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Letter on Bioelectrosynthesis

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ABSTRACT

Due to an increasing world population and water shortages, wastewater is considered to be one of the main important water sources. In addition, it is necessary for use in treatment of wastes for public health and environmental conservation. Traditional wastewater treatment technologies serve to treat the wastes and residues. However, this may not sufficient and consumption energy can be decisive. Therefore, efforts to find new technologies with lower energy consumption is vital. To date, the bioelectrochemical technologies consist of the generation of electricity from relatively cheap organic compounds [1] along with the wastewater treatment. More exploration of bioelectrochemical technologies has led to the appearance of a new process that is called bioelectrosynthesis or microbial electrosynthesis (MES). Bioelectrosynthesis is a novel approach to developing new routes for the synthesis of valuable chemicals simultaneously with electricity generation and wastewater treatment. During this process, many valuable chemicals such as methane, hydrogen, and hydrogen peroxide are generated. The MES entails the application of microorganisms to the cathode of an electrochemical cell, wherein the microbes facilitate the transfer of electrons and the production of fuels and chemicals [2]. In MES, the valuable chemicals are synthesized from CO2 by using the microorganisms that are growing on the cathode. However, superior to bioelectrochemical systems (such as MFCs and MECs), MES not only further stores electricity as the desired commodities for conserving energy and reducing the dependency on fossil fuels, but also captures/fixes carbon dioxide while alleviating the greenhouse effect [3]. To overcome energy consumption costs and high efficient wastewater recovery this process can be considered to be one of the main recommended treating methods in the near future. The importance of MES in recent years and publications about it has been represented in Fig. 1. As demonstrated in the figure, MES has been one of the most studied fields in chemical and environmental sciences during the last 7 years. This indirectly implies that the research attitude has changed from the conventional view to progressive approaches.

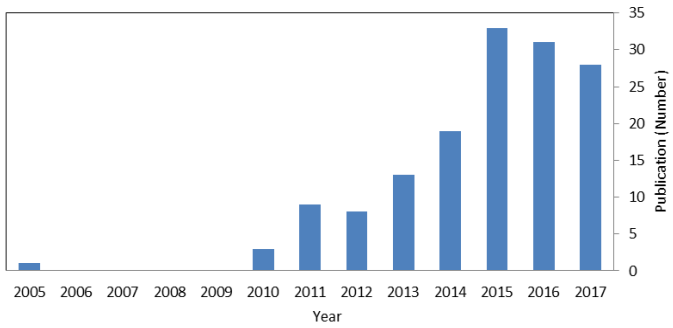

Figure 1. The trend of published documents about bioelectrosynthesis (Scopus)

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