

New Ionic Liquids with Diverse Properties

UT-B IDs 200301332, 200701993



Technology Summary

Hundreds of new ionic liquids can be synthesized using a method invented by ORNL researchers. This innovation makes it possible to produce ionic liquids and ionic compounds with a variety of tunable chemical properties, and provides ionic liquids that are nonvolatile and nonpolluting. These liquids are important in many scientific research and energy applications, including chemical catalysis and in the design of new ultracapacitors.

In this invention, cations of ionic liquids are formed through the reactions of a neutral ligand with metal ions, followed by the reaction of the resulting salts with an anion donor. Crown ethers are used as the neutral ligand. The organic salt of many of these compounds is a strongly hydrophobic, room temperature ionic liquid with low volatility. The reactions require no solvent, heat, or catalyst. The specific method includes mixing a neutral ligand from the group of organic alkyl amines and crown ethers, with a metal ion, and the salt of a metal cation and its conjugate anion at room temperature.

Advantages

- Diverse ionic liquids can be produced
- Tunable chemical properties
- Water stable and immiscible with water
- Performance can be significantly higher than that of current technology

Potential Applications

- Solvents for separation of gas mixtures
- Solvent extractions
- Catalysis
- Electrolytes for electrochemical applications, heat transfer, and energy storage
- Ultracapacitor design

Patent

Sheng Dai and Huimin Luo, *Synthesis of Ionic Liquids*, U.S. Patent 7,423,164, issued September 9, 2008.

Inventors

Sheng Dai¹ and Huimin Luo²
¹Chemical Sciences Division
²Nuclear Science and Technology Division
Oak Ridge National Laboratory

Licensing Contact

Jennifer Tonzello Caldwell
Group Leader, Technology Commercialization
UT-Battelle, LLC
Oak Ridge National Laboratory
Office Phone: 865.574.4180
E-mail: caldwelljt@ornl.gov

