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Abstract

With the aim to enhance the hydrophilic–hydrophobic separation and thus improve the anion conductivity of diblock copolymer anion exchange membranes (AEMs), a fluorinated hydrophobic block was introduced into quaternized diblock copolystyrene. Two fluoro-containing monomers (i.e., 4-fluorostyrene (4FS) and 2, 3, 4, 5, 6-pentafluorostyrene (PFS)) were polymerized into a poly(4-vinyl benzyl chloride)-based macroinitiator (Macro-$PVBC_{263}$) via reversible addition–fragmentation chain transfer (RAFT) polymerization. This route led to the corresponding diblock copolymers $PVBC_{263}$-*b*-$P4FS_y$ and $PVBC_{263}$-*b*-$PPFS_y$, which served to prepare AEMs (i.e., $PVBC_{263}$-*b*-$PPFS_y$-OH and $PVBC_{263}$-*b*-$P4FS_y$-OH, respectively) via quaternization with trimethyl amine (TMA) and subsequent ion-exchange. As expected, the as-obtained AEMs showed well-defined lamellar morphologies, as revealed by small-angle X-ray scattering (SAXS) and atomic force microscopy (AFM). Consequently, all the fluorinated diblock copolymer-based AEMs showed