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ELECTRICAL AND MAGNETIC PROPERTIES OF MULTIFERROIC $Bi_5FeTi_3O_{15}$ AND $Bi_{4.25}La_{0.75}Ti_3FeO_{15}$ CERAMICS

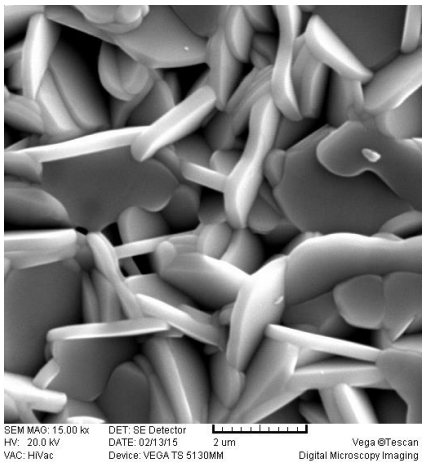
Jelena Bobić[1], Mirjana Vijatović Petrović[1], Nikola Ilic[1], Adis Džunuzović[1], Maksim Ivanov[2], Biljana Stojanović[1]

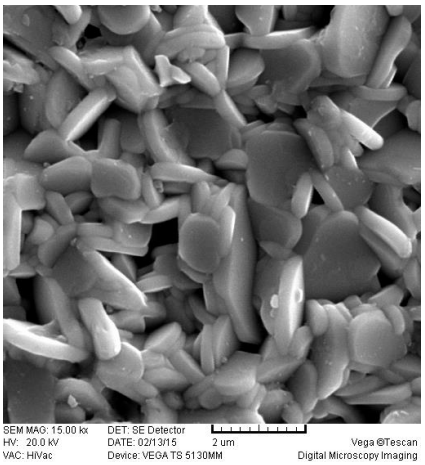
[1]Institute for Multidisciplinary Research, University of Belgrade, Serbia
[2]Faculty of Physics, Vilnius University, Lithuania

Abstract

Multifferioc materials exhibiting ferroelectric and magnetic orders simultaneously have attracted a lot of interest in recent years due to their special phenomena and potential applications in multifunctional devices [1]. One of the most frequently investigated single-phase multiferroic materials is perovskite $BiFeO_3$ (BFO) but it shows weak ferromagnetics at room temperature due to its canted spin structure. Among the compounds, $Bi_5FeTi_3O_{15}$ (BFT) ceramics can be regarded as a model of the Aurivillius type of ferroelectromagnetics [2].

BFT was prepared by solid state reaction methods from the constituting high purity oxides (Fe_2O_3, Bi_2O_3, TiO_2 and La_2O_3). XRD data confirm the formation of single-phase Aurivillius compounds while SEM micrographs shows a evident decrease of grain size of La modified ceramics in comparison with pure BFT. Dielectric properties were investigated in a wide range of temperatures (300-1000 K) and frequencies (1 Hz – 1 MHz). The conductivity of sintered samples was studied, suggesting decreasing of conductivity of La modified ceramics in comparison with pure BFT. Ferroelectric and ferromagnetic measurements of both samples were also performed. An energy bandgap of 1.76 eV and 1.81 eV for BFT and BFLT ceramics, respectively was determined from UV-vis diffuse absorption spectrum.





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