

Development of Solid Electrolyte Membranes for Use in Lithium Water Batteries

Robert E. Doe and Michael J. Wagner

Lithium metal in combination with water is a highly attractive power source because of the high specific energy for this system. In order to harness the energy that this system is capable of producing many obstacles must be overcome because of the vigorous nature of the reaction between lithium and water. Parasitic reactions must be controlled so as not to passivate the lithium or consume it totally. Production of hydrogen gas is also another detrimental effect of these reactions. As a result it is difficult to maintain high voltage and control the current density in these systems.

In order to overcome these obstacles we are developing composite membranes of various lithium-ion conducting solid electrolytes and polymers. Lithium-ion conducting solid electrolytes are known to achieve ionic conduction of up to 10^{-3}S/cm^2 . By using these materials in conjunction with polymers we are able to create durable, hydrophobic membranes that allow us to limit the parasitic reactions as well as to simplify the overall design of this system. Results of the experiments will be presented herein.