

Nanopores in track-etched polymer membranes characterized by small-angle x-ray scattering

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Nanochannels and nanowires with diameters ranging from 30 to 400 nm were produced by etching ion tracks in thin polyarylate and polycarbonate foils. The shape and the size distribution of dry and wet nanochannels, as well as of nanowires grown therein, were examined by small-angle x-ray scattering. The x-ray intensity as a function of the scattering vector exhibits pronounced oscillations showing that both the channels and the wires have a highly cylindrical geometry and a very narrow size distribution. UV exposure before chemical etching significantly improves the monodispersity of the nanopores. For fixed etching conditions, the scattering patterns provide evidence that the diameter of dry and water-filled channels as well as for embedded nanowires are identical, demonstrating that the pores in the polymer are completely filled.