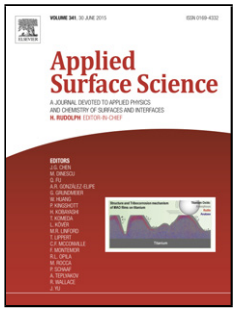

Title: Patterning of Water Traps Using Close-Loop Hydrophilic Micro Grooves

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PII: S0169-4332(16)31568-9
DOI: http://dx.doi.org/doi:10.1016/j.apsusc.2016.07.132
Reference: APSUSC 33700

To appear in: *APSUSC*

Received date: 20-4-2016
Revised date: 13-7-2016
Accepted date: 24-7-2016

Please cite this article as: Xiaolong Yang, Xin Liu, Jinlong Song, Jing Sun, Xiaohong Lu, Shuai Huang, Faze Chen, Wenji Xu, Patterning of Water Traps Using Close-Loop Hydrophilic Micro Grooves, Applied Surface Science http://dx.doi.org/10.1016/j.apsusc.2016.07.132

<AT>Patterning of Water Traps Using Close-Loop Hydrophilic Micro Grooves
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<ABS-HEAD>Highlights► Micromilling was proposed to fabricate close-loop hydrophilic micro grooves (CLHG). ► A new liquid patterning technique was realized using CLHGs. ► The wetting and sliding property on the CLHGs were investigated systematically. ► CLHG-based patterning has merits of high-efficiency and less liquid loss.

<ABS-HEAD>Abstract

<ABS-P>Milling technique was proposed to fabricate close-loop hydrophilic groove (CLHG) patterns on superhydrophobic Al alloy surface. On account of the pinning force that derives from the milled smooth grooves, water can be trapped and stretched into thin water films with different shapes on the superhydrophobic substrate. The contact angle of 13 μL water film trapped by a circular CLHG with an outer diameter of 10.3 mm was only 5.8°. Water films trapped by the CLHGs are similar to those hydrophilic/superhydrophilic patterns and have great water trapping capacity. The critical water trapping volume (CWTV) and sliding resistance of droplets on the circular CLHGs versus outer diameters and groove widths of the CLHGs were investigated. The results indicate that both the CWTV and sliding resistance are independent of the groove widths but closely related to the CLHG outer diameters. Compared with plasma-treated superhydrophilic dots, the circular CLHGs have equal CWTV and sliding resistance. This water-film patterning method has advantages like high efficiency and less liquid loss in liquid shifting processes, and