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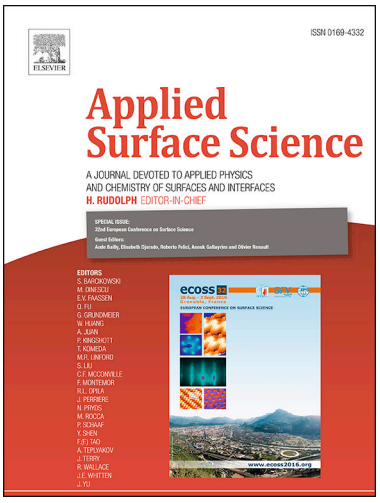

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Seeun Woo, Wonshik Kwak, Woonbong Hwang

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Sequential liquid separation using meshes with hierarchical microcube–nanohole structure and controlled surface wettability

Seeun Woo, Wonshik Kwak, and Woonbong Hwang*

Department of Mechanical Engineering, POSTECH, Pohang 37673, Republic of Korea

ABSTRACT

In actual industrial processes, in addition to separation of just water and oil, separation of multiphase liquids and separation of organic solvents are also required. Here, we demonstrate successful multiphase liquid separation by simply applying different coating materials to aluminum meshes with a hierarchical microcubic and nanohole structure. A gravity-driven multiphase separation system was designed using these meshes as the separation media, and it showed high collection rate (99%) and high content ratio (95%). The fabricated separation system could sequentially separate liquids with surface tension of ≤21.6, 21.6–32.0, and ≥32.0 mN/m by choosing a filter with the proper surface energy. Given

* Corresponding author. Tel: +82-54-279-2174. Fax: +82-54-279-5899.
E-mail address: whwang@postech.ac.kr (W. Hwang).

Abbreviations: CA, contact angle; DI, deionized; FE-SEM, field-emission scanning electron microscopy; HDFS, heptadecafluoro-1,1,2,2,-tetrahydrodecyl trichlorosilane; OTS, octadecyltrichlorosilane; SA, sliding angle; SAM, self-assembled monolayer; SBSi, sulfobetaine silane; TEOS, tetraethyl orthosilicate; XPS, X-ray photoelectron spectroscopy