

# IMPROVING THE PERFORMANCE OF SEDIMENT MICROBIAL FUEL CELLS BY INCREASING SEDIMENT CONDUCTIVITY USING CONDUCTIVE SOLUTION

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## **Abstract**

Sediment microbial fuel cells (SMFCs) are innovative and promising technologies for green energy production. These bioelectrochemical devices convert organic matter in sediments into electricity using microorganisms as active biocatalysts. In this study, a conductive solution containing ferric ion and colloidal iron oxyhydroxide was used to increase sediment conductivity and improve production power. The performance of the cells was evaluated in two modes of open circuit ( $R = \infty$ ) and closed circuit ( $R = 1\text{K}\Omega$ ). Two SMFCs were also used as controls (without the presence of conductive solution) in both closed and open circuit modes. According to the results obtained from the power curves, the cell containing the conductive solution in the open circuit produced the highest maximum power density and also the highest current density, which were  $180.44\text{ mW/m}^2$  and  $861.11\text{ mA/m}^2$ , respectively. In general, the use of iron compounds in solution is a useful and appropriate solution to increase the conductivity of sediment and also improves the oxidation process of organic matter.