

### Effect of polydopamine-coated separators on electrochemical performance of high power lithium metal secondary batteries

Yunju Lee<sup>1</sup>, Myungwon Seo<sup>1</sup>, Byung-hyun Kim<sup>2</sup>, Myung-Hyun Ryou<sup>3</sup>, Jang Wook Choi<sup>4</sup> and Yong Min Lee<sup>1\*</sup>

<sup>1</sup>Hanbat National University, <sup>2</sup>W-SCOPE KOREA CO., LTD., <sup>3</sup>Münster Electrochemical Energy Technology, <sup>4</sup>Graduate School of EEWS

<sup>1</sup>San 16-1, Deokmyoung, Yuseong, Daejeon, 305-719, Korea

<sup>2</sup>653-7, Gak-ri, Ochang-eup, Cheongwon-gun, Chungbuk, 363-883, Korea

<sup>3</sup>Corrensstraße 46, 48149 Münster Germany

<sup>4</sup>Korea Advanced Institute of Science and Technology, Daejeon, 305-701, Korea

\* [yongmin.lee@hanbat.ac.kr](mailto:yongmin.lee@hanbat.ac.kr), +82-42-821-1549

One of the disadvantages of polyethylene (PE) separators is poor wettability towards polar organic solvents because of its extreme hydrophobic property. As a result, the ionic conductivity of PE separators impregnated with liquid electrolyte becomes about 10% level comparing to pure liquid electrolytes, even though the separator porosity is ranged from 30 to 60%. Therefore, there are lots of previous works such as polymer coating [1] and surface modification [2] to improve the wettability of liquid electrolytes to PE separators. Recently, our group reported in-situ polydopamine coating on PE separators, which is very simple and environmentally-friendly.[3-4]

In this work, polydopamine coating effects were evaluated with various separators, which were manufactured from the same production line but had different physical properties. The ionic conductivity was measured with a liquid electrolyte of 1M LiPF<sub>6</sub> in EC/DEC (1/2, v/v). The LiMn<sub>2</sub>O<sub>4</sub>/Li metal unit cells with polydopamine-coated separators were prepared and characterized by c-rate performance, cycle life, impedance. Wettability was tested uptake amount, contact angle, etc. The coated separator safety with electrolyte was measured linear sweep voltammetry (LSV). And then, some physical properties of separators for proper polydopamine coating were summarized.

### Reference

1. J.A Lee, J.Y Lee, M.H Ryou, G.B Han, J.N Lee, D.J Lee, J.K Park, Y.M Lee, J Solid State Elec. 15(2011)753
2. J.Y Lee, Y.M Lee, B. Bhattacharya, Y.C Nbo, J.K Park, Elec. Acta 54(2009)4312
3. M.H Ryou, Y.M Lee, J.K Park, J.W Choi, Adv. Mater. 23(2011)3066
4. M.H Ryou, D.J Lee, J.N Lee, Y.M Lee, J.K Park, J.W Choi, Adv. Energy Mater. (2012)

### Acknowledgement

This research was financially supported by the Ministry of Knowledge Economy(MKE), Korea Institute for Advancement of Technology(KIAT) through the Inter-ER Cooperation Projects