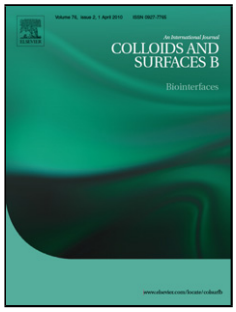

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Antibody tagged gold nanoparticles as scattering probes for the pico molar detection of the proteins in blood serum using nanoparticle tracking analyzer

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Abstract

We report a rapid one-step immunoassay to detect protein using antibody conjugated gold nanoparticles (AbGNPs) where the targeted protein concentration was determined by analyzing the gold nanoparticle aggregation caused by antibody–antigen interactions using Nanoparticles tracking analysis (NTA) technique. The sandwich structure constituting the binding of the targeted human IgG to the gold nanoparticle conjugates with goat anti human monoclonal IgG (AbGNPs) was confirmed by transmission electron microscopy. The binding of human IgG (antigen, mentioned hence forth as AT) induce AbGNPs to form dimers or trimers through a typical antibody-antigen- antibody sandwich structure that can be analyzed for the sensitive determination on the basis of change in hydrodynamic diameter of AbGNPs. By this method the minimum detectable concentration of AT is found to be below 2 pg/ml. We expect that a significant change in the hydrodynamic diameter of AbGNP could form the basis for the rapid one-step immunoassay development.

Keywords: Antibody tagged GNPs, antigen detection, NTA, pico molar detection

Introduction

Sensitive and selective detection of clinical elements is extremely important for the early stage diagnosis of disease conditions. In the early stage the clinical elements like proteins, regarded as biomarkers are present in very low concentrations which could be used as biomarkers. [1]. A biomarker is a ‘‘molecule with biologically important intra- or intercellular function, an expression or activity of which either causes or is scientifically