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Lithium Transport through Amorphous and Crystalline Vanadium Pentoxide Film Electrodes by Current Transient Analysis

전류 추이 곡선을 통한 비정질 및 결정질 V_2O_5 박막
전극내로의 리튬 이동 연구

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The kinetics of lithium transport through two kinds of vanadium pentoxide film electrodes have been investigated in a 1 M solution of $LiClO_4$ in propylene carbonate using current transient technique. From the XRD patterns of the spin-coated xerogel film electrodes, the structures of one film electrode specimen dried at 130 °C and of another specimen dried at 550 °C were identified as an amorphous and orthorhombic V_2O_5 , respectively. All the cathodic and anodic current transients experimentally obtained from that film electrode specimen, exhibited clearly a linear relationship between logarithmic current and logarithmic time, followed by an exponential decay. From this result, it was suggested that lithium transport through that film electrode proceeds under the diffusion controlled lithium transport. In contrast, all the cathodic and anodic current transients experimentally measured from this film electrode specimen hardly follow the Cottrell behaviour. So, lithium transport through this film electrode specimen was theoretically analysed under the assumption of the 'cell-impedance controlled' lithium transport. The difference in the mechanism of lithium transport between through amorphous and crystalline vanadium pentoxide film electrodes was discussed in terms of the chemical diffusivity of lithium ion and cell-impedance of the two electrodes.

References

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2. S.-I. Pyun, M.-H. Lee and H.-C. Shin, submitted to *J. Power Sources* for publication (2000).