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Quantification of Protein-Ligand Interaction Using Supported Lipid Bilayer Assisted Biosensors

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Extended Abstract

Quantification of kinetics of protein interactions has been a fundamental challenge in biophysics and biotechnology [1],[2]. To investigate the binding kinetics on a cell membrane rigorously, active ligands should be prepared in a controlled environment in terms of the number of binding sites and its kind. Conventional binding assays using ligand immobilization techniques with glue-like layers still have problems typically related to ligand denaturalization and non-specific binding. To demonstrate monitoring real-time binding kinetics between proteins and ligands, we introduce a supported lipid bilayer (SLB) to model the binding kinetics. The role of the supported lipid bilayer here is three-fold: accurate control over the binding sites, structural formation of receptors, and reducing non-specific bindings effectively. We adopted a field effective transistor device capable of reliable observation of protein interactions via its modulated current responses. The binding sites and rate constants of the protein-ligand pair interaction are determined by monitoring the real-time reaction kinetics, demonstrating the possible quantification of protein interactions with a detection limit of picomolar concentration and association constant was about $1 \times 10^9\ M^{-1}$ using SLB assisted biosensors.

References

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