Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

A facile method to fabricate double-layer stainless steel mesh for effective separation of water-in-oil emulsions with high flux

Yahui Cai,[a] Dongyun Chen,[a] Najun Li,[a] Qingfeng Xu,[a] Hua Li,[a] Jinghui He[a] and Jianmei Lu*[a]*

College of Chemistry, Chemical Engineering and Materials Science, Collaborative Innovation Center of Suzhou Nano Science and Technology, Soochow University, Suzhou, 215123, China

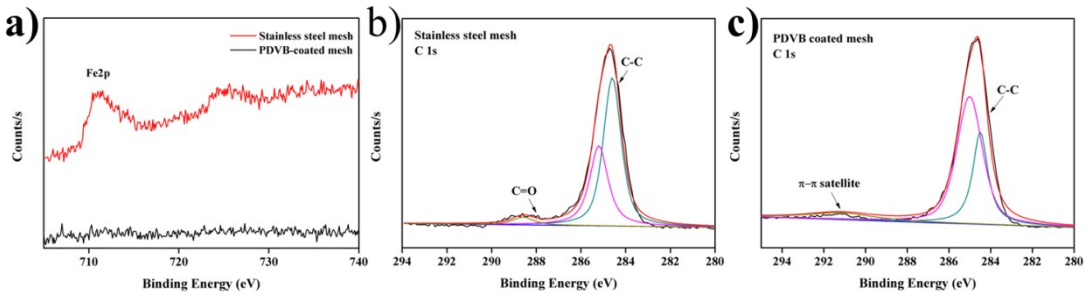

Fig S1. (a) Fe 2p analysis of the original SSM and the PDVB-coated SSM. After modification, the content of Fe significant decrease. (b) and (c) High resolution XPS C 1s of the original SSMand the PDVB-coated SSM. After polymerization, there is a peak appears at 291 eV, representing p-p satellite. All the results demonstrate that PDVB has been modified onto the SSM successfully.

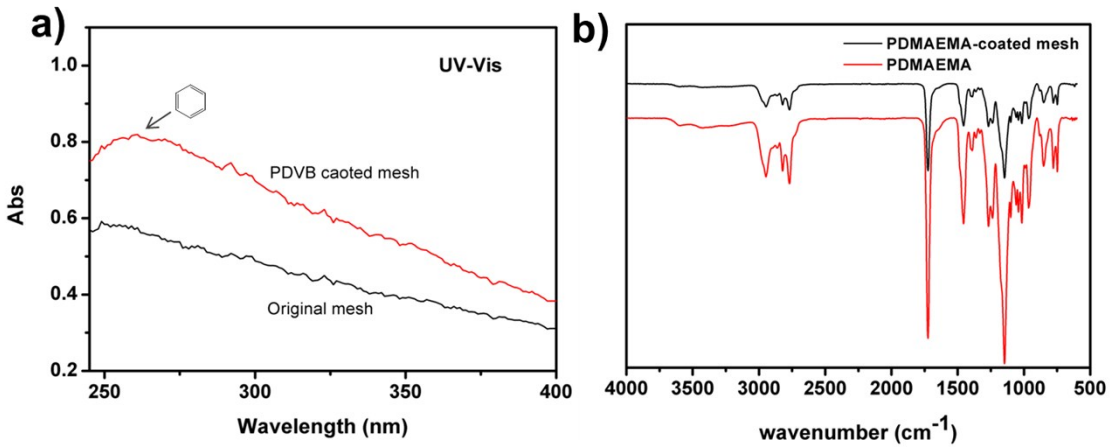

Fig S2. (a) UV-Vis spectrum of the original mesh and the PDVB decorated mesh, the peak in the range of 250-280 nm is because of the adsorption of benzene ring. (b) IR spectra of PDMAEMA-modified steel mesh and pure PDMAEMA.

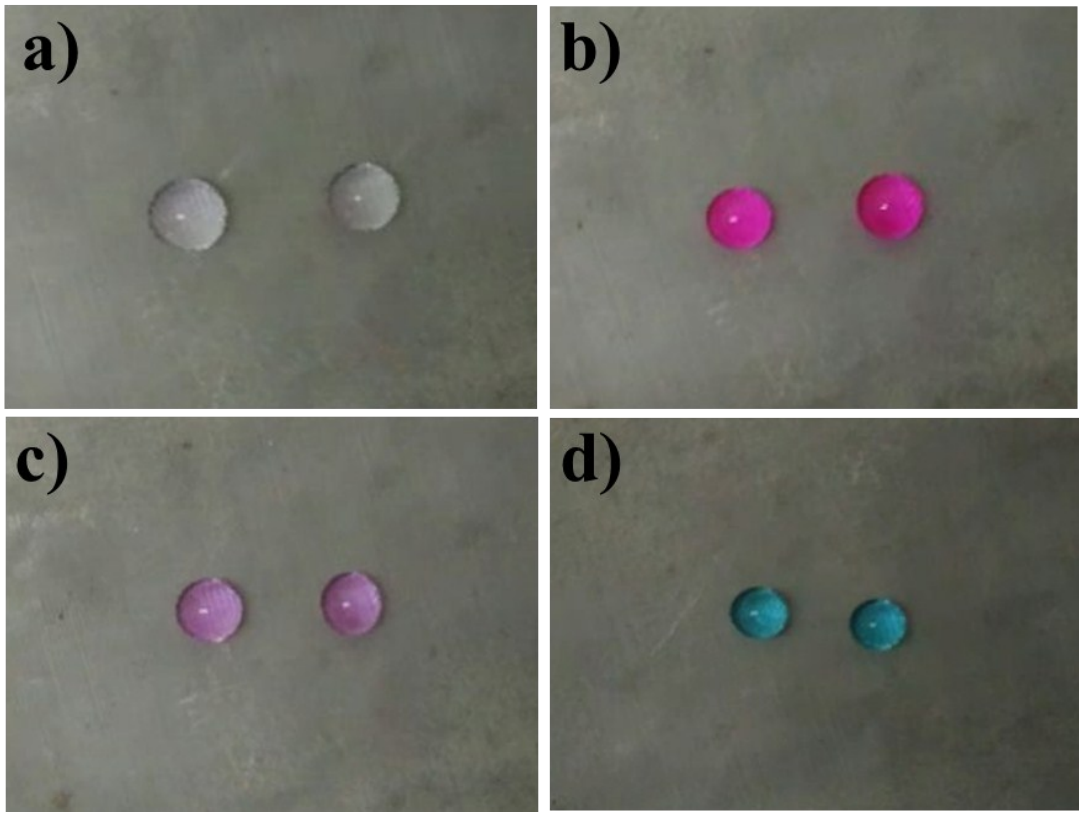

Fig S3. Photographs of the droplet to different pH values on the PDVB-coated SSM. All the droplets exhibit spherical on the surface, proving that the SSM possess excellent pH stability. (a) deionized water, (b) 1moL/L NaOH, (c) 10wt% NaCl, d) 1moL/L HCl.

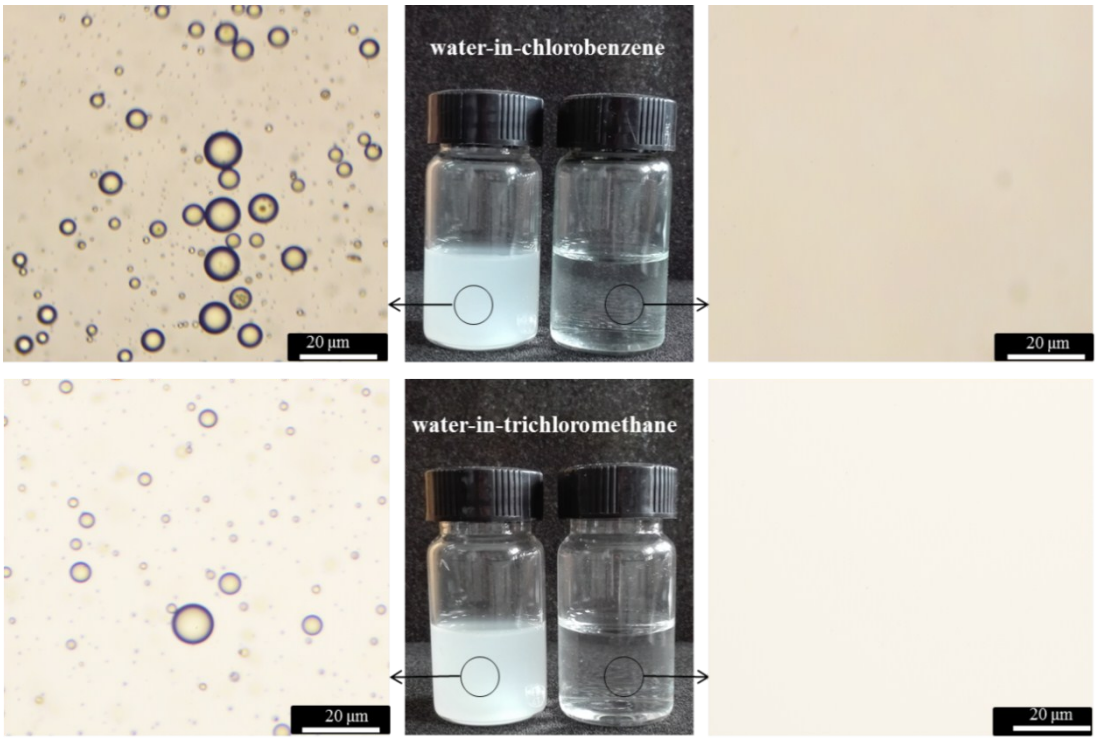

Fig S4. Photographs and optical microscope images of the demulsification results of water-in-oil emulsions: (a) water-in-chlorobenzene emulsion, (b) water-in-chloroform emulsion. After the separation, the emulsions become transparent and no droplets could be observed in the filtrates.

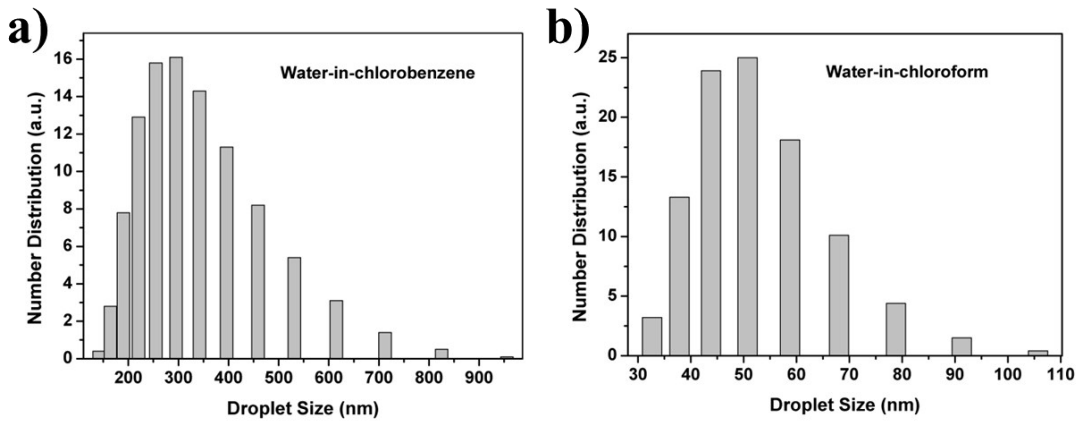

Fig S5. Droplet size distribution of different stabilized emulsions for (a) water-in-chlorobenzene emulsion, (b) water-in-chloroform emulsion.

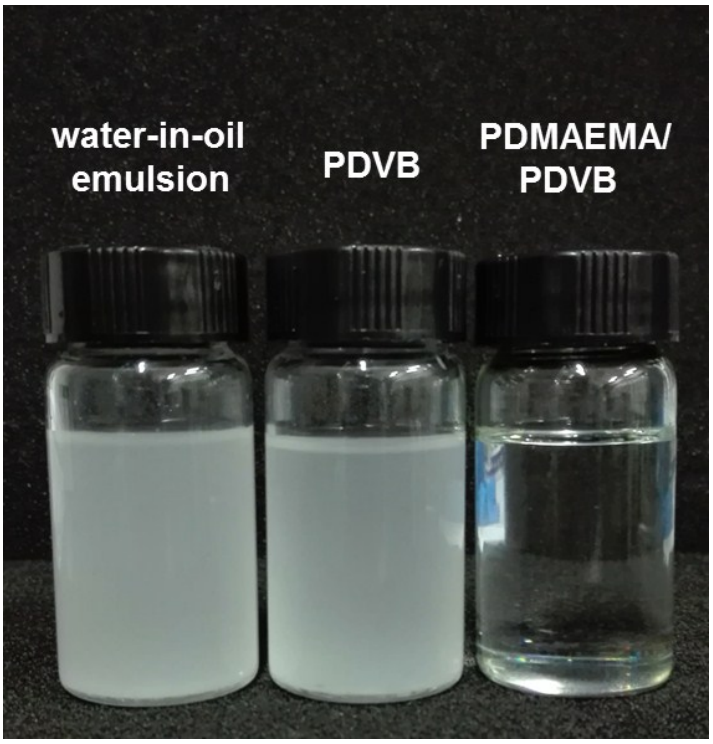

Fig S6. Emulsion separation process of the PDVB coated single-layer mesh (the middle vial) and the PDVB- and PDMAEMA- coated double-layer mesh (the right vial). The only PDVB coated mesh cannot separate water-in-oil emulsion.

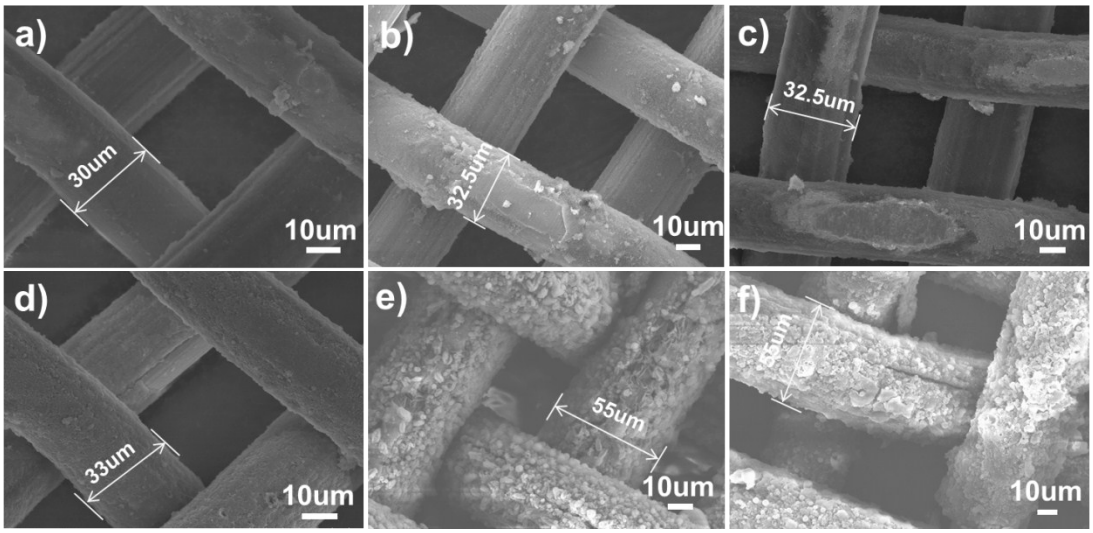

Fig S7. SEM images of the PDMAEMA coated mesh (a), (b) and (c) and the PDVB coated mesh (d), (e) and (f). (a) and (b) are the SEM images of PDMAEMA coated mesh for 12 and 24 h polymerization time, (b) and (c) are the pictures of PDMAEMA coated mesh before and after separation tests. (d) and (e) are the SEM images of PDVB coated mesh for 6 and 12 h polymerization time, (e) and (f) are the pictures of PDVB coated mesh before and after separation tests. From the pictures, the thickness of the polymer coating on mesh could be controlled by adjusting polymerization time and the surface morphology and thickness of the polymer basically remain unchanged after 10 cycles.