

Nanocomposites and nanomaterials

Track-etched membranes based on the modified Cyanate Ester Resins

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The present work describes the development and characterization of nanoporous membranes based on thermosetting Cyanate Ester Resins (CER) modified with linear poly(oxytetramethylene glycol) (PTMG, $M \sim 1000$ g/mol) chemically embedded into the CER network. Porous structure was formed via chemical etching of the preliminarily irradiated (with α -particles) thin CER-based films in a solution of alkaline in ethanol at 70°C under continuous stirring for 25-180 min with subsequent rinsing and drying of the materials obtained up to the constant weight. Generation of well-ordered porous structure was evidenced by using Scanning Electron Microscopy (SEM) and thermoporometry studies based on the application of Differential Scanning Calorimetry (DSC-thermoporometry), and the main porosity parameters of the samples obtained were determined as well. It was established that regardless the etching time, the nano-sized porous structure in all the samples investigated with rather narrow pore size distribution extending from 15 up to 120 nm and an obvious predominance of pore diameters sizing around 30-40 nm have been developed. Interestingly, the porosity characteristics of the films produced strongly depended on the type of the CER monomer used. Positive effect of additional γ -sensitization prior to etching procedure on the final morphology and membrane properties (namely, gas permeability, diffusion coefficient etc.) of the nanoporous materials obtained has been revealed.