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Title:	Strategies for optimizing the power output of microbial fuel cells: Transitioning from fundamental studies to practical implementation
Authors:	Patil, Sunil A. (/jspui/browse?type=author&value=Patil%2C+Sunil+A.)
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Abstract:	Microbial electrochemical technologies, such as microbial fuel cells (MFCs), are attracting extraordinary attention due to their dual functions of waste removal and energy production from wastewaters. If deployed for decentralized wastewater treatment or integrated into existing wastewater treatment plants, the MFC technology has the potential to make the overall treatment process energy efficient. Despite numerous advances in fundamental and technological aspects, implementation of MFCs in real-world applications is taking considerable time. This is mainly due to critical limitations such as high capital costs per treatment capacity versus competing existing wastewater treatment technologies. In particular, low substrate turnover rates and concurrently low power outputs are the key hindrances for scaling-up of wastewater treating MFCs. Here, we provide a systematic multi-perspective overview of distinct strategies for optimizing MFC performance in terms of electric power output. A brief discussion on fundamental aspects of power losses at different current densities is followed by an extensive analysis of the measures that can be undertaken for optimizing power output and decreasing power losses. Special emphasis is given to addressing voltage reversal issues associated mainly with practically-relevant systems. Finally, future perspectives and research directions that need progressive considerations for realizing real-world applications for MFCs are presented. We propose reporting additional MFC performance indicator numbers to better facilitate their cross-comparison with each other and other energy producing technologies. By presenting a consolidated information source on different power optimization strategies, this review provides a valuable guideline for optimizing the electrical energy generation of MFCs.
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