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Thermogravimetric study on preparation of $NiTiO_3$ in different reactions times

The thermodynamic properties of the fabrication of $NiTiO_3$ material in different reaction times are reported. The design of this material is accessible through a new efficient sol–gel method, utilizing $Ni(Ac)_2 \cdot 4H_2O$ and $Ti(OiPr)_4$ as starting materials for the formation of $NiTiO_3$ final product through thermal decomposition. The Thermogravimetric (TG) and differential scanning calorimetric (DSC) techniques were used to analyze the reaction of $Ni(Ac)_2 \cdot 4H_2O$ and $Ti(OiPr)_4$, which produce precursor materials at 0.5, 1, 2, 24, 48 and 72 h of reaction times, as well as the thermal stability of these precursors and the final product. The DSC data show an exothermic phenomenon of releasing large amount of energy: -1393 J/g at TPeak: 655 K as the first event of decomposition started at TOnset: 607 K and finished at TEndset: 663 K for the precursor materials obtained at 0.5 h of reaction, showing the presence of starting materials in this precursor. A similar exothermic behavior was observed in the sample of 1 h of reaction time, and was vanished in the materials obtained at 2 to 72 h of reaction, indicating the influence of the time on the completion of reaction and formation of $NiTiO_3$ crystalline phase as final product of thermal decomposition. In addition, using the information obtained from the TG/DSC, XRD and FTIR analyses, the optimum temperature for the thermal decomposition of the precursor materials to $NiTiO_3$ with fairly high crystallinity was also determined and discussed.

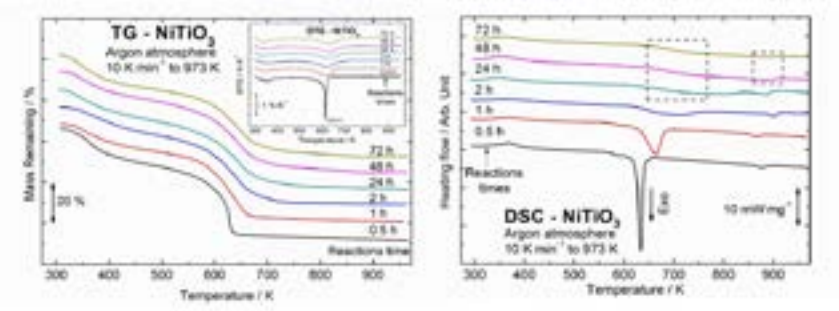

Figure 1 – TG/DTG/DSC curves of materials obtained at 0.5, 1, 2, 24, 48 and 72 h of reaction, in argon atmosphere with flow rate of 50 cm^3 min^{-1} at 973 K of maximum temperature and heat rate of 10 K min^{-1}.

Biography

Rodrigo V Rodrigues develops materials using the TG/DTG/DSC Thermal Analysis Techniques and TG/MS in the part of obtaining and characterizing the application of thermogravimetry to obtain nanomaterials and luminescent materials, studying kinetic methods (Ozawa) in determining the time of life of compounds. And in the study of photoluminescence applications of the excitation and emission spectra of the luminescence of rare earth elements RE. Has work with collaborations of São Paulo University USP – Brazil, Turku University – Finland and Institute of Low Temperature of Wroclaw – INTIBS – Poland

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