Electrochemical DNA hybridization Detection using DNAzyme

Dohyoung Kwon and Juhyoun Kwak
.
Department of Chemistry, Korea Advanced Institute of Science and Technology (KAIST), Daejeon 305-701, Republic of Korea,

Electrochemical techniques have experienced substantial growth as promising tools for detection of biomolecules in molecular diagnosis, environmental monitoring, or food authentication. The detection of DNA hybridization among them is of significantly scientific and technological importance in chip-based characterization of gene expression patterns and detection of pathogens.[1,2] Here in we report the new method using enzymatic cleavage of immobilized DNA. The strategy is based on that DNAzyme (nuclease S1) is able to specifically cleave only single strand DNA (ssDNA), not double strand DNA (dsDNA).[3]

As described in scheme 1, electrocative ferrocene group linked to thiolated ssDNA and synthesized capture was immobilized on gold electrode.[4] Then, target DNA is hybridized and nuclease S1 cleaves nonhybridized DNA probe. The difference of nuclease S1 enzymatic cleavage on single and double strand modified gold electrode was charaterized by Cyclic Voltametry (CV). We charaterized the modified surface by nuclease S1 through the mass change with surface plasmon resonance (SPR) experiments. Our system does not require the posthybridization treatment with either hybridization indicators or other exogenous signaling molecules which most of the electrochemical hybridization detection systems require.

Reference

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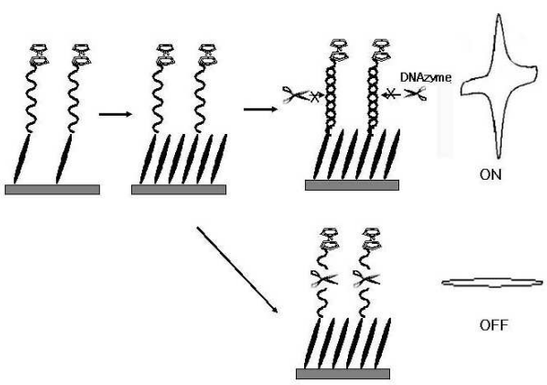

Scheme 1. Schematic illustration of the electrochemical DNA detection using DNAzyme