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In the field of fermentation biotechnologies, mixed cultures processes are more and more considered as a viable industrial alternative to pure culture fermentation, beyond their usual usages in waste and wastewater treatment or in food industry. From an industrial point of view, mixed-culture fermentations present many advantages. As an illustration, it is possible to work under non-sterile conditions and to use cheap and raw non-purified substrates. Yet the usual environmental parameters (pH, temperature, OLR…) are often not efficient enough to control the activity of the microbial community and the main drawback of using mixed cultures is their high versatility in metabolic patterns. It is therefore not rare to observe a lack of selectivity in the molecules produced, lowering the product yield.

In this work, we propose to use bio-electrochemical systems (BESs) as a new way to control fermentation patterns in a process named electro-fermentation. In this process, electricity is provided to the micro-organisms as it is in microbial electrosynthesis systems but not as sole electron donor. The electrochemical input of electrons is an additional reducing power to micro-organisms along with a fermentation substrate.

Electro-fermentation of glycerol to 1,3-propanediol (1,3-PDO) by a mixed culture in a minimal medium was performed and compared to conventional fermentation. The working electrode, used as a cathode, was precolonized by the electro-active bacteria *Geobacter sulfurreducens* and poised at -0.6V *vs.* SHE. The electron input represented less than 1% of the total reducing equivalent introduced in the reactor but the fermentation pattern was significantly different between fermentation and electro-fermentation. 1,3-PDO production yield was increased by 32% in electro-fermentation. The obtained value of 0.62±0.07 $mol_{1,3\text{-}PDO}\ mol^{-1}_{glycerol}$ was very close to the maximum theoretical yield of 0.64 $mol_{1,3\text{-}PDO}\ mol^{-1}_{glycerol}$.