Impact of Glucose as an Additive on the Deposition of Nickel: Application for Electrocatalytic Oxidation of Glucose

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A nickel oxide (NiO_x) nanoparticles modified glassy carbon (GC) electrode, designated as GC_{ox}/NiO_x(Glu), were fabricated from a nickel bath (0.02 M NiSO₄ + 0.03 M NiCl₂ + 0.03M H₃BO₃) containing a suitable additive, typically glucose. The GC was electrochemically pretreated prior to the deposition of nickel. The thus modified electrode was applied for the electrooxidation of glucose in alkaline medium. For the sake of comparison, a similar modification was conducted but in the absence of glucose as an additive, and the modified electrode is designated as GC_{ox}/NiO_x. The effect of loading of NiO_x was optimized. Cyclic voltammetry (CV), and chronoamperometry were used for the voltammetric characterization. Several surface techniques were used for probing the morphology and composition of the deposited modifier, including field emission scanning electron microscopy (FE-SEM), EDX and X-ray diffraction. The highest electrocatalytic activity towards glucose oxidation was obtained at GC_{ox}/NiO_x(Glu) using five potential cycles in the range from 0.0 to -1.0 V vs. Ag/AgCl(KCl sat.). Possible reason(s) behind the enhancement of glucose electrocatalytic oxidation was (were) explored.

Keywords: Modified electrodes, Nickel oxide nanoparticles, Glucose, Electrocatalysis

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