Novel immunosensor for glyphosate detection based on DNA-coated gold nanoparticles

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A novel immunosensor based on DNA-coated gold nanoparticles (NP) was developed for the glyphosate detection. The glyphosate antibody was immobilized on a glass substrate based on covalent bonding via silanization. This novel immunosensor can detect the glyphosate, which contained sandwich structures (glyphosate-dsDNA-gold NP) to enable high sensitivity. The results of the antigen-antibody reaction were measured by the fluorescent images based on the comparison with the low concentrations of free antigens at concentrations of 0.01 μg ml^{-1} to 100 μg ml^{-1} for the detection of the immobilized antigen groups. In the quantitative analysis of very low concentration of glyphosate, the immunosensor response also revealed the same detection range of glyphosate using DNA detection. The detection limit was found to be 0.01 μg ml^{-1}, which was lower than an enzyme-linked immunosorbent assay (ELISA) for the detection of pesticide. In addition, when the immunosensor was utilized for the detection of 2,4-dichlorophenoxyacetic acid (2,4-D) and 2,4,5-tichlorophenoxyacetic acid (2,4,5-T) good sensitivities (0.01 μg ml^{-1}) were obtained.