

Surface Grafting of Poly Acrylic Acid onto Nanofiltration Membranes for pH Response

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Abstract. Surface modification of membranes has been shown to increase performance without comprising the stability of the membrane. An exciting extension of this are the so-called responsive membranes; membranes whose properties can be altered through the used of an external stimulus. We have created nanofiltration membranes whose permeability can be altered dependent upon pH by modifying commercially available Dow Filmtec NF 270 membranes. Poly acrylic acid (pAA) was grafted onto the surface of the membranes using UV initiated graft polymerization. pAA undergoes a reversible conformational change when solution pH is altered above or below a certain pKa value. Above this pKa value, pAA is hydrophilic resulting in less hydrodynamic resistance. Below the pKa, pAA is hydrophobic and compressed, resulting in greater resistance. Modification was confirmed by ATR-FTIR and XPS spectroscopy as well as contact angle measurements. Flux tests were performed to demonstrate the effect of pH on membrane permeability.