

Accepted Manuscript

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PII: S0013-4686(18)31780-8

DOI: [10.1016/j.electacta.2018.08.012](https://doi.org/10.1016/j.electacta.2018.08.012)

Reference: EA 32446

To appear in: *Electrochimica Acta*

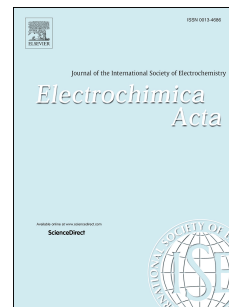
Received Date: 16 April 2018

Revised Date: 31 July 2018

Accepted Date: 4 August 2018

Please cite this article as: S. Suriyakumar, S. Gopi, M. Kathiresan, S. Bose, E.B. Gowd, J.R. Nair, N. Angulakshmi, G. Meligrana, F. Bella, C. Gerbaldi, A.M. Stephan, Metal organic framework laden poly(ethylene oxide) based composite electrolytes for all-solid-state Li-S and Li-metal polymer batteries, *Electrochimica Acta* (2018), doi: 10.1016/j.electacta.2018.08.012.

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Metal organic framework laden poly(ethylene oxide) based composite electrolytes for all-solid-state Li-S and Li-metal polymer batteries

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Abstract

In this work, the possibility of employing aluminium terephthalic acid metal organic framework (Al-TPA-MOF)-laden composite polymer membranes as electrolyte for all solid-state-lithium-sulfur (Li-S) and lithium-metal (Li-metal) polymer batteries is explored. The prepared composite polymer electrolytes (CPEs) based on a poly(ethylene oxide) (PEO) network with lithium bis(trifluoromethane)sulfonimide (LiTFSI) and Al-TPA-MOF are mechanically robust and thermally stable up to 270 °C, and provide appreciable ionic conductivity in the order of 0.1 mS cm⁻¹ at 60 °C. The enhanced compatibility of CPEs with the lithium metal anode is attributed to the scavenging effect of Al-TPA-MOF. Laboratory scale all-solid-state Li-S and Li-metal polymer cells are assembled, which deliver specific capacities exceeding 800 and 130 mAh g⁻¹, respectively, and a stable performance upon prolonged cycling even at 60 °C, which is superior to earlier reports on similar systems.

Keywords: Lithium-sulfur battery; Lithium-polymer battery; Polymer electrolyte; Poly(ethylene oxide); Metal organic framework.

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