Electrifying microbes for the production of chemicals

Powering microbes with electrical energy to produce valuable chemicals such as biofuels has recently gained traction as a biosustainable strategy to reduce our dependence on oil. Microbial electrosynthesis (MES) is one of the bioelectrochemical approaches developed in the last decade that could have critical impact on the current methods of chemical synthesis. MES is a process in which electroautotrophic microbes use electrical current as electron source to reduce CO₂ to multicarbon organics. Electricity necessary for MES can be harvested from renewable resources such as solar energy, wind turbine, or wastewater treatment processes. The net outcome is that renewable energy is stored in the covalent bonds of organic compounds synthesized from greenhouse gas. This review will discuss the future of MES and the challenges that lie ahead for its development into a mature technology.