Direct or Mediated Electrochemical Signal Amplification for Affinity Biosensors

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This presentation reports a comparative study for the evaluation of signal amplification strategies in electrochemical immunosensing.[1] The electroactive dendrimer modified self-assembled monolayer(SAM)/gold surface was developed as the platform for affinity biosensors.[2,3] As a model system for affinity recognition, we investigated the functionalization of biotin groups to the surface monolayer and their biospecific interactions with streptavidin molecules.[1] Electrochemical signal from the affinity sensor was generated by the biocatalytic reaction of specifically bound biotinylated-glucose oxidase (b-GOx) in either (i) direct electron transfer between the prosthetic group of GOx (FAD) and the electroactive functionality on the dendrimer monolayer or (ii) mediated electron transfer facilitated by diffusible ferrocenyls in bulk electrolyte. As a result, direct electron transfer (mode i) yielded only small signal from the limited chance of direct electrical communication.[4] However, efficient signal amplification was accomplished in the diffusible group-mediated electron transfer (mode ii). Fully developed voltammograms, whose signal magnitude correlated to the streptavidin concentration, were registered. This signal amplification strategy is readily applicable to the sandwich type electrochemical immunoassay system.

1. Hyun C. Yoon (2002), Haskin Yang, Young Tae Kim, *Analyst* **127**, 1082.
2. Hyun C. Yoon (2002), Dohoon Lee, Hak-Sung Kim, *Anal. Chim. Acta.* **456**, 209.
3. Hyun C. Yoon, Mi-Young Hong, Hak-Sung Kim (2000), *Anal. Biochem.* **282**, 121.
4. Nathalie Anicet, Agns Anne (1998), Jacques Moiroux, and Jean-Michel Savant, *J. Am. Chem. Soc.* **120**, 7115.