Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION IX
New Frontiers in Multifunctional Material Science and Processing

Serbian Ceramic Society
Institute of Technical Sciences of SASA
Institute for Testing of Materials
Institute of Chemistry Technology and Metallurgy
Institute for Technology of Nuclear and Other Raw Mineral Materials

PROGRAM AND THE BOOK OF ABSTRACTS

Serbian Academy of Sciences and Arts, Knez Mihailova 35
Serbia, Belgrade, 20-21. September 2021.

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$BiFeO_3$ fine powder controlled hydrothermal process synthesis and characterization

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From the technological point of view, the mutual control of electric and magnetic properties is an attractive possibility, but the number of candidate multiferroic materials is limited. One of the most studied of them, $BiFeO_3$, has critical conditions for synthesizing single phase since the phase temperature stability range is very narrow. Bismuth ferrite (BFO) particles were synthesized by controlled hydrothermal process, where the particles of small sizes and high purity were obtained. A fitting refinement procedure using the Rietveld method was performed. Bismuth ferrite crystallizes in the perovskite type structure (α-$BiFeO_3$) with rhombohedral space group R3c. The effects of thermal treatment through applied hydrothermal method on the obtained BFO grains morphology were evaluated by SEM and TEM analyses.SEM analysis showed that grains are very well crystallized, with non-fragmented crystal flats. Individual particles HRTEM analysis confirmed the evidence of ultra-fine single crystal particles, with characteristic (012) crystal planes. Furthermore, HRTEM confirmed the existence of twin stacking faults responsible for synthesized fine particles enhanced magnetic properties. The EPR results suggested the existence and participation of electrons trapped by vacancies or defects. It has been proposed that the existence of Fe^{3+}−O_V defect complex could be generated at elevated temperatures followed by formation of Fe^{3+} ions, which intensely provide the local 3d moments.