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

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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 generate surfaces of chitin or chitosan that mimic the surface of the native nanostructure 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.

Biography

Rakkiyappan Chandran has completed his PhD at the age of 28 from Joint School of Nanoscience and Nanoengineering (JSNN) at the University of North Carolina, Greensboro. Prior to his PhD, he did his joint Master's Degree project from Harvard Medical School at the Wellman Center for Photomedicine, Massachusetts General Hospital and further went on being a research assistant at MIT for a year. He then Joined Triad Polymers, as a Research and Development Scientist and is also a joint consortium member of JSNN. He has published more than 20 papers in reputed international scientific and peer-reviewed journals, with a book and 3 chapters on polymeric biomaterial and tissue engineering.

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