Synthesis and characterization of nanostructured $V_2O_5nH_2O$ prepared throughout the hydrothermal method

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Recently, it has been shown that nanostructured materials presenting an anisotropic nanostructure can present new properties and applications [1-3]. Recently, a large attention has been given to the synthesis of vanadium pentoxide ($V_2O_5nH_2O$) nanoparticles mainly due its wide variety of applications [4,5]. The main objective of this work is study the mechanism of growth during the formation of $V_2O_5nH_2O$ nanoparticles prepared throughout the decomposition of vanadium peroxide when submitted to a hidrothermal treatment. The samples were prepared by dissolving the quantity of V_2O_5 powder in a hydrogen peroxide (H_2O_2) solution with a 1:10 V_2O_5/H_2O_2 molar ratio, completing the desired volume with distilled water. A clear yellow solution was formed after 10 minutes, indicating the formation of vanadium peroxide. The solution was packed in a reacting bottle with the objective that all the gas produced during the decomposition was not set free. The bottle was placed in a regular laboratory oven and subjected to a thermal treatment. The samples were subjected at different temperature and time of treatments. X-ray analysis revealed the formation of a high-preferred phase orientation on the (00l) direction, and that the basal distance *d* depend on the temperature and time of heat-treatment. As expected, the basal distance increases with increasing number of water molecules in the structure [5]. The high-resolution transmission electron microscopy (HRTEM) results shows that that the samples are in a ribbon form with a particle size less than 20nm and that the nanoparticle growth preferentially on the direction of [010].

Key words: Vanadium oxide, Hydrothermal synthesis, X-ray diffraction, HR-TEM.
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