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All Solid State Rechargeable Lithium Batteries using Block Copolymers DANIEL HALLINAN, NITASH BALSARA, U.C. Berkeley — The growing need for alternative energy and increased demand for mobile technology require higher density energy storage. Existing battery technologies, such as lithium ion, are limited by theoretical energy density as well as safety issues. Other battery chemistries are promising options for dramatically increasing energy density. Safety can be improved by replacing the flammable, reactive liquids used in existing lithium-ion battery electrolytes with polymer electrolytes. Block copolymers are uniquely suited for this task because ionic conductivity and mechanical strength, both important properties in battery formulation, can be independently controlled. In this study, lithium batteries were assembled using lithium metal as negative electrode, polystyrene-b-poly(ethylene oxide) copolymer with lithium salt as electrolyte, and a positive electrode. The positive electrode consisted of polymer electrolyte for ion conduction, carbon for electron conduction, and an active material. Batteries were charged and discharged over many cycles. The battery cycling results were compared to a conventional battery chemistry.

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