Electrocatalysis of interfacial bioelectrochemical electron transfer processes at the single-molecule level

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The structure, two-dimensional surface organization, and electron transfer (ET) function of biological macromolecules and biomimetic molecules on solid surfaces can now be addressed at a degree of detail that reaches the level of the single molecule. ET metalloproteins such as blue copper, heme, and iron-sulfur proteins have thus become new target molecules for single-molecule electrochemical surface science. Redox molecules such as these are "smart" molecules in the sense that they can be brought to "do" something in their natural aqueous biological buffer environment. Scanning tunnelling and atomic force microscopy in aqueous biological media supported by theoretical frames are core approaches in these new areas.
We overview here some new recent efforts in *electrocatalysis* of redox metallo*enzymes* and biomimetic metalloenzyme models also brought to the single-molecule level. Structures and enzyme mechanisms of these large and composite biomolecular entities offer new challenges. We shall address:

- Binding modes of molecular linkers on electrochemical Au(111)-electrode surfaces.
- A biomimetic metalloenzyme unit – the $[Mo_3S_4]^{3+/4+}$ cluster.
- Interfacial bioelectrochemical catalysis by "normal" and "green" gold nanoparticles.
- Single-molecule bioelectrocatalysis - multi-copper nitrite reductase and laccases.

Some references:

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