

# Renewable Energy and Resources & Energy Materials and Fuel Cell Research

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## Low cost membrane for efficient microbial fuel cell: power generation and petroleum refinery wastewater treatment

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Electric energy generation from the association of organic materials in the wastewater by microbes using microbial fuel cell (MFC) is one of the developing techniques used to generate energy for some applications. The goal of this project was to construct low-cost, double-chambered MFCs that harvest electricity and produce reclaimed water from wastewater. MFCs were constructed from cheap alternatives to traditionally used expensive Nafion membranes and platinum cathodes. Low-Density Polyethylene, aluminum and graphite for membrane, cathode, and anode respectively were used to construct double chamber MFC. For power generation the double-chambered consist wastewater and salt solution at the anode and cathode sides respectively. The MFC produced about 0.087 mA/cm<sup>2</sup> of anode area at a potential of more than 842 mV. MFC efficiency 0.49%. A 3 MFCs series connected to produce 2.232 V and 67% fuel cell efficiency. There are enormous methods to treat petroleum refinery wastewaters (PRW) that contain water-soluble hydrocarbons which cannot be separated by physical methods. Using microbial fuel cell (MFC) is a new PRW treatment method. Potassium permanganate as cathodic electron acceptors in the cathode apartment of MFC with low-density polyethylene membrane instead of expensive Nafion was used in to treat PRW taken from Al Dura refinery, Iraq. The effects of potassium permanganate amount on the MFC performance and PRW treatment results were investigated. An electrochemical property of the cell was attained from empirical polarization curves. Maximum power production at the room temperature of 1.0032 W/m<sup>2</sup> using 0.125 g/L of permanganate concentration, the maximum COD removal efficiency was 71.24 % during 48 hours.

### Biography

Shrok Allami is a scientific researcher in the ministry of science and technology/ renewable energy directory/ department of hydrogen and biofuel. She has completed her PhD in 2007 from University Technology, Iraq. She has published more than 25 papers in reputed journals, participates at more than 16 national and international conferences as a researcher and at their committees, and has been serving as an editorial board member in Iraqi scientific journals.

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