Development of a Chemiluminometric Immunosensor Array for Genetically Modified Organisms (GMOs)

Hye-Jee Jang, Eui-Hwan Paek, Won-Mok Park, and Se-Hwan Paek

Lab. of Biosensor System Engineering, Korea University

Tel: +82-2-3290-3438, FAX: +82-2-927-2797

Abstract

A wide spread in cultivating GMO may be an alternative solution resolving the difficulty of obtaining food, a critical problem, particularly, in developing countries. However, there are many concerns that the transgenic crops might cause, as long-term effects, adisorder of ecosystem and even diseases to human such as allergies. By these reasons, many countries tend to regulate the upper limit of GMO content (e.g., 3% in Korea) included in manufacturing various food stuffs.[1)]

To facilitate monitoring the targets, we have developed a 2x2 immunosensor array that can accomplish quantitative analyses at the places, where the samples are provided, such as quarantine station, customs house, and warehouse. As specific markers of GMO, neomycin phosphotransferase Ⅱ (NPTⅡ), phosphinothricin acethytransferase (PAT), and 5-enolypyruvylshikimate-3-phosphate synthase (EPSPS) were selected and produced as recombinant proteins from *E. coli*.[2)] Using these markers as immunogens, we have produced monoclonal and polyclonal antibodies (raised from rabbit) to use them as specific binders. The monoclonal antibodies to each analyte were arranged in a 2x2 array and immobilized on the surfaces of a glass slide via streptavidin-biotin linkage.[3)] After reacting them with each analyte, the complexes were monitored by adding specific polyclonal antibodies and further sequentially binding anti-rabbit IgG conjugated with horseradish peroxidase (HRP). After separation of unreacted components, chemiluminescent signals detectable at the maximum wavelength of 425 nm were generated by supplying a HRP substrate solution containing luminol and then measured on different photodiodes organized in the same manner as mentioned.[4)] We constructed a standard graph using samples with known concentrations and used it for determining each dose of unknown specimens prepared by extraction of the markers from GMO.[5)] The results were identified by comparing them with those obtained by using commercial ELISA kits.

References

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