Facile method to synthesis hybrid phase 1T@2H MoSe2 nanostructures for rechargeable lithium ion batteries

Energy storage devices have become vital parts of our routine life. Among the numerous candidates, lithium ion batteries are considered the most favorable energy storage systems. MoSe2 consists of Se–Mo–Se atom layers bounded with van-der Waals forces and is highly favored for lithium ion intercalation and extraction. This paper establishes a simple and economical one-pot chemical method to synthesize MoSe2 nanostructures for lithium ion battery anode material. Raman scattering confirmed the 1T@2H MoSe2 mixed phase structure, transmission electron microscopy showed 2H and 1T phase contours in the MoSe2 nanosheet, and scanning electron microscopy showed the nanograin honeycomb structured morphology. The 1T@2H MoSe2 nanostructures deliver enhanced primary discharge capacity 843 mAh/g at 100 mA/g with 99% Coulombic efficiency after 100 cycles. Electrochemical results confirmed the 1T@2H MoSe2 nanostructure would be an excellent anode material and a promising candidate for high performance lithium ion batteries.