World Academy of Science, Engineering and Technology
International Journal of Energy and Power Engineering
Vol:13, No:02, 2019

$CoFe_2O_4$ as Anode for Enhanced Energy Recovery in Microbial Fuel Cell

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Abstract : Microbial Fuel Cells (MFCs) are an alternative sustainable approach that utilize bacteria present in waste water as a bio-catalyst for the production of energy. It is a promising growing technology with minimal requirement for chemical supplements. Here electrode material plays a vital role in its performance. The present study represents CoFe2O4 spinel as a novel anode material in the MFC. It not only improve the bacterial metabolics but also enhance the power output. Generally, biocompatible conductive carbon paper/cloth, graphite and stainless steel are utilised as anode in MFCs. However, these materials lack electrochemical activity for anodic microbial reaction. Therefore, we developed CoFe2O4 on graphite sheet which enhanced the anodic charge transfer process. Redox pair in CoFe2O4 helped in improvement of extracellular electron transfer, thereby enhancing the performance. The physical characterizations (FT-IR, XRD, Raman) and electrochemical measurements demonstrate the strong interaction with E.coli bacteria and thus providing an excellent power density i.e. 1850 mW/m2 .The maximum anode half -cell potential is measured to be 0.65V. Therefore, use of noble metal free anodic material further decrease the cost and the long term cell stability makes it an effective material for practical applications.

Keywords : microbial fuel cell, cobalt ferrite, E. coli, bioelectricity
Conference Title : ICFCT 2019 : International Conference on Fuel Cell Technology
Conference Location : Mumbai, India
Conference Dates : February 07-08, 2019