The Serbian Society for Ceramic Materials
Institute for Multidisciplinary Research (IMSI), University of Belgrade
Institute of Physics, University of Belgrade
Center of Excellence for the Synthesis, Processing and Characterization of Materials for use in Extreme Conditions "CEXTREME LAB" - Institute of Nuclear Sciences "Vinča", University of Belgrade
Faculty of Mechanical Engineering, University of Belgrade
Center for Green Technologies, Institute for Multidisciplinary Research, University of Belgrade
Faculty of Technology and Metallurgy, University of Belgrade
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PROGRAMME AND THE BOOK OF ABSTRACTS

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properties. These ferrites are used in microwave devices, electronic communication, and various antenna components. The requirement of high-permeability and permittivity at relatively lower microwave frequencies considers Y-type hexaferrites as a potential material.

In the present work, the structural, magnetic and frequency dependent dielectric properties of the cerium doped barium hexaferrite are discussed. The sol-gel auto-combustion technique was employed for the preparation of these nano-hexaferrite catalysts. The crystallinity and phase purity of synthesized ferrite nanoparticles were confirmed by the X-ray diffraction technique. The magnetic and dielectric properties of the prepared samples were studied using SQUID based VSM technique and Impedance analyzer at room temperature. The magnetic study reveals that the saturation magnetization (Ms) increases from 30.59 to 38.04 emu/g, whereas intrinsic coercivity (Hc) increases from 19 to 118 Oe, with increasing doping level.

Keywords: hexaferrite, microwave, crystallinity, saturation magnetization, intrinsic coercivity

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MAGNETIC BEHAVIOUR OF Ag DOPED $BiFeO_3$

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Bismuth ferrite (BFO) is one of a few room temperature magneto-electric multiferroics. High ferroelectric and magnetic transition temperatures (1100 and 630 K, respectively) make it interesting for possible technological application. The problem with BFO bulk ceramic is low net magnetic moment of its ordered antiferomagnetic phase. To disturb the antiferromagnetic order and induce bigger magnetic moment, BFO is often doped with different elements, usually heavy rare earth elements or transition metal ions. In this study we have investigated magnetic behaviour of Ag doped BFO.

Compounds of $BiFeO_3$, with metal ions substituted by different percentage of silver, were synthesized using hydrothermal method. Structural characterization of synthesized samples was performed using X-ray diffraction. Magnetization of polycrystalline samples measured in a wide temperature range, from 2 to 720 K, showed that the transition temperature for all the samples is nearly the same, T_N = 630 K. The development of weak ferromagnetism with doping was observed as enhanced splitting between zero field cooled (ZFC) and field cooled (FC) curves, together with increased magnetization seen also in M(H) curves. The peculiar behaviour of ZFC and FC curves expressed at lower temperatures, where the FC curve crossed the ZFC curve attaining lower values of magnetization then the ZFC curve, could be attributed to the competition of exchange interactions within and between the sublattices.

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SYNTHESIS AND CHARACTERIZATION OF $BiFeO_3$ FINE POWDERS

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Bismuth ferrite ($BiFeO_3$) is one of the most studied multiferroic system with a large number of published articles. This is mainly because $BiFeO_3$ material possesses both ferromagnetic and ferroelectric properties observed at room temperature, which opens great possibility for industrial and technological applications. Well-crystallized single-crystal $BiFeO_3$ nanopowder has been successfully synthesized with the hydrothermal method. Structural analysis showed that non-annealed powder can be perfectly fitted to rhombohedral space group R3c and contains a very small amount of secondary phase, whereas the final product (annealed at 800 °C) represents single-phase perovskite powder with high crystallinity. HRTEM analysis confirmed existence of twin stacking faults, which are responsible for enhanced magnetic properties. EPR measurements suggested existence of electrons trapped by vacancies or defects. It has been proposed that existence of Fe^{3+} −OV defect complex could be generated at elevated temperatures followed by formation of trivalent Fe ions, which intensely provide local 3d moments.