Ionic Liquids for Photovoltaic Cells

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Ambient temperature molten salts, are attractive candidates for applications as redox electrolytes in dye sensitized nanocrystalline solar cells [1]. This new class of "green" solvents offers a number of advantages over common organic liquids, such as a negligable vapour pressure and excellent electrochemical as well as thermal stability. My presentation will describe the state of the art in the development of photovoltaic devices based on methyl-alkyl-imidazolium iodides.

Recent investations have shown that the performance of these cells is greatly affected by the nature of the alkyl substituent on the imidazolium ring and the type of sensitzers employed. Heteroleptic amphiphilic cis- dithiocyanoato Ru(II) complexes containing -4,4'-dicarboxyylato-2,2'- bipyridyl and 4,4'-dialkyl -2,2'-bipyridyl ligands have given so far the best results. A remarkable improvement of photovoltaic performance with regards to the earlier work [2] was achieved by employing these sensitizere in conjunction with new imidazolium iodide based ionic liquids and by optimising the nanocrystalline film configuration to minimize mass-transport related losses. Power conversion efficiencies over 6Am 1.5 sun light. The stability is outstanding both under accelerated UV light soaking and thermal stress rendering these devices very attractive for a number of practical applications.

Literature:

1) M. Grtzel Photoelectrochemical Cells Nature 2001, 414, 332-344

2) N. Papageorgiou, Y. Athanassov, M. Armand, P. Bonhte, H. Pettersson, A. Azam and M. Grtzel "The Performance and Stability of Ambient Temperature Molten Salts for Solar Cell Applications" J. Electrochem.Soc.1996, 143, 3099

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