Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Ultrasmooth, Polydopamine Modified Surfaces for Block Copolymer Nanopatterning on Inert and Flexible Substrates REIKA KATSUMATA, JOON HEE CHO, SUNSHINE ZHOU, CHAE BIN KIM, AUSTIN DULANEY, The University of Texas at Austin, DUSTIN JANES, U.S. Food and Drug Administration, CHRISTOPHER ELLISON, The University of Texas at Austin — Nature has engineered universal, catechol-containing adhesives that can be synthetically mimicked in the form of polydopamine (PDA). We exploited PDA to enable block copolymer (BCP) nanopatterning on a variety of soft material surfaces in a way that can potentially be applied to flexible electrical devices. Applying BCP nanopatterning to soft substrates is challenging because soft substrates are often chemically inert and possess incompatible low surface energies. In this study, we exploited PDA to enable the formation of BCP nanopatterns on a variety of surfaces such as Teflon, poly(ethylene terephthalate) (PET), and Kapton. While previous studies produced a PDA coating layer too rough for BCP nanopatterning, we succeeded in fabricating conformal and ultra-smooth surfaces of PDA by engineering the PDA coating process and post-sonication procedure. This chemically functionalized, biomimetic thin film (3 nm thick) served as a reactive platform for subsequently grafting a surface treatment to perpendicularly orient a lamellae-forming BCP layer. Furthermore, we demonstrated that a perfectly nanopatterned PDA-PET substrate can be bent without distorting or damaging the nanopattern in conditions that far exceeds typical bending curvatures in roll-to-roll manufacturing.

Reika Katsumata
The University of Texas at Austin

Date submitted: 05 Nov 2015 Electronic form version 1.4