Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Wetting Transition and Directed Assembly of Block Copolymers on UVO Tunable Nanopatterned Elastomeric Substrates ARZU HAYIRLIOGLU, The University of Akron, MANISH KULKARNI, IIT, Kanpur, ALAMGIR KARIM, The University of Akron — Controlled self-assembly of block copolymers (BCP) on flexible substrates will enable use of these unique structures in various future applications such as photovoltaic devices, capacitors, and high-density data storage devices. A notable challenge in this regard is that successful deployment of BCPs requires an understanding of BCP ordering properties on flexible substrate as a function of the surface chemistry, topography including patterning, roughness, stiffness, etc. In our studies, the surface energy (SE) of PDMS substrates was varied by UV-ozone exposure of the smooth elastomeric substrates and results indicated that a dewetting to wetting transition occurred with increasing PDMS surface energy. Consequently, the morphology variations in the wetting regime was fully investigated for cylinder and lamellae forming BCP films. Recently, we discovered that creating a uniform nanopatterned surface on PDMS substrates yields induced stability to BCP films. This allows to utilize the full range SE regime (20-70 mJ/m^2) to create stable BCP films and to examine the desired morphological behavior of BCP films on flexible substrates. This significant result allows us to exploit to full range of SE of flexible substrates for next generation of functional BCP films in flexible devices.

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Date submitted: 15 Nov 2013 Electronic form version 1.4