

Micro-nano hybrid structure of Lithium titanate to achieve high areal capacity and free-standing feature for fast-charge Li-ion battery

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Reducing charging time is one of the most important issues in battery industry to expand markets related electric vehicle and energy storage system. Lithium titanate (LTO) is considered alternative anode materials due to its fast kinetics with Li-ion and negligible volume expansion during charge and discharge process. Unlike commercial graphite anode or silicon which is one of possible anode materials, LTO shows better rate performance and life capability. However, its theoretical capacity is even lower than graphite. In this work, to achieve high areal capacity, free-standing LTO anode was synthesized. Carbon coated LTO nanowire sheets were stacked layer-by-layer to construct free-standing electrode. Micro-sized stacked sheet structure could enhance mass-transfer and nanosized wire structure with carbon coating might improve conductivity due to its continuous structure. The interconnected micro-sheets also remove a current collector, which could achieve high areal capacity comparable to commercial graphite. Fast kinetics of LTO was still work even though no current collector and high thickness so, it is capable to convert graphite-based Li-ion batteries.