# $MoO_3$ Thin Films Prepared by Thermal Spray Using Ammonium Moybdate

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Molybdenum trioxide is an attractive material from the technological point of view due to its potential use in electro chromic devices. In this work, MoO3 thin films deposited by Spray Pirolysis (SP) were evaluated. SP is interesting not only because is a low cost technique but it could produce large area thin films as well. $MoO_3$ films were prepared using as precursor, a solution based on $(NH_3)_6Mo_7O_{24}.4H_2O$ (ammonium molybdate tetrahydrate), and air as transport gas. Samples were deposited on to 50x20x1 mm Corning glass substrates. 0.1 M water dissolutions of precursor solution were sprayed over substrates following the next procedure. Initially, glass substrates were heated in an oven and kept it at 400 $^oC$. Then, substrates were taken of from the oven and sprayed during 1 min with the previously prepared dissolution at a rate of 2 mL/min. After that and for 3 min, samples were placed into the oven and heated at 400 $^oC$ again. At last, samples were removed from the oven and sprayed again for 1 min more. This procedure was repeated until all dissolution is stingished. Samples were prepared using different amounts of water dissolutions: 5, 10, 15, 20, 30 and 40 mL. In order to study the MoO3 thin films properties, they were characterized using XRD, SEM and resistivity measurements. All samples with exception of that prepared at 10 mL grown in a polycrystalline phase and all peaks in XRD-spectra correspond to those associated to the $\alpha$–MoO3 phase. These spectra are shown in figure 1. The sample prepared at 10 mL showed a lack of oxygen and its crystallographic structure could be associated to the $\xi$-$MoO_{2.88}$ crystalline phase.

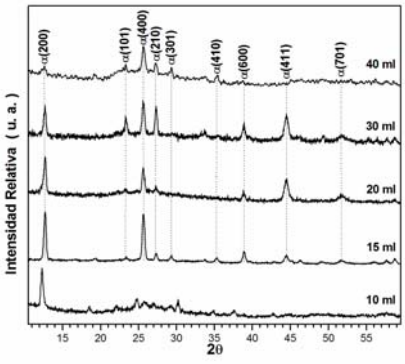


Figure 1. XRD-spectra of MoO3 samples prepared at different conditions

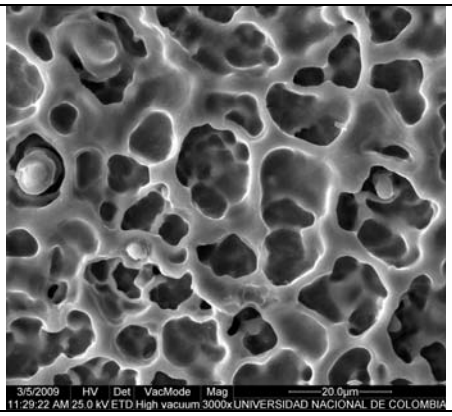


Figure 2. SEM photograph of the sample prepared using a dissolution volume of 40 mL

SEM analysis reveals that the sample-roughness goes from a totally flat surface to a plenty of pores surface as the sample thickness is increased. The last case is shown in Figure 2. According to electrical measurements, the samples have an extremely high resistance values in the GΩ range.

MoO3, Thin films, XRD, SEM