

**SIFAT MAGNETO-ELASTISITAS FEROGEL
DENGAN *FILLER* MAGNETIK Fe_3O_4
YANG DISINTESIS DARI BATUAN BESI**

SKRIPSI



**Nadya Mayestika
1510441015**

**Dosen Pembimbing:
Astuti, M.Si**

**JURUSAN FISIKA
FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM
UNIVERSITAS ANDALAS
PADANG**

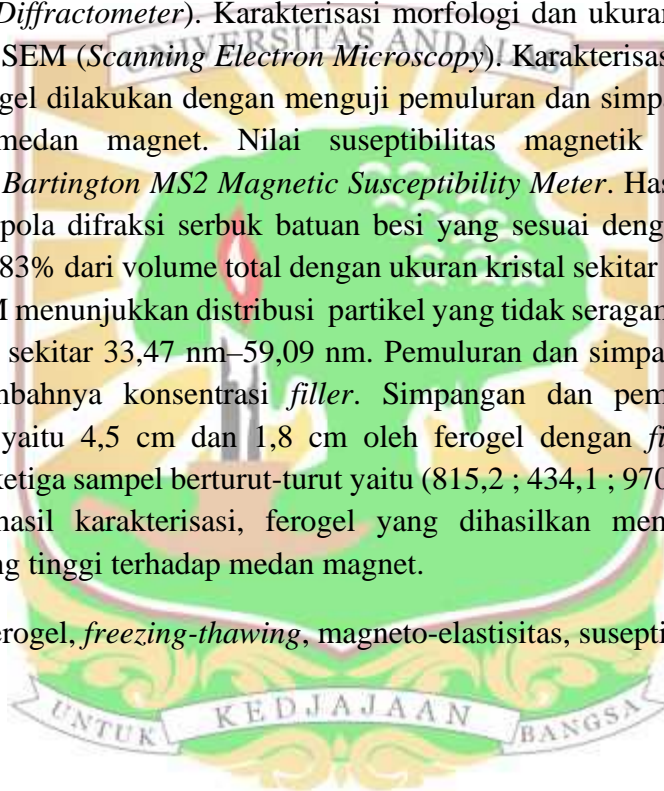
2019

SIFAT MAGNETO-ELASTISITAS FEROGEL DENGAN *FILLER* MAGNETIK Fe₃O₄ YANG DISINTESIS DARI BATUAN BESI

ABSTRAK

Sintesis Fe₃O₄ sebagai *filler* material magnetoelastik ferogel dari batuan besi menggunakan metode kopresipitasi telah dilakukan. Ferogel disiapkan dari campuran PVA, air, dan gliserin sebagai matriks. Variasi massa *filler* yang diberikan yaitu 20%, 25%, dan 30%. Ferogel disintesis menggunakan metode *freezing-thawing* (beku-cair). Karakterisasi fasa dan ukuran kristal Fe₃O₄ menggunakan XRD (*X-Ray Diffractometer*). Karakterisasi morfologi dan ukuran partikel Fe₃O₄ menggunakan SEM (*Scanning Electron Microscopy*). Karakterisasi sifat magnetoelastisitas ferogel dilakukan dengan menguji pemuluran dan simpangannya ketika dipengaruhi medan magnet. Nilai suseptibilitas magnetik ferogel diukur menggunakan *Bartington MS2 Magnetic Susceptibility Meter*. Hasil analisis XRD menunjukkan pola difraksi serbuk batuan besi yang sesuai dengan pola difraksi Fe₃O₄ sebesar 83% dari volume total dengan ukuran kristal sekitar 26,68 nm–78,08 nm. Hasil SEM menunjukkan distribusi partikel yang tidak seragam dengan ukuran partikel Fe₃O₄ sekitar 33,47 nm–59,09 nm. Pemuluran dan simpangan meningkat seiring bertambahnya konsentrasi *filler*. Simpangan dan pemuluran terbesar berturut-turut yaitu 4,5 cm dan 1,8 cm oleh ferogel dengan *filler* 30%. Nilai suseptibilitas ketiga sampel berturut-turut yaitu (815,2 ; 434,1 ; 970,2) × 10⁻⁸m³kg⁻¹. Berdasarkan hasil karakterisasi, ferogel yang dihasilkan mempunyai tingkat sensitifitas yang tinggi terhadap medan magnet.

Kata kunci : ferogel, *freezing-thawing*, magneto-elastisitas, suseptibilitas magnetik



MAGNETO-ELASTICITY PROPERTIES OF FERROGEL WITH Fe₃O₄ MAGNETIC FILLER WHICH SYNTHESIZED FROM IRON ROCKS

ABSTRACT

Synthesis of Fe₃O₄ as filler of ferrogel magnetoelastic materials from iron rocks has been conducted by using coprecipitation method. Ferrogel was prepared by mixing PVA, water, and glycerin as its matrix. Variations of filler mass were 20%, 25%, and 30%. Ferrogel was synthesized by using freezing-thawing method. Phase and crystal size of Fe₃O₄ were characterized by using XRD (X-Ray Diffractometer). Morphology and particle size of Fe₃O₄ were characterized by using SEM (Scanning Electron Microscopy). Magneto-elasticity properties of ferrogel were characterized by testing its elongation and distortion under the effect of the magnetic field. The values of magnetic susceptibility were measured by Bartington MS2 Magnetic Susceptibility Meter. The results of XRD show that diffraction patterns of iron rocks powders were matched to Fe₃O₄ patterns that was 83% of total volume and having a crystal size about 26.68 nm–78.08 nm. The results of SEM indicated that particles distribution are not uniform with Fe₃O₄ particle size is about 33.47 nm–59.09 nm. The elongation and distortion are equal with increasing concentration of filler. The highest elongation and distortion respectively are 4.5 cm and 1.8 cm by ferrogel with 30% filler. The results of magnetic susceptibility respectively are (815.2 ; 434.1 ; 970.2) × 10⁻⁸m³kg⁻¹. Based on the results of the characterizations, ferrogel that was synthesized having a high sensitivity to magnetic field.

Keywords : ferrogel, freezing-thawing, magneto-elasticity, magnetic susceptibility

