

Accepted Manuscript

Polymer ionic liquid bearing radicals as an active material for organic batteries with ultrafast charge-discharge rate

Mohamed Aqil, Farid Ouhib, Abdelhafid Aqil, Abdelrahman El Idrissi, Christophe Detrembleur, Christine Jérôme

PII: S0014-3057(18)30745-6

DOI: <https://doi.org/10.1016/j.eurpolymj.2018.07.028>

Reference: EPJ 8490

To appear in: *European Polymer Journal*

Received Date: 20 April 2018

Revised Date: 16 July 2018

Accepted Date: 20 July 2018

Please cite this article as: Aqil, M., Ouhib, F., Aqil, A., El Idrissi, A., Detrembleur, C., Jérôme, C., Polymer ionic liquid bearing radicals as an active material for organic batteries with ultrafast charge-discharge rate, *European Polymer Journal* (2018), doi: <https://doi.org/10.1016/j.eurpolymj.2018.07.028>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Polymer ionic liquid bearing radicals as an active material for organic batteries with ultrafast charge-discharge rate

Mohamed Aqil¹⁻², Farid Ouhib¹, Abdelhafid Aqil¹, Abdelrahman El Idrissi², Christophe Detrembleur¹ and Christine Jérôme¹

¹*Center for Education and Research on Macromolecules (CERM), CESAM Research Unit, University of Liège, B6a Sart-Tilman, B 4000 Liège, Belgium*

²*LCAE-URAC 18, Faculty of Science, University of Mohammed Premier, Po Box 717, 60000 Oujda, Morocco*

Abstract :

We report on the synthesis of a new polymer ionic liquid (PIL) based on polyvinylimidazolium bearing a pendent nitroxide radical on each monomer unit. Firstly, the quaternization of 1-vinylimidazole by a brominated alkoxyamine, i.e. a protected tetramethylpiperidinyloxy (TEMPO) nitroxide, was achieved. Then, the bromide anion was substituted by anion exchange reaction for the bis(trifluoro-methanesulfonyl)imide (TFSI) anion. The as-obtained monomer was successfully polymerized by free radical polymerization at low temperature (40°C) by using 2,2'-azobis(4-methoxy-2.4-dimethyl valeronitrile) as initiator. Finally, the C–O bond of the alkoxyamine pendant groups was thermally cleaved releasing the redox-active TEMPO nitroxide radicals. The PIL bearing TEMPO groups was coated onto a carbon nanotubes buckypaper and tested as cathode in a lithium ion battery. Such battery remarkably exhibits a high charge/discharge rate capability, e.g. at 60C the full charge is reached in 1min and a high cycling stability; 100% of the initial capacity 60 mA h/g is kept after 1300 cycles.

Keywords:

Polymer Ionic Liquids, TEMPO, Organic radical batteries, polyvinylimidazolium

Download English Version:

<https://daneshyari.com/en/article/7803383>

Download Persian Version:

<https://daneshyari.com/article/7803383>

[Daneshyari.com](https://daneshyari.com)