

Utilization of Ionic Liquids in Battery Technology and Medicine Science

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Abstract

Ionic liquids (ILs) have many excellent properties and have been utilized in many fields, including renewable energy, energy storage, CO₂ capture, oil & gas process, medicine science, catalysis science, biotechnology, and nanoscience. Our laboratory focuses on utilization of ILs in battery technology and medicine science. In the conference, I will present the new important experimental results that we have obtained in our laboratory relevant to ILs for novel battery fabrication and new medicine science development.

First of all, we utilize ILs as electrolytes for novel battery fabrication. ILs electrolyte is a safe, low cost, high thermal stability, and high electrochemical performance electrolyte. The chemical structure of ILs electrolytes is investigated using Raman analysis. In addition, physical and thermal properties of ILs electrolytes, including density, viscosity, melting point and decomposition temperature, are investigated using density meter, viscosity meter, differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA). Moreover, the electrochemical properties, including the electrochemical windows, and ionic conductivity of ILs electrolytes are investigated using electrochemical instrument VMP and conductivity meter. It is found that some ILs obtained in our laboratory have excellent physical and electrochemical properties to utilize as electrolytes for novel battery fabrication. Nanomaterials, including carbon nanotube and nanoparticles are also characterized for battery electrode preparation. Finally, full cells are obtained in our laboratory. The electrochemical properties of full cells are investigated, including cyclic voltammetry curves, and specific charge-discharge capacity.

Due to excellent solubility, ILs can be designed to utilize in medicine science. In our laboratory, ILs based new anti-cancer drugs are synthesized for anti-cancer test. New disease diagnosis methodologies will also be developed using ILs.