

# VII INTERNATIONAL CONFERENCE ON MECHANOCHEMISTRY AND MECHANICAL ALLOYING

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#### MECHANOCHEMICAL SYNTHESIS OF MULTIFERROIC YTTRIUM MANGANITE

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Multiferroic yttrium manganite (YMnO<sub>3</sub>) 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<sub>3</sub> was prepared for the first time by mechanochemical synthesis in a planetary ball mill. The YMnO<sub>3</sub> can be formed directly from the highly activated constituent oxides, Y<sub>2</sub>O<sub>3</sub> and Mn<sub>2</sub>O<sub>3</sub>, 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 (*P*6<sub>3</sub>*cm*) and minorly with orthorhombic (*Pnma*) YMnO<sub>3</sub> 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<sub>3</sub> 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<sub>0.4</sub>Sr<sub>0.6</sub>FeO<sub>3</sub> PEROVSKITES PREPARED VIA MECHANOCHEMICAL ROUTE IN N<sub>2</sub>O DECOMPOSITION PROCESS VERSUS Sr-CONTAINING PRECURSOR

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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 °C) from La $_2$ O $_3$ , Fe $_2$ O $_3$  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 $_2$ O 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 °C) catalytic activity in N $_2$ O decomposition process was higher for N-sample that correlates with surface oxygen mobility.