

## BFA1

### Investigation of the Electrochemical Properties of Lithium Chloride Layer Formed on the Porous Carbon Cathode during Discharge of Li/SOCl<sub>2</sub> Batteries

Li/SOCl<sub>2</sub> 배터리의 방전동안 다공성 탄소 캐소드에 생성된 염화리튬막의 전기화학적 성질에 대한 연구

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The electrochemical properties of lithium chloride layer formed on the porous carbon cathode during discharge of Li/SOCl<sub>2</sub> batteries were investigated using nitrogen gas adsorption, galvanostatic discharge experiment, ac-impedance spectroscopy, and potentiostatic current transient technique. For this purpose, the carbon electrode specimen was first galvanostatically discharged at current densities of 20 - 50 mA cm<sup>-2</sup> in 1.25 M LiAlCl<sub>4</sub>-SOCl<sub>2</sub>. Then it was exposed either to the ac-impedance measurement or to the potentiostatic current transient experiment. The pore size distribution of discharged electrode specimen was determined with the help of nitrogen gas adsorption at 77 K. In order to roughly estimate the resistive and capacitive elements of the electrode specimen, we employed modified transmission line model in view of the charge transfer impedance. The time constant at a given frequency was found to be higher in value for the specimen with longer discharging time, which is certainly due to the increase of the thickness of porous layer in the lithium chloride layer. The cathodic current transients were simulated from the circuit analysis using SPICE based upon the modified transmission line model at a potential step. The simulated current transients accorded well in shape and values with those experimentally measured. The electrochemical properties of lithium chloride layer on the porous carbon cathode were discussed in terms of the porous structure change of lithium chloride layer during discharge of Li/SOCl<sub>2</sub> batteries.

#### Reference

1. C.-H. Kim, S.-I. Pyun and H.-C. Shin, J. Electrochem. Soc. 149 (2001) A93.