

Pengaruh Penambahan Unsur Kromium terhadap Sifat Magnetik Lapisan Ni₉₀Co₅Fe_{5-x}Cr_x (x=0,1,2,3,4) yang Disintesis dengan Metode Elektrodeposisi = Effects of Cr Composition on Magnetic Properties of Ni₉₀Co₅Fe_{5-x}Cr_x (x=0,1,2,3,4) Films Synthesized by Electrodeposition Method

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Abstrak

Lapisan paduan NiCoFeCr telah berhasil disintesis menggunakan metode elektrodeposisi dengan penambahan zat aditif Na-sakarín dalam pengaruh arus deposisi sebesar -25mA selama lima menit pada suhu ruang. Pengaruh komposisi Kromium (Cr) sebesar 0 hingga 39,78at% Cr terhadap struktur, morfologi, dan sifat magnetik lapisan paduan NiCoFeCr telah diteliti. Berdasarkan hasil *X-Ray Diffractometer* (XRD), peningkatan komposisi Cr tidak mengubah struktur kristal FCC dan *space group* Fm-3m. Hasil karakterisasi *Scanning Electron Microscopy* (SEM) menunjukkan terbentuknya *microvoids* dan *microcracks* yang diindikasikan oleh evolusi gelembung gas hidrogen ketika komposisi Cr bertambah. Lapisan paduan NiCoFeCr (0 hingga 39,78at% Cr) menunjukkan sifat feromagnetik berdasarkan hasil *Vibrating Sample Magnetometer* (VSM). Lapisan paduan NiCoFeCr (0 hingga 39,78at% Cr) mengalami penurunan saturasi magnetisasi (Ms) sebesar 159,85 emu/g hingga 4,20 emu/g dan mengalami peningkatan koersivitas (Hc) sebesar 51,84 Oe hingga 257,73 Oe. Peningkatan komposisi Cr menyebabkan saturasi magnetisasi (Ms) menurun dan koersivitas (Hc) meningkat.

NiCoFeCr film alloys were synthesized using the electrodeposition method by adding Na-saccharin additives under the deposition current of -25mA for five minutes at room temperature. The effect of chromium (Cr) addition with composition 0 to 39.78at% on the structure, morphology, and magnetic properties were investigated. From the X-Ray Diffractometer (XRD) results, the increase in Cr composition does not change the FCC crystal structure and Fm-3m space group. The result of the Scanning Electron Microscopy (SEM) observation reveals a formation of microvoids and microcracks indicated by the evolution of hydrogen gas bubbles when the Cr composition is increased. The NiCoFeCr (0 to 39.78at% Cr) film alloys exhibit ferromagnetic properties based on the results of the Vibrating Sample Magnetometer (VSM). The saturation magnetization (Ms) and coercivity (Hc) of NiCoFeCr (0 to 39.78at% Cr) varied between 159.85 emu/g to 4.20 emu/g and 51.84 Oe to 257.73 Oe, respectively. The decrease in saturation magnetization (Ms) and the increase in coercivity (Hc) values are due to an increase in Cr composition.