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Nanoporous Membranes with Chemically-Tailored Pore Walls from Triblock Terpolymer Templates RYAN MULVENNA, Purdue University, JACOB WEIDMAN, University of Notre Dame, JOHN POPLE, Stanford Synchrotron Radiation Lightsource, BRYAN BOUDOURIS, Purdue University, WILLIAM PHILLIP, University of Notre Dame — Membranes generated from self-assembled block polymers have shown promise as highly permeable and selective filters; however, current syntheses of such materials lack diverse pore wall chemical functionality. Here, we report the facile synthesis of polyisoprene-*b*-polystyrene-*b*-poly(*N*, *N*-dimethylacrylamide) (PI-PS-PDMA) using a controlled reversible addition-fragmentation chain transfer (RAFT) polymerization mechanism to yield a macromolecule with an easily-tunable molecular weight and a narrow molecular weight distribution. The PI-PS-PDMA is then cast into an anisotropic membrane using the self-assembly and non-solvent induced phase separation process (SNIPS) protocol. These membranes can be used in size-selective separations for particles as small as 8 nm in diameter. Furthermore, the PDMA block can be converted to poly(acrylic acid) (PAA) readily in the solid state, and this PI-PS-PAA terpolymer membrane can separate particles as low as 2 nm in diameter while still retaining a relatively high flux. This is the smallest reported separation for a block polymer-based membrane to date. Additionally, the PAA-lined pores serve as a conversion platform to be tuned to any other pore chemistry, which allows the membrane to be of great utility in optimizing chemistry-specific separations.

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