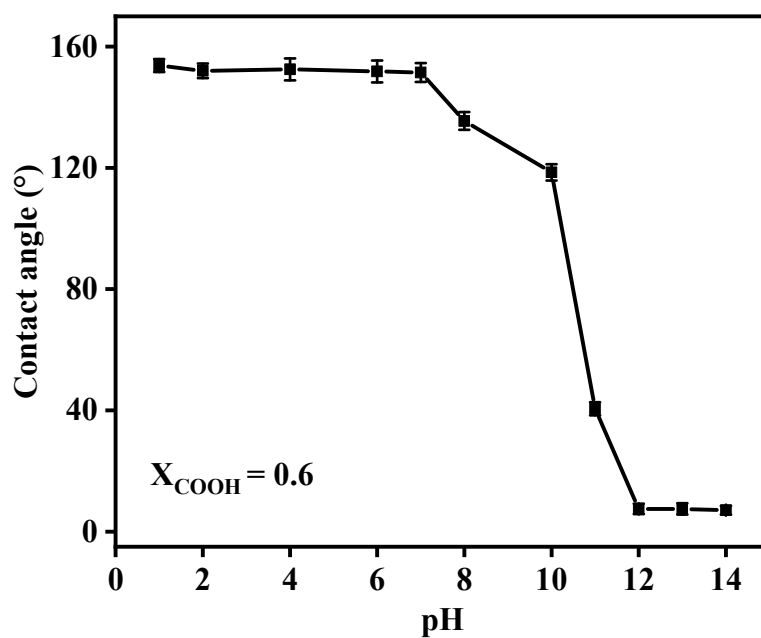
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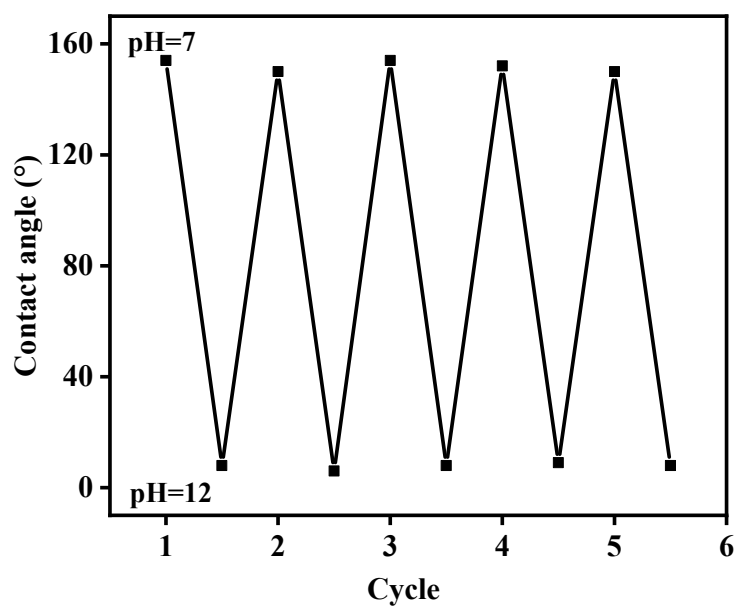
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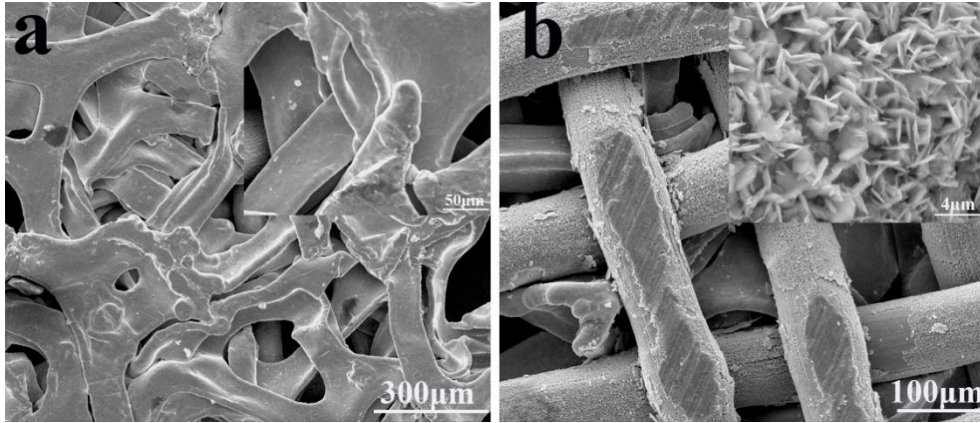
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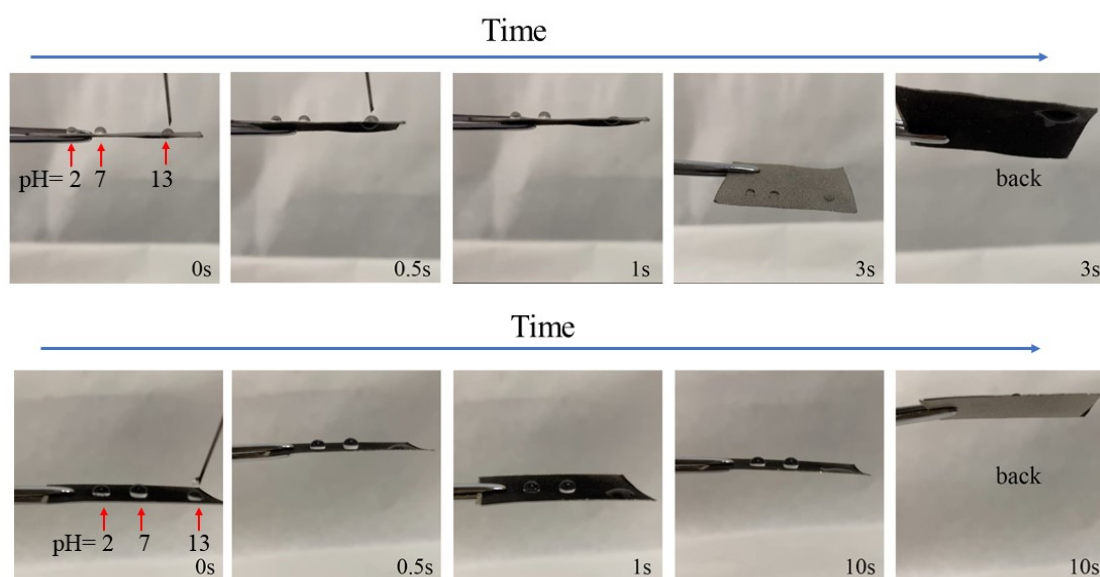
**Figure S1.** The water contact angle (WCA) curve with the pH change.



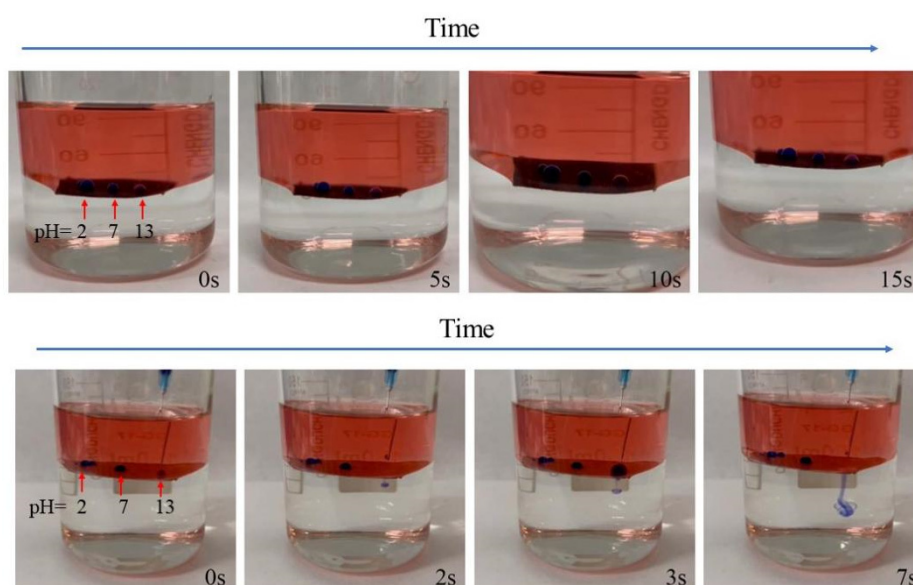
**Figure S2.** Reversible transition between the superhydrophobicity and superhydrophilicity on the rough copper mesh film (prepared with  $X_{\text{COOH}} = 0.6$ ) can be repeated by changing the water pH alternately.



**Figure S3.** SEM of the integrated membrane of hydrophobic Ni foam and smart brass mesh (inlet figures are their enlarged surface images). (a) the integrated Janus with the foam Ni as the upper layer;(b) the integrated Janus with modified Cu mesh as the upper layer.



**Figure. S4** Directional water droplet penetration across the integrated membrane in the air-water system. a) The integrated membrane only allows penetration of alkaline water droplet (pH=13) when it is positively aligned, b) and prevents all water droplets (pH=2, 7 and 13) penetration when reversely aligned.



**Figure. S5** An “on-off” control for water droplets with different pH (pH=2, 7 and 13) in the oil-water system.

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(a) liquid droplet is blocked when the integrated membrane was positively aligned at the interface, (b) liquid droplet is blocked when the membrane was negatively aligned at the interface. Light oil (n-hexane) is dyed red by Sudan III.