

Fabrication of MEA from Biomass-Based Carbon Nanofibers Composited with Nickel–Cobalt Oxides as a New Electrocatalyst for Oxygen Reduction Reaction in Passive Direct Methanol Fuel Cells

Original Research | Published: 30 May 2020

Volume 11, pages 485–496, (2020) [Cite this article](#)

[Farhad Golmohammadi](#)  & [Masoud Amiri](#)

 936 Accesses  15 Citations  1 Altmetric [Explore all metrics](#) →

Abstract

Biomass has some advantages including renewability, abundant resources, being eco-friendly, easy processing, and low cost; and it is an important step in designing electrocatalysts in fuel cells as clean energy sources. In this study, a biomass-based carbon nanofiber of *Typha domingensis*, as available biomass source, and nickel–cobalt oxides is synthesized. The physicochemical techniques including X-ray powder diffraction, Fourier-transform infrared spectroscopy, energy-dispersive X-ray spectroscopy, field emission scanning electron microscopy, transmission electron microscopy, thermogravimetric analysis, Barrett–Joyner–Halenda, and Brunauer–Emmett–Teller as well as electrochemical techniques are used to evaluate the surface morphology, crystal structure, and electrochemical performance of composites. The biomass-derived composite is used as a new electrocatalyst for the oxygen reduction reaction and oxygen evolution reaction. A membrane electrode assembly is prepared by employing of the produced composite for alkaline passive direct methanol fuel cell, which characterized by polarization, power density curves, methanol crossover test, and stability test for 8 h. Electrochemical results show that the composite is an appropriate electrode material for oxygen reduction reaction in passive direct methanol fuel cells.