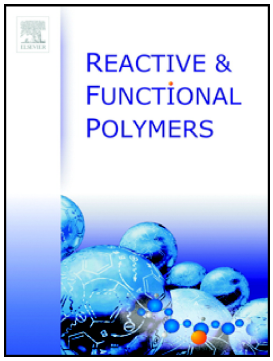

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One-pot Synthesis of Supported Hydrogel Membranes via Emulsion Templating

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Abstract:

Supported hydrogel membranes were produced by one-pot synthesis by the polymerisation of suitable emulsion templates. High internal phase emulsions (HIPEs) with styrene (St), divinylbenzene (DVB) and ethylhexyl acrylate (EHA) in the continuous phase and methacrylic acid (MAA) in the internal phase were polymerised to prepare poly(MAA) hydrogel grafted poly(St-co-DVB-co-EHA) poly(merised)HIPEs. By changing the concentration of the crosslinker, *N,N'*-methylenebisacrylamide, in the internal phase of the emulsion template the crosslinking density of the grafted poly(MAA) was tuned. The presence of the hydrogel was indicated by a change in pore morphology, e.g. coverage of the pore throats and the wrinkled pore wall surface, and the increase in the density of the composite polyHIPEs as compared to control polyHIPEs. Moreover, the increase in foam density and reduction of porosity were related to the crosslinking degree of the hydrogel. The water uptake of the composite polyHIPEs exceeded the pore volume of the polyHIPE scaffold supporting the grafted hydrogel. The permeability and rejection of aqueous solutions of polyethylene glycol (PEG) by the hydrogel grafted polyHIPE membranes were strongly pH dependent, the permeability decreased and the rejection of PEG increased with increasing pH due to the increased swelling of the hydrogel. A 91% rejection of 50kDa PEG for polyHIPE supported hydrogel membranes has been identified,