

Synthesis of copper nanocone array electrodes and its electrocatalytic properties toward hydrogen peroxide reduction.

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The copper nanocone (Cu-NC) array electrodes were successfully synthesized by metal sputtering on $\text{Al}_2\text{O}_3/\text{Al}$ substrate with conical nanopores followed by electrodeposition of Cu. To fabricate the conical pores on aluminum substrate, repeated and alternating anodizations and pore widening treatments were performed. Each anodization step was conducted at 45 V in a 0.3 M oxalic acid solution at 9 °C. After that, the holes were widened by immersion in a 5 vol% phosphoric acid solution at 30 °C. The effect of different number of alternating anodization-etching cycles on the shape, diameter and height of pores in anodic aluminum oxide (AAO) template was studied. After the electrochemical deposition of Cu, free standing Cu-NC arrays were obtained by chemical etching of Al_2O_3 templates in dilute phosphoric acid. The dimensions of copper nanocones correspond closely with used Al_2O_3 templates. The morphology and structural characterization of fabricated Al_2O_3 templates and Cu-NC arrays were performed. The electrocatalytic activity of the Cu-NC array electrodes toward hydrogen peroxide reduction was investigated.

Słowa kluczowe

Anodization, Etching, Copper, Nanocones, Hydrogen peroxide, Sensors

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