Abstract Submitted
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Experimental studies of charge transport and storage in microbial biofilms[1] NIKHIL MALVANKAR, KELLY NEVIN, ASHLEY FRANKS, MADELINE VARGAS, KENGO INOUE, MARK TUOMINEN, DEREK LOVLEY, University of Massachusetts, Amherst — We discuss results of ac impedance spectroscopy and dc I-V measurements applied to microbial biofilms and demonstrate that the biofilms of *Geobacter sulfurreducens* that grow on the anodes of microbial fuel cells are electronically conductive, with conductivities comparable to conjugated polymers. To investigate the components conferring the conductivity, we studied novel strains of *G. sulfurreducens* and mutants deficient in various outer surface components. Strains producing more current, produced biofilms with higher conductivity, demonstrating that conduction is the mechanism for long-range electron transfer through the biofilms. There was a direct correspondence between biofilm conductivity and the abundance of pili, referred to as microbial nanowires. Electrochemical gating suggested that in contrast to conventional redox activated hopping, charge transport is polaron-like. Biofilms also exhibited supercapacitor behavior. The results are being incorporated into a physical model of electron transfer and storage through the biofilms.

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