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# ADVANCED CERAMICS AND APPLICATION

Organized by
**Serbian Ceramic Society**
**&**
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# PROGRAM AND THE BOOK OF ABSTRACTS

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# Mechanochemical Synthesis of Nanocrystalline Multiferroics Based on Bismuth Manganite

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Multiferroic materials simultaneously possess two or more ferroic orders, and enable a coupling interaction between them. Multiferroic bismuth manganite is known as a material that exhibits both ferromagnetic and ferroelectric properties making it interesting for various technological applications. Unfortunately, preparation of $BiMnO_3$ is not possible by conventional solid state reaction and $BiMnO_3$ has been synthesized from the mixture of oxides only at high pressures (> 40 kbar). The aim of this work was to synthesize $BiMnO_3$ (BMO) without additional heating or application of high pressures. Nanocrystalline single-phased $BMnO_3$ was prepared for the first time by mechanochemical synthesis directly from the highly activated constituent oxides, $Bi_2O_3$ and $Mn_2O_3$, in a planetary ball mill. The obtained materials were characterized by X-ray diffraction, SEM with EDS analysis, HRTEM and magnetization measurements. All the samples were found to be tetragonal perovskite with P4mm crystallographic group. The broad maxima reflections of BMO samples can be ascribed to an amorphous/disordered phase. HRTEM micrographs give clear evidence of core-shell structure with amorphous shell around the nanocrystalline BMO particles. The magnetic hysteresis behavior is similar to that of a soft ferromagnet. The magnetic properties of the obtained BMO powders were found to change as a function of milling time in a manner consistent with the variation in the nanocomposite microstructure.