Short Communication

Ni-Au Anodic Nano-Electrocatalyst for Direct Glucose Fuel Cells

Aya S. Abdulhalim¹, Yasser M. Asal¹, Ahmad M. Mohammad^{2*}, Islam M. Al-Akraa^{1,*}

¹ Department of Chemical Engineering, Faculty of Engineering, The British University in Egypt, Cairo 11837, Egypt

² Chemistry Department, Faculty of Science, Cairo University, Cairo 12613, Egypt

*E-mails: islam.ahmed@bue.edu.eg (Islam M. Al-Akraa); ammohammad@cu.edu.eg (Ahmad M. Mohammad)

doi: 10.20964/2020.04.01

Received: 21 October 2019 / Accepted: 28 December 2019 / Published: 10 March 2020

This study aims at the sequential assembling of a nickel oxide (NiOx: cauliflower-like nanostructure, 90 nm) and gold (Au; spherical, 95 nm in an average particle size) onto the GC surface nanocatalyst on a glassy carbon (GC) electrode (will be abbreviated as Ni-Au/GC) for the glucose electro-oxidation (GO); the principal anodic reaction in the direct glucose fuel cells (DGFCs). The charge of the Ni deposition on the GC surface (will be abbreviated as Ni/GC electrode) was initially optimized to obtain the highest catalytic activity toward GO which attained at (339.8 Ag⁻¹) by applying 15 mC in the Ni deposition. Yet, the NiOx/GC could not maintain an enduring stability toward GO, which suggested a further modification with Au. Interestingly, this modification obviously improved the stability toward GO; sustaining the rate of current decay at the Ni-Au/GC catalyst much lower than that at the Ni/GC catalyst. After 1 h of continuous electrolysis, the current was 1.15 mA at the Ni-Au/GC electrode compared to 0.6 mA at the Ni/GC electrode (~ twofold higher).

Keywords: Glucose electro-oxidation; Ni; Au; Catalytic activity; Stability.

[FULL TEXT](#)

© 2020 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).