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Multiheme Cytochromes as Electron Transfer Conduits in Bioenergy Applications: Insights from *Shewanella oneidensis* MR-1

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Multiheme cytochromes support facile electron exchange across two, or more, covalently bound heme cofactors. These proteins are of much interest for bioenergy applications because they underpin electron exchange between electrodes and bacteria from the families of *Shewanellaceae* and *Geobacteraceae*. In microbial fuel cells such multiheme cytochromes support production of electricity from the bacterial oxidation of waste organic materials. There are opportunities for the microbial electrosynthesis of fuels and chemical feedstocks when the direction of electron transfer is reversed.

This contribution will review recently gained insights into the electron transfer properties of multiheme cytochromes from *S. oneidensis* MR-1. The constellations of hemes underpinning the rapid, and directional, electron transfers achieved by these proteins will be presented (Breuer *et al* J. R. Soc. Interface DOI: 10.1098/rsif.2014.1117). Opportunities for these structures to inform advances in bioenergy applications, including the assembly of dye-sensitised photoanodes, will be discussed (Hwang *et al* Adv. Funct. Mater. DOI: 10.1002/adfm.201404541).

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