Nanoporous Ultrathin Polymer Films: Synthesis and Application in Nanobioreactors

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Abstract

Synthesis of nanostructured materials “by design” and their use in fabrication of functional nanodevices requires conceptually new fabrication technologies. The goal of our work is developing a general methodology for the directed assembly of nanothin polymer films with selective pores and demonstrating their potential in the fabrication of nanobioreactors and biosensors.

Nanoporous films are formed by the polymerization of hydrophobic monomers dissolved in the interior of lipid bilayers. The pore size and/or chemical environment are controlled by the appropriate template which is mixed with the monomers and removed after the polymerization reaction. As the result of this work, we expect to produce a unique family of soft nanomaterials with nearly atomically smooth surface, pore density up to $10^{17}$ per m$^2$, and surface area as high as 1,500 m$^2$ per gram of material.

The presentation will discuss the synthesis of nanoporous films, their characterization, and application in nanobioreactors.