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Design of Honeycomb Structure Surface with Controllable Oil Adhesion Underwater

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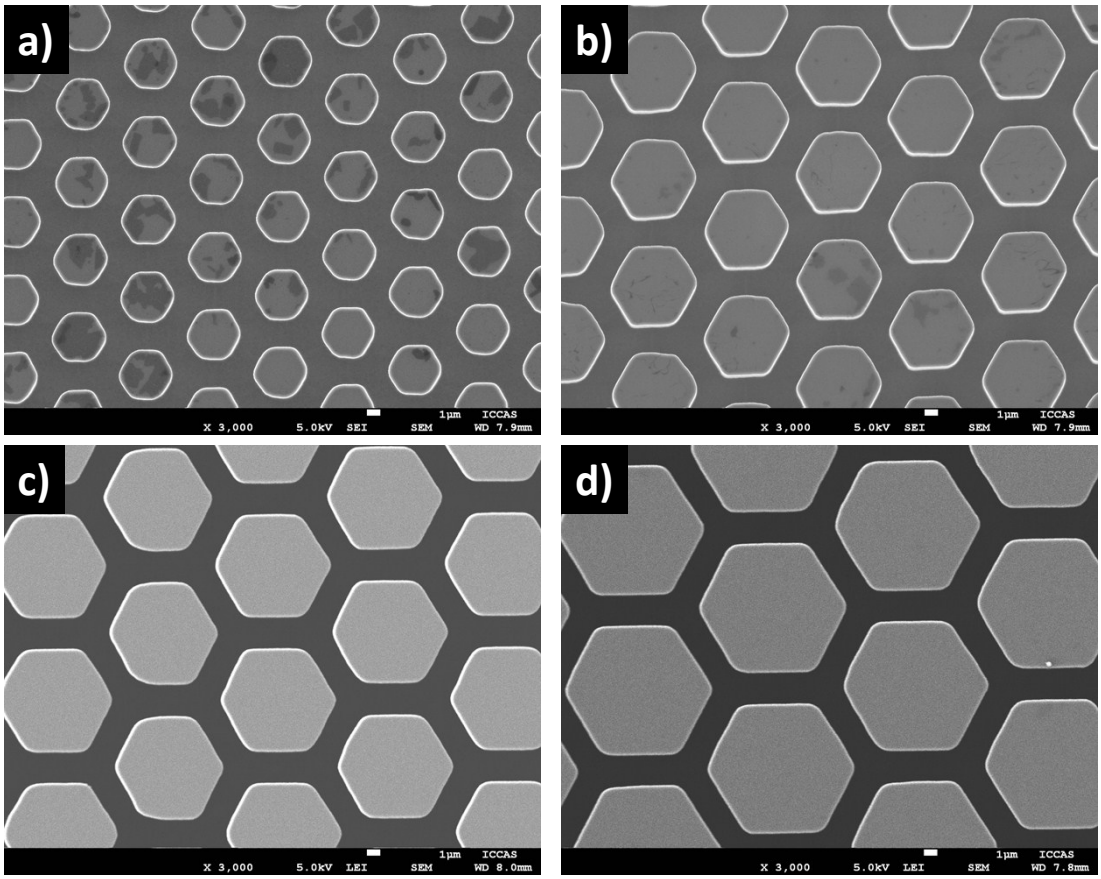

Figure S1 SEM images of hexagonal silicon pillar templates with different sizes. a) 4um, b) 6um, c) 8 um, d)10 um. The distance between two pillars is 1.5 um.

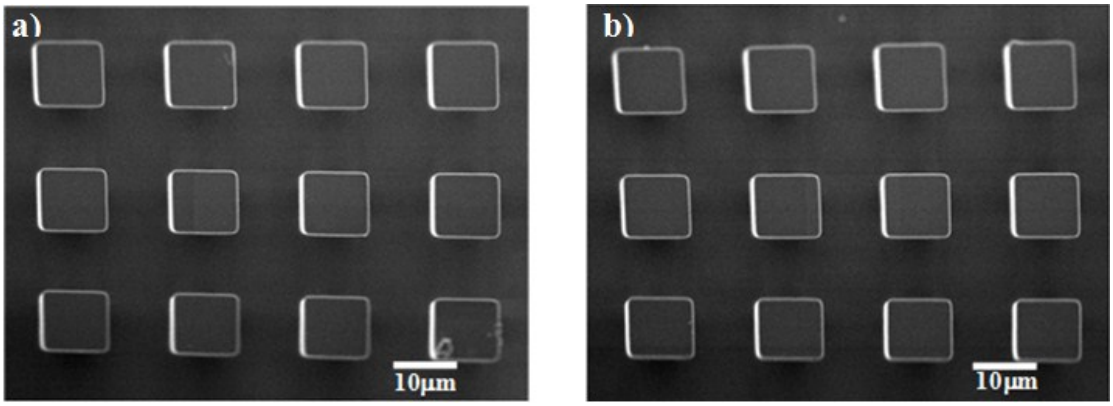

Figure S2. SEM images of a) superoleophobic square-pillar-structured silicon substrates underwater, b) oleophilic square-pillar-structured silicon substrates underwater.

Squared-pillar-structured substrate preparation and modification

Silicon wafers (4 in. in diameter, P/N doped, <100> oriented, 525 μm thick) were structured by standard photolithography techniques that can be found elsewhere[1-2]. The dimension of the silicon pillars in our experiment was 10×10 μm, the distance between two adjacent pillars was 10 μm, and the height of the silicon pillars was 10 μm. The superoleophobic pillar-structured silicon substrates underwater were prepared by treating the silicon substrates with O2 plasma in the power of 200 W for 300 s. The oleophilic pillar-structured silicon substrates underwater were prepared by silanizing the silicon substrates with FAS (1H, 1H, 2H, 2H-perfluorodecyltrimethoxysilane) in a decompression environment at 80 °C for 4 h.

[1] J. Linnros, X. Badel, P. Kleimann. *Phys. Scr,* 2006, **T126,** 72-76.

[2] T. Q. Guo, M. C. Li, L. P. Heng, L. Jiang，*Phys. Chem. Chem. Phys.,* 2015, **17**, 6242-6247.