Effect of applied potential for start-up of electrosynthesis from carbon dioxide using bioelectrochemical system

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Electrochemically active bacteria is bio-catalyst for useful chemical and biofuel production on electrode in bioelectrochemical system. Primary product from microbial electrosynthesis with CO2 is acetate which is important intermediate chemical. Start-up potential for CO2 reduction is main factor to develop electron transfer system between electrode and microbe, thus reduce start-up time. Here, we investigate effect of start-up potential for autotrophic electrosynthesis with two different condition, critical potential for direct electron transfer and the potential for hydrogen mediated acetate production. Electrosynthesis was confirmed through long-term operation in bioelectrochemical system using CO2 as sole carbon source to produce acetate and other organic acids. However, at -700mV potential, acetate is not produced enough amount. After acclimating biocathode with the condition which produce acetate mediated by hydrogen, we tested sustainability of biocathode at direct electron transfer mode by lowering operation potential gradually. This study was carried out to provide elucidative concept to establish an efficient enrichment and start-up strategy to produce useful chemical and biofuels.