

# Struktur Mikro dan Perubahan Magnetisasi Material Perovskite $\text{La}_{0,7}\text{Ca}_{0,05}\text{Sr}_{0,25}\text{Mn}_{(1-x)}\text{Fe}_{(x)}\text{O}_3$ ( $x = 0; 0,05; 0,1; 0,15$ ) = 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, Calcium 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  $800^\circ\text{C}$  selama 8 jam, sampel serbuk disintering pada suhu  $900^\circ\text{C}$  selama 24 jam dan sampel pellet disintering pada suhu  $1000^\circ\text{C}$  selama 12 jam dan  $1200^\circ\text{C}$  selama 12 jam dengan kenaikan 8 jam. Hasil karakterisasi menggunakan X-Ray Diffractometer (XRD) menunjukkan struktur kristal Rhombohedral dengan space group R-3c, substitusi Fe terhadap sampel tidak mengubah struktur kristal tetapi mengubah nilai parameter kisi kristal. Karakterisasi SEM-EDS menampilkan ukuran grain dan mengkonfirmasi unsur penyusun material dengan doping Fe berhasil tersubstitusi. 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, Calcium 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  $800^\circ\text{C}$  for 8 hours, sintered the powder sample at  $900^\circ\text{C}$  for 24 hours, sintered the pellet sample at  $1200^\circ\text{C}$  for 12 hours in 8 hour increments and re-sintered the pellet sample at  $1000^\circ\text{C}$  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 successfully 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.