Pengaruh Penambahan Unsur Kromium terhadap Sifat Magnetik Lapisan Ni90Co5Fe5-xCrx (x=0,1,2,3,4) yang Disintesis dengan Metode Elektrodeposisi = Effects of Cr Composition on Magnetic Properties of Ni90Co5Fe5-xCrx (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-sakarin 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. ÃÂ <hr /> 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%ÃÂ 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.