Flexible MoS$_2$ Nanosheets/Carbon Nanotube Paper Anode Electrode for Lithium Ion Batteries
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Lithium ion batteries (LIBs) have been receiving great attention for potential applications in electric vehicles and stationary energy storage devices. The current use of graphite still dominates the anode material in commercial batteries which cannot fully meet the energy density requirements for high rate LIBs applications due to its relatively small capacity (372 mAh/g). One of the promising choices for the next generation LIBs is to develop alternative higher capacity materials to replace the graphite. Among the multitudinous explored materials, graphene-like layered transition metal sulphide, MoS$_2$, has attracted particular attention due to their high theoretical capacities and safer operation. In this work, we report a simple and feasible process to fabricate MoS$_2$ nanosheets grown on carbon nanotube paper which was directly used as a flexible electrode for LIBs. This flexible electrode exhibits exceptional high capacity, superior cyclic stability and high-rate capability. The morphology and microstructure of the MoS$_2$/carbon nanotube paper composite were investigated using scanning electron microscopy (SEM) as shown in Figure 1. Representative MoS$_2$ nanosheets/carbon nanotube composite with one-dimensional network structure appear to be loose and soft agglomerates (Figure 1a, b, c). The diameter of the composite was ~250 nm and the nanosheets like MoS$_2$ were uniformly grown on the surface of the carbon nanotube (Figure 1d).

Figure 1 a, b, c) Low and d) high magnification SEM images of MoS$_2$/carbon nanotube paper.

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References