Highly Sensitive Detection of 2,4,6-Trinitrotoluene (TNT) Using Poly(vinylamine-*co*-*N*-vinylformamide)-Based Surface Plasmon Resonance (SPR) Immunosensor

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In this paper, we describe the fabrication of a novel poly-(vinylamine-*co*-*N*-vinylformamide) (poly-(VAm-*co*-NVF))-based surface plasmon resonance (SPR) sensor chip supported by a self-assembled monolayer (SAM) of alkanethiol and its use in the highly sensitive detection of 2,4,6-trinitrotoluene (TNT), which is a typical explosive. 2,4-dinitrophenyl-glycine (DNP-Gly) was immobilized to amino groups on the side chain of poly-vinylamine (poly-VAm) on the sensor surface. The fabricated surface showed a high response for flow of anti-TNT antibodies. However, it was found that the response included the nonspecific adsorption of anti-TNT antibodies, because unreacted amino groups of the poly-VAm were positively charged and it caused nonspecific adsorption due to electrostatic interaction. Then, the number of amino groups was reduced by making low-hydrolyzed poly-*N*-vinylformamide(poly-NVF), i.e., poly(VAm-*co*-NVF) –poly-NVF is a precursor of poly-VAm, and nonspecific adsorption was controlled. The limit of detection (LOD) of TNT was 28 ppt using the sensor chip fabricated with 23% hydrolyzed poly-(VAm-*co*-NVF) by inhibition assay.

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