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Characterization of the physical properties of $NdNiO_3$ nanotubes

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Neodymium nickelate ($NdNiO_3$) is a correlated oxide that exhibits a metal–insulator transition (MIT) close to 200K and is of interest for advanced electronics and optoelectronics. In this work, we have synthesized $NdNiO_3$ nanotubes using a template-assisted method. For this, precursor solution with stoichiometric amounts of Nd-Ni was prepared by polymeric precursor route, than this solution was deposited in commercial anodized aluminum mesoporous membranes. All samples were heat treated at temperatures ranging from 350 to 750°C under oxygen pressure of 1 and 100 bar. The samples were characterized by X-ray diffraction, scanning electron microscopy (SEM), differential scanning calorimetry (DSC) and magnetization as a function of temperature (M(T)). The structural characterization revealed that both samples crystallize in orthorhombic-distorted perovskite structure (Pbnm space group symmetry). Images of SEM revealed ultrafine grains assembled in $NdNiO_3$ nanotubes, the size of those grains vary from 20 to 30 nm. Those tubular samples present external diameter close to 250 nm and length ranging from 1 to 10 microm. The paramagnetic/antiferromagnetic transition could not be verified through M(T) measurements, although DSC measurements revealed a phase transition close to 200 K for both samples. Such transition could be related to a metal-insulator transition that occurs close to 200 K for $NdNiO_3$ bulk samples. In order to verify these results, these samples are going to be characterized through transport properties measurements.

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