Supporting Information

An Eco-Friendly Manner to Prepare Superwetting Melamine Sponges with Switchable Wettability for The Separation of Oil/water Mixtures and Emulsions

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Materials

Commercial melamine sponge was purchased from BASF. HCl (37%) and Chloroform (99%) were purchased from Fluka. Sodium Laurate (>97%) was purchased from Tokyo Chemical Industry Co., Ltd.. Petroleum ether (60/80) and n-hexadecane (99%) were purchased from Alfa Aesar. Span 80, tween 80, and n-octane (98%) were purchased from Acros Organics. Isooctane (99.7%), and n-hexane (95%) were purchased from TEDIA Company Inc.

Instruments and characterization

The surface morphology was evaluated by Scanning electron microscopy (SEM; JEOLJSM-6500, JEOL. Ltd.). Attenuated total reflection Fourier transform infrared spectra (ATR-FTIR, PerkinElmer, Inc.) was used to record the surface composition of the pristine and superwetting MS. The static contact angle on the pristine and superwetting MS was evaluated through a Magic Droplet-100 contact angle goniometer (Sindatek Instruments Co., Ltd.) by injecting a 5 µL liquid droplet. To analyze water content in the permeate, a titrator Compact C10SX Coulometric Karl Fischer moisture titrator (Mettler-Toledo PacRim AG) was used. A total organic carbon analyzer (Vario TOC, Elementar) was used to measure the oil content in the filtrate. Optical microscopy images were characterized by a VHX-7000 instrument (Keyence Corp.).

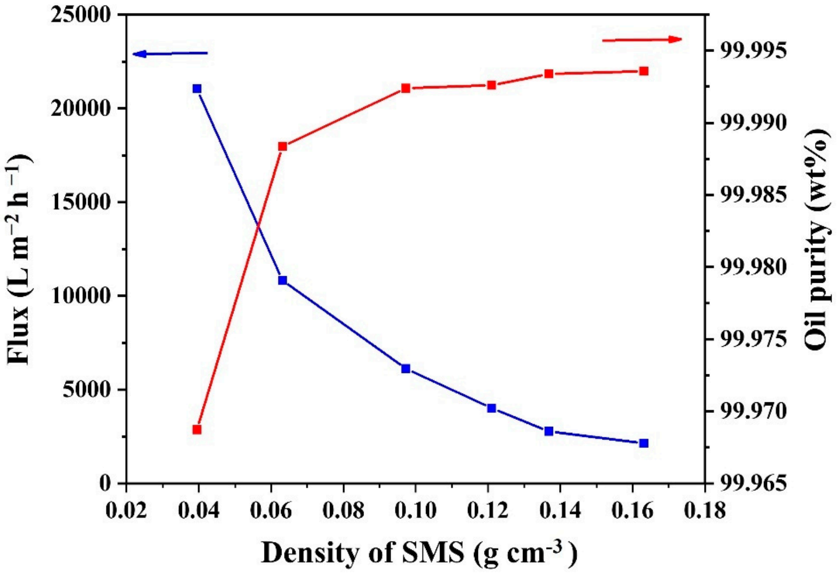

Figure S1. The changes of filtrate flux and separation performance for water-in-isooctane emulsion with increasing the density of the compressed SMS layer.

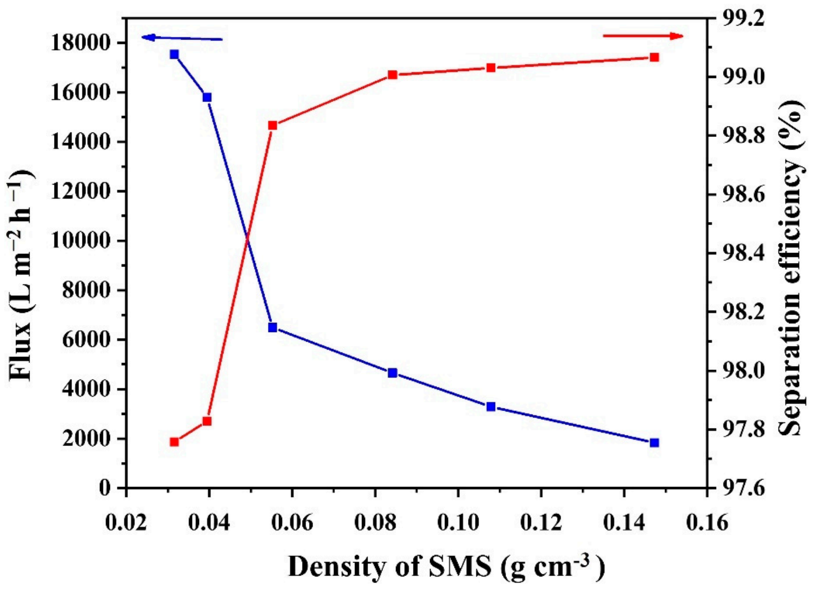

Figure S2. The changes of filtrate flux and separation efficiency for isooctane-in-water emulsion with increasing the density of the compressed SMS.

Table S1. Comparison of various superwetting materials for surfactant stabilized water-in-oil emulsion separations.

Materials	Water-in-oil emulsion separation		Reference
	Flux (L m^{-2} h^{-1})	Oil purity (wt%)	
FPBZ/SiO_2@Melamin sponge	1500	>97.6	**[S1]**
PVPh/PBO coated raw cotton	10,400	>99.98	**[S2]**
PBZ-SiO_2-MS	1300	>99.9	**[S3]**
3D Composite PXSNF	6200	>99.96	**[S4]**
Dually prewetted carbon black membrane (DCBM)	8500	>99.6	**[S5]**
Superhydrophobic copper foam	6560	>99.89	**[S6]**
Superwetting melamine sponge (SMS)	7210	>99.98	This work

Table S2. Comparison of various superwetting materials for surfactant stabilized oil-in-water emulsion separations.

Materials	Oil-in-water emulsion separation		Reference
	Flux (L m^{-2} h^{-1})	Efficiency (%)	
GO/g-C_3N_4/TiO_2 Melamine foam	1910.8	>99	**[S7]**
Superhydrophilic Ti foam	1033	>98	**[S8]**
Biomimetic hydrophilic membrane (MF-D/T-2/8)	2100	>99.6	**[S9]**
WBG (waste bricks) layer	1079	>98.4	**[S10]**
Silica-decorated microfiltration membranes	1431	>99	**[S11]**
Waste-coal fly ash (CFA)	1050	>92	**[S12]**
Superwetting melamine sponge (SMS)	5054	>98.84	This work

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