

Ionic liquids for carbon dioxide capture and conversion

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Ranjit Koodali, Ah-Hyung Park

Tuesday, March 18, 2014

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Ionic liquids (ILs) are defined as organic compounds consisting entirely of ions and are characterized by melting points below 100 °C, with many of them being liquid at room temperature (RTILs). ILs feature often unique property profiles, which can be tuned by design, such as viscosity, density, solubility, conductivity or high thermal and chemical stability, just to name the most important ones. With these versatile properties they may have a major impact on many promising applications. In this context, our focus is on CO₂ capture.

The current process to capture CO₂ is based on highly corrosive, volatile and smelly aqueous amine solutions (e.g. MEA). Due to their ability to retain CO₂ - both physically (physical sorption) and chemically (chemisorption)^[1] ILs can be used for the direct capture of CO₂. This should lead to a reduction of water consumption, release of solvents and strong odors to atmosphere, corrosion of plant components.

A major advantage is that absorption/stripping rates and CO₂ loading can be elevated at the same time.

It turns out that some ILs, *i.e.* 1-alkyl-3-methylimidazolium tricyanomethanides exhibit a considerable increase of both, CO₂ solubility and the diffusivity in binary systems consisting of IL and water in comparison to dry solvents. This is a considerable improvement over most of the CO₂ absorbing ionic liquids where water impairs the efficiency of the CO₂ capture.^[2]

CO₂ captured by such a process can be consecutively used for conversion into other products such as methane (Sabatier-process)^[3] again in the presence of ILs, where they can be used because of their low vapor pressure, thermal stability, tunable miscibility and polarity ILs as reaction medium and heat transfer fluids.

Monday, March 17, 2014 08:00 PM[Sci-Mix \(08:00 PM - 10:00 PM\)](#)**Location: Dallas Convention Center****Room: Hall F****Tuesday, March 18, 2014 09:05 AM**[Innovations in Carbon Dioxide Capture, Storage, Conversion and Utilization \(08:00 AM - 11:40 AM\)](#)**Location: Dallas Convention Center****Room: A118/A119**

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