Preparation and Electrochemical Performances of TiO_2/graphene Composite as Anode Material for High-power Lithium Ion Batteries

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Titanium dioxide (TiO_2) possess good reversibility, small volume change during charge-discharge process, low cost and environmental friendly, which make it to be one of the ideal anode materials for high power lithium-ion batteries. To enhance the electronic conductivity and structural stability of TiO_2, honeycomb-like porous TiO_2/GNs nanocomposite was prepared by a reflux method. The composite was characterized by XRD, SEM, TEM, BET and their electrochemical performances were investigated by galvanostatic charge/discharge. Results indicated that the nanosized anatase TiO_2 (about 5~8 nm) particles were uniformly dispersed on the surface of GNs. The honeycomb-like porous TiO_2/GNs nanocomposite exhibited excellent rate capability and cycling performance: a stable charging capacity of 154.1 $mAh \cdot g^{-1}$ was obtained at 50 C, and could recover to 241.7 $mAh \cdot g^{-1}$ while the current went back to 1 C. The charging capacity of TiO_2/GNs nanocomposite could achieve up to 201.9 $mAh \cdot g^{-1}$ at 10 C in the first cycle, and maintained at 181.4 $mAh \cdot g^{-1}$ after 300 cycles.

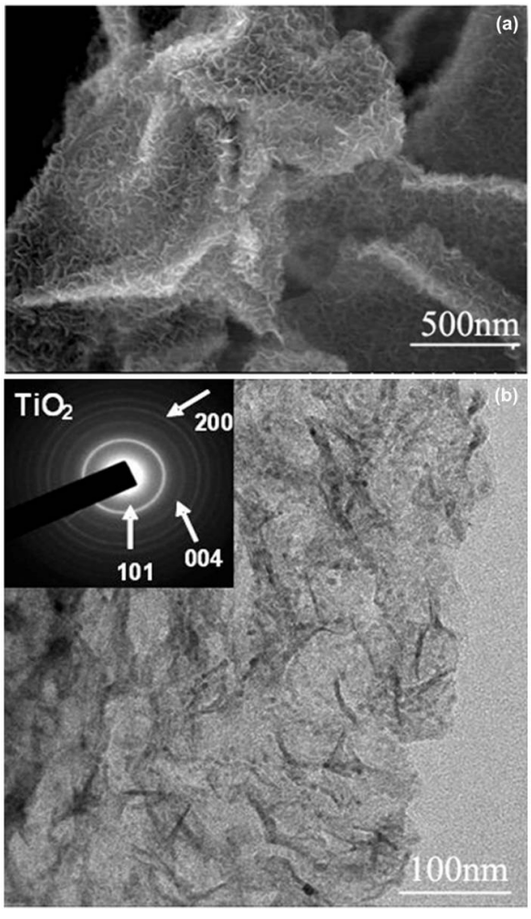

Fig.1 (a) SEM images of TiO_2/GNs; (b)TEM image and inset is SAED patterns of TiO_2/GNs.

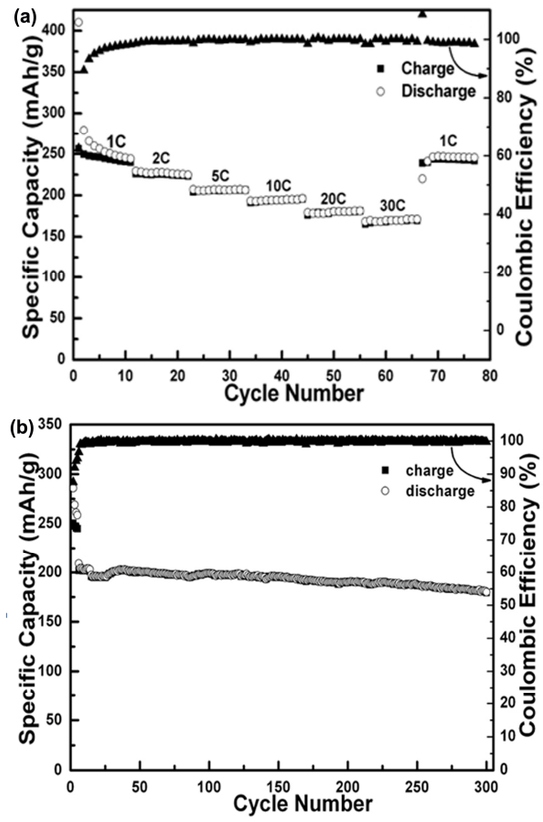

Fig.2 (a) Rate performances of TiO_2/GNs; (b) Cyclic performance of TiO2/GNs at 10C.

References

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