

BT02

Effect of Annealing Temperature on Stresses Generated during Lithium Transport through LiMn_2O_4 Film Electrode 열처리 온도가 리튬 망간 산화물 박막 전극내 리튬 이동시 발생하는 응력에 미치는 영향에 대한 연구

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Effect of annealing temperature on stresses generated during lithium transport through LiMn_2O_4 film electrode was investigated in a 1 M LiClO_4 -PC solution using a laser beam deflection method combined with cyclic voltammetry and galvanostatic charge/discharge experiments. For this purpose, LiMn_2O_4 film electrodes were prepared by spin-coating a viscous gel on the Pt/Ti/thin glass substrate, and then annealed at 550 °C and 650 °C in air. From the X-ray diffraction patterns and the scanning electron microscopy images, it was found that LiMn_2O_4 film electrode annealed at 550 °C (LT- LiMn_2O_4) showed less crystallinity and smaller grain size than those of LiMn_2O_4 film electrode annealed at 650 °C (HT- LiMn_2O_4). From the cyclic voltammograms (CVs) and the galvanostatic charge/discharge curves, it was noted that LT- LiMn_2O_4 showed better cyclability and larger capacity than HT- LiMn_2O_4 . From the analysis of the stress transients measured along with the CVs and the galvanostatic charge/discharge curves, it was shown that the stress change developed in LT- LiMn_2O_4 during lithium transport in the two-phase region around $3 V_{\text{Li/Li}^+}$ was less than that developed in HT- LiMn_2O_4 . The effects of annealing temperature on the cyclability and the stress generation were discussed in terms of a Jahn-Teller distortion in detail. Furthermore, the effect of annealing temperature on the capacity was also discussed in terms of the crystallinity of the LiMn_2O_4 film electrode.

References

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