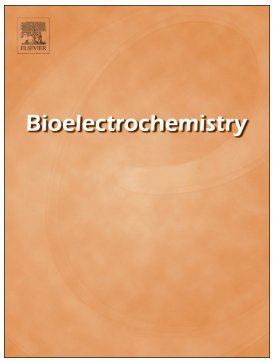

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Influence of cytochrome charge and potential on the cathodic current of electroactive artificial biofilms

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Abstract

An electroactive artificial biofilm has been optimized for the cathodic reduction of fumarate by *Shewanella oneidensis*. The system is based on the self-assembly of multi-walled carbon nanotubes with bacterial cells in the presence of a *c*-type cytochrome. The aggregates are then deposited on an electrode to form the electroactive artificial biofilm. Six *c*-type cytochromes have been studied, from bovine heart or *Desulfuromonas* and *Desulfuvibrio* strains. The isoelectric point of the cytochrome controls the self-assembly process that occurs only with positively-charged cytochromes. The redox potential of the cytochrome is critical for electron transfer reactions with membrane cytochromes of the Mtr pathway. Optimal results have been obtained with c_3 from *Desulfovibrio vulgaris* Hildenborough having an isoelectric point of 10.2 and redox potentials of the four hemes ranging between -290 and -375 mV vs. SHE. A current