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Development of Li(Ni0.5Mn0.3Co0.2)O2 and LiMn0.8Fe0.2PO4 Thin Film Electrodes for Next Generation Li-ion Batteries

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In this study, $LiMn_{0.8}Fe_{0.2}PO_4$ and $Li(Ni_{0.5}Mn_{0.3}Co_{0.2})O_2$ thin film were selected to research. The low electronic conductivity and Li^+ diffusivity of $LiMnPO_4$ severely limits its electrochemical activity room for maneuver, especially under high current density. On the other hand, $Li(Ni_{0.5}Mn_{0.3}Co_{0.2})O_2$ can exhibit a promising electrochemical performance among currently working cathode materials. However, the Ni/Li mixing and growth of preferred orientation seriously affect the capacity and rate capability. To overcome these drawbacks, DC/RF magnetron sputtering approach will be incorporated. Through intrinsic modification of $LiMnPO_4$ cathode with Fe and C, a better electrochemical performance could be demonstrated in half lithium-ion battery. For layered type material, the $Li(Ni_{0.5}Mn_{0.3}Co_{0.2})O_2$ is deposited on various buffer layer substrate by reactive magnetron sputtering using single NMC target in an argon/oxygen atmosphere. It is expected that the development of $LiMn_{0.8}Fe_{0.2}PO_4$ and $Li(Ni_{0.5}Mn_{0.3}Co_{0.2})O_2$ would exhibit a great potential to meet the demand of next-generation high power Li-ion battery.

Keywords
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LiMn0.8Fe0.2PO4
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Cathode
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