

Cylindrical nanostructured MoS₂ directly grown on CNT composites for lithium ion batteries

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The direct attachment of MoS₂ to carbonaceous architecture materials remains a major challenge because of the non-intimate contact between carbonaceous materials and active MoS₂ material. In this study, we report a new unique synthesis method to produce a new type of hybrid nanostructure of MoS₂-CNTs composites. We developed a novel strategy for the synthesis of cylindrical MoS₂ directly grown on CNT composites without the use of any other additives, exhibiting super electrochemical performances as the anode material of lithium ion batteries via a microwave irradiation technique. We adopt a simple, step-by-step method: sulfur coating on CNTs and then reaction with a Mo source to synthesize hybrid cylindrical nanostructures of the MoS₂-CNT composite. X-ray diffraction, field emission scanning electron microscopy, and high-resolution transmission electron microscopy analyses demonstrated that the as-synthesized MoS₂-CNTs possessed a hybrid nanostructure in which MoS₂ sheets were well attached to the CNTs. The directly attached MoS₂ sheets on the CNTs showed superior electrochemical performance for anode materials of a lithium ion battery.