

Multi-color Colorimetric Plasmonic assay of salivary alkaline phosphatase based on change in the longitudinal localized surface plasmon resonance of gold nano-bipyramid

Hafez Eslam, Samy M. Shaban, 김동환[†]

성균관대학교

(dhkim1@skku.edu[†])

Developing a sensitive, rapid, and easy method for alkaline phosphatase (ALP) detection in noninvasive saliva fluid is very important issue to meet the basic requirement of the point of care diagnosis specially for dental application. In our developed multi-color sensor, a visual multicolor change was observed based on the change in the longitudinal localized surface plasmon resonance (LSPR), induced as a result of deposition of silver nanoparticles (AgNPs) on the surface of as-prepared gold nano-bipyramid (AuNBPs) based the reduction affinity of the released glucose from the selectively hydrolysis of glucose phosphate by the ALP enzyme. The glucose phosphate does not induce the reduction of AgNO₃ into AgNPs. The change in the LSPR has been used for quantitatively assay of ALP with a detectable multi-color change. The developed sensor showed high sensitivity for ALP assay with linear dynamic range 0.1–20 U/L and low limit of detection (LOD) 0.091 U/L. the sensor showed high applicability and feasibility of the ALP assay in real saliva fluid with high recovery rate of average 98%, showing that the sensor can be used in nominative assay of salivary ALP for dental applications.