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**One dimensional and coaxial polyaniline@tin dioxide@multi-wall carbon nanotube as
advanced conductive additive free anode for lithium ion battery**

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Abstract

In this paper, we design a novel one dimensional and coaxial polyaniline@tin dioxide@multi-wall carbon nanotube (PANI@SnO₂@MWCNT) composite as advanced conductive additive free anode material for the lithium ion battery. The SnO₂ nanoparticles (~5 nm) are firstly fixed on the conductive MWCNT skeleton by self-assembling the nano-sized SnO₂ particles on the surface of MWCNT with the assist of surfactant P123 then followed by in-situ coating a flexible layer of PANI with excellent electron and lithium ion conductivity. The one dimensional and coaxial PANI@SnO₂@MWCNT can effectively accommodate the volume expansion of SnO₂ nanoparticles during lithiating and delithiating via the wrapping of the flexible coating layer of PANI and the

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