

# Sintesis dan karakterisasi $\text{La}_{1-x}\text{Ca}_x\text{Mn}_{1-y}\text{Cu}_y\text{O}_3$ sebagai bahan giant magnetoresistance dengan berbagai variasi x dan y = Synthesis and characterization $\text{La}_{1-x}\text{Ca}_x\text{Mn}_{1-y}\text{Cu}_y\text{O}_3$ as a matter giant magnetoresistance with the variation x and y

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## Abstrak

### **ABSTRAK**

Thesis ini menyajikan hasil penelitian eksperimen tentang struktur, besaran magnet, specific heat dan giant magnetoresistance dari sampel polikristal manganat tanah jarang seri  $\text{La}_{1-x}\text{Ca}_x\text{Mn}_{1-y}\text{Cu}_y\text{O}_3$  dengan  $x = 0,1$ ;  $0,47$  dan  $0,73$  dan  $0 < y < 0,19$ . Sampel disiapkan dengan metode reaksi zat padat. Analisis struktur menggunakan difraksi sinar-x dan high resolution powder diffraction (HRPD) dengan program fullprof. Semua sampel mempunyai struktur orthorhombic dengan space group Pnma. Pada suhu kamar semua sampel bersifat paramagnetik dan berubah campuran antara antiferromagnetik (AFM) dengan ferromagnetik (FM) pada suhu rendah dan juga akibat adanya medan magnet luar. Pendopongan Cu pada posisi Mn mengakibatkan menurunnya momen magnet  $\mu_B$ . Besaran specific heat pada suhu rendah didominasi oleh faktor charge carriers ( $70$ , sedangkan faktor kisi B konstan, sementara faktor spin wave-nya diabaikan. Sifat giant magnetoresistance (GMR) pada suhu ruang menunjukkan bahwa pendopongan Cu pada Mn mengakibatkan menurunnya nilai magnetoresistansinya. Semakin tinggi nilai medan magnet luar, maka nilai magnetoresistansinya juga semakin naik.

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### **ABSTRACT**

This thesis presents result of an experimental study on structure, magnetic properties, specific heat and giant magnetoresistance of polychrystal samples manganese rare-earth series  $\text{La}_{1-x}\text{Ca}_x\text{Mn}_{1-y}\text{Cu}_y\text{O}_3$  with  $x = 0.1$ ;  $0.5$ , and  $0.9$  and  $y = 0$ ;  $0.05$ ;  $0.10$ ;  $0.15$ , and  $0.20$ . All samples by solid state reaction. The structure analysis use x-ray diffraction and high resolution powder diffraction with fullprof program. The structure of all samples are orthorhombic with space group Pnma. At room temperature all samples are paramagnetic and change became ferromagnetic at low temperature and consequence external magnetic field too. The doping Cu at Mn site makes decrease the moment magnetic. The specific heat at low temperature, upon increasing the Cu dopant, the y and therefore the charge carriers increase. The specific heat for all samples are insensitive to the external magnetic field up to 9 T. The presence of external magnetic field has no influence on the p value for samples with and without Cu dopant. At room temperature, the doping of Cu at Mn makes decrease the magnetoresistance. The increasing external magnetic field, the magnetoresistance are increasing to.