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Procedia Engineering 44 (2012) 1209

Procedia Engineering

www.elsevier.com/locate/procedia

Euromembrane Conference 2012

[P2.019]

iPOSS nano ultra-thin hybrid polyhedral silsesquioxane-polyamide films with potentially unlimited dimensions

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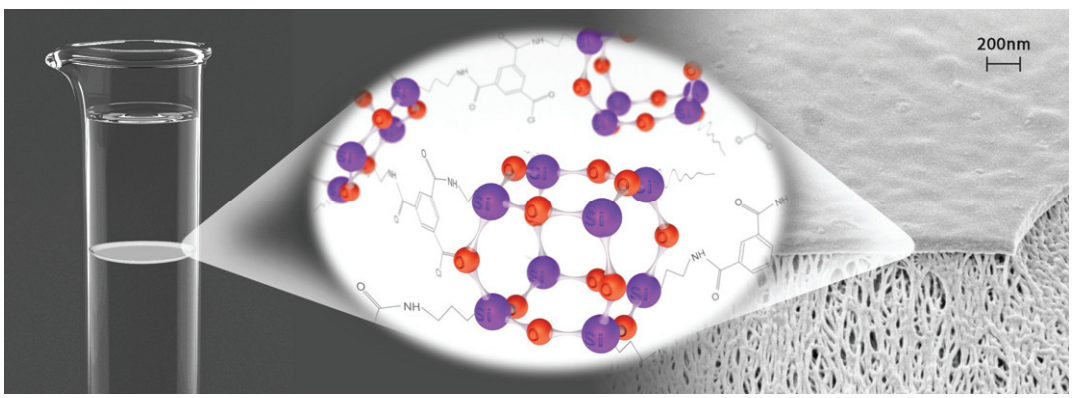
Hybrid materials combine the versatility of organic polymers with the superior thermo-mechanical properties of inorganic materials. Due to their unprecedented properties hybrid materials have great potential for applications in a variety of fields, in particular when the geometry of the material is, in one dimension, confined to the nanometer range.



Here, we report a method for the formation of hybrid polyhedral silsesquioxanes-polyamide, in the form of self-supporting or supported ultra-thin films. Our approach is based on interfacial polymerization of a polyhedral oligomeric silsesquioxane (POSS) with an acyl chloride. Confinement of the reaction to a liquid-liquid inter-phase region allows facile preparation of ultra-thin hybrid films with virtually unlimited macroscopic dimensions. The thin films are robust and flexible, and exhibit molecular selectivity in liquid permeation experiments. The proposed method allows development of a new generation of ultra-thin film hybrid networks, combining intrinsic local ordering of inorganic and organic constituents on the molecular scale with potentially infinite macroscopic dimensions.

Keywords: Hybrid organic-inorganic material, Self supporting ultra thin film, Polyhedral silsesquioxane-polyamide, Interfacial polymerization

doi:10.1016/j.proeng.2012.08.727