

## Molecular Layer-by-Layer Assembled Thin Film Composite Membranes for Seawater Desalination

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There is a growing demand for highly-performing and durable desalination membranes. However, the conventional technique relying on interfacial polymerization (IP) to create selective layers for desalination membranes has imposed limitation in improving membrane selectivity and antifouling owing to its lack of control over the selective layer structures. In this study, we describe a molecular layer-by-layer (mLbL) assembly to prepare high-performance membranes. Sequential deposition of reactive monomers created defect-free, crosslinked, highly-selective layers whose thickness, roughness, and chemistry are controllable at the molecular length scale. The membrane performance is tunable by adjusting the deposition cycle number, and the minimal mLbL deposition leads to a significant improvement both in salt rejection and water flux compared to the IP-based membranes. Furthermore, the well-controlled surface structure achieved by mLbL deposition further improves antifouling.