

Internal Seminar

Development of Lithium Superionic Conducting Solid Polymer Electrolyte & Construction of a low temperature Dielectric Cell

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Recent security threats in conventional liquid electrolytes based Li-ion batteries invoke the search for high ionic conductivity solid electrolytes (SEs) for solid state batteries. In the talk, the development of a polymer superionic (conductivity $>1 \text{ mS cm}^{-1}$) SE will be discussed and this SE brings the other exotic properties such as high Li-ion transport number (~ 0.69) with large electrochemical window (2-5 V), high mechanical robustness and flexibility (Young's modulus $\sim 1 \text{ MPa}$), visible light transparency ($\sim 85\%$), and hydrophobicity (contact angle $>100^\circ$). Poly(ethylene oxide) (PEO) and poly(dimethyl siloxane) (PDMS) based polymer eutectic mixture is served as the Li-ion transport membrane, and lithium perchlorate (LiClO_4) as the Li ion source. The 'salting in' phenomenon induced by the ClO_4^- -PEO interactions modified the crystalline melting temperature of PEO leading to the amorphization of the PEO-PDMS matrix and hence in to a superionic Li-ion conductivity by microstructure modifications. This transparent flexible SE is shown for its applicability in flexible symmetric supercapacitors and Li-ion cells without the use of liquid electrolyte interfaces. The talk will also summarize the design and construction of a cell for studying various types of relaxation phenomena in super cooled liquids near to their glass transition temperatures (T_g).

Attempts towards the realization of stable Li-sulfur electrodes based on 2D materials will also be discussed.

Friday, Dec 16th 2016

2:00 PM (Tea/Coffee at 1:45 PM)

Seminar Hall, TCIS