INTISARI

Sintesis dan Analisis Gugus Fungsi pada Nanopartikel Magnetik Magnesium Nikel Ferit ($Mg_{0,5}Ni_{0,5}Fe_2O_4$) yang Dienkapsulasi dengan Polietilen Glikol (PEG)-4000

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Nanopartikel magnetik $Mg_{0,5}Ni_{0,5}Fe_2O_4$ disintesis dengan menggunakan metode kopresipitasi dan berhasil dienkapsulasi dengan menggunakan variasi konsentrasi polietilen glikol (PEG)-4000. Ferit yang diperoleh dikarakterisasi dengan *X-Ray Diffractometer* (XRD), *Transmission Electron Microscopy* (TEM) dan *Fourier Transform Infra-red Spectroscopy* (FTIR). Berdasarkan analisis XRD menunjukan struktur spinel kubik dengan ukuran partikel $Mg_{0,5}Ni_{0,5}Fe_2O_4$ sebelum dan sesudah dienkapsulasi PEG-4000 masing–masing 5,7 nm dan 4,2 nm. Hasil analisis TEM menunjukan pola cincin difraksi polikristal. Hasil analisis FTIR menunjukkan bahwa pada $Mg_{0,5}Ni_{0,5}Fe_2O_4$ yang telah dienkapsulasi PEG-4000 terjadi pergeseran bilangan gelombang. Muncul ikatan C–O pada bilangan gelombang 1111,00 cm^{-1} dan 956,69 cm^{-1} merupakan karakteristik dari PEG-4000 murni. Dan muncul puncak serapan pada bilangan gelombang 393,48 cm^{-1} dan 324,04 cm^{-1}yang mengindikasi ikatan logam oksida (M–O) pada nanopartikel magnetik $Mg_{0,5}Ni_{0,5}Fe_2O_4$ yang terenkapsulasi PEG-4000. Penambahan PEG-4000 mempengaruhi ukuran partikel, struktur kristal dan gugus fungsi pada nanopartikel.

Kata kunci : nanopartikel magnetik, $Mg_{0,5}Ni_{0,5}Fe_2O_4$, kopresipitasi, PEG-4000, FTIR

ABSTRACT

Synthesis and Functional Group Analysis of Magnesium Nickel Ferrite ($Mg_{0.5}Ni_{0.5}Fe_2O_4$) Magnetic Nanoparticles Encapsulated with Polyethylene Glycol (PEG)-4000

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$Mg_{0.5}Ni_{0.5}Fe_2O_4$ magnetic nanoparticles were synthesized by using co-precipitation method and succesfully encapsulated with using various concentrations of polyethylene glycol (PEG)-4000. Ferrite obtained was characterized by X-Ray Diffractometer (XRD), Transmission Electron Microscopy (TEM), and Fourier Transform Infra-red Spectroscopy (FTIR). Based on analysis of XRD showed cubic spinel structure with particle size before and after encapsulated PEG-4000 were 5.7 nm and 4.2 nm, respectively. The result of TEM showed ring diffraction pattern was polycrystal. FTIR analysis results showed that there were some shifting of wavenumber on $Mg_{0.5}Ni_{0.5}Fe_2O_4$ after PEG-4000 encapsulated. C–O bonds appear at wavenumber 1111.00 cm^{-1} and 956.69 cm^{-1} are characteristic of pure PEG-4000. And appeared the absorption peaks at 393.48 cm^{-1} and 324.04 cm^{-1}which indicates bonding metal oxide (M–O) on magnetic nanoparticles $Mg_{0.5}Ni_{0.5}Fe_2O_4$ encapsulated PEG-4000. The addition of PEG-4000 affected particle size, structure and functional groups on $Mg_{0.5}Ni_{0.5}Fe_2O_4$ magnetic nanoparticle .

Keywords : magnetic nanoparticles, $Mg_{0.5}Ni_{0.5}Fe_2O_4$, co-precipitation, PEG-4000, FTIR