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Molten salt synthesis of hexagonal tungsten trioxide nanoparticles for lithium-ion battery anode

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*Keywords:* Molten salt synthesis; Tungsten trioxide; Anode; Lithium-ion battery.

*Abstract:* Hexagonal tungsten trioxide nanoparticles were prepared using ammonium metatungstate hydrate as the precursor by a facile molten salt method. The as-prepared samples were characterized by X-ray diffraction, Fourier-transform infrared spectroscopy, X-ray photoelectron spectroscopy, Brunauer-Emmett-Teller, Scanning electron microscope and Transmission electron microscope. When applied for lithium-ion battery anode, it delivers 320 mAh g<sup>-1</sup> delithiation capacities at current density of 100mA g<sup>-1</sup> after 130 discharge-charge cycles. The results indicate that tungsten trioxide prepared by molten salt method would be a promising anode for Lithium-ion batteries.

## 1. Introduction

Tungsten trioxide has been used in many fields due to its low toxicity and environmental friendliness, such as metal secondary battery [1-3], photocatalysis [4, 5], photoelectrochemical water splitting [6-8] and fuel cell [9]. In recent years, many methods have been employed to prepare tungsten trioxide with different structure and morphology. For example, Sim et al. [10] synthesized three kinds of WO<sub>3</sub> particles with yolk-shell, hollow and dense structure through spray pyrolysis. Pervez et al. [11] prepared amorphous WO<sub>3</sub> mesosponge grown on the substrate of the tungsten anode by electrochemical oxidation method. Duan et al. [12] obtained biconical WO<sub>3</sub> mesocrystalline with hexagonal structure via an ionic liquid-assisted hydrothermal reaction. However, the synthesis of hexagonal WO<sub>3</sub> nanoparticles in molten

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