



Università di Padova

Dipartimento di Ingegneria Industriale

Giovedì 11 luglio 2019 alle ore 15.00

presso l'Aula RH01, Via Marzolo 9 (ex-Fisica tecnica)

Il Prof. Steve G. Greenbaum

CUNY Distinguished Professor of Physics
Hunter College of CUNY (NY, USA)

Terrà un seminario dal titolo:

**Recent liquid state and solid state NMR investigations
of battery electrolytes**

Our laboratory is focused on application of various nuclear magnetic resonance (NMR) techniques to help understand structure and dynamics of energy storage materials, in particular novel electrolytes. In this presentation we discuss three recent collaborative efforts.

- (i) The first topic, in collaboration with Oak Ridge National Lab (R. Ruther, J. Nanda), is on low molecular mass polyethers (i.e. glyme) -based electrolytes being developed for lithium metal and Na ion batteries as well as electrolytic double layer capacitors. Though electrochemically more stable than the carbonates, NMR and vibrational spectroscopic measurements show that significant ion pairing is evident in these electrolytes.
- (ii) In collaboration with UCLA (B. Dunn, D. Ashby), we have investigated ionogels, which are pseudo-solid-state electrolytes consisting of the IL BMIM TFSI plus LiTFSI salt electrolyte confined in a mesoporous inorganic matrix. We report here NMR measurements of ionic self-diffusion coefficients as well as broadband relaxometry with emphasis on elucidating confinement effects of the silica matrix on ionic transport.
- (iii) With Ionic Materials, Inc. (M. Zimmerman, R. Leising), we discuss results for a solid polymeric electrolyte based on semicrystalline polyphenylene sulfide and LiTFSI. This polymer electrolyte can be reliably extruded into thin films, is non-flammable, has attractive mechanical properties for lithium dendrite suppression, is electrochemically stable against Li, and is compatible with a variety of different cathodes, including NMC811. NMR diffusometry measurements reveal Li room temperature self-diffusion coefficients that are the highest in any known solid.

Il Direttore di Dipartimento
Prof. Massimo Guglielmi

Prof. Vito Di Noto
