Bioelectrochemical conversion of glycerol to 1,3-propanediol

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The production of biodiesel via the transesterification reaction delivers a low value waste stream rich in glycerol. It is possible to convert this glycerol to 1,3-propanediol, this two-electron reduction entails a significant value increase. Here, we used electrical current and an enriched microbial population to drive the conversion of glycerol to 1,3-propanediol. In the absence of current, the population converted the glycerol almost exclusively to propionate, while the current driven population shifted to 1,3-propanediol as dominant product, aside from producing more acetate and CO₂. The microbial community in the experiment was strongly dominated by a close relative of Citrobacter freundii, while the control was dominated by a Pectinatus strain. Interestingly, the product spectrum of the experiment corresponded well with that of C. freundii as type strain. Microbial electrosynthesis thus appears to be a viable approach for the production of chemicals and fuels, starting from CO₂ or substrate organics.