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Electrodic capacitance and its influence on performance of microbial fuel cells - electrochemical impedance studies

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Electrochemical impedance spectroscopy is employed to understand the role of biological capacitance and individual component resistance in the bioelectricity generation throughout the life time of the microbial fuel cells. Gram stain analysis and optical microscopy supported the predominant growth of rod shaped *Geobacter* culture in sweet lime based microbial fuel cells. The anodic capacitance during initial bacterial growth (1-9 days) is 6 times higher than the literature data. The anodic capacitance decreased to 0.52 mF on day 24 and anodic polarization resistance increased to 913.8Ω due to fungal formation. The power density calculated on day 24 being 497.1 mW/m^2, which is approximately three times higher than the literature data. These results demonstrate that (i) *Geobacter* culture is more efficient in bioelectricity generation than *Shewanella* based biofilm in microbial fuel cells and (ii) the biological capacitance of electrodes plays an important role in the power generation of microbial fuel cells.

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