**Synthesis and Structural Characterizations of Vanadium Oxides Thin Films Prepared by MOCVD and ALD**

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There is growing interest in producing thin film lithium batteries for microelectronic applications. Vanadium oxides such as $V_2O_5$, $V_6O_{13}$, … demonstrate interesting electrochemical performances as cathode thanks to its high specific energy density. $V_2O_5$ thin films can be deposited by several methods (sol-gel, sputtering, chemical vapor deposition, pulsed-laser deposition, flash evaporation, thermal evaporation and electron beam deposition). It was also shown recently (1-2) that $V_2O_5$ thin and well crystallized films can be obtained by ALD (Atomic Layer Deposition). This technique is a modification of the classical CVD and can also be called as « alternately pulsed-CVD » (3). In the present work, a new approach has been conducted for the preparation of the $V_2O_5$ films by CVD. Hence, in a first step thin films were obtained by using a new "home-made" liquid delivery system of pure or isopropanol solution of vanadium (V) tri(isopropoxide) oxide. In a second step, thin films of vanadium oxides were also prepared by ALD (atomic layer deposition). Therefore, the main objective of this paper is to compare the structural properties of vanadium oxides thin films synthesized by these two different deposition processes using X-ray diffraction, atomic force microscopy (AFM) and scanning electron microscopy (SEM).

The influence of the substrate and the experimental conditions on the crystallinity of the deposited films is discussed.

XRD analyses performed with the obtained $V_2O_5$ thin films demonstrate a strong preferred c orientation. By changing the experimental conditions, in particular by using precursor isopropanol solution and higher evaporation and decomposition temperature, $V_6O_{13}$ thin films are obtained by MOCVD. AFM and SEM results showed a good film stability and homogeneity before and after annealing whatever the deposition technique.

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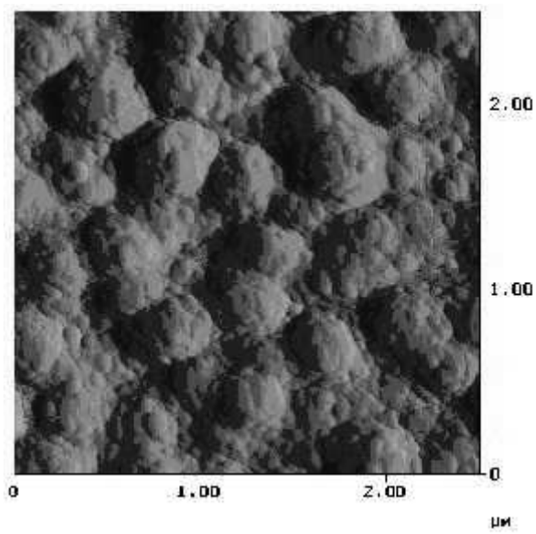


Fig.1 : Typical AFM images (2.5 × 2.5 µm) of an ALD $V_2O_5$ film deposited on $SnO_2$ substrate before heat treatment. Section profile of the $V_2O_5$ film showing a grain of 125nm.