

Ionic Liquids as a Critical Enabling Technology for Meeting Current and Future Needs in Energy

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Energy consumption is one of the most challenging issues that humankind is facing. Approximately 20% of the world's energy is used for lighting. It is therefore important to reduce the energy consumption of lighting devices and increase their efficiency. For that reason, the old incandescent lamp which has been used for illumination for over 130 years is being phased out around the world. The most common replacement are CFLs (compact fluorescent lamps), which have certain drawbacks related to the mercury content. LEDs (light emitting diodes) have become competitive for illumination as energy efficient lighting sources. Thus, there is a significant driving force to look for improved, alternative lighting sources and technologies. The discovery of OLEDs (organic light-emitting diodes) marks a significant progress in this direction. However, one of the major drawbacks of OLEDs for lighting applications is their complex device architecture and air-sensitivity which makes them expensive to manufacture and prone to de-composition. The alternative, LECs (light emitting electrochemical cells) can be as simple as being only composed of a light emitting material sandwiched between two electrodes (one reflective electrode: widely the cathode and a second transparent electrode: usually the anode to allow light to exit the device) and LECs are promising as a low cost large area future lighting technology which allows overcoming the problems of OLEDs. However, still efficient emitter materials that have a significant lifetime need to be provided for this technology to enter the market.

The talk will show how for each of the advanced lighting technologies, such as CFLs, LEDs and LECs, ionic liquids allow for a major improvement. Specific focus will be put on the synthesis of new emitter materials using ionic liquid technologies.

References:

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