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### Comparative study of effects of electrode materials and catholyte on simultaneous generation of bioelectricity and waste water treatment

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Improvement of the parameters which limit the harvest of energy in microbial fuel cell (MFC) is paramount to increase its output and promote commercial application of the technology. Six dual chamber MFCs with either potassium permanganate or potassium ferricyanide as electron acceptor and various combinations of carbon and copper rods as electrodes produced maximum open circuit voltage (OCV) of 0.97V, 1.23V, 1.34V, 0.75V, 1.03V and 0.63V. The power density (at  $R_{ext} = 1000\Omega$ ), which increased with decreasing external resistance until  $200\Omega$  beyond which it decreased, peaked at  $79.27\text{mW}/\text{m}^2$  ( $105.7\text{mA}/\text{m}^2$ ),  $156.32\text{mW}/\text{m}^2$  ( $148.4\text{mA}/\text{m}^2$ ),  $92.29\text{mW}/\text{m}^2$  ( $114.0\text{mA}/\text{m}^2$ ),  $60.94\text{mW}/\text{m}^2$  ( $92.6\text{mA}/\text{m}^2$ ),  $39.94\text{mW}/\text{m}^2$  ( $75.0\text{mA}/\text{m}^2$ ) and  $14.21\text{mW}/\text{m}^2$  ( $44.70\text{mA}/\text{m}^2$ ) for the MFCs. Similarly, Coulombic efficiency (CE) were 69%, 84%, 74%, 76%, 72% and 5.10%, while COD removal were 65%, 51%, 47%, 83%, 48% and 49%. Above results indicated that potassium permanganate outperformed potassium ferricyanide, while use of carbon as both electrodes was better than other blends copper and/or carbon used in the study. *Lactobacillus spp.*, *Corynebacterium spp.*, *Streptococcus spp.*, *Proteus mirabilis*, *Enterobacter spp.*, *Escherichia coli*, *Pseudomonas spp.*, *Bacillus spp.*, *Aeromonas spp.*, *Micrococcus lyteus*, *Corynebacterium spp.*, *Cladosporium*, *Aspergillus versicolour*, *Candida albicans*, *A. flavus*, *Aspergillus nidulans*, *Trichoderma spp.* and *Aspergillus fumigatus* were microorganisms isolated from the piggery wastewater. Further studies using cheaper, more sustainable materials with better effects on the setup are necessary.

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