

Abstract Submitted
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Controlled morphology of Nafion[®] perfluorinated ionomer membrane and poly(vinylidene-co-trifluoroethylene) blends for swelling suppression. NADZRINAHAMIN AHMAD NAZIR, THEIN KYU, University of Akron — The major objective of the present study is concerned with the swelling suppression of Nafion[®] membrane upon hydration through blending with poly(vinylidene fluoride-co-trifluoroethylene) (PVDF-TrFE) copolymer. The phase diagram of the Nafion/PVDF-TrFE blend was established by differential scanning calorimetry, cloud point measurement, and optical microscopy. A theoretical phase diagram was calculated by self-consistently solving the combined Flory-Huggins free energy for liquid-liquid demixing and the phase field free energy for crystal solidification. The resulting phase diagram is the combined LCST-UCST and/or an hour glass type. Guided by the phase diagram, the phase separated domain morphology can be controlled to exhibit bicontinuous or dispersed domains via phase separation by solvent casting or thermal quenching. The blends thus prepared not only afford suppression of water uptake, but also render dimensional stability. Fourier transform infrared spectroscopy studies and water uptake measurement showed infallible evidence that modification of Nafion[®] with PVDF-TrFE reduces swelling upon hydration.

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