Construction of novel high-performance Li-ion hybrid supercapacitors based on 3D graphene composites

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Abstract

Li-ion hybrid capacitors (LIHCs) as a novel and promising energy storage unit, consisting of a Li-ion battery type anode and an electrochemical double layer capacitance (EDLC) type cathode, has attracted enormous research attentions. [1-3] However, it remains a significant challenge to build the high-performance LIHCs due to most battery-type anodes with the sluggish kinetics of Li-ion storage and low specific capacitance of common capacitor-type cathodes. [4, 5] Thus, a search of alternative high-performance battery type anode materials and capacitor-type cathode materials, able to deliver higher energies and power densities in organic electrolyte is highly required. Herein, a novel high-performance LIHCs is constructed by combining a Li-ion battery type anode (3D graphene/MoO$_3$ nanocomposite) with a capacitor type cathode (3D graphene/PANI derived carbon material). Such a subtle design endow LIHCs with a wide voltage range of (3.8 V), a high energy density of 128.3 Wh·kg^{-1}, and an ultra-long cycle life up to 3000 cycles with 87% capacity retention.

References

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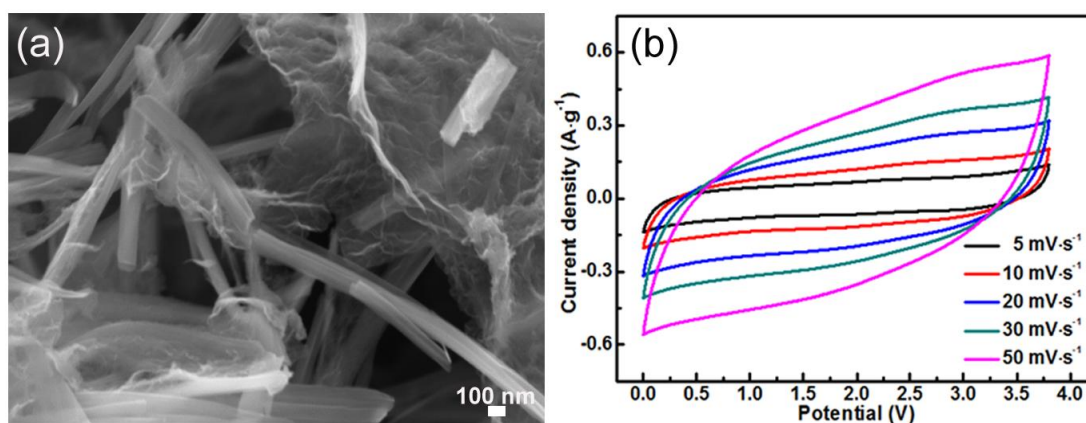[5] H. W. Wang, C. Guan , X. F. Wang, H. J. Fan, *Small,* **11** (2015), 1470–1477.

Figure 1 (a) SEM image of 3D graphene/MoO$_3$ nanocomposite, (b) CV test of LIHSs device based on 3D MoO$_3$/GNSs and 3D PANI/GNSs derived carbon at various scan rates.