

FUNCTIONAL MATERIALS DESIGN AT NANOSCALE

Yannan Duan^a, Xiao Wang^a, Rafael Benavides^a, and Sadhan C. Jana^a

^a Department of Polymer Engineering, University of Akron, Akron, OH 44325, USA, E-mail: janas@uakron.edu

ABSTRACT

Template materials, such as surface aligned nanotubes or surface-anchored fullerenes are integral to research projects on tissue engineering, biomineralization, coalescing filtration, and development of ice phobic surfaces. We currently look at a number of bulk materials (e.g., aerogels and multicomponent nanofibers) in our laboratory where the investigation focuses on how the nanoscale crystalline polymer strands¹, polymeric nanofibers^{2,3}, and 5-10 nm diameter pearl-necklace silica strands⁴ can hierarchically construct the bulk structures and offer desired mechanical integrity, surface energy, and chemical functionality. It became imperative that these nanoscale strand-like elements can be easily recreated on flat, deformable substrates or packaged in three-dimensional objects of arbitrary cross-sectional shapes for potential use in tissue culture, energy harvesting, oil-water separation, and as biomaterial implants. This talk will discuss several cases on the design of nanoscale asperities on template materials.

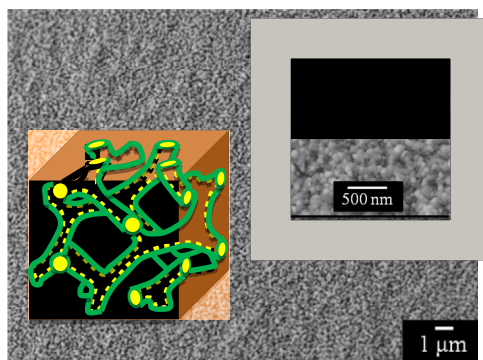


Fig. 1: The high surface area networks of sulfonated syndiotactic polystyrene gels are shown as templates for adsorption and polymerization of aniline, thereby producing electrically conductive aerogel. Such materials can dissipate electrical charge while reclaiming air.

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References:

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