

Electronic Supplementary Information

for

Surface engineering of a superamphiphilic, self-growing fibrous Janus membrane prepared from mycelium

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1. Mycelium growth

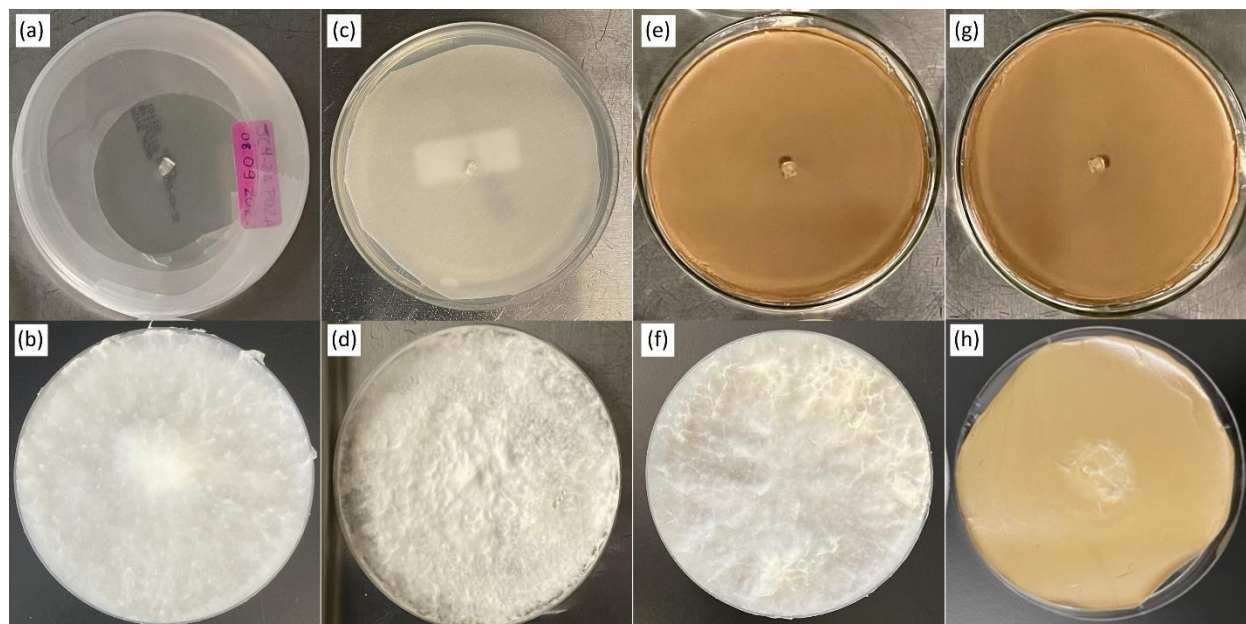


Figure S1: Optical images of mycelium growth before and after 21 days of subculture inoculation in (a, b) PDA, (c, d) PDA with PP microporous interlayer, (e, f) PDA with PBI nanoporous interlayer, and (g, h) PBI without PDA.

2. Dissolution tests

Table S1: Dissolution tests of mycelium mats performed for up to 24 h in 11 different solvents.

	H ₂ O	Acetone	MeCN ^a	Ethanol	Ethyl acetate	Methanol	DMF ^b	DMAc ^c	DMSO ^d	Chloroform	THF ^e
1 min	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
1 h	●	✖	✖	✖	✖	✖	●	●	●	✖	✖
24 h	●	✖	✖	✖	✖	✖	●	●	●	✖	✖

^a MeCN = acetonitrile, ^b DMF = dimethylformamide, ^c DMAc = dimethylacetamide, ^d DMSO = dimethyl sulfoxide, ^e THF = tetrahydrofuran

✖ Does not dissolve or swell

✖ Mild swelling

✖ Medium swelling

✖ Strong swelling

● Partially dissolves

● Strongly dissolves

● Completely dissolves

3. Thermal characterization

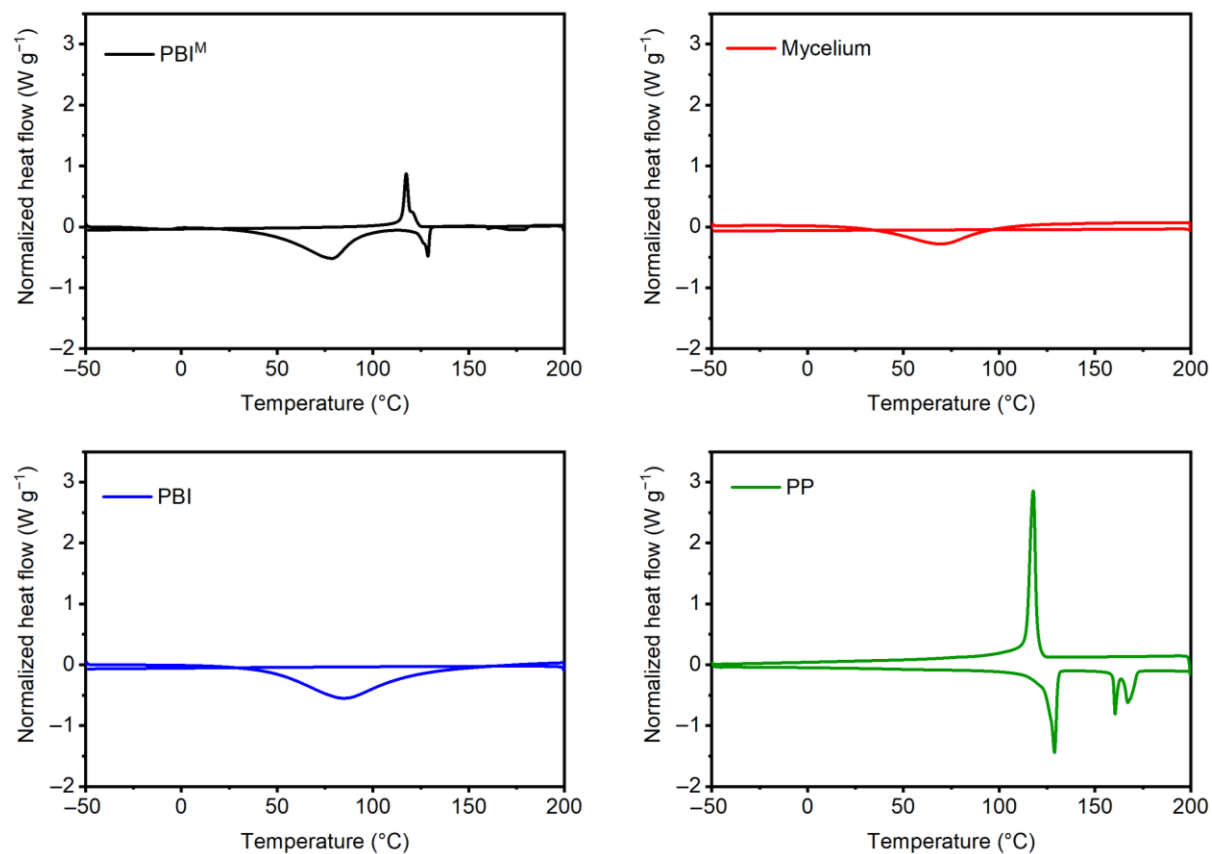


Figure S2: DSC spectra of (a) PBI^M, (b) Mycelium, (c) PBI, and (d) PP.

4. Wetting behavior

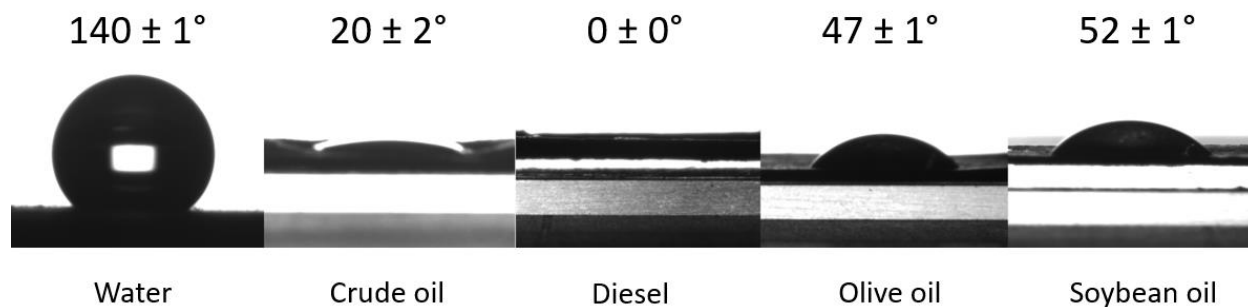


Figure S3: Water and oil contact angle for α surface of mycelium grown with a nanoporous interlayer.

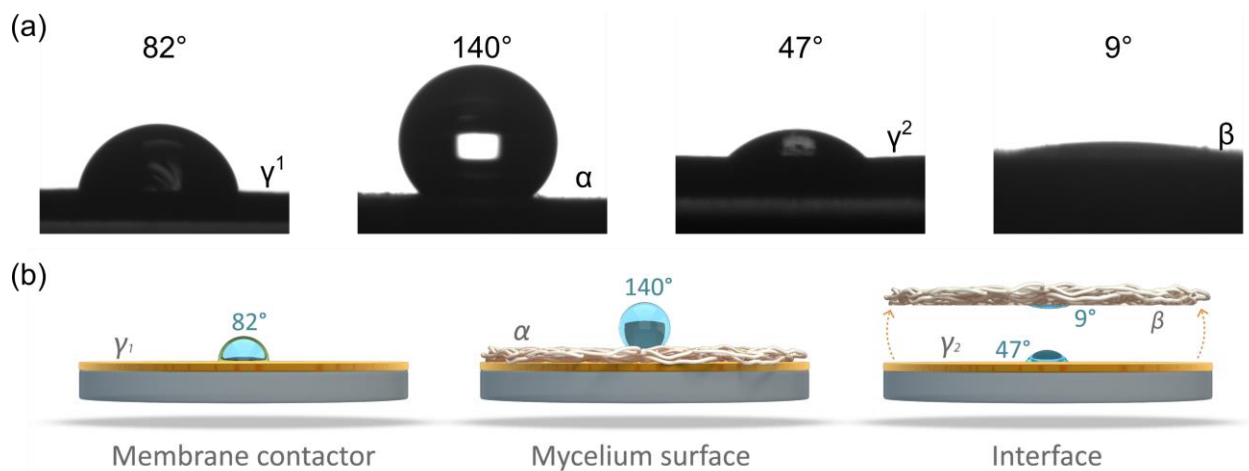


Figure S4: (a) Water contact angle at surfaces and interfaces in/between mycelium and PBI. (b) Schematic drawing defining the region of contact angle analysis.

5. Confocal fluorescence analysis

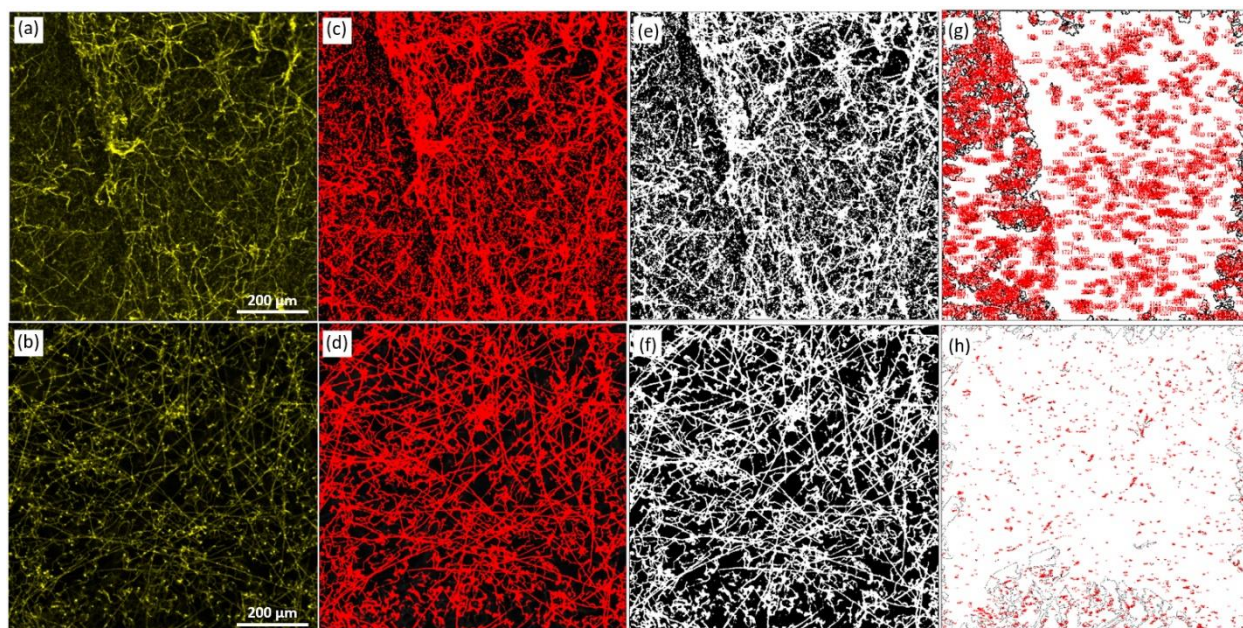


Figure S5: 2D segmentation using ImageJ at $10\times$ magnification for fluorescence microscopy: (a, b) Threshold adjustment, (c, d) applied threshold, and (e, f) fiber segmentation analysis (g, h) for (a, c, e, g) top surface and (b, d, f, h) interfacial mycelium.

Table S2: 2D segmentation results obtained using ImageJ for fluorescence optical microscopy of surface and interfacial mycelium.

	Count	Area (%)
Surface mycelium	2242	48.230
Interfacial mycelium	2876	39.896

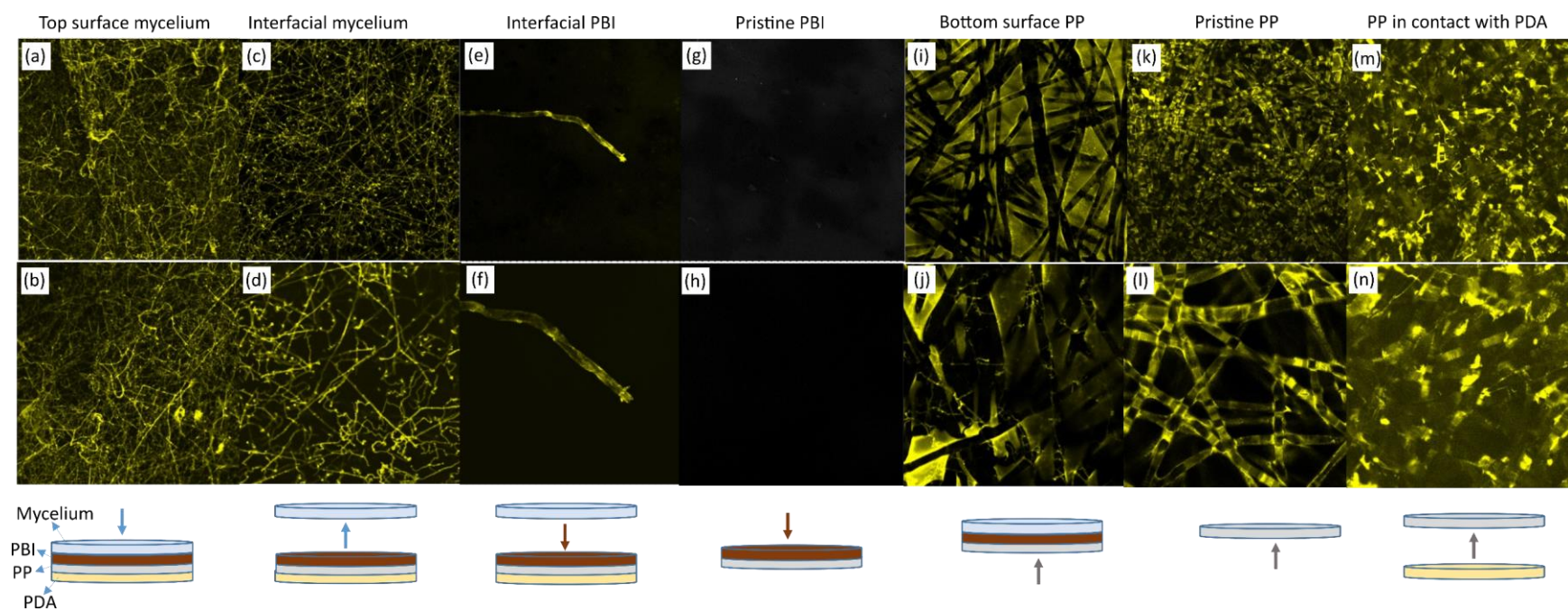


Figure S6: Fluorescence optical microscopy of the many investigated interfaces: (a, b) top surface mycelium view, (c, d) interfacial mycelium view, (e, f) interfacial PBI view, (g, h) pristine PBI view, (i, j) bottom surface PP view, (k, l) pristine PP view, and (m, n) PP in contact with PDA for 21 days. (a, c, e, g, i, k, m) 10× magnification and (b, d, f, h, j, l, n) 20× magnification.

6. Oil sorption analysis

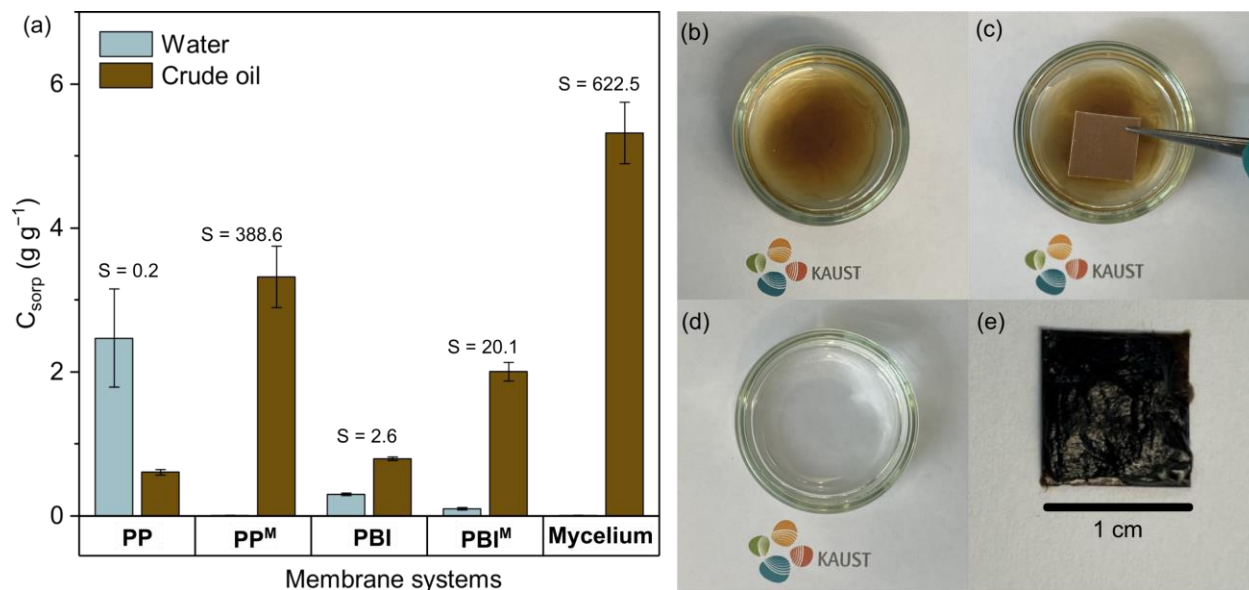


Figure S7: (a) Crude oil and water sorption after 1-min treatment for different spill remediation systems; optical photos for the treatment of crude oil spillage on water (b) before, (c) during, and (d, e) after treatment of crude oil spill.