

Influence of boric acid (H_3BO_3) concentration on the physical properties of electrochemical deposited nickel (Ni) nanowires

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Abstract. Authors have investigated the influence of the stabilizer (Boric Acid) concentration during the template-assisted electrochemical deposition of Nickel (Ni) nanowires in Anodic Alumina Oxide (AAO) templates. The synthesis was performed using Ni Sulfate Hexahydrate ($NiSO_4 \cdot 6H_2O$) as metal salts and Boric Acid (H_3BO_3) as a stabilizer. The mixture of both solutions creates electrolyte and utilized for the electrochemical deposition of Ni nanowires. During the experiment, the boric acid concentration varied between 5 g/L, 37.5 g/L and 60 g/L with a deposition temperature of 80 °C (constant). After the electrochemical deposition process, AAO templates were cleaned with distilled water before dissolution in Sodium Hydroxide (NaOH) solution to obtain the freestanding Ni nanowires. Physical properties of the synthesized Ni nanowires were analyzed using Field Emission Scanning Electron Microscopy (FESEM), Energy Dispersive Spectroscopy (EDX) and X-ray Diffraction (XRD). The physical properties of obtained Ni nanowires has elaborated by taking into account the effect of boric acid concentration on the surface morphology, growth length, elemental composition and crystal orientation crystal of the synthesized nickel nanowires. The finding exposes that the boric acid concentration does not influence all aspects in the physicals properties of the synthesized Ni nanowires. The boric acid concentration did not affect the surface texture and crystal orientation. However, shorter Ni nanowires obtained as the concentration of boric acid increased.