Nanoparticle Platforms for Controlled Protein Adsorption and Behavior in Protein Monolayer Electrochemistry

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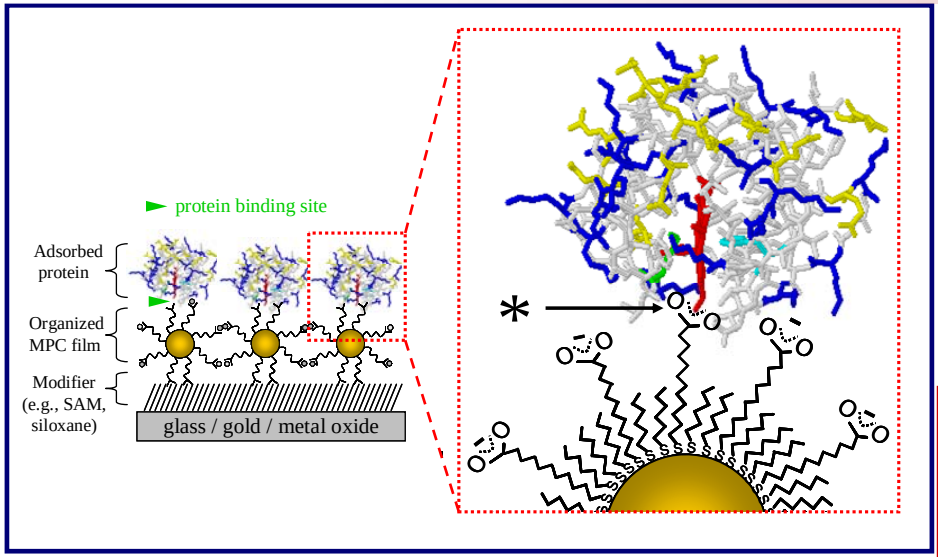

◀ Synthetic models of biological interfaces are of interest for many bioanalytical applications, including biosensor development. Here we explore films of nanoparticles called monolayer protected clusters (MPCs) as a functional component of protein monoalyer electrochemistry. A major goal of our work is to see if rational design of the MPCs translated into molecular level control at the protein binding site* that affects the adsorbed electrochemistry.

Cytochrome c (Cc) was adsorbed to films of MPCs assembled on modified gold substrates. The terminal layer of the MPC film was systematically altered to exhibit a range of Cc binding ligands (11-mercaptoundecanoic acid, MUA). As the number of MUA ligands per MPC was increased, higher Cc adsorption and more defined cyclic voltammetry was observed. By engineering the architecture of the MPC adsorption platform, the voltammetry of adsorbed Cc as well as the background charging current can be controlled to yield more ideal protein monolayer electrochemistry. ▶