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PVDF/PVIm polymer blend films for fuel cell membranes[1] WENWEN HUANG, Tufts University, MENG ZHAO, FAN YANG, Rochester Institute of Technology, LORNE FAROVITCH, Gallaudet University, PARISA HAGHIGHI, LEONARD MACISCO, TYLER SWOB, THOMAS SMITH, Rochester Institute of Technology, PEGGY CEBE, Tufts University — We report the preparation and characterization of binary blend films of poly(vinylidene fluoride) (PVDF) and poly(1-ethyl-3-vinylimidazolium trifluoromethylsulfonimide) (PVIm+TFSI-). The potential utility of such materials in proton exchange membrane fuel cells is of particular interest. Thin PVDF/ PVIm+TFSI- films were fabricated from solutions of dimethly formamide by doctor blading. The nature of the PVDF crystalline polymorph and degree of crystallinity was evaluated as a function of the volume fraction of imidazolium polymer and thermal treatment. The morphology, thermal and mechanical characteristics of the blend films was studied by wide angle X-ray diffraction, thermogravimetry, calorimetry, and Fourier transform infrared spectroscopy. In these materials, conditions such as choice of solvent, drying conditions, and thermal treatment affect the crystal phase, crystallite size, and degree of crystallinity of PVDF as well as the distribution of PVIm+TFSI-. The beta phase of PVDF crystals dominates in as-cast films, while the alpha phase is observed after cooling from the melt. PVDF imparts mechanical strength and chemical stability to the composite films, and because of its high crystal melting point (Tm $>$ 160 C), serves to improve the high temperature stability of resulting films.

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