Li-Nb-O protection layer for Li-ion battery electrodes *via* Atomic-layer-deposition

Dae Woong Kim[1], Woongpyo Hong[1], Jung-Yeon Park[1], Seung-Jeong Oh[1], Minji Lee[2], Seung Won Noh[2] and Tae Joo Park[2]

[1] *Advanced Materials Research Team, Hyundai Motor Company, Uiwang-Si, Korea*

[2] *Department of Materials Science and Chemical Engineering, Hanyang University, Ansan-Si, Korea*

E-mail: kimdw@hyundai.com

Recently, various active materials are being developed as anode/cathode to enhance the performance of next-generation lithium-ion batteries. However, due to the high reactivity occurring at the electrolyte/electrode interfaces, the active material requires a protective layer to improve durability.[1] Unlike general metal-oxide materials, lithium compounds have high ionic conductivity as well as electrochemical stability, so they are considered as one of ideal solution for active material protection. Although various technologies are used for coating processes, it is an issue to apply a nano-scale coating to the active material due to thickness control, uniformity and intrinsic defects of the film. Owing to the attainment of uniform, conformal, ultra-thin, pin-hole free and thickness controlled deposition of sub-nanoscale films, atomic layer deposition (ALD) is one of the most promising technique to realize stable, high performance thin film protection layer.

In this work, we have demonstrated Li-ion conductive ALD Li-Nb-O thin films with various compositions were grown by repeated sub-cycle of LiOH and NbOx *via* ALD, and thickness was measured by ellipsometry. The composition of thin films was estimated by XPS and ICP The ionic conductivity of thin films was measured by electrochemical impedance spectroscopy. The experimental results will be presented in detail.

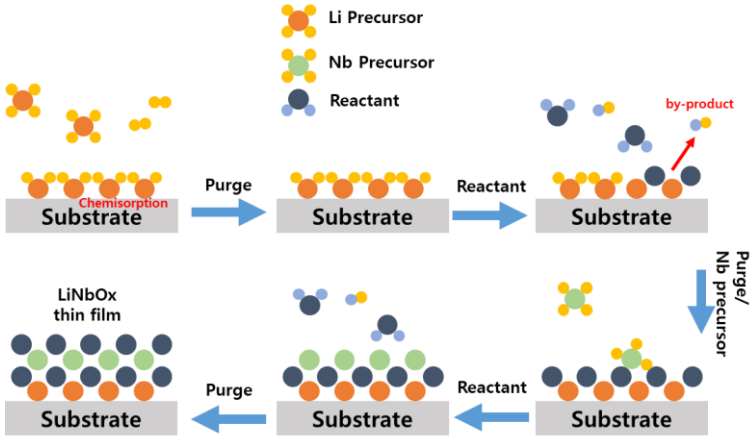

Figure 1. Schematic of LiNbOx deposition *via* super-cycle ALD

References [1] Yizhou Zhu, Xingfeng He and Yifei Mo. ACS Appl. Mater. Interfaces 2015, 7, 23685-23693