**Electrochemical Communication between Viable Bacterial Cells and Flexible Redox Polymers**

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Recently we have shown that bacterial cells can be electrochemically ”wired” to electrodes with flexible redox polymers e.g., poly(1-vinylimidazole)12-[Os(4,4’-dimethyl-2,2’-dipyridyl)2Cl2]2+/3+ and poly(vinylpyridine) [Os(N,N’-dimethyl-2,2’-biimidazole)3]2+/3+. Our initial studies1 were made with the simple Gram-negative *Gluconobacter oxydans*,where we addressed redox enzymes from the cytoplasmic membrane yielding response for glucose, fructose, ethanol and glycerol. Later focus was on more complex Gram-negative *Pseudomonas putida* and *P. fluorescens*,2,3 where response currents were obtained for substrates metabolised in the cytoplasmic membrane (glucose) and in the cytosol (phenol). Recently introduction of a cytochrome to the cytoplasmic membrane of *E. coli* facilitated the communication between *E. coli* cells and the redox polymers.4 In Gram-positive *B. subtili* 5 strain which overproduces complex II, current resonse has been improved several times although it was expected to be more difficult for the thick cell wall to permeate by rodox polymer. Another recent work that supports such a theory is a paper by Marshall and May6, who show that Gram-positive *Thermincola ferriacetica* strain Z-0001 readily can grow onto a graphite electrode and exhibit direct e- transfer communication. Currently we are investigating *Rhodobacter capsulatus,* one of the most metabolic versatile bacteria in the nature, grown heterotrophically and successfully wired with poly (1-vinylimidazole) 12-[Os(4,4’-dimethyl-2,2’bipyridyl)2Cl]2+/+, E°’= 200 mV vs. SCE7in both batch and flow mode. More experiments are going on to establish the communication between phtoheterotrophicaly grown cells and the redox osmium polymers followed by electrode by using light as a energy source instead of any organic substrate.

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