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## MECHANOCHEMICAL SYNTHESIS OF MULTIFERROIC YTTRIUM MANGANITE

Z. Marinković Stanojević[1], M. Počuča Nešić[1], Z. Branković[1], L. Mančić[2], S. Bernik[3], A. Rečnik[3]. G. Branković[1]
*[1]Institute for Multidisciplinary Research,University of Belgrade, Belgrade, Serbia, [2]Institute of Technical Sciences of SASA, Belgrade, Serbia, [3]Jozef Stefan Institute, Ljubljana, Slovenia*

Multiferroic yttrium manganite ($YMnO_3$) is known as a material that exhibits both ferromagnetic and ferroelectric properties making it interesting for various technological applications. In this work single-phased $YMnO_3$ was prepared for the first time by mechanochemical synthesis in a planetary ball mill. The $YMnO_3$ can be formed directly from the highly activated constituent oxides, $Y_2O_3$ and $Mn_2O_3$, after 60 min of milling time and subsequently grows during prolonged milling. The cumulative energy introduced into the system during milling for 60 min was 86 kJ/g. X-ray analysis indicates that the as-prepared samples crystallize majority with hexagonal (*$P6_3cm$*) and minorly with orthorhombic (*Pnma*) $YMnO_3$ structure. The morphology, structure and chemical composition of the powder were investigated by SEM with EDS and TEM. The magnetic properties of the obtained $YMnO_3$ powders were found to change as a function of milling time in a manner consistent with the variation in the nanocomposite microstructure.

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## CATALYTIC ACTIVITY OF $La_{0.4}Sr_{0.6}FeO_3$ PEROVSKITES PREPARED VIA MECHANOCHEMICAL ROUTE IN $N_2O$ DECOMPOSITION PROCESS VERSUS Sr-CONTAINING PRECURSOR

L.A. Isupova, D.V. Ivanov, L.G. Pinaeva, E.M. Sadovskaya
*Boreskov Institute of Catalysis SB RAS, Novosibirsk, Russia*

Strong influence of Sr containing precursor on the phase composition and microstructure of $La_{0.4}Sr_{0.6}FeO_{3-\delta}$ perovskites prepared via mechanochemical route (mechanical treatment in APF-5 + thermal treatment at 900 $^oC$) from $La_2O_3$, $Fe_2O_3$ and $SrCO_3$ (C-sample) or $Sr(NO_3)_3$ (N-sample) as well as on the oxygen mobility (SSITKA) and catalytic activity in high temperature $N_2O$ decomposition process was revealed. The perovskite particles covered with $LaSrFeO_4$ layer structured perovskite were detected in the case of $Sr(NO_3)_3$ while two perovskites with orthorhombic and cubic structures were detected in the case of $SrCO_3$. Both samples characterized by comparable bulk oxygen mobility, while higher surface oxygen mobility was observed for N-sample. High temperature (800-900 $^oC$) catalytic activity in $N_2O$ decomposition process was higher for N-sample that correlates with surface oxygen mobility.