

Studi sifat struktur dan sifat listrik material perovskite $\text{La}_{1-x}\text{Pb}_x\text{Fe}_{0.5}\text{Ti}_{0.5}\text{O}_3$ ($x = 0.1, 0.2, 0.3$) = Study of structure and electrical properties of material perovskite $\text{La}_{1-x}\text{Pb}_x\text{Fe}_{0.5}\text{Ti}_{0.5}\text{O}_3$ ($x = 0.1, 0.2, 0.3$)

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Abstrak

Material $\text{La}_{1-x}\text{Pb}_x\text{Fe}_{0.5}\text{Ti}_{0.5}\text{O}_3$ ($x = 0.1, 0.2, 0.3$) telah disintesis dengan menggunakan metode sol-gel. Hasil karakterisasi XRD menunjukkan material memiliki struktur orthorhombik *space group* Pnma dan diperoleh fase tunggal untuk konsentrasi $x = 0.2$ dan $x = 0.3$. Hasil karakterisasi XRF mengkonfirmasi bahwa konsentrasi unsur-unsur penyusun material $\text{La}_{1-x}\text{Pb}_x\text{Fe}_{0.5}\text{Ti}_{0.5}\text{O}_3$ ($x = 0.1, 0.2, 0.3$) sesuai dengan perhitungan stoikiometri yang diharapkan. Hasil pengukuran SEM menunjukkan distribusi ukuran grain pada permukaan sampel *Bulk* mengalami peningkatan seiring dengan kenaikan konsentrasi Pb. Karakterisasi sifat listrik dilakukan pada material $\text{La}_{1-x}\text{Pb}_x\text{Fe}_{0.5}\text{Ti}_{0.5}\text{O}_3$ dengan konsentrasi $x = 0.2$ dan $x = 0.3$. Plot Nyquist menunjukkan *semicircle* yang semakin mengecil seiring dengan kenaikan temperatur yang menunjukkan fenomena *negative temperature coefficient resistance* (NTCR). Konstanta dielektrik dan energi aktivasi mengalami peningkatan seiring dengan peningkatan konsentrasi Pb.

Material $\text{La}_{1-x}\text{Pb}_x\text{Fe}_{0.5}\text{Ti}_{0.5}\text{O}_3$ ($x = 0.1, 0.2, 0.3$) has been synthesized using the sol-gel method. XRD characterization results show that the material has an orthorhombic space group Pnma structure. The results of XRF characterization confirm that the concentration of $\text{La}_{1-x}\text{Pb}_x\text{Fe}_{0.5}\text{Ti}_{0.5}\text{O}_3$ material ($x = 0.1, 0.2, 0.3$) was in expected stoichiometric calculation. The SEM measurement results show the grain size distribution of Bulk materials increases along with the increasing Pb concentration. Characterization of electrical properties was carried out on $\text{La}_{1-x}\text{Pb}_x\text{Fe}_{0.5}\text{Ti}_{0.5}\text{O}_3$ material with concentrations of $x = 0.2$ and $x = 0.3$. Nyquist plots show a semicircle that decreases with increasing temperature which shows the phenomenon of negative temperature coefficient resistance (NTCR). The dielectric constant and activation energy increase with increasing Pb concentration.