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Electrochemical Studies of Nickel Nanoparticles Decorated the Surface of Some Conducting Polymers for Glucose Oxidation in Biofuel Cells

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Abstract : Potential strategies for deriving useful forms of renewable high density energy from abundant energy stored in carbohydrates is direct conversion of glucose (GLU) to electrical power. A three novel versatile modified electrodes, synthesized by electrochemical polymerization of organic monomers on glassy carbon electrodes (GC), have been developed for biofuel cells results in stable and long-term power production. Electrocatalytic oxidation of glucose in alkaline solution on conducting polymers electrodes modified by incorporation of Ni nanoparticles (NiNPs) onto poly(1,5-aminonaphthalene) (1,5-PDAN), poly(1,8-diaminonaphthalene) (1,8-PDAN) and poly(1-amino-2-methyl-9,10-anthraquinone) (PAMAQ) was investigated. The electrocatalytic oxidation of glucose at NiNPs-modified 1,5-PDAN/GC, 1,8-PDAN/GC and PAMAQ/GC electrodes has been studied using voltammetry technique. The PDAN electrodes show a slight activity in the potential of interest. The prepared NiNPs/PAMAQ/GC catalyst showed a very interesting catalytic activity that was nicely comparable to the NiNPs/1,5-PDAN/GC, NiNPs/1,8-PDAN/GC modified electrodes. In advance, both shows a significant more catalytic activity compared to the reported data for electrodes for glucose electrocatalytic oxidation.

Keywords : biofuel cells, glucose oxidation, electrocatalysis, nanoparticles and modified electrodes
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