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PII: S0013-4686(18)31250-7

DOI: [10.1016/j.electacta.2018.05.191](https://doi.org/10.1016/j.electacta.2018.05.191)

Reference: EA 31977

To appear in: *Electrochimica Acta*

Received Date: 8 January 2018

Revised Date: 27 May 2018

Accepted Date: 28 May 2018

Please cite this article as: D.O. Ponkratov, E.I. Lozinskaya, P.S. Vlasov, P.-H. Aubert, Cé. Plesse, F. Vidal, Y.S. Vygodskii, A.S. Shaplov, Synthesis of novel families of conductive cationic poly(ionic liquid)s and their application in all-polymer flexible pseudo-supercapacitors, *Electrochimica Acta* (2018), doi: 10.1016/j.electacta.2018.05.191.

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# Synthesis of novel families of conductive cationic poly(ionic liquid)s and their application in all-polymer flexible pseudo-supercapacitors<sup>†</sup>

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## ABSTRACT

This paper deals with the synthesis of two new families of cationic poly(ionic liquid)s (PILs). The first one is obtained by free radical copolymerization of 1-[2-(2-(2-(methacryloyloxy)ethoxy)ethoxy)ethyl]-3-methylimidazolium bis(trifluoromethylsulfonyl)imide with poly(ethylene glycol) methyl ether methacrylate, while the second one by chemical modification of poly(epichlorohydrin-co-ethylene oxide) via quaternization with N-methylimidazole and subsequent ion exchange with lithium bis(trifluoromethylsulfonyl)imide. Both PILs demonstrated  $T_g$  below 0°C, bulk ionic conductivities in anhydrous state in the range of  $8.4 \times 10^{-7}$ - $1.5 \times 10^{-5}$  S/cm (25°C) and electrochemical stability of 3.1-3.4 V (25°C). These PILs were further applied in the construction of symmetric truly all-polymer pseudo-supercapacitors. The first PIL, possessing high ionic conductivity of  $1.5 \times 10^{-5}$  S/cm at 25°C, was chosen to play the role of separator, while the second one, demonstrating an ability to form good coatings, was

<sup>†</sup> Paper presented at the ISEE CAP 2017, Jena, 10-14 July 2017.

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