A viable electrode material for use in microbial fuel cells for tropical regions

Electrode materials are critical for microbial fuel cells (MFC) since they influence the construction and operational costs. This study introduces a simple and efficient electrode material in the form of palm kernel shell activated carbon (AC) obtained in tropical regions. The novel introduction of this material is also targeted at introducing an inexpensive and durable electrode material, which can be produced in rural communities to improve the viability of MFCs. The maximum voltage and power density obtained (under 1000 Ω load) using an H-shaped MFC with AC as both anode and cathode electrode material was 0.66 V and 1.74 W/m3, respectively. The power generated by AC was as high as 86% of the value obtained with the extensively used carbon paper. Scanning electron microscopy and Denaturing Gradient Gel Electrophoresis (DGGE) analysis of AC anode biofilms confirmed that electrogenic bacteria were present on the electrode surface for substrate oxidation and the formation of nanowires.