Sensors and Materials, Vol. 26, No. 10 (2014) 737–744
MYU Tokyo

S & M 1037

Signal Enhancement of Indirect-Competitive Metallothionein Immunosensor by Horseradish-Peroxidase-Induced Precipitation of Diaminobenzidine Derivatives

Namsoo Kim*

Research Group of Convergence Technology, Korea Food Research Institute,
Seongnam 463-746, Republic of Korea

(Received February 17, 2014; accepted September 12, 2014)

Key words: signal enhancement, indirect-competitive metallothionein sensor, horseradish peroxidase (HRP)-induced precipitation, diaminobenzidine derivatives

An indirect-competitive quartz crystal microbalance immunosensor is well acknowledged as a tool for biological detection. As a method of improving sensitivity, horseradish-peroxidase-induced precipitation of 3,3'-diaminobenzidine (DAB) derivatives to the sensor surface, which was confirmed by field emission-scanning electron microscopy imaging, was conducted using metallothionein (MT) as a model analyte. The sensor signal was enhanced up to 5.3-fold when the DAB concentration was varied from 0.1 to 2 mM at the secondary antibody concentration of 10 μg/ml. Linearity in response signal was found in the MT range of 0.05–1 ng/ml, with the limit of detection of 50 pg/ml. The present biosensor can serve as a highly sensitive detection tool for biomarkers of physiological importance.

*Corresponding author: e-mail: k9130sen@hanmail.net