Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Viscoelastic Properties and Ionic Conductivity of Block Copolymer-Based Ion Gel Electrolytes[1] SIPEI ZHANG, KEUN HYUNG LEE, C. DANIEL FRISBIE, TIMOTHY P. LODGE, University of Minnesota — The viscoelastic properties and ionic conductivity of block copolymer-based ion gels were investigated with polymer concentrations of 10 – 50 wt% over a temperature range of 25 – 200 °C. Ion gels were prepared through the self-assembly of poly(styrene-*b*-ethylene oxide-*b*-styrene) (SOS) and poly(styrene-*b*-methyl methacrylate-*b*-styrene) (SMS) triblock copolymers in a room-temperature ionic liquid, 1-ethyl-3-methylimidazolium bis(trifluoromethylsufonyl)imide ([EMI][TFSI]). The S endblocks associate into micelles, whereas the O and M midblocks are well-solvated by this ionic liquid. Under oscillatory mechanical shear, two relaxation modes have been observed in the SMS ion gels. The faster mode corresponds to the relaxation of the M midblocks in the ionic liquid, while the slow mode reflects motion of the S end blocks within their micellar cores. Comparison of the solid gels and the liquid homopolymer solutions showed that the reduction of ionic conductivity of the gels with respect to that of the solutions is relatively small, and depends primarily on the volume fraction of S micelles.

[1]This work was supported by the National Science Foundation through the MRSEC program at the University of Minnesota.

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Date submitted: 30 Nov 2010 Electronic form version 1.4