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Abstract

Application of Electrochemical Processes to Membrane Bioreactors for Sustainable Wastewater Treatment: A Short Review †

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Abstract: Membrane bioreactors (MBRs) are considered as innovative systems for wastewater treatment in line with sustainable development and the reuse of treated wastewater. One of the main problems of MBRs is the fouling of the membrane modules, defined as fouling, which affects both the stability and the effectiveness of the biological purification process. Among the many technologies developed by the scientific community for the mitigation of fouling, the application of electrochemical processes to MBRs has attracted considerable interest. It has been observed that these processes present greater simplicity from a management point of view and, at the same time, allow an improvement in the purification performance of the system, achieving greater purification efficiencies compared to conventional MBR systems. Unlike traditional chemical and physical cleaning methods, which cause a reduction in the useful life of the membranes and require higher operating costs, these systems, defined as membrane electrobioreactors (eMBRs), can prove economically advantageous. This technology does not involve the addition of chemical substances in the reactor, which can alter the characteristics of the wastewater. It is also simple from a management point of view and can be easily monitored in situ. The eMBR configurations used must be evaluated on the basis of different operating conditions, as a correct balance of parameters is essential for achieving the set objectives. This paper seeks to review technologies proposed for wastewater treatment using eMBRs. Finally, the challenges in applying these removal strategies are also highlighted in this brief review.

Keywords: membrane fouling; electro-membrane bioreactor; current density; wastewater treatment

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