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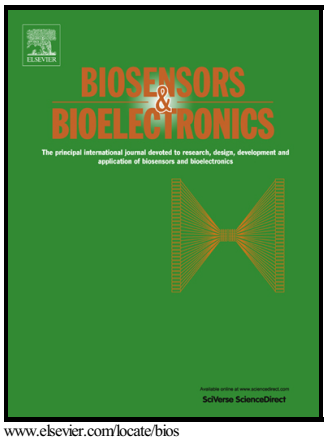

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Development and operation of gold and cobalt oxide nanoparticles containing polypropylene based enzymatic fuel cell for renewable fuels

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Abstract

Newly synthesized gold and cobalt oxide nanoparticle embedded Polypropylene-g-Polyethylene glycol was used for a compartment-less enzymatic fuel cell. Glucose oxidase and bilirubin oxidase was selected as anodic and cathodic enzyme, respectively. Electrode fabrication and EFC operation parameters were optimized to achieve high power output. Maximum power density of 23.5 μW cm^{-2} was generated at a cell voltage of +560 mV vs Ag/AgCl, in 100 mM PBS pH 7.4 with the addition of 20 mM of synthetic glucose solution. 20 μg of polymer amount with 185 μg of glucose oxidase and 356 μg of bilirubin oxidase was sufficient to get maximum performance. The working electrodes could harvest glucose, produced during photosynthesis reaction of *Carpobrotus Acinaciformis* plant, and readily found in real domestic wastewater of Zonguldak City in Turkey.

Keywords: Enzymatic fuel cell; Polypropylene; Nanoparticles; Glucose oxidase; Bilirubin oxidase