

Supporting Information

Hydrothermal synthesis of Ag/ β -AgVO₃ nanobelts with enhanced performance as cathode material for lithium batteries

Shuquan Liang,^{a,b} Jiang Zhou,*^a Xuelin Zhang,^a Yan Tang,*^{a,b} Guozhao Fang,^a Tao Chen,^a Xiaoping Tan^{a,b}

^a School of Material Science and Engineering, Central South University, Changsha 410083, Hunan, China

^b Key Laboratory of Nonferrous Metal Materials Science and Engineering, Ministry of Education, Central South University, Changsha 410083, Hunan, China

* Corresponding author. Tel.: +86 0731 88836069. Fax: +86 0731 88876692.

E-mail address: ty_csua@126.com (Y. Tang); zhoujiangcsu@gmail.com (J. Zhou).

Experimental section

Materials synthesis. All chemicals used in our experiments are of analytical purity and used as received without further purification. The Ag/ β -AgVO₃ nanobelts were prepared using Ammonium metavanadate (NH₄VO₃, $\geq 99.0\%$, Tianjin Guangfu Fine Chemical Research Institute), silver nitrate (AgNO₃, $\geq 99.8\%$, Sinopharm Chemical Reagent Co., Ltd), and hydrogen peroxide (H₂O₂, $\geq 30\%$, Sinopharm Chemical Reagent Co., Ltd) as starting materials. In a typical procedure, 0.3 g NH₄VO₃ powder was added into 20 mL of de-ionized water with actively magnetic stirred at room temperature and then 2 mL 30% H₂O₂ was added and kept continuously stirred for 20 min to form a bright-yellow solution. A stoichiometric amount of AgNO₃ was dissolved in 15 ml deionized water and then was transferred to the above solution with vigorously stirred for another 30 min. The resulting solution was then transferred to a 50 mL autoclave and kept in an electrical oven at 190 °C for 24 h. After cooling down naturally, the precipitates were collected by centrifugation and washed with de-ionized water and anhydrous ethanol several times, following by drying at 60 °C overnight and the Ag/ β -AgVO₃ nanobelts obtained.

Materials characterization. The phase purity of the as-prepared products were studied by X-ray power diffraction (XRD, Rigaku D/max2500 XRD with Cu K α radiation, $\lambda=1.54178$ Å). The morphologies and sizes of the as-prepared products were characterized by scanning electron microscopy (SEM, FEI Nova NanoSEM 230) and transmission electron microscopy (TEM, JEOL JEM-2100F). High-resolution transmission electron microscope (HRTEM) and selected-area electron diffraction (SAED) analysis were performed on the JEOL JEM-2100F transmission electron microscope.

Electrochemical measurements. The electrochemical properties were carried out by assembly

of coin cells (2025 type coin cell). The cathode slurry was prepared by dispersing the as-prepared products, acetylene black, and polyvinylidene fluoride (PVDF) binder in a weight ratio of 70 : 20 : 10 in a N-methyl-2-pyrrolidone (NMP) solution. The slurry was coated on aluminum foil and dried in a vacuum oven at 90 °C overnight prior to coin-cell assembly. The coin cells contained cathode electrode, metallic lithium, polypropylene separator, and electrolyte of 1 M solution of LiPF₆ in ethylene carbonate/dimethyl carbonate (EC/DMC) (1 : 1, vol.%), were assembled in a glove box (Mbraun, Germany). The galvanostatic charge/discharge performances of the electrodes were evaluated at room temperature (about 35 °C) using an Land Battery Tester (Land CT 2001A, Wuhan, China) within the voltage range of 1.5 V- 3.5 V (vs. Li/Li⁺). The electrochemical impedance spectrometry (EIS) was performed on a ZAHNER-IM6ex electrochemical workstation (ZAHNER Co., Germany) in the frequency range of 100 kHz to 10 mHz. The loading of the MoS₂ cathode material for coin cell test is about 1-2 mg. The specific capacity and current density are based on the weight of Ag/β-AgVO₃ nanobelts only.

Table and Captions

Table S1 The EIS Simulation Parameters of Ag/ β -AgVO₃ nanobelts

Samples	R _s (Ω)	R _f (Ω)	R _{ct} (Ω)
fresh	2.206	11.02	66.09
1 st cycle	4.795	19.08	64.89
100 th cycle	4.025	22.28	71.69

Figures and Captions

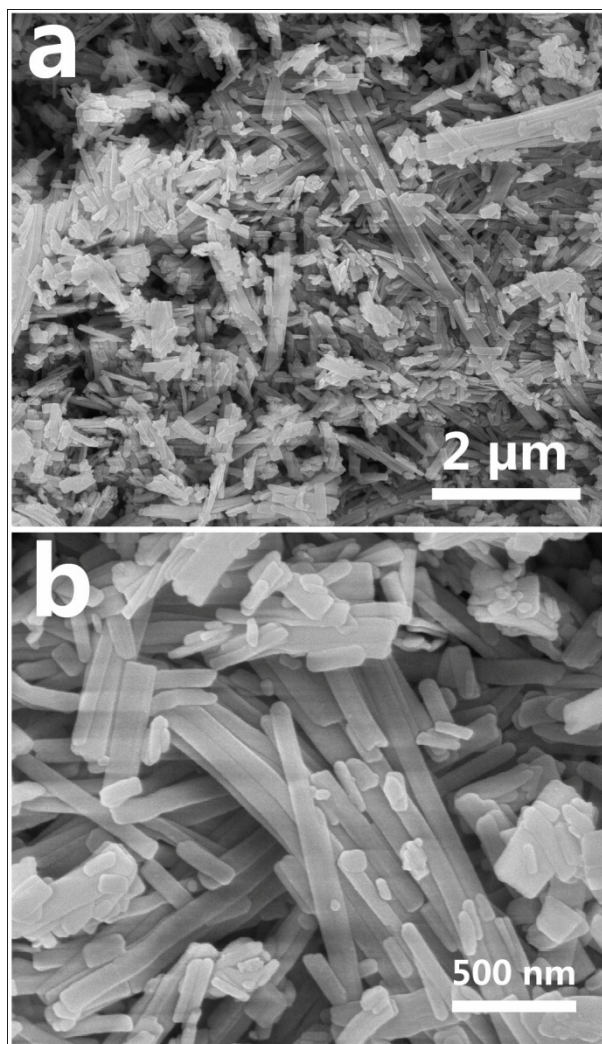


Figure S1. SEM images of Ag/β-AgVO₃ nanobelts with different magnifications.