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CNTs as anode for Lithium ion secondary batteries

리튬 이차 전지의 음극으로서의 탄소 나노 튜브의 특성

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Vertically aligned multiwalled carbon nanotubes (CNT) films have been obtained by DC plasma-assisted hot filament chemical vapor deposition (CVD) over Ni/Cr/SiO₂/Si. About 5 micrometer thick as grown film was electrochemically characterized for applications as anode in lithium ion batteries. Cyclic voltammograms of Li/1M LiClO₄, PC/CNT half cell show that CNT films can reversibly intercalate Li⁺ mainly under 0.5V. Reversible capacity (1.5mAh/cm², 1500mAh/g) has been estimated from galvanostatic charge-discharge characteristics under constant current density of 1mA/cm². Kinetic studies on the lithium intercalation reaction also have been carried out using electrochemical impedance spectroscopy (EIS) and Galvanostatic and Potentiostatic Intermittent Titration Techniques (GITT, PITT respectively). Reversible capacity was quantitatively analyzed using Electrochemical Voltage Spectroscopy (EVS). We employed 10um thick LiMn₂O₄ screen printed on stainless steel mesh as cathode to characterize the full cell of CNT/ 1M LiClO₄, PC/ LiMn₂O₄ system. 100 charge-discharge cycles have been performed and, no noticeable performance degradation was found compared with Li/ 1M LiClO₄, PC/ LiMn₂O₄ cell.