

## Author's Accepted Manuscript

A mechanically robust porous single ion conducting electrolyte membrane fabricated via self-assembly

Yuan Liu, Yunfeng Zhang, Meize Pan, Xupo Liu, Cuicui Li, Yubao Sun, Danli Zeng, Hansong Cheng



PII: S0376-7388(16)30059-X  
DOI: <http://dx.doi.org/10.1016/j.memsci.2016.02.002>  
Reference: MEMSCI14267

To appear in: *Journal of Membrane Science*

Received date: 8 November 2015  
Revised date: 11 January 2016  
Accepted date: 2 February 2016

Cite this article as: Yuan Liu, Yunfeng Zhang, Meize Pan, Xupo Liu, Cuicui Li, Yubao Sun, Danli Zeng and Hansong Cheng, A mechanically robust porous single ion conducting electrolyte membrane fabricated via self-assembly, *Journal of Membrane Science*, <http://dx.doi.org/10.1016/j.memsci.2016.02.002>

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 a review of the resulting galley proof before it is published in its final citable 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.

A mechanically robust porous single ion conducting electrolyte membrane fabricated  
via self-assembly

Yuan Liu, Yunfeng Zhang,\* Meize Pan, Xupo Liu, Cuicui Li, Yubao Sun, Danli Zeng and Hansong  
Cheng\*

Sustainable Energy Laboratory, Faculty of Materials Science and Chemistry, China University of  
Geosciences Wuhan, 388 Lumo RD, Wuhan 430074, China.

\*Corresponding Authors: phone: +86 27 67883049

E-mail address: zhangyf329@gmail.com (Y Zhang)

chghs2@gmail.com (H Cheng)

*Keywords:* Li-ion battery, porous polymer electrolyte, single ion conducting, self-assembly, pore  
preparation

### **Abstract**

A polymer electrolyte with high porosity and good mechanical strength plays a critical role in improving the compatibility between the electrolyte and the electrodes in a battery device by raising the ionic conductivity and enhancing the cyclic performance. Here, we present a facile self-assembly technique to fabricate a single ion conducting polymer electrolyte membrane with appropriate porosity and strong mechanical strength by taking advantage of the poor physical compatibility between the rigid aromatic backbone of the polymer electrolyte and the flexible aliphatic poly(vinylidene fluoride-hexafluoropropylene) used as a binder. The influence of membrane porosity on ionic conductivity and interfacial contacts between the polymer electrolyte and electrodes was investigated. Excellent battery performance at both room temperature and 60 °C was demonstrated.

### **1. Introduction**

Polymer electrolytes with high ionic conductivity and low interfacial resistance with electrodes can significantly enhance lithium ion battery performance and have been a subject of intense research in recent years.[1-8] An effective strategy to prepare polymer electrolytes with these improved properties is to construct appropriate porosity in the electrolyte membranes. Here, the porosity plays a dual role in improving the battery performance, achieving high ionic conductivity through absorption of a sufficient amount of solvent[9] and reducing interfacial resistance by partially tuning the solid-solid contact between an electrode and the electrolyte into a

Download English Version:

<https://daneshyari.com/en/article/632519>

Download Persian Version:

<https://daneshyari.com/article/632519>

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