

Pengaruh doping silver (Ag) terhadap sifat listrik dan efek magnetoresistansi material $\text{La}_{0,8-x}\text{Ag}_x\text{Ca}_{0,2}\text{MnO}_3$ ($x = 0; 0,05; 0,1; 0,15$) dengan metode sol-gel = The effect of silver ag doping on electrical property and magnetoresistance $\text{La}_{0,8-x}\text{Ag}_x\text{Ca}_{0,2}\text{MnO}_3$ ($x = 0; 0,05; 0,1; 0,15$) material by sol gel method

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Abstrak

Telah dilakukan penelitian pengaruh doping Ag terhadap sifat listrik dan efek magnetoresistansi material $\text{La}_{0,8-x}\text{Ag}_x\text{Ca}_{0,2}\text{MnO}_3$ $x = 0; 0,05; 0,1; 0,15$. Material disintesis dengan metode sol-gel dan disintering pada temperatur 900 oC selama 24 jam. Material lanthanum manganit telah banyak diteliti karena memiliki sifat-sifat yang menarik, baik dalam segi struktural, sifat listrik, serta sifat magnet nya.

Struktur material dikarakterisasi menggunakan Difraksi Sinar-X XRD dan menunjukkan bahwa pada doping $x = 0$ dan $0,05$, material memiliki fase tunggal single phase yaitu fase manganite, sedangkan pada doping $x = 0,1$ dan $0,15$, material terdiri dari fasa campuran, yaitu fasa manganite dan Ag. Scanning Electron Microscopy SEM digunakan untuk observasi morfologi serta menunjukkan kehomogenan material. Dengan doping Ag, ukuran grain boundary dari material membesar.

Hasil karakterisasi dari Electron Dispersive Spectroscopy EDS mengkonfirmasi keberadaan unsur Ag pada material. Karakterisasi menggunakan Cryogenic Magnetometer dilakukan untuk menguji sifat listrik dari material seiring dengan peningkatan doping Ag. Seiring dengan peningkatan konsentrasi doping Ag, resistivitas material mengecil serta temperatur transisi metal-isolator TMI bergeser kearah temperatur ruang. Efek magnetoresistansi menurun saat doping $x = 0,05$ dan meningkat kembali saat $x = 0,1$ dan $0,15$.

The research about effect of dopant Ag on electrical and magnetoresistance properties of $\text{La}_{0,8-x}\text{Ag}_x\text{Ca}_{0,2}\text{MnO}_3$ $x = 0; 0,05; 0,1; 0,15$ has been done. The materials were synthesized via sol gel method, sintered at temperature 900oC for 24 hours. Lanthanum manganite material has been widely investigated because its interesting properties, such as physical, electrical, and magnetic properties.

The structural of the materials were characterized using X Ray Diffraction XRD, show in doping $x = 0$ and $0,05$, material has single phase manganite phase, whereas in doping $x = 0,1$ and $0,15$, material consists of mixed phases, manganite and Ag phases. Scanning Electron Microscopy SEM was used to observe morphology of the materials and showed homogeneity of the materials. By doping Ag, grain boundary size of the material increase.

Electron Dispersive Spectroscopy EDS result confirmed existence of Ag in the material and the materials having desired composition. Characterization using Cryogenic Magnetometer was used to examined electrical property of the materials with increasing of Ag doping. As the Ag doping concentration increases, resistivity of the material decreases and the metal isolator transition temperature TMI shifts towards room temperature. Magnetoresistance effect decreases when doping $x = 0,05$ and increase again when doping $x = 0,1$ and $0,15$.