

교류 임피던스 측정법을 이용한
탄소 박막 전극 내로의 리튬 인터칼레이션에 대한 연구

A Study on Lithium Intercalation into Carbon Film
Electrode by Using Ac-impedance Spectroscopy

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Electrochemical lithium intercalation into carbon film electrodes prepared by using chemical vapour deposition(CVD) method was investigated in 1 M LiPF₆-ethylene carbonate(EC) and diethylene carbonate(DEC) solution, by using X-ray diffraction(XRD) method, Fourier transform infra-red(FT-IR) spectroscopy, Auger electron spectroscopy(AES) and ac-impedance spectroscopy. The carbon film electrodes were prepared at different deposition temperatures of 500°, 600°, 700° and 800 °C. The carbon deposit had a layer structure whose interplanar spacing is larger than that of graphite from the analysis by the XRD method. In addition, the carbon deposit contained hydrogen in its structure as analysed by FT-IR spectroscopy and AES. From the impedance spectra of carbon film electrodes, it was shown that, during the electrochemical intercalation and deintercalation of lithium, the resistance concerning charge transfer at the interface between the carbon film electrode and electrolyte varies as the layer spacing of the carbon changes, indicating that there exists a close relationship between the crystallinity, which determines the capacity of accommodation of lithium to reach the highest composition LiC₆, and the microstructure which fixes the electrode surface accessible to the electrolyte. In the present work, the dependence of lithium intercalation on the layer structure of host carbon was discussed in terms of the variation in interplanar spacing of the host carbon with respect to deposition temperature.

References

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