

Silicon incorporated mesoporous SnO₂ anode for high energy Li ion secondary batteries

장윤정, 박귀옥, 김지만*
성균관대학교
(jimankim@skku.edu*)

High energy batteries are important for the development of high performance portable devices and electric vehicles. Si and SnO₂ are one of the most promising high energy anode materials because it is well known theoretical capacity of 4200mAh/g and 780mAh/g, respectively which is much higher than capacity of graphite (372mAh/g). However these Li alloyed materials suffer from significant volume change during alloying and de-alloying process and this causes cracking and pulverization of anode, which leads to loss of electrical contact and fading of capacity.

In this report, we present silicon incorporated mesoporous SnO₂ electrode material as a high energy anode for Li ion secondary batteries. Mesoporous structure that have nano-sized pores separated by walls attributes to enhance the transfer of Li ions and reduce the diffusing resistance of the electrode. Silicon incorporated mesoporous SnO₂ was prepared using silicon nano-particle contained KIT-6 silica template via nano-replication method. Silicon species are in the range of 15-40 wt%, which induce high capacity. Well-defined meso pores in the silicon incorporated mesoporous SnO₂ also accommodate volume changes during the Li alloy and dealloy process.