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Structural and electrochemical characterization of lithium excess and Al-doped nickel oxides synthesized by sol-gel method

졸-겔법을 이용한 리튬 과량 $Li_{1+x}NiO_2$ 와 Al-doped $LiAl_yNi_{1-y}O_2$의 구조와 전기화학적 특성 연구

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The layered $LiNiO_2$ ($R\bar{3}m$) has been of great interesting as positive electrode materials for secondary lithium batteries. Recently $LiNiO_2$ has been intensively investigated because of its comparatively low cost, large theoretical capacity (275mAh/g) and environmental advantages. However, $LiNiO_2$ has several problems such as difficulty in synthesis of the electroactive $LiNiO_2$, cation mixing and thermal stability.

We reported here the synthesis of highly crystalline $Li_{1+x}NiO_2$ powders using the excess-lithium method and the Al doped nickelate ($LiAl_yNi_{1-y}O_2$). Cycling properties of these materials are discussed in comparision with $LiNiO_2$ both at room temperature and high temperature(50℃). We also report that the synthesic property of $LiNiO_2$ which was synthesized by sol-gel method. The gas investgation was analyzed during the decomposition of gel precursor using a quadrapole mass spectroscopy (QMS). The QMS data reveals that oxygen might play an important role in the synthesis of highly crystallized $LiNiO_2$.

The initial capacity of the $LiAl_yNi_{1-y}O_2$ cells decreases with the increases of Al content, the aluminum dopant is very effective to increase the cycle performance of $LiNiO_2$ cells at high temperature(50℃).