

Supporting information

Materials Preparation. Anatase TiO_2 polycrystal structure was prepared by solvothermal processing, and the cetyltrimethylammonium bromide (CTAB) used as dispersing agent. In a typically synthesis, a desired amount of CTAB anhydrous ethanol was ultrasonically dispersed in 15ml of anhydrous ethanol before cetyltrimethylammonium bromide (CTAB) was added with magnetic stirring at room temperature for 1 h. Then 0.2 M anhydrous ethanol solution of tetrabutyl titanate was added and dissolved with stirring, forming the mixed solution with mole ratio of Ti : CTAB was 1: 0.31. Ammonia was added dropwise to adjust the pH value to 8.5. After stirring for 0.5 h, the resulting suspension was transferred to a 50ml Teflon-lined autoclave and heated at 180 °C for 12 h. The product was filtered, washed with deionized water and anhydrous ethanol respectively, and dried at 60 °C overnight.

Materials Characterization. The shape and crystal structure of the resulting anatase TiO_2 were investigated by X-ray spectroscopy (XRD, Philips Rigaku D/Max-ka X-ray diffractometer equipped with a Cu-Ka source at 40 kV and 30 mA). The morphologies of the samples were investigated by using SU-70 field-emission scanning electron microscopy (FE-SEM) and the transmission electron microscope (TEM) images were obtained in Tecnai 20U-Twin at an acceleration voltage of 200 kV. The mogravimetric analysis (TGA) was performed in air with a heating rate of 10 °C/min⁻¹ by using thermogravimetric analyzer (TG-209C), it is performed to measure the weight content of the carbon.

Electrochemical Measurements. The electrochemical tests were performed using two-electrode Swagelok-type cells with lithium tablets serving as both the counter and reference electrodes under ambient temperature. The working electrode was composed of 70 wt % of TiO_2 polycrystal crystals active material, 10 wt % of carbon black conductivity agent and 20 wt % of polyvinylidene difluoride binder (PVDF). 1 mol L⁻¹ LiPF_6 solution in a mixture of ethylene carbonate (EC) and dimethyl carbonate (DMC) (EC : DEC, 1 : 1 by volume) was used electrolyte. Cell assembly was carried out in an Argon-filled glovebox with both moisture and oxygen contents below 1 ppm. Galvanostatic charge/discharge was conducted using a battery tester (NEWAER) with voltage window 1 V-3 V at a current density of 100 mA g⁻¹.

Figure captions

Figure. S1 XRD pattern of the TiO_2 samples.

Figure. S2 SEM images of the TiO_2 samples.

Figure. S3 the charge-discharge capacities curves of the TiO_2 samples.

Figure. S4 the coulombic efficiency curve of the TiO_2 samples.

Figure. S5 the rate performance curve of the TiO_2 samples.

Figure. S6 TGA curve of the OMCT_5 and OMCT_{15} samples under air atmosphere at a rate of $10\text{ }^\circ\text{C min}^{-1}$ from $30\text{ }^\circ\text{C}$ to $800\text{ }^\circ\text{C}$.

Figure. S7 SEM images of the electrodes after 5 cycling (a), 10 cycling (b) at a current of 100 mA g^{-1}

Figure. S1

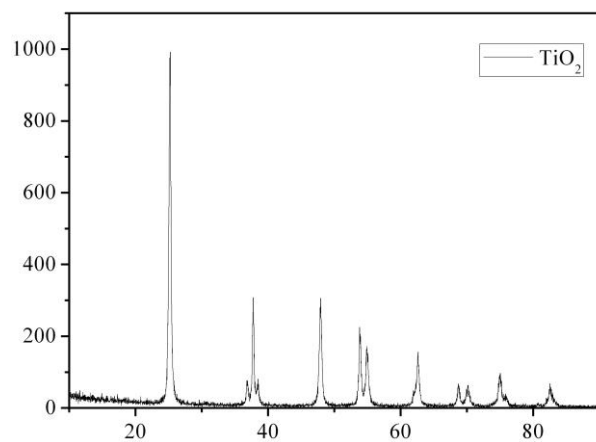


Figure. S2

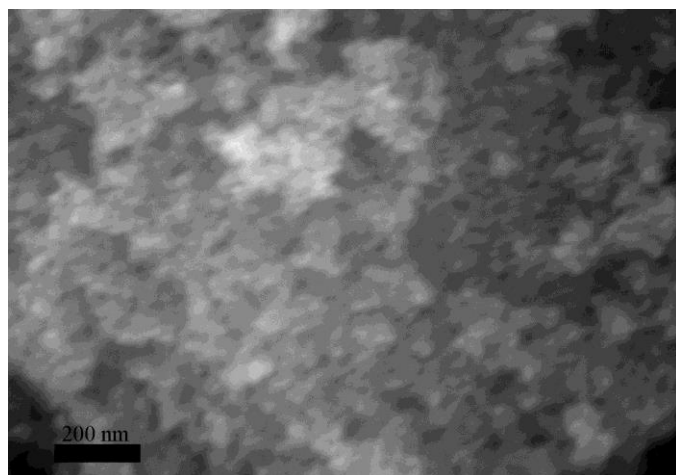


Figure. S3

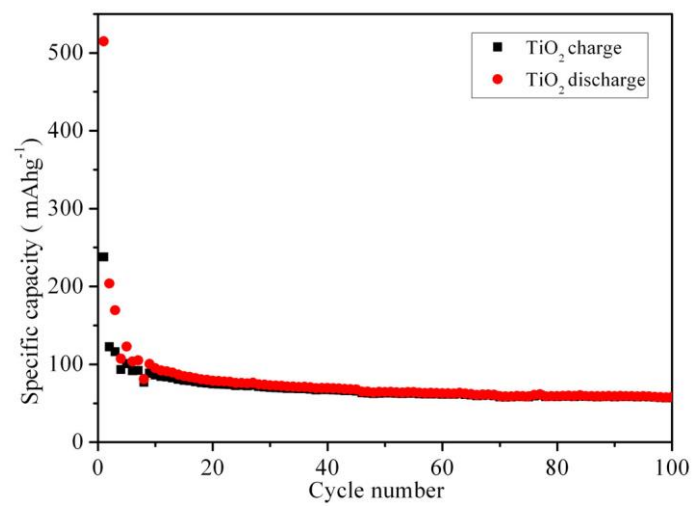


Figure. S4

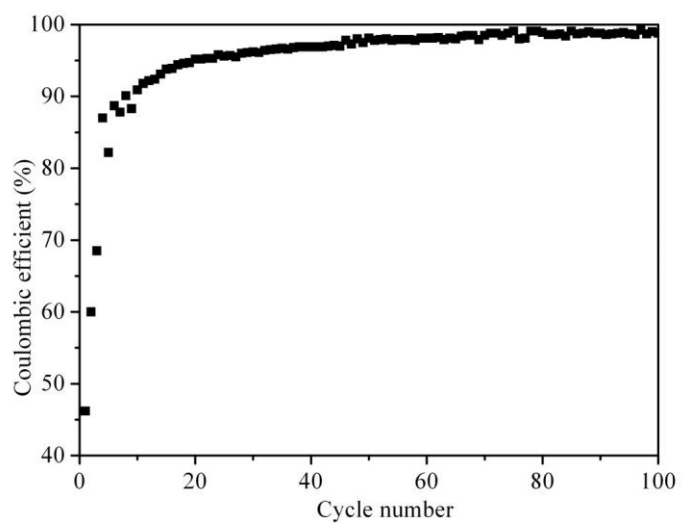


Figure. S5

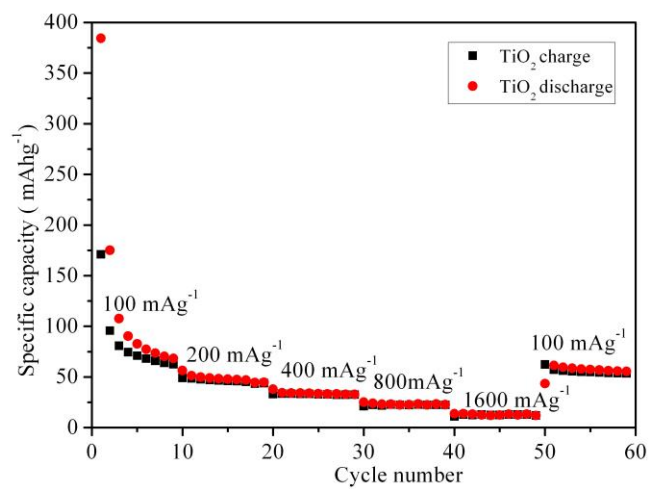


Figure. S6

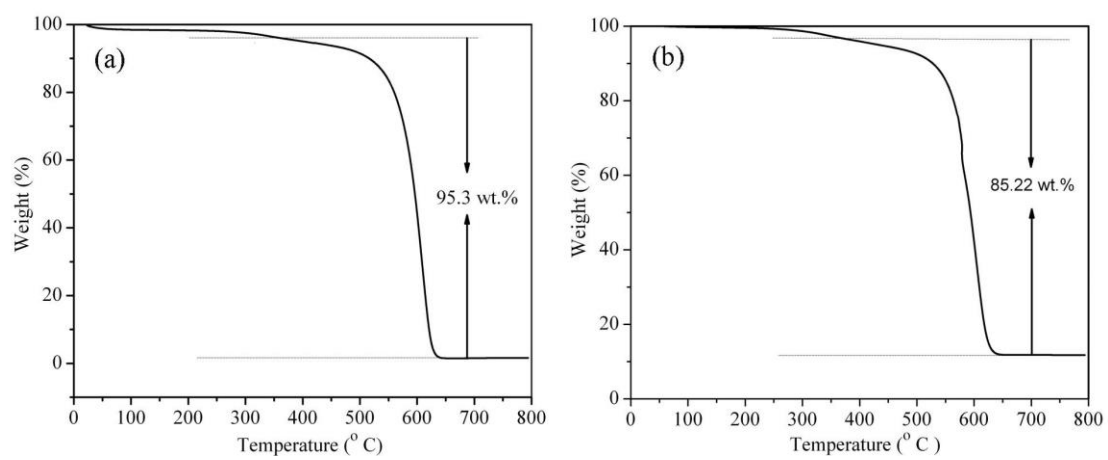


Figure. S7

