# High-performance Ceramic Supported Thin Film Composite Membrane for Organic Solvent Nanofiltration

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Abstract

The commercial success of membrane-based separations processes related to water treatment has helped launch an emergent field of membrane based organic solvent nanofiltration (OSN). Aromatic polyamide, a mainstay selective layer found in reverse osmosis (RO) membranes, has demonstrated some excellent performance in OSN. RO membranes, however, are built on solvent intolerant polymers (polysulfone), thus necessitating the use of other types of supporting materials. This work demonstrates the use of ceramic ultrafiltration membranes as supports for OSN membranes. This is accomplished through traditional *in-situ* polyamide formation through interfacial polymerization. Using select ceramic tubular UF membranes provided by Fraunhofer IKTS as substrates, the resulting thin film composite (TFC) membranes (after activation with dimethylformamide) exhibit a pure methanol permeance of 26.3 $Lm^{-2}h^{-1}bar^{-1}$ with a rejection of methyl orange (327.3g/mol), acid fuchsin (585.5g/mol), chlorophyllin (724.2g/mol) and brilliant blue (792.9g/mol) of 30 %, 90%, 95%, and 91%, respectively. These are the first OSN membranes formed on tubular ceramic membranes that have a demonstrated molecular weight cutoff (with anionic dyes) of less than 1000 Da.

