

Trends and perspectives in membrane separator engineering for microbial fuel cells

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Abstract

In the literature, there is wide consent that the performance of microbial fuel cells (MFCs) is significantly determined by the architecture. From this viewpoint, the separator, mostly a membrane placed between the electrodes and/or their compartments is to be considered of high importance among several other factors [1]. Regarding the deployment of membranes in MFCs, it can be pointed out that Nafion-type proton exchange membranes (PEM) are the most widespread. The Nafion material, however, is often criticized due to its weaknesses frequently observed during MFC operation, such as in terms of (bio)fouling, mass transport properties, etc. [2]. Therefore, to find alternatives of Nafion, the synthesis/development of novel/commercialized membrane separators demonstrating enhanced characteristics has been a hot topic recently. In this study, the goal was (i) to assess the results obtained with various membranes reported in the scientific literature relevant to MFCs, (ii) examine the current standing of research and (iii) reveal – based on the “big picture” – how MFCs installed with “new” membranes behave in comparison with those applying Nafion PEM. To our knowledge, such an evaluation has not been carried out so far and hence, the outcomes of this investigation could be helpful for the community dealing with the improvement of microbial electrochemical technologies, particularly MFCs.

Keywords: Microbial Fuel Cell; Microbial Electrochemical Technology; Membrane; Separator; Comparative Analysis

References:

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