The Artificial Electron Transferases

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Biosensors and bioelectronic devices combine the specificity of enzymes with the sensitivity of an electronic device. Electrical contact between the redox protein and the electrode is usually inefficient due to the steric factors imposed by the protein matrix. The mixed monolayer protected gold clusters (Au-MMPCs) are effective at recognizing protein surfaces specifically and may support good electrical contact between a surface and a redox protein. The yeast cytochrome c peroxidase (CCP) and horse heart cytochrome c (Cyt c) has been selected as a model complex to study the selectivity and the artificial electron transfer potential of Au-MMPC. The addition of Au-MMPC to CCP:Cyt c causes the disappearance of the CCP band on the native gels, but retention of the Cyt c band, indicating that Au-MMPC specifically interacts with CCP. Steady-state kinetic studies indicate that Au-MMPC binds to CCP, excluding Cyt c binding. In further studies, the Au-MMPC will replace Cyt c as the electron-transferase supporting the CCP catalyzed reduction of peroxide to water.