ABSTRACT

The clean water crisis caused by high salinity has driven the development of efficient and sustainable desalination technologies. Graphene oxide (GO) is a promising membrane material due to its lamellar structure, which forms selective nanochannels; however, pristine GO membranes still suffer from fouling and poor long-term stability. This study aims to develop graphene oxide–polyamidoamine (GO–PAMAM) membranes for pervaporation desalination with enhanced performance. GO was synthesized using a modified Hummers method, while PAMAM was prepared via a Michael addition reaction. GO–PAMAM membranes were fabricated by vacuum filtration followed by crosslinking with maleic anhydride, with PAMAM volumes of 0, 0.5, 1, and 2 mL. Membrane characterization was conducted using FTIR, XRD, Raman spectroscopy, XPS, and SEM-EDX. Desalination performance was evaluated using various salt solutions in a pervaporation system. The results show that PAMAM incorporation gradually reduced the GO interlayer spacing from 0.85 nm to 0.78 nm and improved membrane morphology. The modified membranes exhibited higher water fluxes (12–15 $kg \cdot m^{-2} \cdot h^{-1}$), high salt rejection (>98% for 3.5% NaCl), stable operation over 100 h, and excellent fouling resistance with a flux recovery ratio of up to 98%. These findings demonstrate that GO–PAMAM membranes are promising candidates for efficient, stable, and fouling-resistant pervaporation desalination.