Ionic liquid-based polymer gel electrolytes for symmetrical solid-state electrical double layer capacitor operated at different operating voltages

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Contents from available at SciVerse ScienceDirect

Journal homepage: www.elsevier.com/locate/electacta

ARTICLE INFO

Keywords: Ionic liquid; Symmetrical solid-state; Electrical double layer capacitor; Polymer gel; Electrochemical stability

Abstract

Symmetrical solid-state electrical double layer capacitors (EDLCs) are assembled using ionic liquid-based polymer gel electrolytes (PGEs). The performance of the EDLCs is compared with that of the carbon-based EDLCs. The symmetrical EDLCs are tested in three different electrolytes: 1:1, 1:2, and 1:3 by weight. The results show that the 1:1 electrolyte performs better, with a higher capacitance and electrochemical stability. The EDLCs are tested at different operating voltages and show good performance. The electrolyte stability is also investigated, and the results show that the 1:1 electrolyte has the best stability. The EDLCs are designed to operate at high temperatures and show good performance in this condition. The results of this study show that ionic liquid-based polymer gel electrolytes can be used in symmetrical solid-state electrical double layer capacitors, and these devices can be used in various applications.