Struktur Mikro dan Perubahan Magnetisasi Material Perovskite La0,7Ca0,05Sr0,25Mn(1x)Fe(x)O3 (x = 0; 0,05; 0,1; 0,15) = Micro Structure and Magnetization Change of Perovskite Material (x = 0; 0,05; 0,1; 0,15)

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Abstrak

Material perovskite manganites (x = 0; 0,05; 0,1; 0,15) dari bahan dasar Lanthanum (III) Oxide , Calsium Carbonate , Stronsium Carbonate , Manganese (II) Carbonate , Iron (III) Oxide telah disintesis dengan menggunakan metode solid state. Bahan dasar dicampur dan digerus dengan menggunakan mortar dan pestel, dikompaksi, kalsinasi pada suhu 800°C selama 8 jam , sampel serbuk disintering pada suhu 900°C selama 24 jam dan sampel pellet disintering pada suhu 1000°C selama 12 jam dan 1200°C selama 12 jam dengan kenaikan 8 jam. Hasil karakterisasi menggunakan X-Ray Diffractometer (XRD) menunjukkan struktur kristal Rhombohedral dengan space group R-3c, subsitusi Fe terhadap sampel tidak mengubah struktrur kristal tetapi mengubah nilai parameter kisi kristal. Karaktersasi SEM-EDS menampilkan ukuran grain dan mengkonfirmasi unsur penyusun material dengan doping Fe berhasil tersubsitusi. karakterisasi SEM-EDS dengan menggunakan metode elemental mapping mengkonfirmasi homogenitas sampel. Hasil pengukuran nilai magnetisasi menggunakan permagraph menunjukkan penurunan nilai magnetisasi seiring bertambahnya konsentrasi doping Fe. Penurunan nilai magnetisasi secara signifikan terlihat pada doping Fe di atas 5%. Penurunan nilai magnetisasi disebabkan karena adanya interaksi Double Exchange & Superexchange yang terjadi pada sampel.

.....Material perovskite manganese (x = 0; 0,05; 0,1; 0,15) from base material Lanthanum (III) Oxide, Calsium Carbonate, Stronsium Carbonate, Manganese (II) Carbonate, Iron (III) Oxide have been synthesized using solid state reaction method. The basic ingredients were mixed and ground using a mortar and pestle , compacted, calcined at 800°C for 8 hours, sintered the powder sample at 900°C for 24 hours, sintered the pellet sample at 1200°C for 12 hours in 8 hour increments and re- sintered the pellet sample at 1000°C for 12 hours. The result of characterization using an X-Ray Diffractometer (XRD) shows a rhombohedral crystal structure with space group R-3c. The substitution of Fe in the sample does not change the crystal structure but changes the value of the crystal lattice parameter. SEM-EDS characterization shows grain size and confirms that the constituent elements of the material with Fe doping have been succesfully substituted. SEM-EDS characterization using elemental mapping method confirmed the homogeneity of the sample. The result of measuring the magnetization value using a permagraph showed a decrease in the magnetization value as the concentration of Fe doping increased. A significant decrease in magnetization value was seen in Fe doping above 5%. The decrease in magnetization value is due to the Double Exchange (DE) and superexchange interactions that occur in the sample.