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Bio-mimetic multimodal nanostructured surfaces fabricated with self-assembling biopolymer and its applications

Rakkiyappan Chandran
Triad Polymers LLC, USA

Composite surface topographies, control and determine the properties of insect cuticles. In some cases, these nanostructured materials are a direct extension of chitin-based cuticles. The cellular mechanisms that generate these structures are unknown and involve complex cellular and biochemical "bottom-up" processes. A synthetic "top-down" fabrication nanosphere lithography techniques can generates surfaces of chitin or chitosan that mimic the native nanostructures surface of certain insect wings and eyes. Biopolymer chitin and chitosan are flexible, biocompatible and abundant in nature. The fabrication of nanostructured chitin and chitosan materials could enable the development of new properties in biopolymeric materials. Also, the ability to generate a self-masking thin film and leads to synthesis and formation of metallic nanoparticles, enables a novel and powerful new tool for generating structured composite biomaterials. These crystalline metallic nanoparticles then served as seeds for the solid-state formation of nanowires within a drop-cast thin film by providing a flexible biopolymeric/metallic nanocomposite material. This information provides insight into the mechanisms that are essential for *in vitro* nanoscale manipulation of polymer in hydrogels and other synthetic biomaterials. The biomimetic nanostructured surfaces (NSS) formed through biopolymer scaffolds have potential applications for various defense and biomedical technologies.

rakki@triadpolymers.com