Simple Salt-Templating Approach to Design Porous Molybdenum Carbide as a Promising Anode Material for Secondary Ion Batteries

Albertina Ingrid, Winda Devina[1], 김재훈[1,†]
Sungkyunkwan University (Suwon Campus); [1]Sungkyunkwan University
(jaehoonkim@skku.edu[†])

Molybdenum carbide (Mo_2C) has gained a great interest as an advanced anode material for secondary ion batteries owing to its low cost, high chemical stability, and high conductivity. However, the electrochemical performance of bulk Mo_2C is still inferior compared to the commercial graphite. Herein, to maximize the electrochemical performance of Mo_2C, we demonstrate a simple route to fabricate porous Mo_2C by using crystal NaCl as porous template. The resultant porous Mo_2C has high surface area (177.28 $m^2\ g^{-1}$) as compared to that of bulk Mo_2C (1.06 $m^2\ g^{-1}$). The porous structure and 3D interconnected configuration of Mo_2C offer larger active sites and shortened ions diffusion pathways to the electrode/electrolyte when the materials are used as anode materials for Li/Na/K ion batteries. Porous Mo_2C can deliver a reversible discharge capacity of 560 mAh g^{-1} at 50 mA g^{-1} for LIBs, 160 mAh g^{-1} at 25 mA g^{-1} for SIBs, and 200 mAh g^{-1} at 20 mA g^{-1} for KIBs. The porous Mo_2C exhibits excellent stability, revealing superior electrochemical activity compared to the bulk Mo_2C.