SYNTHESIS AND CHARACTERIZATION OF NEW IMIDAZOLIUM IONIC LIQUIDS AS SOLVENTS IN LITHIUM ELECTROLYTES

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ABSTRACT

Lithium-ion batteries are produced on a large scale mainly for powering electronic devices, but simultaneously intensive research is carried out on the development of large, high power-source systems for other applications, as accumulating energy obtained from renewable sources, load-leveling and also powering hybrid and plug-in electric vehicles (HEVs). From among the requirements put before batteries, their reliability, especially regarding safety issues is a very important problem which must be solved to develop large, high power and high voltage lithium batteries [1].

The application of ionic liquids instead of volatile and flammable solvents in the electrolyte allows to solve the problem of battery safety and widens the temperature range of its operation. There has been a lot of research concerning ionic liquids involving imidazolium cation as solvent of lithium salts. The problem of electrochemical stability limited by the presence of an acidic C2 proton is pointed out in some of them.

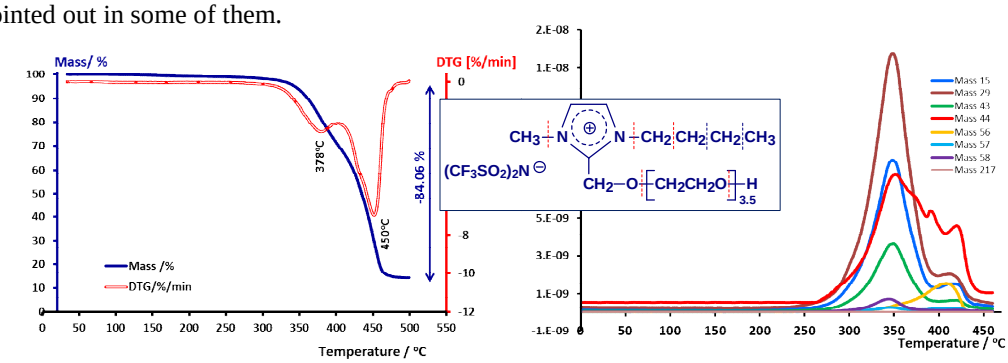

Fig. 1: Thermal stability of [BuMeIm 3.5EO]N(CF_3SO_2)$_2$ imidazolium ionic liquid.

In this research study we examined imidazolium ionic liquids (ImIL) that, in order to extend their electrochemical stability, contain a substituent at position C2. Oligooxyethylene groups of various length introduced into the imidazolium ring as described earlier [2] were the substituents used. The purpose of introducing oligomeric ether groups is to reduce IL cations mobility and promotion of lithium cation transport properties. We report the ionic conductivity, stability and lithium cation transference numbers of liquid and polymer electrolytes with modified ImIL's.

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References:

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