Studi Pengaruh Doping Chromium Dan Temperatur Sintering Terhadap Struktur Kristal, Morfologi, Dan Sifat Kemagnetan Material La0,7Sr0,2Ba0,1Mn1-xCrxO3 (x=0; 0,03; 0,05; 0,07; DAN 0,1) = Study of Effects of Chromium Substitution and Sintering Temperature on Structural, Morphology, and Magnetic Properties of Material La0,7Sr0,2Ba0,1Mn1-xCrxO3 (x=0; 0.03; 0.05; 0.07; and 0.1)

Trians Aprilianto, author

Abstrak

Struktur kristal, morfologi, dan sifat kemagnetan dari material perovskite manganat La0,7Sr0,2Ba0,1Mn1-xCrxO3 dengan substitusi ion chromium sebesar 0%, 3%, 5%, 7%, dan 10% serta temperatur sintering sebesar 900οC dan 1200οC telah dipelajari dalam penelitian ini. Material La0,7Sr0,2Ba0,1Mn1-xCrxO3 yang disintesis dengan menggunakan metode solgel telah di karakterisasi X-Ray Diffractometer (XRD), Scanning Elektron Microscope (SEM), Energy Dispersive Spectroscopy (EDS), dan Vibrating Sampel Magnetometer (VSM). Hasil analisis data XRD menunjukkan bahwa material La0,7Sr0,2Ba0,1Mn1-xCrxO3 memiliki fasa tunggal serta bebas dari unsur pengotor (impuritas). Dalam penelitian ini, substitusi ion chromium (Cr) pada ion mangan (Mn) dengan konsentrasi doping Cr3+ hingga 10% menghasilkan struktur rhombohedral R-3C space group. Peningkatan konsentrasi doping ion chromium (Cr) pada material La0,7Sr0,2Ba0,1Mn1-xCrxO3- menyebabkan penurunan pada ukuran kisi c, penurunan sudut ikatan oktahedron ion mangan/chromium terhadap oksigen, dan peningkatan nilai panjang rata-rata ikatan oktahedron ion mangan/chromium sehingga nilai electronic bandwidth menjadi berkurang dan mengindikasikan penurunan nilai saturasi magnetisasi. Berdasarkan analisis data SEM, konsentrasi doping ion chromium (Cr) sebesar 10% menghasilkan ukuran butir terbesar pada setiap temperatur sintering yang diberikan. Material La0,7Sr0,2Ba0,1Mn1-xCrxO3 dengan temperatur sintering 1200οC menghasilkan ukuran rata-rata kristalit yang lebih besar daripada temperatur sintering 900οC karena adanya pembesaran ukuran butir dan batas butir menjadi semakin jelas. Analisis data VSM menyimpulkan bahwa peningkatan konsentrasi doping ion Chromium mengakibatkan penurunan nilai saturasi magnetisasi pada material La0,7Sr0,2Ba0,1Mn1-xCrxO3-.

<hr>

Crystal structure, morphology, and magnetic properties of the perovskite manganite material La0.7Sr0.2Ba0.1Mn1-xCrxO3 with substitution of Cr from 0%, 3%, 5%, 7%, and 10% and sintering temperatures of 900oC and 1200oC have been studied in this study. La0.7Sr0.2Ba0.1Mn1-xCrxO3 materials synthesized using the sol-gel method have been characterized by X-Ray Diffractometer (XRD), Scanning Electron Microscope (SEM), Energy Dispersive Spectroscopy (EDS), and Vibrating Sample Magnetometer (VSM). The results of XRD showed that material La0.7Sr0.2Ba0.1Mn1-xCrxO3 3 has a single phase and free of impurities. In this study, substitution of Cr in Mn site with doping concentrations of Cr3+ up to 10% resulted in the rhombohedral structure with R-3C space groups. Increasing doping concentration of chromium (Cr) in La0.7Sr0.2Ba0.1Mn1-xCrxO3 material causes a decrease in lattice size c, decrease Mn/Cr-O bonding angle, and increase Mn/Cr-O so that the value of electronic bandwidth and indicates a decrease in the value of saturated magnetization. Based on SEM data analysis, doped chromium (Cr) ion

concentration of 10% produces the largest grain size at every sintering temperature. La0.7Sr0.2Ba0.1Mn1-xCrxO3 material with a 1200°C sintering temperature produces an average size of crystallite that is greater than of 900°C sintering temperature because at a higher sintering temperature causing enlargement of grain size and grain boundaries will increase. Based on VSM data analysis concluded that an increase in the concentration of doped Chromium ions resulted in a decrease in the saturated magnetization value of the material La0.7Sr0.2Ba0.1Mn1-xCrxO3.