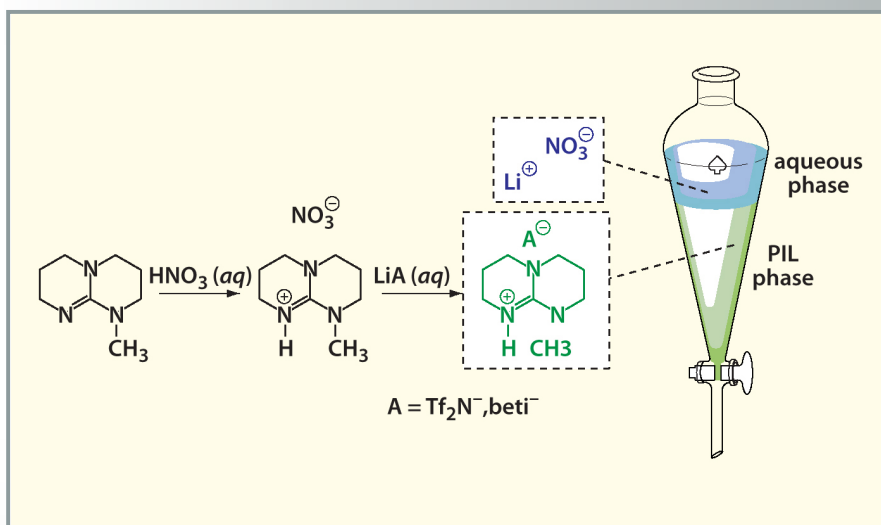


Ultrastable Superbase-Derived Protic Ionic Liquids

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Technology Summary

ORNL researchers developed a method of producing a new family of conductive, low-volatility protic ionic liquids (PILs). Protic ionic liquids can be used in proton-exchange membrane fuel cells for the transformation of chemical energy to electrical energy. These liquids are also useful as separation materials and solvent systems in chemical reactions.

Protic ionic liquids have had a propensity to degrade over time and in high temperature conditions. This is a particular problem for fuel cell applications, as it reduces operational lifetime and performance. The PILs in this invention show improved stability, even at elevated temperatures of 150°C.

These PILs are derived from strong acid/base couples that generate low vapor pressures, enhancing their thermal stability. The invention produces hydrophobic PILs through a facile one-pot method.

Advantages

- Superior thermal stability over other protic ionic liquids
- Proton conducting mechanism does not depend on water
- Quick, simple synthesis (one-pot reactor)

Potential Applications

- Fuel cells (PEM type)
- Electrolytes (fuel cells, sensors, capacitors, metal finishing)
- Dye-sensitized solar cells
- Ultracapacitors
- Hydrogen production
- Other electrochemical processes

Patent

Sheng Dai, Huimin Luo, and Gary A. Baker, *Ultrastable Superbase-Derived Protic Ionic Liquids*, U.S. Patent Application 12/690,224, filed January 20, 2010.

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