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Performance of Osmotic Microbial Fuel Cell in Wastewater Treatment and Electricity Generation: A Critical Review

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Abstract : Clean water and electricity are vital services needed in all communities. Bio-degradation of wastewater contaminants and desalination technologies are the best possible alternatives for the global shortage of fresh water supply. Osmotic microbial fuel cell (OMFC) is a versatile technology that uses microorganism (used for biodegradation of organic waste) and membrane technology (used for water purification) for wastewater treatment and energy generation simultaneously. This technology is the combination of microbial fuel cell (MFC) and forward osmosis (FO) processes. OMFC can give more electricity and clean water than the MFC which has a regular proton exchange membrane. FO gives many improvements such as high contamination removal, lower operating energy, raising high proton flux than other pressure-driven membrane technology. Lower concentration polarization lowers the membrane fouling by giving osmotic water recovery without extra cost. In this review paper, we have discussed the principle, mechanism, limitation, and application of OMFC technology reported to date. Also, we have interpreted the experimental data from various literature on the water recovery and electricity generation assessed by a different component of OMFC. The area of producing electricity using OMFC has further scope for research and seems like a promising route to wastewater treatment.

Keywords : forward osmosis, microbial fuel cell, osmotic microbial fuel cell, wastewater treatment
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