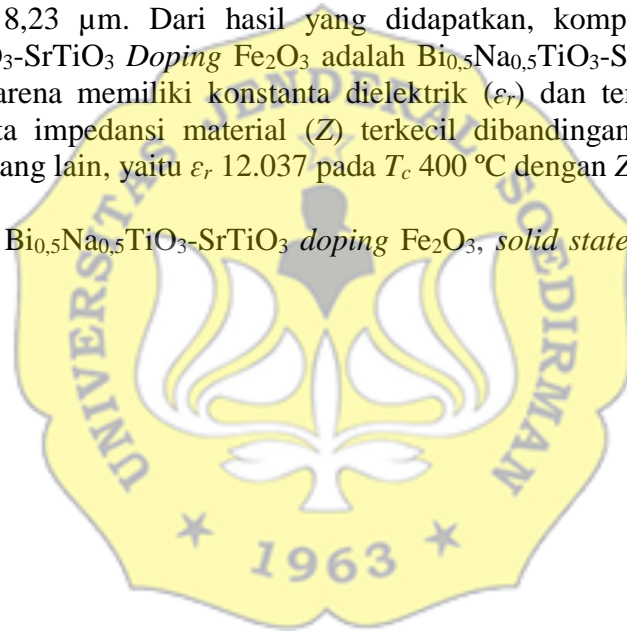


ABSTRAK

Penelitian material piezoelektrik $\text{Bi}_{0,5}\text{Na}_{0,5}\text{TiO}_3\text{-SrTiO}_3$ *doping* Fe_2O_3 telah dilakukan menggunakan metode *solid state reaction* untuk menentukan komposisi *doping* optimum dan karakteristik material yang terbentuk. Variasi *doping* adalah 0; 2,5; 5; 7,5; dan 10 dalam %mol. Pengujian dilakukan menggunakan *X-Ray Diffraction* (XRD), *Scanning Electron Microscope-Energy Dispersive Spectroscopy* (SEM-EDS), dan LCR meter. $\text{Bi}_{0,5}\text{Na}_{0,5}\text{TiO}_3\text{-SrTiO}_3$ *doping* Fe_2O_3 menghasilkan senyawa baru berupa $\text{FeBi}_5\text{Ti}_3\text{O}_{15}\text{-Na}_2\text{Ti}_3\text{O}_7\text{-SrTiO}_3$ dan struktur kristal berupa kubik, ortorombik, dan monoklinik, serta ukuran kristal yang semakin meningkat seiring dengan banyaknya penambahan *doping*, namun terjadi anomali pada variasi konsentrasi Fe_2O_3 5 %mol dan 7,5 %mol. $\text{FeBi}_5\text{Ti}_3\text{O}_{15}\text{-Na}_2\text{Ti}_3\text{O}_7\text{-SrTiO}_3$ juga menghasilkan ukuran partikel yang bervariasi, yaitu antara 0,88 μm – 8,23 μm . Dari hasil yang didapatkan, komposisi optimum dari $\text{Bi}_{0,5}\text{Na}_{0,5}\text{TiO}_3\text{-SrTiO}_3$ *Doping* Fe_2O_3 adalah $\text{Bi}_{0,5}\text{Na}_{0,5}\text{TiO}_3\text{-SrTiO}_3$ *doping* Fe_2O_3 2,5 %mol karena memiliki konstanta dielektrik (ϵ_r) dan temperatur Curie (T_c) terbesar, serta impedansi material (Z) terkecil dibandingkan dengan variasi konsentrasi yang lain, yaitu ϵ_r 12.037 pada T_c 400 °C dengan Z 135 k Ω .

Kata kunci: $\text{Bi}_{0,5}\text{Na}_{0,5}\text{TiO}_3\text{-SrTiO}_3$ *doping* Fe_2O_3 , *solid state reaction*, konstanta dielektrik.



ABSTRACT

The study of piezoelectric material $\text{Bi}_{0,5}\text{Na}_{0,5}\text{TiO}_3\text{-SrTiO}_3$ doped Fe_2O_3 had been carried out using solid state reaction method to determine the composition of optimum doping and the characteristics of the material formed. Doping variations are 0; 2.5; 5; 7.5; and 10 in %mol. Tests were carried out using X-Ray Diffraction (XRD), Scanning Electron Microscope-Energy Dispersive Spectroscopy (SEM-EDS), and LCR meters. $\text{Bi}_{0,5}\text{Na}_{0,5}\text{TiO}_3\text{-SrTiO}_3$ doped Fe_2O_3 produced a new compound in the form of $\text{FeBi}_5\text{Ti}_3\text{O}_{15}\text{-Na}_2\text{Ti}_3\text{O}_7\text{-SrTiO}_3$ and the crystal structure in the form of cubic, orthorhombic, and monoclinic, as well as the increasing crystalline size with the addition of dopants, but anomaly at 5 %mol and 7,5 %mol. $\text{FeBi}_5\text{Ti}_3\text{O}_{15}\text{-Na}_2\text{Ti}_3\text{O}_7\text{-SrTiO}_3$ also produces varying particle sizes, which are between $0.88\ \mu\text{m}$ - $8.23\ \mu\text{m}$. From the results obtained, the optimum composition of $\text{Bi}_{0,5}\text{Na}_{0,5}\text{TiO}_3\text{-SrTiO}_3$ doped Fe_2O_3 was $\text{Bi}_{0,5}\text{Na}_{0,5}\text{TiO}_3\text{-SrTiO}_3$ doped 2,5 %mol Fe_2O_3 because it has the highest dielectric constant (ϵ_r) and temperature Curie (T_c), and also the smallest material impedance (Z) compared with the others concentration variation, namely ϵ_r 12.037 at T_c 400 °C with Z 135 k Ω .

Keywords: $\text{Bi}_{0,5}\text{Na}_{0,5}\text{TiO}_3\text{-SrTiO}_3$ doped Fe_2O_3 , solid state reaction, dielectric constant.

