Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

High Performance Electroactive Polymer Actuators Based on Sulfonated Block Copolymers Comprising Ionic Liquids ONNURI KIM, MOON JEONG PARK, Pohang Univ of Sci & Tech — Electroactive polymer (EAP) actuators that show reversible deformation under external electric stimulus have attracted great attention toward a range of biomimetic applications such as microsensors and artificial muscles. Key challenges to advance the technologies can be placed on the achievement of fast response time, low driving voltage, and durable operation in air. In present study, we are motivated to solve these issues by employing self-assembled block copolymers containing ionic liquids (ILs) as polymer layers in the actuator based on knowledge of factors affecting electromechanical properties of actuators. By controlling the block architecture and molecular weight of block copolymers, bending strain and durability were controlled in a straightforward manner. It has also been revealed that the type of IL makes impact on the EAP actuator performance by determining ion migration dynamics. Our actuators demonstrated large bending strains (up to 4%) under low voltages of 1-3V, which far exceeds the best performance of other EAP actuators reported in the literature. To underpin the molecular-level understanding of actuation mechanisms underlying the improved performance, we carried out in situ spectroscopy and in situ scattering experiments under actuation.

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Date submitted: 13 Nov 2014 Electronic form version 1.4