Physics-Based Modeling of Lithium Ion Cells and Batteries

ABSTRACT: Physics-based mathematical models of lithium ion cells and batteries will be presented. These models are used in a variety of ways such as specifying the cell or battery design criteria to meet the design requirements of a battery for a particular application. One such requirement is the lifetime of the battery, which is of particular importance in satellite batteries and electric vehicles. The lifetime of the battery depends strongly on how it is used and where it is used. Experimental data obtained from cells can be used to develop the capability of predicting the lifetime of lithium ion batteries. Some methods for carrying out such predictions will be presented in this seminar.

BIO: Dr. Ralph E. White is a Professor and Distinguished Scientist in the Department of Chemical Engineering at the University of South Carolina. He received his PhD from the University of California at Berkeley in 1977. Dr. White has authored or coauthored over 306 peer-reviewed journal articles. Currently, members of his research group are working on projects in the areas of fuel cells, batteries, and numerical methods. Their work on fuel cells and batteries consists of developing physics based models for use in design and lifetime predictions. Their work on numerical methods consists of developing efficient algorithms to solve the equations that represent the phenomena that occur in electrochemical and chemical systems. His work is funded by government agencies and companies. Dr. White has received several awards and he is a Fellow of The Electrochemical Society and an AIChE Fellow.