

Abstract Submitted  
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**Morphology and Proton Transport in Sulfonated Block Copolymer and Mesoporous Polymer Electrolyte Membranes<sup>1</sup>** CHELSEA CHEN, Materials Sciences Division, Lawrence Berkeley National Laboratory, DAVID WONG, Department of Chemical and Biomolecular Engineering, University of California, Berkeley, KEITH BEERS, Exponent, NITASH BALSARA, Department of Chemical and Biomolecular Engineering, University of California, Berkeley — In an effort to understand the fundamentals of proton transport in polymer electrolyte membranes (PEMs), we have developed a series of poly(styrene-*b*-ethylene-*b*-styrene) (SES) membranes. The SES membranes were subsequently sulfonated to yield proton conducting S-SES membranes. We examine the effects of sulfonation level, temperature and thermal history on the morphology of S-SES membranes in both dry and hydrated states. The effects of these parameters on water uptake and proton transport characteristics of the membranes are also examined. Furthermore, building upon the strategy we deployed in sulfonating the SES membranes, we fabricated mesoporous S-SES membranes, with pores lined up with the proton conducting channels. These membranes have three distinct phases: structural block, proton-conducting block, and void. We examine the effects of pore size, domain structure and sulfonation level on water uptake and proton conductivity of the mesoporous PEMs at different temperatures.

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