

Supplementary Information

One-step synthesis of highly aligned SnO₂ nanorods on self-produced Na₂Sn(OH)₆ substrate for performance lithium-ion batteries

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Experimental Section:

Synthesis and characterization of SnO₂/ Na₂Sn(OH)₆ array:

In a typical synthesis, SnCl₄•5H₂O (0.35 g, 1 mmol), PVP (K-30, M=58000, 0.335 g, 0.006 mmol) and NaOH (0.28 g, 7 mmol) were in order added to the mixed solvent of ethanol and distilled water (6 mL, v/v of 1:1). The mixed solvent placed in a beaker was put into ultrasonic cleaning machine (Frequency: 40 KHZ, Power: 50 W) for about 5 minutes. The purpose of treatment is fully mixed of the reactants. The resulting solution was transferred into a Teflon-lined stainless-steel autoclave and was kept at 200 °C for 18 h. The products were collected by centrifugation at 10000 rpm, and washed several times with deionized water and ethanol.

The composition and phase of the as-prepared products were acquired by the powder X-ray diffraction (XRD) pattern using a Panalytical X-pert diffractometer with CuK α radiation. The morphology and crystal structure of as-prepared products were observed by scanning electron microscopy (SEM, S4800), and high-resolution transmission electron microscopy (HRTEM, FEI Tecnai-F30) with an acceleration voltage of 300 kV. All TEM samples were prepared from depositing a drop of diluted suspensions in ethanol on a carbon film coated copper grid.

Measurement of lithium-ion batteries. The working electrode was prepared by compressing a mixture of active materials, acetylene black, and binder (poly(tetrafluoroethylene, PTFE) in a weight ratio of 75:15:10. The weight of working

electrode is around 1.5 mg/cm². Lithium metal was used as the counter and reference electrodes. The electrolyte was LiPF₆ (1 M) dissolved in a mixture of ethylene carbonate (EC), ethyl methyl carbonate (EMC) and dimethyl carbonate (DMC) with a volume ratio of 1:1:1. The galvanostatic method at the charge/discharge current density of 100 mA g⁻¹ was employed to measure the electrochemical capacity and cycle life of the working electrode using a LAND-CT2001A instrument. The cut-off potentials for charge and discharge were set at 2.5 and 0.1 V (vs. Li⁺/Li), respectively. All electrochemical measurements were carried out at room temperature.