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Conversion of fatty acids to their corresponding alcohols by *Sporomusa ovata* using Microbial Electrosynthesis (MES) technology

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Diminishing crude fossil fuel resources has received increasing attention during the last decade and mobilized lots of efforts to develop new technologies for the production of sustainable biofuels. Despite intensive efforts, only ethanol so far has served the purpose of alternative fuel due to its easy and cost effective manufacturing process. Higher carbon chain fuels like propanol and butanol are more attractive due to their energy density, making them suitable for engine usage. From the process point, alcohol production can be divided into two distinct biological processes: (i) fatty acids production and (ii) their conversion to biofuel molecules. Microbial electrosynthesis (MES) is one of these new green technologies, aiming for sustainable production of bio-commodities. MES employs microorganisms as biocatalysts and electricity as energy to reduce carbon dioxide into multicarbon compounds (e.g. acetate). The objective of this work is to reduce long chain fatty acids (e.g. propionic, butyric, valeric and hexanoic acids) beforehand produced by different fermentation processes to their corresponding alcohols with a concomitant reduction of carbon dioxide using electricity as the electron source. For the first time we were able to demonstrate the conversion of propionate acid to 1-propanol in MES system using *S. ovata* as biocatalyst. The conversion efficiency was around 15% using a potential of -900 mV vs Ag/AgCl. In addition to the 1-propanol, acetate and ethanol were also produced from carbon dioxide fixation. Despite the low bioconversion efficiency, these results open the door for new applications for Microbial electrosynthesis. Further optimization is undoubtedly required to improve the conversion efficiency of propionic acid to 1-propanol and other fatty acids could be tested in MES system for biofuels production.