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Swelling of ultrathin crosslinked polyamide water purification membranes EDWIN CHAN[1], CHRISTOPHER STAFFORD[2], National Institute of Standards and Technology — Polyamide (PA) ultrathin films represent the state-of-the-art nanofiltration and reverse osmosis membranes used in water desalination. The performance of these materials, such as permselectivity, is intimately linked with extent of swelling of the PA network. Thus, quantifying their swelling behavior would be a useful and simple route to understanding the specific network structural parameters that control membrane performance. In this work, we measure the swelling behavior of PA ultrathin films using X-ray reflectivity as a function of water hydration. By applying the Flory-Rehner theory used to describe the swelling behavior of polymer networks, we quantify the PA network properties including Flory interaction parameter and the monomer units between crosslinks. Finally, we demonstrate application of this measurement approach for characterizing the network properties of different types of PA ultrathin films relevant to water purification and discuss the relationship between network and transport properties.

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