



PHYSICS AND ASTRONOMY COLLOQUIUM

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“All-Solid Lithium Batteries and the Clean Energy Landscape”

Abstract

Microstructured block copolymers enable the design of membranes with optimized channels for transporting charged species in lithium batteries. Block copolymer electrolytes with soft lithium-conducting channels embedded in hard insulating matrices exhibit unusual properties. In contrast to current liquid and solid electrolytes, the ionic conductivity of the electrolyte increased with increasing molecular weight, thus enabling optimization of both its electrical and mechanical properties. The ability of block copolymer electrolytes to prevent the formation of lithium dendrites is demonstrated. It is also possible to design block copolymers wherein one of the microstructures conducts electrons while the other conducts lithium ions. We demonstrate the potential for using these polymers in lithium battery electrodes. Of particular interest is the fact that cell potential can be used to control electron transport which, in turn, can be used to control the battery characteristics. In contrast to conventional lithium ion batteries which contain flammable liquid electrolytes, the batteries discussed here are made up entirely of nonflammable solids. This makes all-solid batteries suitable for large applications like automobiles and electric grid back-up.

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3:30 p.m.

Bob Wright Centre

Room A104