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Structural and electrochemical characterization of anion doped
LiNiO_{2-y}S_y synthesized by sol-gel method

졸-겔법을 이용한 음이온 도핑 LiNiO_{2-y}S_y계 양극활물질의 구조와
전기화학적 특성 연구

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The layered LiNiO₂ (R $\bar{3}$ m) has been of great interesting as positive electrode material for secondary lithium batteries. Recently LiNiO₂ has been intensively investigated because of its comparatively low cost, large theoretical capacity (275mAh/g) and environmental advantages. However, LiNiO₂ has several problems such as difficulty in the synthesis of stoichiometric LiNiO₂ and thermal instability. The main problem is the capacity fading of the LiNiO₂ electrode during intercalation/deintercalation of lithium ion.

In this work, oxysulfide layered LiNiO_{2-y}S_y powders were synthesized and characterized to investigate the effect of S-doping on the electrode performance of LiNiO₂. LiNiO₂ powders were first synthesized by a sol-gel method and then doped with sulfur powders by a solid-phase reaction under the flow of oxygen to prepare LiNiO_{2-y}S_y (y = 0 ~ 0.3) powders. While the LiNiO₂ electrode showed a gradual decrease of discharge capacity with cycle number, the capacity retention rate of LiNiO_{2-y}S_y electrodes significantly improved. The initial capacity of the LiNiO_{2-y}S_y cells was lower than that of LiNiO₂ cell and decreased with increasing the content of sulfur doped in LiNiO_{2-y}S_y. LiNiO₂ powders were also doped with sulfur using Li₂S powders to investigate the effect of sulfur source. It was found that sulfur powders can be more effectively produce better quality of LiNiO_{2-y}S_y cathode materials.