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Synthesis and characterization of the nanotubes $NdNiO_3$

The *R*NiO_3 compounds (R= Nd, Sm, Eu, Pr) have been extensively studied due to their metal-insulator transition, which occurs at temperatures varying from 135 to 450 K. This work reported the study of experimental conditions to produce $NdNiO_3$ (NNO) nanostructures using the template assisted method. In this procedure, mesoporous anodic aluminum oxide templates (AAO) were filled with a Nd-Ni-O chemical solution, in order to produce nanotubes of the NNO. The chemical solutions were prepared by the modified-polymeric precursor method and to produce the nanotubes the AAO membranes were submersed into these solutions. Before the deposition, the precursor materials and the polymeric resin were analyzed by infrared spectroscopy. During the depositions, we have controlled the time of deposition and the viscosity of the solution. After that, NNO/AAO systems were heat-treated at ~ 700°C and characterized by X-ray powder diffraction (XRD), high-resolution scanning electron microscopy (HRSEM) and transmission electron microscopy (TEM). The results of XRD of samples revealed that these samples crystallize in perovskite-like $NdNiO_3$ structure. The images of the HRSEM and TEM show the nanotubes formation of polycrystalline NNO as can be seen in figure 1. These nanotubes present 200 nm of the diameter and length ranging from 1 to 3 μm. Also, in Figure 1(c) it can be observed the formation of smaller nanostructures above these bigger nanotubes, which presents the $NdNiO_3$ phase as verified by electron diffraction in the TEM analysis.

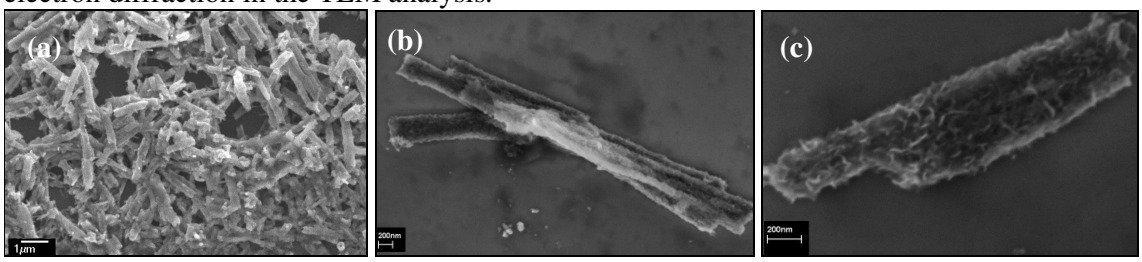

Figure 1 – HRSEM images obtained for the $NdNiO_3$ nanotubes.

Keywords: nanotubes, $NdNiO_3$, templates, synthesis.

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