Tracking the confinement effect of highly dispersive carbon in a tungsten oxide/carbon nanocomposite: conversion anode materials in lithium ion batteries

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Various transition metal compounds which has intercalation-initiated conversion reaction mechanism have been widely studied as anode materials in lithium ion batteries (LIBs). Although introducing carbonaceous materials solved issues arising from the conversion reaction during repetitive cycles, perfect electrical contact of the carbonaceous material with the active material on a few-nanometer scale has been rarely accomplished. In addition, almost previous studies have focused on maximizing the electrochemical performance without an in-depth understanding of the fundamental effect of each component. Hereby, an ordered mesoporous tungsten oxide/carbon composite with ultra-highly dispersive carbon over few-nanometer scale is synthesized by evaporation induced self-assembly. The confined tungsten oxide within the nanowalls(~10nm) is investigated by electrochemical transient analysis and various ex-situ analysis including X-ray diffraction and X-ray absorption spectroscopy. The prepared electrode shows an excellent cycle and rate performance owing to the highly conductive and stable matrix which can endures severe volume change caused by conversion reactions.