

Sifat optik dan listrik material lanthanum orthoferrite di substitusi Mg pada Site-La ($\text{La}_{1-x}\text{Mg}_x\text{FeO}_3$) yang di sintesis dengan metode sol-gel = Optical and electrical properties of Lanthanum Orthoferrite substituted Mg on La-site ($\text{La}_{1-x}\text{Mg}_x\text{FeO}_3$) with sol-gel method

Rianty Wanto Utami, author

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Abstrak

Substitusi Mg pada site-La material LaFeO_3 ($\text{La}_{1-x}\text{Mg}_x\text{FeO}_3$, dengan $x=0.0, 0.1, 0.2$ dan 0.3) telah dilakukan dengan metode sintesis sol-gel. Sifat struktur material perovskite $\text{La}_{1-x}\text{Mg}_x\text{FeO}_3$ dikarakterisasi menggunakan XRD, XRF, BET, SEM dan EDX. Analisis XRD material $\text{La}_{1-x}\text{Mg}_x\text{FeO}_3$ menunjukkan struktur Orthorhombic dengan space group Pnma. Terjadi penurunan crystallite size seiring dengan meningkatnya konsentrasi Mg. Analisis BET menunjukkan terjadinya peningkatan surface area seiring penambahan konsentrasi Mg. Hasil SEM menunjukkan bahwa ukuran grain terlihat semakin menurun dan terjadi aglomerasi. XRF dan EDX mengkonfirmasi adanya unsur La, Mg, Fe dan O pada material perovskite $\text{La}_{1-x}\text{Mg}_x\text{FeO}_3$. Sifat optik dikarakterisasi dengan menggunakan FTIR, Raman spectroscopy dan UV-Vis. FTIR mengkonfirmasi adanya stretching vibration La/Mg-O , Fe-O dan bending vibration Fe-O-Fe . Hasil karakterisasi UV-Vis menunjukkan penurunan nilai energi band gap dengan rentang 2.14–2.05 eV. Sifat listrik material diuji menggunakan RLC-meter dengan metode Impedance Spectroscopy (IS) pada temperatur ruang dan temperatur tinggi (300C-2000C).

Mg substitution on La-site at LaFeO_3 ($\text{La}_{1-x}\text{Mg}_x\text{FeO}_3$, with $x=0.0, 0.1, 0.2,$ and 0.3) has been done by sol-gel method. The structural properties of $\text{La}_{1-x}\text{Mg}_x\text{FeO}_3$ perovskite material were characterized using XRD, XRF, BET, SEM and EDX. XRD analysis of $\text{La}_{1-x}\text{Mg}_x\text{FeO}_3$ material shows the Orthorhombic structure with the Pnma space group. There was a decrease in crystallite size with increasing Mg concentration. BET analysis shows an increased surface area with the increase of Mg concentration. SEM analysis shows that the grain size appears to decrease and agglomeration occurs. XRF and EDX confirmed the presence of La, Mg, Fe and O element in $\text{La}_{1-x}\text{Mg}_x\text{FeO}_3$ perovskite material. Optical properties were characterized using FTIR, Raman spectroscopy and UV-Vis. FTIR confirmed the presence of stretching vibration of La/Mg-O , Fe-O and bending vibration of Fe-O-Fe . The results of UV-Vis characterization showed a decrease in the band gap energy value with a range of 2.14–2.05 eV. The electrical properties were characterized by RLC-meters using Impedance Spectroscopy (IS) method at room temperature and high temperatures (300C-2000C).