

BF02

Charge/Discharge Performance of Bulk and Thin Film Tin Oxide Composites Negative Electrodes

주석 복합 산화물 음극의 벌크와 박막에서의 충방전 특성

남상철*, 백지흠, 조원일, 조병원, 윤경석, 전해수*

한국과학기술연구원 전지·연료전지 센터, *고려대학교 화학공학과

Tin oxide and tin oxide composite electrodes were studied in both bulk and thin film forms for their perspective use as a negative electrode for lithium rechargeable battery. In this work, characteristics of tin oxide and tin-oxide composite electrodes in forms of both bulk and thin films are compared. For bulk electrodes, the materials are prepared by thermal decomposition or synthesis. Sn-Zn-P-O based composite glass was obtained from Mitsuya Boeki Ltd., and is designated as SEAN-31(Seimi). Thin film was deposited on a stainless steel substrate from a pelletized tin oxide(Aldrich) or SEAN-31 powder(Seimi) source by electron beam evaporation system(ESV 6-Leybold Heraeus). The cutoff voltages influenced the reversibility of alloying phases undergone between lithium and metallic tin. Preliminary testings of negative electrode consisting of SEAN-31 active material was reported. For bulk system, fabrication and testings showed a capacity of 300 - 400 mAh/g lasting upto 20 cycles upon proper control of the cutoff voltage. Heat treated thin films showed a more defined crystalline structures and higher performance in capacity and cycle life with homogeneous composition. For thin film SEAN-31 systems, observation by AES, ICP and RBS suggest a possible change in the stoichiometry of bulk powder. Despite the non-uniformity and heterogeneity, the heat treated electrode exhibited a higher capacity (400 mAh/g) and a more stable cycle performance.