USING DIFFERENT TYPES OF WASTEWATERS IN THE ANODES OF TWO-CHAMBER MICROBIAL FUEL CELLS

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ABSTRACT

Microbial fuel cells (MFCs) are devices generating power through the decomposition of organic compounds which are present in various wastes/wastewaters. MFCs have gained significant scientific interest over the last years [1], since energy production is accomplished simultaneously with the wastewater treatment and as such they could be considered very promising for practical applications, in the near future [2].

In the present work four different wastewaters, with different origin and composition were used as substrates in four identical dual-chamber MFCs, using graphite granules as anodic electrodes. Specifically, a mixture of hydrogenogenic-reactor (dark fermentative hydrogen production reactor) effluents (MFC1), cheese whey wastewater (MFC2), a mixture of expired juices (MFC3) and a sugary-wastewater (candy-jelly mixture from a food industry) (MFC4) were used as substrates in the MFCs, so as to assess the effect of the specific wastewater type on their efficiency. In all MFCs, high organic (Chemical Oxygen Demand) removal efficiencies were observed, while the coulombic efficiency values varied from 3-16.5%, depending on the wastewater type used. Similarly, the maximum power densities varied from 0.39 -0.97 W/m^3, with the MFC4 giving the highest energy, a result that was also confirmed by the impedance spectroscopy measurements, associated with the lower internal resistance of the MFC4.

KEYWORDS: Microbial Fuel Cells, power density, Impedance spectroscopy Measurements, Internal Resistance

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