Bioelectrochemical conversion of glycerol to 1,3-propanediol

Alexander Wise, Angela J Johnstone, Bernardino Virdis, Stefano Freguia, René A Rozendal and Korneel Rabaey

Advanced Water Management Centre, The University of Queensland, Brisbane, QLD4072; Tel. +61 7 3365 4730; k.rabaey@uq.edu.au

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 CO_2. 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 CO_2 or substrate organics.