

Electrochemical signaling method for affinity biosensors based on biocatalyzed precipitation

윤현철*, 양해식, 김윤태

한국전자통신연구원(ETRI) 원천기술연구소, 바이오소자팀

*Corresponding author: Phone: 042-860-1781, E-mail: hcyoona@etri.re.kr

We have developed a strategy of signal generation for immuno- biosensors that transduces the biospecific affinity recognition reaction into electrochemical signal. The cyclic voltammetric method, tracking the precipitation of insoluble product onto the sensing surface and subsequent decrement in the electrode surface area, was chosen for the signal registration. Precipitation of insolubilities was induced by the catalytic reaction of enzymes labeled to the biospecifically-attached antibody molecules onto the sensing surfaces.¹⁾

As a model system for the affinity recognition, we have investigated the functionalization of biotin groups to the sensing monolayer and their biospecific interaction with biological molecules. Anti-biotin monoclonal antibody was used as model affinity recognition targets for biotinyl groups which were functionalized on electrode surfaces.^{2),3)} As the template layer for the functionalization and affinity sensing, dendrimer-activated self-assembled monolayer (SAM) was employed. Mixed-SAM supported layers were also tested and compared with the dendrimer-assisted ones. The advantages of using dendrimer-activated SAM in comparison to the plain thiolate SAM or mixed-SAM for the sensing surface were shown in terms of sensing performances, and the analytical characteristics of the resulting surface were examined. Additionally, the sensing system was applied for the biotin/(strept-)avidin couple, extending the applicability of the developed strategy.

1. Patolsky, F.; Zayats, M.; Katz, E.; Willner, I. *Anal. Chem.* 1999, 71, 3171.
2. Yoon, H.C.; Hong, M.Y.; Kim, H.S. *Langmuir* 2001 17, 1234.
3. Yoon, H.C.; Lee, D.; Kim, H.S. *Anal. Chim. Acta* 2002 456, 209.