

PELAPISAN BAHAN MAGNETIK PASIR BESI DENGAN SILIKA TERMODIFIKASI ETILENDIAMINA

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INTISARI

Pada penelitian ini telah dilakukan pelapisan bahan magnetik pasir besi dengan silika termodifikasi etilendiamina (PB/SiO₂/EN) menggunakan larutan natrium silikat (26,5% SiO₂) sebagai sumber silika dan 3-etilendiaminopropil trimetoksisilan (EDPTMS) sebagai sumber etilendiamina melalui proses *sol-gel*. Kajian meliputi pengaruh volume larutan Na₂SiO₃ dengan volume EDPTMS tetap dan sebaliknya terhadap berat, keberadaan gugus fungsi, kristalinitas, dan kemagnetan PB/SiO₂/EN yang dihasilkan.

Pelapisan dilakukan dengan cara mencampur 0,5 g bahan magnetik pasir besi dengan 1 mL larutan Na₂SiO₃ dan EDPTMS dengan volume bervariasi (1, 2, 3, 4, dan 5 mL) dan dilanjutkan penambahan larutan HCl hingga pH 7 untuk memperoleh akuagel. Pelapisan yang sama dilakukan dengan volume EDPTMS 1 mL dan volume larutan Na₂SiO₃ bervariasi (1, 2, 3, 4, dan 5 mL). Karakterisasi PB/SiO₂/EN dilakukan dengan *Fourier Transform Infrared* (FTIR), *X-ray Diffractometer* (XRD), *Elemental Analyzer* (EA), *Transmission Electron Microscope* (TEM) dan *Vibrating Sample Magnetometer* (VSM).

Hasil menunjukkan bahwa bahan magnetik pasir besi berhasil dilapisi silika termodifikasi etilendiamina melalui proses *sol-gel*. Penambahan volume Na₂SiO₃ meningkatkan berat PB/SiO₂/EN yang dihasilkan dan konstan pada volume 2 mL. Pada variasi volume EDPTMS dicapai berat konstan pada penambahan volume 3 mL. Pada kondisi tersebut, kristalinitas dan sifat kemagnetan PB/SiO₂/EN cenderung lebih rendah daripada bahan magnetik sebelum pelapisan.

Kata kunci: pasir besi, silika, *sol-gel*, bahan magnetik

COATING OF MAGNETIC MATERIAL OF IRON SAND WITH ETHYLENDIAMINE MODIFIED SILICA

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ABSTRACT

Study on coating magnetic material of iron sand with ethylenediamine modified-silica using sodium silicate (26.5% SiO₂) as the silica source and 3-ethylenediaminopropyl trimethoxysilane (EDPTMS) as the ethylenediamine source through sol-gel process has been carried out. Studies covered the effect of Na₂SiO₃ solution volume at a constant volume of EDPTMS and vice versa on weight, the presence of functional groups, crystallinity, and magnetism of PB/SiO₂/EN.

The coating was carried out by mixing 0.5 g of magnetic material, obtained from separation of iron sand, with 1 mL of Na₂SiO₃ solution and volume variation of EDPTMS (1, 2, 3, 4 and 5 mL), and followed with addition of HCl solution to reach pH of 7 to obtain aqua-gel. The analog work was carried out by varying Na₂SiO₃ volume. Characterizations of PB/SiO₂/EN were performed by Fourier Transform Infrared (FTIR) spectroscopy, X-ray Diffractometer (XRD), Elemental Analyzer (EA), Transmission Electron Microscope (TEM), and Vibrating Sample Magnetometer (VSM).

The results showed that the magnetic material of iron sand has been successfully coated with ethylenediamine-modified silica. The increase in volume of Na₂SiO₃ solution inclines weight of obtained PB/SiO₂/EN and reached constant at addition of the volume 2 mL. Meanwhile, at variation in volume of EDPTMS the constant weight was achieved at addition of 3 mL. In the above condition, the crystallinity and magnetic property of PB/SiO₂/EN tend to be lower than those of the magnetic material before coating.

Keywords: iron sand, silica, sol-gel, magnetic material