Exploring the molecular mechanisms of electron uptake by (photo)electro-autotrophic organisms

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Some bacteria can use electrons provided by an external circuit to capture CO_2 and synthesize high value chemicals. This capacity has raised great interest due the potential to dramatically reduce the ecological footprint of parts of the chemical industry. This bioelectrosynthetic capacity can be powered directly by electrodes poised at very reducing potentials or rely on sunlight to boost the reducing power of electrons poised at less negative potentials. Two archetypal organisms engaged in these processes are *Sporomusa ovata* and *Rhodopseudomonas palustris* TIE-1. For the later an operon encoding proteins that fit the porin-cytochrome paradigm has been assigned to the activity of electron uptake from electrodes. For the former the molecular mechanisms are still debated and the responsible proteins remain to be identified, with hydrogenases and cytochromes as likely candidates.

We will present our ongoing investigation of the molecular players and interactions that underpin the electrode-microbe electron transfer and enable (photo)electro-biosynthesis of valuable chemicals coupled with CO_2 capture.