Communication

Single Lithium-Ion Conducting Polymer Electrolytes Based on a Super-Delocalized Polyanion

Qiang Ma, Heng Zhang, Chongwang Zhou, Liping Zheng, Pengfei Cheng, Prof. Jin Nie, Prof. Wenfang Feng, Prof. Yong-Sheng Hu, Prof. Hong Li, Prof. Xuejie Huang, Prof. Liquan Chen, Prof. Michel Armand, Prof. Zhibin Zhou

First published: 14 January 2016  Full publication history
DOI: 10.1002/anie.201509299  View/save citation

Abstract

A novel single lithium-ion (Li-ion) conducting polymer electrolyte is presented that is composed of the lithium salt of a polyanion, poly[(4-styrenesulfonyl)(trifluoromethyl[S-trifluoromethylsulfonyl]iminosulfonylimide) (PSsTFSI−), and high-molecular-weight poly(ethylene oxide) (PEO). The neat LiPSsTFSI ionomer displays a low glass-transition temperature (44.3 °C; that is, strongly plasticizing effect). The complex of LiPSsTFSI/PEO exhibits a high Li-ion transference number (t Li+ = 0.91) and is thermally stable up to 300 °C. Meanwhile, it exhibits a Li-ion conductivity as high as 1.35×10−4 S cm−1 at 90 °C, which is comparable to that for the classic ambipolar LiTFSI/PEO SPEs at the same temperature. These outstanding properties of the LiPSsTFSI/PEO blended polymer electrolyte would make it promising as solid polymer electrolytes for Li batteries.

[*] Q. Ma, H. Zhang, C. Zhou, L. Zheng, P. Cheng, Prof. J. Nie, Prof. W. Feng, Prof. Z. Zhou
Key Laboratory for Large-Format Battery Materials and System, Ministry of Education, School of Chemistry and Chemical Engineering, Huazhong University of Science and Technology, 1037 Luoyu Road, Wuhan 430074 (China)
E-mail: zb-zhou@mail.hust.edu.cn
Prof. Y.-S. Hu, Prof. H. Li, Prof. X. Huang, Prof. L. Chen
Key Laboratory for Renewable Energy, Beijing Key Laboratory for New Energy Materials and Devices, Beijing National Laboratory for Condensed Matter Physics, Institute of Physics, Chinese Academy of Sciences, Beijing 100190 (China)
E-mail: yshu@aphy.iphy.ac.cn
Prof. M. Armand
CIC energigune, Alava Technology Park, Albert Einstein 4801510 MINANO Alava (Spain)

Supporting information for this article is available on the WWW under http://dx.doi.org/10.1002/anie.201509299.