Supercritical Ethanol Synthesis of MoS_2 Nanoparticles and Their Electrochemical Properties

Siva Kumar, 김재훈†
성균관대학교
(jaehoonkim@skku.edu†)

Molybdenum disulfide (MoS2) is a promising anode material for high performance lithium-ion batteries owing to its high specific capacity, natural abundance, and inexpensive. Nevertheless, poor cycling stability, low rate capability and uncertain electrochemical reaction mechanism are the main obstacles for MoS2 in lithium ion batteries. Molybdenum disulfide nanostructures were fabricated via a facile green supercritical ethanol route over a very short time of 10 min without using surfactants or templates. The as synthesized nanoparticles were of ~4 nm in diameter, BET surface area of ~ 67.67 m2g-1 and average pore diameter of 17.16nm. These samples were subject subsequent calcination at various temperatures (500, 600, 700, and 800oC) under H2S/Ar atmosphere and used them as lithium -ion battery anodes. We describe the ability of these calcination samples as anode materials for lithium-ion batteries. The calcination samples exhibited high initial reversible capacities. Among the calcination samples MoS2-700, MoS2-800 exhibited capacity retention of 80% and 87% at the end of 30th cycles without any composite structure and carbonaceous support.