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Morphological and physical behavior of styrenic, phosphonium-containing ionomers RICK BEYER, KRISTOFFER STOKES, Army Research Laboratory — Despite many years of effort, a clear understanding of the factors controlling morphology in Nafion and other ionomers has not been achieved. The increasing need for fuel cell technology continues to drive efforts to develop materials having better performance characteristics even though fundamental structure-property relationships remain unclarified. Alkaline fuel cells (AFCs) present several benefits over proton exchange membrane (PEM) fuel cells, including cost of manufacture (less expensive catalysts) and a significantly shorter path to commercialization. Here we present the most recent findings from our efforts to examine structure-morphology-property relationships for a series of model cationic ionomers. A series of statistical copolymers of styrene and p-vinylbenzyl-trimethyl-phosphonium chloride have been prepared via RAFT polymerization, allowing us to investigate the effect of ion content on physical behavior. Chemical, physical, and morphological characterization has been undertaken using NMR, TGA, DSC, SAXS, and TEM.

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