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

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8
9 **Abstract**

10 We report a rapid one-step immunoassay to detect protein using antibody conjugated
11 gold nanoparticles (AbGNPs) where the targeted protein concentration was determined by
12 analyzing the gold nanoparticle aggregation caused by antibody–antigen interactions using
13 Nanoparticles tracking analysis (NTA) technique. The sandwich structure constituting the
14 binding of the targeted human IgG to the gold nanoparticle conjugates with goat anti human
15 monoclonal IgG (AbGNPs) was confirmed by transmission electron microscopy. The
16 binding of human IgG (antigen, mentioned hence forth as AT) induce AbGNPs to form
17 dimers or trimers through a typical antibody-antigen- antibody sandwich structure that can be
18 analyzed for the sensitive determination on the basis of change in hydrodynamic diameter of
19 AbGNPs. By this method the minimum detectable concentration of AT is found to be below
20 2 pg/ml. We expect that a significant change in the hydrodynamic diameter of AbGNP could
21 form the basis for the rapid one-step immunoassay development.

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

23 **Introduction**

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

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