

Inorganic and organic polymer nanocomposite synthesis and applications

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Silica and its nanocomposites are representative inorganic polymeric materials showing novel functions in the fields of energy, catalyst, electronics and nanobiotechnology. And organic polymer is being under the numerous applications. We present a simple and scalable approach to fabricate arrayed nanowire structure using combined techniques of colloidal nanolithography, deep-silicon etching, and nanomolding 1) to mimic the nanostructure of gecko foot-hairs, and 2) to fabricate transparent and flexible electrode. The artificial surface features densely packed polymeric nanopillars structure and 2 D arrayed flexible carbon nanotube based polymer sheet. The method allows both fabrication of synthetic structures in large area and direct integration of flexible membrane to assist the array of “nanohairs” in making intimate contact with the uneven surfaces. Our results indicate that a single “nanohair” exhibit a mean adhesive force of 1.84 nN. In the macroscopic scale, we demonstrate that the nanostructured surface can adhere firmly to a smooth glass substrate and inherit the self-cleaning property of the setal nanostructures found in gecko lamellae.