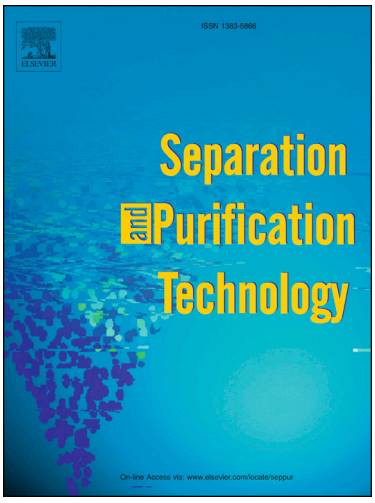

Nanopatterning commercial nanofiltration and reverse osmosis membranes

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Abstract: There have been differing views on the ability to pattern polyamide thin-film composite (TFC) membranes directly by nanoimprint lithography. The goal of this study was to understand what factors control patternability, working towards heuristics for use by the membrane community to pattern any polyamide TFC membrane. Despite completing a comprehensive set of experiments to investigate the roles played by membrane chemistry, surface properties, mechanical properties, and performance properties on pattern peak heights for thirteen commercial nanofiltration and reverse osmosis membranes, we found no correlation between the variables studied and patternability of *individual* membranes. We did discover statistically significant differences in patternability between membranes grouped by polyamide class, with those prepared by interfacial polymerization of *m*-phenylenediamine and trimesoyl chloride having the largest pattern peak heights. We further discovered that the humectant used for membrane preservation plays a role on patternability. Upon replacement of the original humectants used by the membrane manufacturers with a 15 wt% glycerol solution, the pattern peak heights approached a similar value for each membrane class. Tests performed to elucidate the role of the glycerol on patternability were inconclusive. Thus, while the humectant clearly contributes to membrane patternability, the reason why remains unknown.