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The effect of magnetic nickel nanowires structural parameters on the electrodeposition efficiency

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Abstract

In this work, magnetic Ni nanowire arrays were ac-pulse electrodeposited into the anodic aluminum oxide (AAO) template fabricated by the common two-step anodization technique. The barrier layers at the bottom of the pores were exponentially thinned in a non-equilibrium anodization process to 8, 12, 16 and 20 V. These were fabricated using the constant of 15 mA deposition current, 48 mS off-time between pulses, 10, 20 substrate temperatures, and 30°C electrolyte temperature. The effects of thinning voltage and substrate temperature on the electrodeposition efficiency and the magnetic quality of the Ni nanowires were investigated by a Vibrating sample magnetometer (VSM) and a scanning electron microscope (SEM). In this paper, we realized that the bed temperature of 10°C, by increasing the thickness of the barrier layer, reduced deposition efficiency and the temperature was 20 degrees backfired.

Keywords: nickel nanowire arrays, electrodeposition efficiency, barrier layer temperature, barrier layer thickness

For full article, refer to the Persian section