

Pengaruh Substitusi Fe dan Ni Pada Mn Terhadap Sifat Kemagnetan dan Kelistrikan Material $\text{La}_{0.825}\text{Sr}_{0.175}\text{MnO}_3$ = The Effect of Fe and Ni Substitution on Mn-site based on the Magnetic and Electric Properties of $\text{La}_{0.825}\text{Sr}_{0.175}\text{MnO}_3$

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Abstrak

Telah dilakukan sintesis sampel $\text{La}_{0.825}\text{Sr}_{0.175}\text{Mn}_{0.9}(\text{Fe}_{1-x}\text{Ni}_x)\text{O}_3$ ($x = 0, 0.02, 0.05, 0.08, \text{ dan } 1$) dengan menggunakan metode sol-gel. Pengujian dengan X-ray Diffractometer menunjukkan bahwa seluruh sampel memiliki struktur kristal rhombohedral dengan space group R-3c. Substitusi Fe, Ni, ataupun Fe dan Ni secara bersamaan tidak merubah struktur namun merubah parameter kisi, volume unit sel, ukuran kristalit rata-rata panjang ikatan serta sudut ikatan $\text{Mn} - \text{O} - \text{Mn}$. Karakterisasi SEM menunjukkan bahwa terjadi perubahan ukuran grain yang semakin membesar ketika didoping Ni, dan mengecil ketika didoping Fe. Karakterisasi dengan menggunakan XRD, SEM, EDS dan VSM menunjukkan bahwa terjadi penurunan nilai magnetisasi seiring penambahan konsentrasi doping Fe dan Ni. Pemberian doping Fe dan Ni akan menurunkan resistivitas sampel yang berkaitan erat dengan morfologi sampel. Jika ukuran grain mengecil seiring dengan penambahan konsentrasi doping, maka jumlah grain akan semakin meningkat, tinggi dan lebar dari tunneling barrier juga semakin meningkat seiring dengan berkurangnya ukuran grain

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Synthesis of the sample $\text{La}_{0.825}\text{Sr}_{0.175}\text{Mn}_{0.9}(\text{Fe}_{1-x}\text{Ni}_x)\text{O}_3$ ($x = 0, 0.02, 0.05, 0.08, \text{ and } 1$) has been successfully carried out using sol-gel method. The X-Ray Diffractometer test shows that all of the sample had a rhombohedral crystal structure with space group R-3c. substitution of Fe, Ni, or Fe and Ni simultaneously does not change the structure but changes the lattice parameters, the volume unit cell, the average crystallite size, and the bond angle of $\text{Mn} - \text{O} - \text{Mn}$. SEM characterization showed that there was a change in grain size that was getting bigger when doped with Ni, and smaller when doped with Fe. Characterization using XRD, SEM, EDS and VSM shows that there is a decrease in the value of magnetization with the addition of doping concentrations of Fe and Ni. With Fe and Ni doping will decreased the resistivity of the sample that closely related to the morphology of the sample. If the grain size decreases with increasing doping concentration, the number of grains will increase, the height and width of the tunneling barrier will also increase as the grain size decreases