Electrode Surface Structures for Studying Long-range Electron Transfer in Biological Systems.

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Gold electrodes modified with a self-assembled monolayer (SAM) of organo-thiol present a well-defined electrode surface for the adsorption of protein molecules to be studied by protein film voltammetry (PFV). Following the publication of the synthesis and characterization of ferrocene-terminated oligophenylenevinylene (OPV) thiol monolayers on gold by Chidsey and coworkers,[1] ethyl-terminated OPV "molecular wires" have been synthesized and incorporated into SAMs on gold. The study of a model system, by PFV, using the simple electron transfer protein, azurin, has demonstrated that OPV SAMs facilitate fast electron transfer between the protein and the electrode. This concept is being extended to develop stable OPV electrode surface structures, which mimic biological membranes and are capable of transferring electrons over distances greater than 30 Angstroms with the goal of achieving fast electron exchange with large and complex membrane-bound redox proteins.

[1]Sikes, H. D.; Smalley, J. F.; Dudek, S. P.; Cook, A. R.; Newton, M. D.; Chidsey, C. E. D.; Feldberg, S. W. *Science*, **2001,** 291, 1519.