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An atomic force microscopy study of hybrid polymeric membranes: Surface topographical analysis and estimation of pore size distribution

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Abstract

© 2016, Pleiades Publishing, Ltd. The surface morphology of polymeric membranes as organic-inorganic block copolymers has been studied by atomic force microscopy (AFM). These hybrid block copolymers have been obtained by the polyaddition of toluene 2,4-diisocyanate to macroinitiators and the addition of oligomeric polyhedral octaglycidyl silsesquioxane (GI-POSS) as a bulky branching agent in a concentration range of 0.1–15 wt %. The AFM study of the morphology made it possible to determine the main roughness parameters and to perform topographical analysis of the surface of the polymers. The pore size distribution was evaluated by histogrammic approximation with the use of the Gauss distribution. The hypothesis of the normalcy of distribution of the experimental sample of pore diameters was confirmed by a combined criterion and Pearson's chi-square goodness-of-fit test. The effect of the GI-POSS concentration on the surface morphology and the microstructure of the organic-inorganic polymeric membranes was found to be nonmonotonic over the test concentration range.

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Keywords

atomic force microscopy, organic-inorganic polymeric membranes, polyhedral oligomeric silsesquioxane, pore size distribution, topographical analysis