MXene Debris Modified Eggshell Membrane as Separator for High-Performance Lithium-Sulfur Batteries

Lingxia Yin, Guiyin Xu, Ping Nie, Hui Dou, Xiaogang Zhang

PII: S1385-8947(18)31296-8
DOI: https://doi.org/10.1016/j.cej.2018.07.063
Reference: CEJ 19461

To appear in: *Chemical Engineering Journal*

Received Date: 27 April 2018
Revised Date: 6 July 2018
Accepted Date: 8 July 2018

Please cite this article as: L. Yin, G. Xu, P. Nie, H. Dou, X. Zhang, MXene Debris Modified Eggshell Membrane as Separator for High-Performance Lithium-Sulfur Batteries, *Chemical Engineering Journal* (2018), doi: https://doi.org/10.1016/j.cej.2018.07.063

MXene Debris Modified Eggshell Membrane as Separator for High-Performance Lithium-Sulfur Batteries

Lingxia Yin, Guiyin Xu, Ping Nie, Hui Dou*, Xiaogang Zhang

Jiangsu Key Laboratory of Electrochemical Energy Storage Technologies, College of Material Science and Technology, Nanjing University of Aeronautics and Astronautics, 210016, Nanjing, P. R. China.

***Corresponding author email address:** dh_msc@nuaa.edu.cn

Institution Mailing Address: 29 Yudao St., 210016, Nanjing, P. R. China.

Key words: *Lithium-sulfur batteries, Eggshell membrane, MXene, Polysulfides absorption, separator*

Abstract: A functional separator (MXene/ESM) to suppress the lithium polysulfides shuttling via coating MXene debris on one surface of a biodegradable eggshell membrane (ESM) is designed to enhance the electrochemical performance of Li-S batteries. The excellent electronic conductivity of the porous MXene debris, and the good mechanical strength, superior thermal stability as well as large electrolyte infiltration of ESM make MXene/ESM an ideal separator for high-performance Li-S batteries. The strong chemisorption induced from both Ti-S bond formed between Ti atom in MXene and the lithium polysulfides by the Lewis acid-base interaction and affinity of O and N containing functional groups on ESM to the lithium polysulfides greatly prevents the shuttling effect of the polysulfides. Compared with a commercial