

Nanoscale Organisation and Dynamics Group

University of Western Sydney



Understanding Molecular Associations and Transport in Ion-Dense Electrolytes

Prof. Louis A. Madsen

Department of Chemistry and Macromolecules and Interfaces Institute
Virginia Tech
Blacksburg, Virginia, USA

Abstract

Electrolytes based on ionic liquids (ILs) are under development for safer and more efficient batteries, as well as for other devices such as artificial muscle actuators. Transport behaviors of IL cations and anions, as well as dopant ions such as Li^+ , Na^+ , or Zn^{2+} , are regulated by a wealth of non-covalent interactions. The resulting ion aggregations drive the properties of ion-dense electrolytes, which in turn affect the performance of electrochemical devices. We are using chemically specific NMR diffusometry as well as electrophoretic NMR (ENMR) to separately measure the diffusion coefficients and mobilities of cations and anions. We can thus quantify the contributions of individual charged species to the total ionic conductivity and can assess subtle ion clustering effects. We will discuss our further understanding of conduction mechanisms in such ion-dense electrolytes.

Profile

Lou grew up in the shadow of the University of Wisconsin-Madison (USA), majored in chemistry at Grinnell College in Iowa, obtained his PhD at Caltech, and did postdoctoral work at University of North Carolina-Chapel Hill and Victoria University of Wellington, New Zealand. Since joining Virginia Tech in 2006, Lou's research has focused on investigating the fundamental behaviors of soft materials such as ionic polymer membranes, liquid crystalline polymers and surfactants, and ionic liquids using multi-modal NMR techniques. Lou is currently spending sabbatical research leave in Prof. Maria Forsyth's Lab at Deakin University in Melbourne.

Staff and students at all levels are welcome to attend.

Venue and Time:

This talk will be held on Tuesday April 1 at 2 pm at the Campbelltown Campus in Building 4, Lecture Theatre 2(CA 04.G.17).

Enquiries:

Prof. William S. Price

Ext. 3336

e-mail: w.price@uws.edu.au