

Single Step Combustion Synthesis to Prepare La doped-Bi₄Ti₃O₁₂ Bulk Ceramics and Some Its Characterization

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This paper describes the potential of combustion route to synthesize the as-burnt Bi_{4-x}La_xTi₃O₁₂ (BLaT) powders with different La content ($x = 0.0, 0.25, 0.50$ and 0.75) in a single step synthesis and subsequently, sintered at 1000°C for 3 hour. The as-burnt powders were systematically characterized by XRD, Raman and FTIR analysis. In addition to that, the sintered samples were used to measure the electrical properties such as dielectric, conductivity, resistivity and ferroelectric. These measurements were performed at frequency ranging from 100 Hz to 1 MHz at room temperature. The grain microstructures were observed by SEM. Based on powder analysis, the XRD pattern confirmed the formation of a single BIT phase without presence any intermediate phase. The structural behaviour was also supported by Raman and FTIR analysis. This indicates that the combustion route is more convenient and economical in ceramic processing route. The electrical properties were greatly improved with higher La content in BLaT composition. In this particular work, the dielectric constant, dielectric loss, conductivity, resistivity, remanent polarization, coercive field of BLaT samples with $x = 0.75$ were recorded around 124 - 130, 0.0048 - 0.0197, 6.24×10^{-9} - 5.42×10^{-5} S/m, 1.60×10^8 - 1.84×10^4 / Ω m, 22.6 μ C/cm² and 86 kV/cm, respectively. In comparison to BIT samples, these results were 118 - 145, 0.0063 - 0.0873, 7.49×10^{-8} - 9.84×10^{-5} S/m, 1.33×10^7 - 1.02×10^4 / Ω m, 13.6 μ C/cm² and 52 kV/cm, respectively.

Keywords: Combustion route, Bi_{4-x}La_xTi₃O₁₂, Dielectric, Conductivity, Ferroelectric

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Ferroelectric and Physical Characteristics in Transparent (Bi_{3.25}Nd_{0.75})(Ti_{2.9}V_{0.1})O₁₂ Films

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The transparency electronic devices, such as amorphous and poly-silicon thin film transistor (TFT) for system on panel (SOP) technology, were discussed and researched because of their excellent switching property, high subthreshold swing, and low operation voltage characteristics. For this reason, transparency electronic devices integrated on the conduction oxide film substrate and were considered and investigated. In addition, the conventional temperature annealing (CTA) and rapid thermal annealing (RTA) processing were essential and indispensable technology for crystallization and quality of thin films. In this study, we investigated the structure and ferroelectric properties of the (Bi_{3.25}Nd_{0.75})(Ti_{2.9}V_{0.1})O₁₂ thin films on ITO substrate fabricated by sol-gel method. We used the (Bi_{3.25}Nd_{0.75})(Ti_{2.9}V_{0.1})O₁₂ films were annealed at various temperatures 600-700°C by conventional furnace annealing (CTA). The temperature dependence of leakage currents densities of ferroelectric (Bi_{3.25}Nd_{0.75})(Ti_{2.9}V_{0.1})O₁₂ thin films. The crystalline structure of the prepared (Bi_{3.25}Nd_{0.75})(Ti_{2.9}V_{0.1})O₁₂ thin films was analyzed by X-ray diffraction (XRD). Field emission scanning electron microscopy (FESEM) was used to observe the film thickness and the surface morphology including grain size and porosity. The leakage current density and capacitance of thin film were measured by HP4294.

Keywords: ferroelectric, (Bi_{3.25}Nd_{0.75})(Ti_{2.9}V_{0.1})O₁₂, transparency electronic devices

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