Supporting Information

Surface Design of Separators for Oil/Water Separation with High Separation Capacity and Mechanical Stability

Yong Taek Lim[‡a], *Nara Han*[‡a], *Wooree Jang*[b], *Wooyoung Jung*[a], *Min Oh*[a], *Seung Whan Han*[c], *Hye Young Koo*[b], *and Won San Choi*[a*]

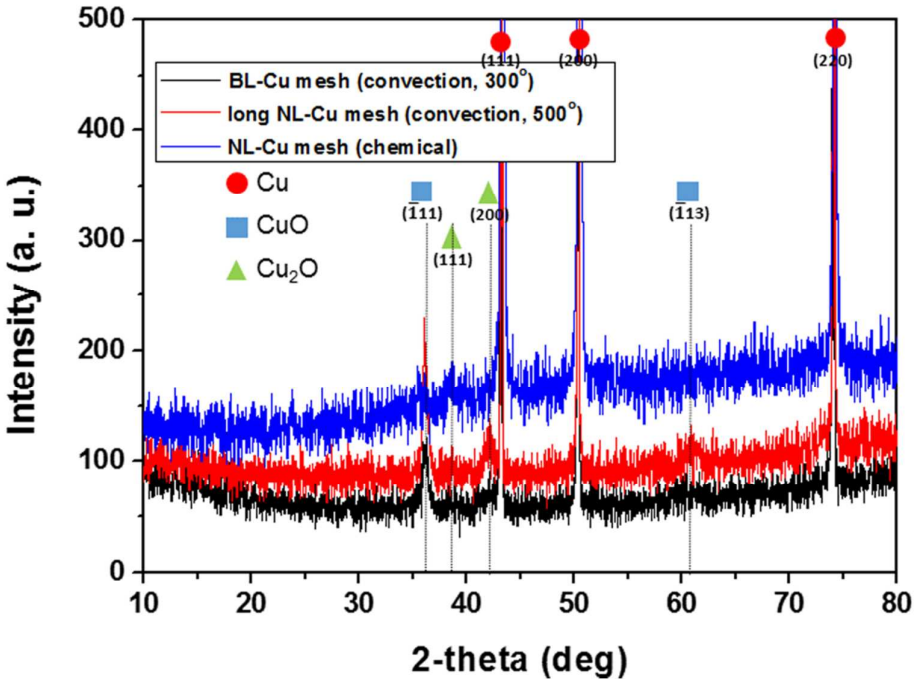


Figure S1. XRD patterns of the three types of oxidized Cu meshes.

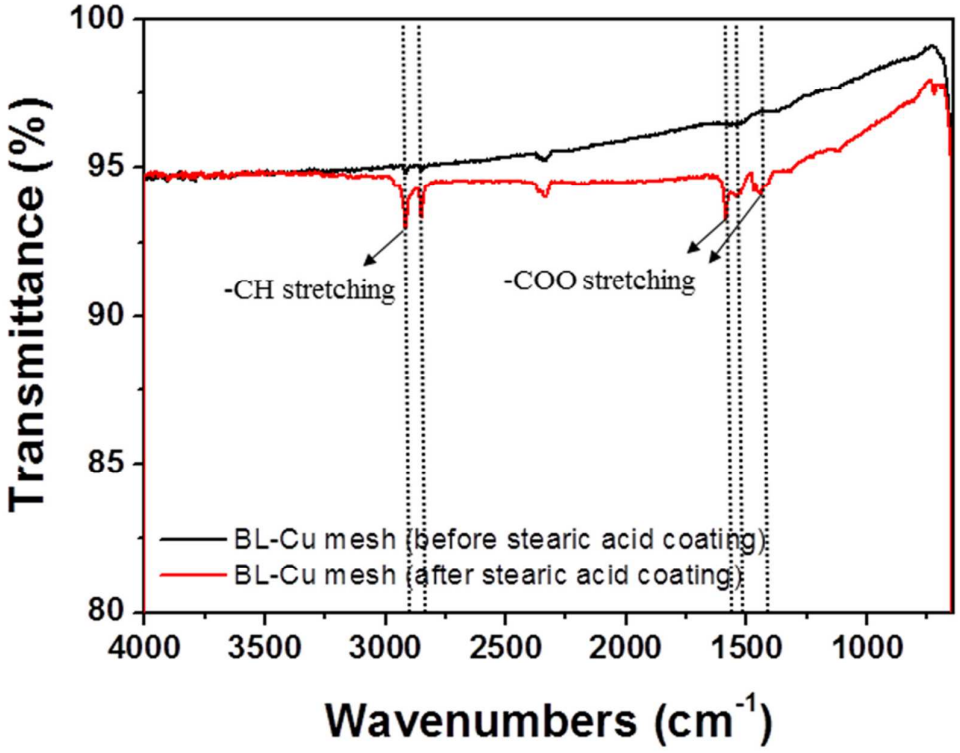


Figure S2. FT-IR spectra of BL-Cu mesh before (black line) and after (red line) the stearic acid coating.

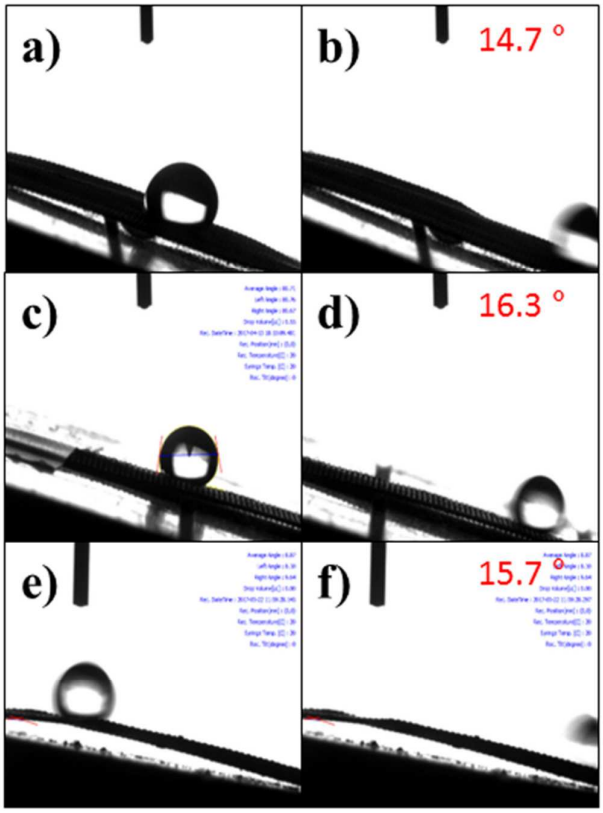
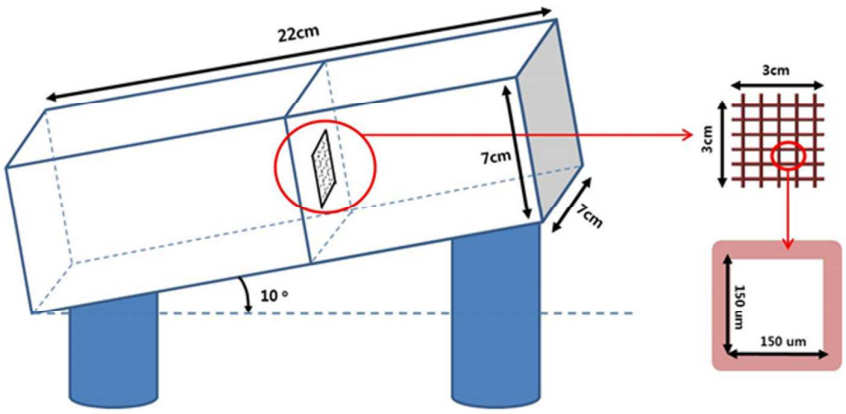


Figure S3. Water roll off angles of (a, b) BL-, (c, d) short NL-, and (e, f) long NL-Cu meshes.



Conditions	Values	Units
Volume of water	150	[ml]
Volume of soybean oil	150	[ml]
Surface tension of soybean oil	31.2	[mN/m]
Operating pressure	101,325	[Pa]
Heat flux	0 (Adiabatic)	[Pa m s^{-1}]
Total simulation time	5	[min]
Time step size	0.1	[s]

Figure S4. Schematic (top) and conditions (bottom) for the CFD simulation of oil/water separation.

1. Description of the separation system

A schematic and summary of the design conditions of the oil separation system used in the computational fluid dynamics (CFD) simulations is shown in Fig. S3. The separator is inclined at an angle of 10° to the horizontal plane and divided into two equal compartments. The upper region of the separator is filled with the water/soybean oil mixture for separation. The lower region is filled with air. Installed at the interface of the two chambers is a 150 μm mesh spanning an area of 9 cm^2, as shown in Fig. S3. Separation of the mixture occurs because of the superhydrophobicity and superoleophilicity of the mesh. The CFD simulation of the process was conducted by modelling the oil separation kinetics from experiments with user-defined functions (UDFs). The effects of surface roughness on the superhydrophobicity

of the mesh and, consequently, the separation efficiency was investigated using the bumpy and needle-shaped meshes.

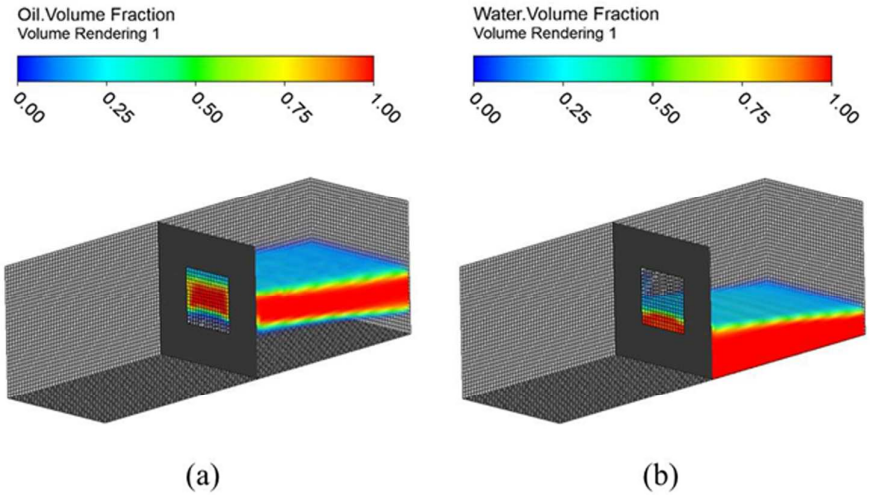


Figure S5. Concentration profiles for the (a) oil and (b) water phase under steady-state conditions.