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<Invited Speaker>

Nano-Structures on Polymers Evolved by Ion Beam/Plasma

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Surface engineering of polymers has a broad array of scientific and technological applications that range from tissue engineering, regenerative medicine, microfluidics and novel lab on chip devices to building mechanical memories, stretchable electronics, and devising tunable surface adhesion for robotics. Recent advancements in the field of nanotechnology have provided robust techniques for controlled surface modification of polymers and creation of structural features on the polymeric surface at submicron scale.

We have recently demonstrated techniques for controlled surfaces of soft and relatively hard polymers using ion beam irradiation and plasma treatment, which allows the fabrication of nanoscale surface features such as wrinkles, ripples, holes, and hairs with respect to its polymers. In this talk, we discuss the underlying mechanisms of formation of these structural features. This includes the change in the chemical composition of the surface layer of the polymers due to ion beam irradiation or plasma treatment and the instability and mechanics of the skin-substrate system. Using ion beam or plasma irradiation on polymers, we introduce a simple method for fabrication of one-dimensional, two-dimensional and nested hierarchical structural patterns on polymeric surfaces on various polymers such as polypropylene (PP), polyethylene (PE), poly (methyl methacrylate) PMMA, and polydimethylsiloxane (PDMS).

Keywords: Ion beam/Plasma, Polymer, Nanostructuring