

INTISARI

KAJIAN SUSEPTIBILITAS PADA *MAGNETIC NANOPARTICLES* (MNPs) *COBALT ZINC FERRITE* (CoZn-Fe₂O₄) YANG DIENKAPSULASI DENGAN SILIKA (SiO₂)

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Nanopartikel magnetik *cobalt zinc ferrite* (CoZn-Fe₂O₄) yang dienkapsulasi dengan silika (SiO₂) telah berhasil disintesis menggunakan metode kopresipitasi. Berdasarkan hasil karakterisasi *X-ray diffractin* (XRD) didapatkan ukuran kristalit nanopartikel magnetik CoZn-Fe₂O₄ yaitu $(16,4 \pm 0,1)$ nm. Setelah dilakukan enkapsulasi dengan silika, ukuran kristalit mengalami penurunan menjadi $(14,8 \pm 0,2)$ nm. Nilai parameter kisi dan *microstrain* mengalami peningkatan setelah dilakukan enkapsulasi akibat adanya defek atau kecacatan pada kristal. Pengukuran suseptibilitas nanopartikel magnetik CoZn-Fe₂O₄ yang dienkapsulasi silika dilakukan dengan metode Guoy dengan variasi konsentrasi silika 0%, 10%, 20%, 30%, dan 40%. Berdasarkan hasil pengukuran, diperoleh nilai suseptibilitas berturut-turut $(1,1 \pm 0,2) \times 10^{-3} \text{ m}^3/\text{kg}$, $(9,6 \pm 0,4) \times 10^{-4} \text{ m}^3/\text{kg}$, $(6,4 \pm 0,4) \times 10^{-4} \text{ m}^3/\text{kg}$, $(5,3 \pm 0,5) \times 10^{-4} \text{ m}^3/\text{kg}$, dan $(4,6 \pm 0,4) \times 10^{-4} \text{ m}^3/\text{kg}$. Berdasarkan hasil pengukuran nilai suseptibilitas menunjukkan bahwa enkapsulasi dengan silika mempengaruhi nilai suseptibilitas nanopartikel magnetik CoZn-Fe₂O₄. Semakin besar konsentrasi silika, nilai suseptibilitas CoZn-Fe₂O₄ semakin kecil.

Kata Kunci: *Cobalt Zinc Ferrite* (CoZn-Fe₂O₄), kopresipitasi, enkapsulasi, silika, suseptibilitas magnetik.

ABSTRACT

THE STUDY OF SUSCEPTIBILITY OF COBALT ZINC FERRITE (CoZn-Fe₂O₄) MAGNETIC NANOPARTICLES (MNPs) ENCAPSULATED BY SILICA (SiO₂)

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Cobalt zinc ferrite (CoZn-Fe₂O₄) magnetic nanoparticles encapsulated by silica (SiO₂) have been successfully synthesized using co-precipitation method. Crystallite size of CoZn-Fe₂O₄ magnetic nanoparticles determined by X-ray diffraction (XRD) is (16.4 ± 0.1) nm. The crystallite size decrease after silica encapsulation became (14.8 ± 0.2) nm. After encapsulation, there was lattice expansion and increased the microstrain value caused by the crystal defect. Susceptibility of CoZn-Fe₂O₄ magnetic nanoparticles encapsulated by silica have been analyzed using Guoy method with concentration 0%, 10%, 20%, 30%, and 40%. The result of susceptibility on concentration of encapsulated by silica are $(1.1 \pm 0.2) \times 10^{-3}$ m³/kg, $(9.6 \pm 0.4) \times 10^{-4}$ m³/kg, $(6.4 \pm 0.4) \times 10^{-4}$ m³/kg, $(5.3 \pm 0.5) \times 10^{-4}$ m³/kg, and $(4.6 \pm 0.4) \times 10^{-4}$ m³/kg. The susceptibility values of CoZn-Fe₂O₄ are effected by silica encapsulated concentration. The incresing of silica concentration which had been given, make the value of susceptibility of CoZn-Fe₂O₄ became decrease.

Keyword: Cobalt Zinc Ferrite (CoZn-Fe₂O₄), co-precipitation, encapsulation, silica, magnetic susceptibility.