Scaling up Nature — Large Area Flexible Biomimetic Surfaces

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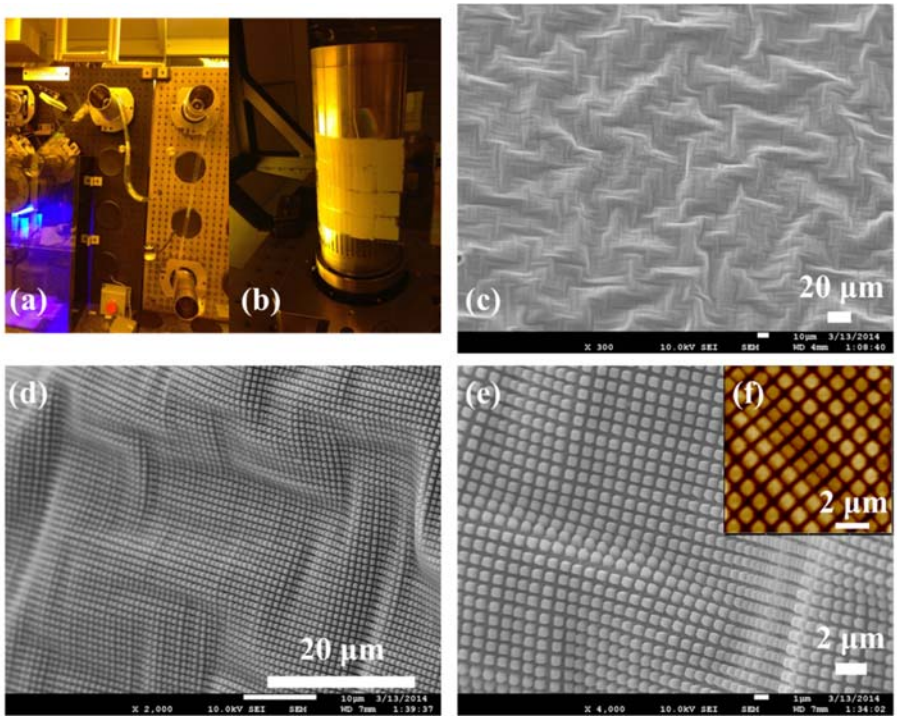

The fabrication and advanced function of large area biomimetic superhydrophobic surfaces (SHS) and slippery lubricant infused porous surfaces (SLIPS) are reported. The use of roll-to-roll nanoimprinting techniques enabled the continuous fabrication of SHS and SLIPS based on hierarchically wrinkled surfaces. Perfluoropolyether (PFPE) hybrid molds were used as flexible molds for roll-to-roll imprinting into a newly designed thiol-ene based photopolymer resin coated on flexible polyethylene terephthalate (PET) films. The patterned surfaces exhibit feasible superhydrophobicity with a water contact angle around 160° without any further surface modification. The SHS can be easily converted into SLIPS by roll-to-roll coating of a fluorinated lubricant, and these surfaces have outstanding repellence to a variety of liquids. Furthermore, both SHS and SLIPS display anti-biofouling properties when challenged with Escherichia coli K12. The current report describes the transformation of artificial biomimetic structures from small, lab scale coupons to low cost, large area platforms. This work is supported by the Center for Hierarchical Manufacturing (CHM), a NSF Nanoscale Science and Engineering Center (CMMI-1025020). *(last edited June 6, 2015)*