Mesoporous carbon fibers/SnO_2 composite as high performance anode material for lithium-ion batteries

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Lithium-ion batteries which can provide high energy densities are considered as the most promising battery for next generation energy storage. Tin oxide (SnO_2), which has a theoretical capacity of 782 mAh g^{-1}, has been studied as an anode material for LIBs. It's a promising material to replace commercialized graphite which has a theoretical capacity of 372 mAh g^{-1}. However, SnO_2 has challenges to surmount for commercialization such as relatively low conductivity and huge volumetric change. Such limitations of SnO_2 lead to precarious electrochemical performances. Herein, mesoporous carbon fibers/SnO_2 composite (MCFs/SnO_2) was prepared to solve the above-mentioned issues. MCFs based on polyacrylonitrile act as a conductor to compensate the conductivity problem of SnO_2 anode material and also provide the second current collector of the electrode. Furthermore, nanosized SnO_2 particles show less crack formation compared with bulk, resulting in stable electrochemical properties.