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Supporting Information

Ultrastable coaxial cable-likesuperhydrophobic mesh with self-adaption effect: facile synthesis and oil/water separation application

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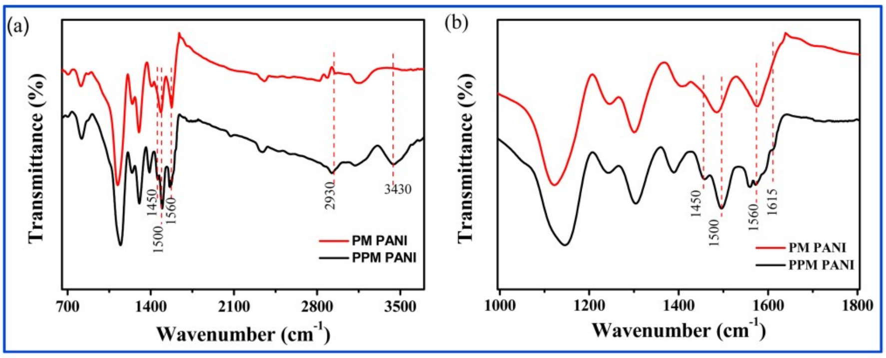

Fig. S1 FTIR spectra of the as-prepared mesh: (a) spectra of PM PANI and PPM PANI; (b) the amplificationspectra in the 1000~1800 cm^{-1} wavenumber ranges.

The surface free energy of the as-prepared mesh was calculated from the static contact angle of two liquids: water and hexane. The surface tensions, dispersion, and polar components of water and hexane were obtained from physical properties database. The surface free energy in air was obtained by modified Owens' equation:

$$\gamma_l(1+cos\theta)=2\left(\gamma_s^d\gamma_l^d\right)^{1/2}+2\left(\gamma_s^p\gamma_l^p\right)^{1/2} \quad (1)$$

$$\gamma_s=\gamma_s^d+\gamma_s^p \quad (2)$$

Where γ_s and γ_l are the surface free energy of the solid in air and liquid in air respectively. The superscripts *d* and *p* are the dispersive force and polar force components. The results are shown in Table S1.

Table S1. Surface free energy values of different surface from Owens' equation.

Liquids	surface free energy in air		
	γ_l^d(mN/m)	γ_l^p(mN/m)	γ_l(mN/m)
Water	21.6	49.6	71.2
Hexane	18.4	0	18.4
Solid surface	WCA (º)	OCA (º)	γ_s(mN/m)
PANI	35.1	6.5	58.9
PANI/SC	154.5	0	23.8
PPy	55.9	4.6	44.1
PPy/SC	153.1	0	23.6

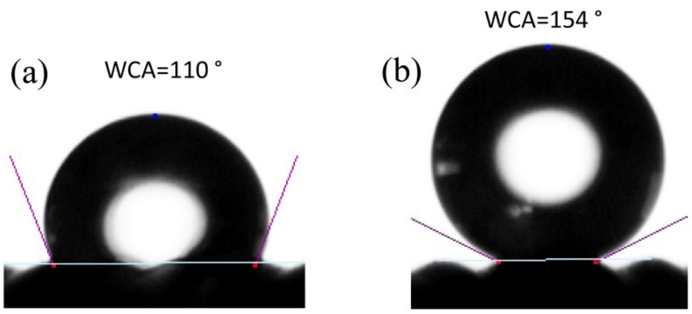

Fig. S2 (a) The PANI/SC mesh absorbed an oil film shows a water contact angle of 110°. (b) The polluted mesh shows a water contact angle of 154° after dried for 5 minutes.

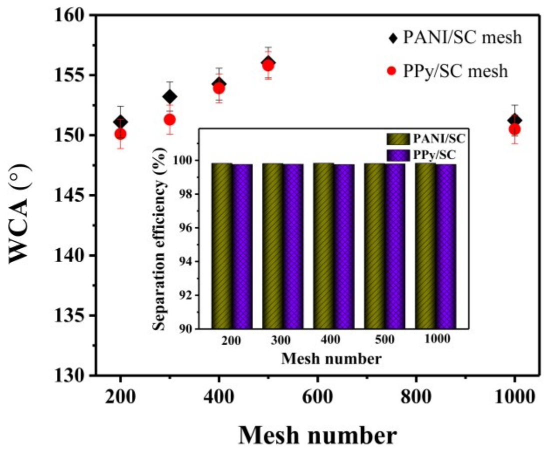

Fig. S3 Relationship between the mesh number and the water contact angle. The inset shows the effect of mesh number on separation efficiency of hexane/water mixture.

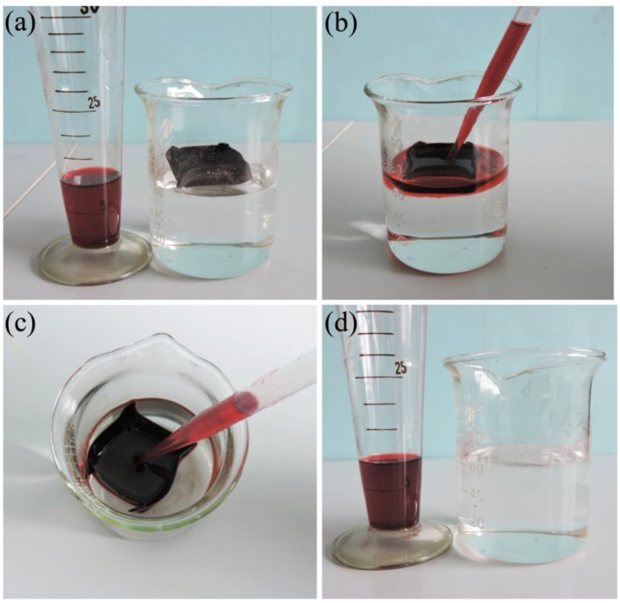

Fig. S4 (a)～(d) Process of separating hexane from water surface by using the mini box made by PANI/SC mesh.

A process for the removal of hexane from the water surface is shown in Fig. S4 and Video S4. The as-prepared PANI/SC mesh was folded into a mini box, which can float freely on the water surface. 10.0 mL of hexane (dyed with red oil O) was poured into a beaker containing 60 mL of water. Then the mini box was placed on the surface of the hexane/water mixture. Hexane was found to rapidly penetrate into the box and finally gathered in the box while water was excluded completely. The agminated hexane can be collected continuously by a dropper. As a result, almost all of the hexane was removed from the beaker and no red oil was found in the water surface. The collected hexane was about 9.7 ml, which indicated that the as-prepared PANI/SC mesh can separate oil from water surface efficiently.

Table.S2 Electrochemical corrosion measurements of bare SS mesh, PPy/SC mesh and PANI/SC mesh electrodes in 0.5 M H_2SO_4 and NaCl (5 wt%) solutions.

Electrochemical Corrosion measurements[a]			
Solution	Sample code	I_{corr}(μA/cm^2)	E_{corr}(V)
0.5 M H_2SO_4			
	Bare SS mesh	47.191	-0.286
	PPy/SC mesh	0.904	0.091
	PANI/SC mesh	1.473	0.212
NaCl (5wt%)			
	Bare SS mesh	86.440	-0.372
	PPy/SC mesh	1.414	0.064
	PANI/SC mesh	2.577	0.141

[a]Saturated calomel electrode (SCE) was employed as a reference electrode.

Video S1 The water droplet rolled off the superhydrophobic mesh surface.

Video S2 The water droplet completely departs from the surface even upon severe deformation.

Video S3 Oil/water separation process.

Video S4 Oil/water separation by using a mini box made by PANI/SC mesh.