

Efek magnetoresistan sebagai pendekatan perhitungan efek magnetokalorik pada $\text{La}_{0,67}\text{Ba}_{0,33}\text{MnO}_3$ dan $\text{La}_{0,7}(\text{Ba}_{1-x}\text{Ca}_x)_{0,3}\text{Mn}_{0,975}\text{Ni}_{0,025}\text{O}_3$ ($x=0,01;0,03;0,05$) = Magnetoresistance effect for magnetocaloric effect approach on $\text{La}_{0,67}\text{Ba}_{0,33}\text{MnO}_3$ dan $\text{La}_{0,7}(\text{Ba}_{1-x}\text{Ca}_x)_{0,3}\text{Mn}_{0,975}\text{Ni}_{0,025}\text{O}_3$ ($x=0,01;0,03;0,05$)

Rico Pratama Putra, author

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Abstrak

Telah dilakukan penelitian sifat resistansi dan hubungannya dengan efek magnetoresistan pada bahan perovskit $\text{La}_{0,67}\text{Ba}_{0,33}\text{MnO}_3$ (LBMO) dan $\text{La}_{0,7}(\text{Ba}_{1-x}\text{Ca}_x)_{0,3}\text{Mn}_{0,975}\text{Ni}_{0,025}\text{O}_3$ ($x=0,01;0,03;0,05$). Bahan uji disintesis dengan menggunakan solid state reaction. Variasi temperatur sintering pada LBMO tidak merubah parameter kisi. Sedangkan variasi dopan pada LBCMNiO dapat mengubah parameter kisi. Pengukuran sifat resistivitas dan sifat magnetoresistan bahan menunjukkan hasil yang berbeda. Karakterisasi menggunakan X-ray diffraction menunjukkan bahwa bahan uji memiliki fasa tunggal pada setiap variasi. Dari pengujian resistivitas di bawah pengaruh medan magnet menunjukkan bahwa variasi suhu sinter dan dopan menghasilkan perbedaan sifat resistivitas yang sangat signifikan. Variasi sinter yang lebih besar dan penambahan dopan kalsium dan nikel dengan komposisi lebih banyak dapat menurunkan resistivitas dan menggeser puncak resistivitas ke arah temperatur ruang serta menaikkan rasio magnetoresistansi mencapai -10% di bawah medan magnet 20.000 gauss. Pendekatan magnetokalorik menghasilkan nilai perubahan entropi yang bervariasi pada tiap sampel uji baik LBMO maupun LBCMNiO.

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A research has been conducted to investigate the resistivity behavior and its relation with magnetoresistance effect on perovskite materials which are $\text{La}_{0.67}\text{Ba}_{0.33}\text{MnO}_3$ (LBMO) and $\text{La}_{0.7}(\text{Ba}_{1-x}\text{Ca}_x)_{0.3}\text{Mn}_{0.975}\text{Ni}_{0.025}\text{O}_3$ ($x=0.01;0.03;0.05$). The samples were synthesized using solid state reaction. The sintering temperature variation on LBMO does not change its lattice parameter and doping variation on LBCMNiO has the lattice parameter. Different result was observed for resistivity and magnetoresistance properties of the materials. Characterization using x-ray diffraction showed that the samples have single phase on each variation. The resistivity measurement under the influence of magnetic field showed that the temperature variation of sintering and doping resulted in the significant differences of resistivity property. A higher sintering variation and the higher addition of Calcium & nickel as doping, decreased the resistivity and shifted the peak of resistivity to near room temperature and increased the ratio of magnetoresistance until -10% under magnetic field 20,000 gauss. A magnetocaloric approach resulted varied entropy change for each sample.