Supplementary Material

Designing innovative heterostructures composed of TiO_2/Bi_2Te_3/ carbon cloth for high efficient sodium-ion batteries

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Material characterization

The crystal structure of Bi_2Te_3 and TiO_2/Bi_2Te_3/CC heterostructures were measured by X-ray diffraction (XRD, Brucker-AXS/D8 Advance powder diffractometer equipped with Cu Kα radiation (λ = 1.541 Å)) and a Witec Alpha 300 R confocal Raman microscopy. The morphology was examined analyzed by field-emission scanning electron microscopy (FESEM, Hitachi/SU8020) with Energy Dispersive X-Ray Fluoresence Fluorescence Spectrometer (EDAX). The atomic resolution images and element allocation distribution were characterized by high-resolution transmission electron microscopy (HRTEM, FEI Tecnai G^2 F20) with Energy Dispersive Spectrometer (EDS). X-ray photoemission spectroscopy (XPS) measurements were performed by Thermo Scientific ESCALAB 250Xi with Al Kα source ($h\nu$ = 1486.6 eV).

Electrochemical measurements

A CR2032-type coin cell with TiO_2/Bi_2Te_3/CC as active material was assembled for cell testing. The active material (TiO_2/Bi_2Te_3/CC) was used directly as the positive electrode of the half-cell. The loading of each electrode sheet was approximately 0.3 mg/cm^2. The cell was encapsulated in a closed glove box containing argon gas with sodium sheets as counter electrodes and glass fibers and 1.0 M $NaClO_4$ (EC: DMC = 1:1 vol% with 5% FEC) as separator and electrolyte, respectively.

Electrochemical impedance spectroscopy (EIS) measurements were performed on an electrochemical workstation (CHI 660E) using a frequency range of 100 kHz to 10 mHz, and cyclic voltammetry (CV) tests were performed on an electrochemical

workstation using different scan rates from 0.2-2 mV s^{-1} with a voltage range of 0.3-2.8 V.