Characterization of LiPON solid electrolytes deposited by MOCVD

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Lithium phosphorous oxynitride (LiPON) thin film electrolytes have drawn much interest in solid state thin film batteries, because they have a moderate Li-ion conductivity (~10^{-6} S/cm) and are not easily decomposed upon contact with Li anode. Li-sulfide and Li-oxide electrolytes have higher Li-ion conductivity (10^{-3}~10^{-4} S/cm) and thus, recently, there are many efforts to use them in solid state batteries. In this study, LiPON thin films were deposited by MOCVD technique, and parametric investigation was conducted to enhance the growth rate of LiPON thin films by varying the deposition conditions. Organometallic precursor for LiPON films were Li($C_{11}H_{19}O_2$), (Li(DPM)), and $PO(C_2H_5O)_3$ (TEP), and N_2 was used as a carrier gas. NH_3 was used as the nitridation gas. Structural and stoichiometric properties of the LiPON thin films were analyzed by standard measurement techniques such as SEM, XPS, Raman, and FT-IR.