Simple and Green Method for Fabricating $V_2O_5 \cdot nH_2O$ Nanosheets for Lithium Battery Application

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During the last few years, the synthesis of inorganic two dimensional (2D) materials tremendously increased, due to their promising surface area[1,2]. However, the synthesis of these 2D materials can significantly influence our environment, by the use of harmful chemicals and severe reaction conditions[3,4].

Herein, we report on a simple and green strategy for fabricating hydrated vanadium pentoxide ($V_2O_5.nH_2O$) nanosheets from commercially available vanadium oxides precursors via water based exfoliation technique. Operando and *ex situ* X-ray diffraction (XRD) studies were conducted to track the structural changes during the exfoliation process. The vanadium oxidation states and the water content of the material were determined by X-ray photoelectron spectroscopy (XPS) and thermogravimetric analysis (TGA), respectively. Electron microscopy and atomic force microscopy (AFM) showed that the $V_2O_5.nH_2O$ is composed of a few nanometer thick nanosheets. A composite material of the $V_2O_5 \cdot nH_2O$ nanosheets and multi-walled carbon nanotube (MW-CNT) were fabricated and then tested as a free standing electrodes (FSE) and conventionally casted electrodes (CCE) for lithium battery. Both electrodes showed promising capacities and rate capabilities for lithium-ion intercalation.

References:

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