Ultrafiltration Membranes from PS-b-PMMA-b-PtBA Triblock Copolymer Functionalized by Selective Modification for Ultrafiltration Membranes

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Herein, we suggest a facile approach to fabricate nanoporous structures applying functionality from triblock copolymer of polystyrene-b-poly(methyl methacrylate)-b-poly(tert-butyl acrylate) (PS-b-PMMA-b-PtBA). With casting the polymer in form of thin films, the continuous-type morphologies were achieved as perpendicular cylinder structure comprised of PMMA and minor PtBA blocks. This cylindrical morphologies were sandwiched two random orientations of cylinder in interfaces of air/polymer and polymer/neutral substrate of the film. Further with selective swelling-deswelling process of cylindrical (PMMA-b-PtBA) blocks generated nanopores with tunable pore sizes without any degradable actions. Moreover, a simple hydrolysis of minor tBA blocks functionalized the nanopore surfaces and walls into poly(acrylic acid) layers. The pH-responsive water permeability of nanoporous membranes and their active switching with respect to biomolecules such as bovine serum albumin (BSA) were performed. These results suggest a platform to fabricate a stimuli-responsive ultrafiltration membrane using a tunable multiblock copolymer.