Intrinsic resistivity of sintered nickel manganite vs. powder activation time and density

S. M. Savić¹, M.V.Nikolić², O.S.Aleksić², M. Slankamenac³, M. Živanov³, P. M. Nikolić¹

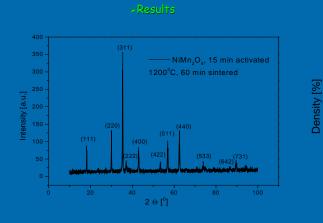
> ¹⁾Institute of Technical Sciences of SASA, Knez Mihajlova 35-IV, Belgrade, Serbia e-mail: <u>slavica.savic@sanu.ac.yu</u> ²⁾ Center for Multidisciplinary Studies of the University of Belgrade, Kneza Viseslava 1a,

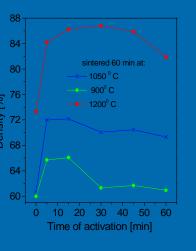
Belgrade 11000, Serbia

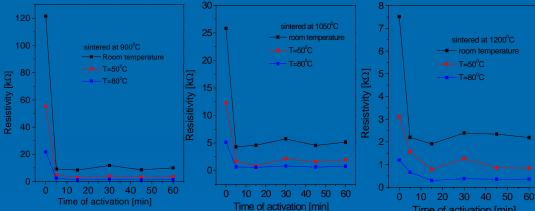
³⁾Faculty of Technical Sciences, University of Novi Sad, Trg Dositeja Obradovića 6, 21000 Novi Sad, Serbia

- Nickel manganite oxides, are very interesting ceramics widely used as negative temperature of temperature control elements and compensation, time delay, voltage regulation, fan control etc.
- Nickel manganite has an intermediate (partially inverse) cubic spinel structure. The values of cation inversion parameter is calculated (between 0.8 and 0.88).
- Mechanism, responsible for conduction in nickel manganite, is described by a phonon-assisted electrons jump (so-called hopping) between $Mn^{3\ast}$ and $Mn^{4\ast}$ cations placed in octahedral sites.
- In our earlier papers we have been investigated the influence of the time and temperature of sintering on thermal, optical and some electrical properties of this material [12,13,14]. The main purpose of this investigation is to show the
- unnegligible influence of mechanical activation of starting mixed oxides on electrical properties (direct current (DC) resistivity in our case) of originating nickel manganit.

- Mixtures of starting MnO, NiO and 0,5 wt % CoO and 0,5 wt % Fe_2O_3 powders was calcinated 1h at 1050°C, vibratory mill in an ultra-fast ball mill for 2h, and an average powder particle size of 0.9 mm was achieved
- Mechanical activation was done by grinding in a continual regime in Fritsch Pulversette 5 planetary ball mill for 5,15,30,45 and 60 minutes
- The grinding powders were unaxially pressed with 196 MPa into disc shape pellets 8 mm in diameter, and then sintered at 900, 1050 and 1200°C for 60 minutes
- The DC resistivity measurements was performed on impedance/gain phase analyzer HP 4194A, at
- The coefficient of temperature sensitivity ${\it B}_{\rm 25/80}$ and acivation energies (${\it E}_a$) for conduction was
- The crystalline structure of the nonactivated and activated samples were recorded using a XRP Difractometer Philips PW 1050, with Cu Klpharadiation and a scans were taken with a step of 0.05°/s







Time of activation [min]