Porous carbonaceous electrodes for microbial electrosynthesis

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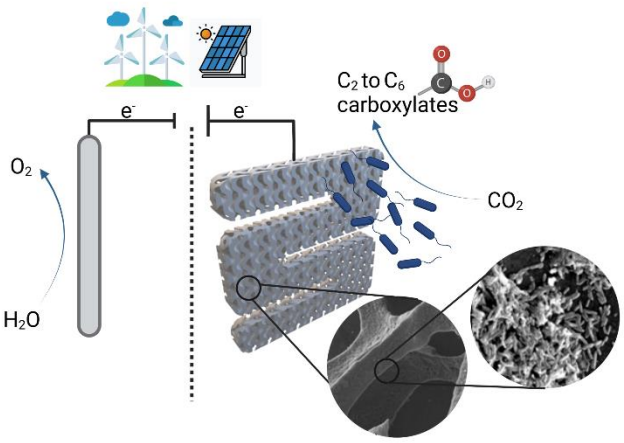
Description



With the growing number of technologies aiming to reduce CO_2 emissions, using CO_2 as a resource will be vital in tackling global warming. One key avenue of utilising CO_2 is via bioelectrochemistry. It is based on the ability of microorganisms to use electrons from solid-state electrodes and metabolise them to convert CO_2 into complex chemical compounds. The approach is cheap and self-regulating, achieving >80% electricity-to-product conversions.[1] However, one of the biggest limitations of MES is to ensure that CO_2 and nutrients can be provided to the microbes through structured electrode design. Natural materials such as marine sea sponges demonstrate high surface area with low-pressure drop in order to extract nutrients from the ocean.[2] Inspired by these structures, we aim to develop electrodes with low transportation limits, suitable surface characteristics and high electric conductivity.[3]

[1]P. Dessì *et al.* Biotechnology Advances 2021 [2]Kleger *et al*. Scientific Reports 2021 [3]L. Jourdin *et al.* Trends in Biotechnology 2020

Are you a student and/or would be interested in electrode material design, additive manufacturing, biobased materials, or materials characterisation? Don't hesitate to reach out.

Shaping Matter Lab

We are an interdisciplinary research group in the ASM, Aerospace Engineering at TU Delft (www.shapingmatterlab.com). We are inspired by how Nature utilises hierarchy at multiple length scales to structure relatively weak building blocks into complex shapes with outstanding mechanical performance. In our lab, we combine self-assembly additive manufacturing of biobased and living matter using additive manufacturing to fabricate sustainable lightweight structures with hierarchical architectures and interesting functional properties at application-relevant scales.

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