



Biomolecule and Biotarget Detection Using Metal Nanoparticle Probes and Dynamic Light Scattering

Background

There is a need to detect various biomolecules and biotargets for a variety of purposes, often in dilute concentrations and mixed with other materials. For example, cancer is a complex disease that involves a gradual change of numerous molecular and cellular processes, and generally is accompanied by one or more biomolecular (e.g. protein) markers. Comprehensive identification of factors at the molecular and cellular level that can contribute to the development and progression of cancer remains a challenge.

UCF researchers recently developed a highly sensitive one-step homogeneous immunoassay technology. This assay is based on the use of gold nanoparticle probes combined with dynamic light scattering (DLS) technique, named nanoDLSAY. The principle of this assay involves two gold nanoparticle probes, Nanoprobe 1 and Nanoprobe 2, which are labeled with a pair of monoclonal antibodies, protein, DNA, or synthetic receptor that can specifically bind to an antigen or specific target. To conduct the assay, these two nanoprobe are mixed in a sample solution that contains the biotarget. The antigen-antibody binding in the case of the use of antibodies produces a nanoparticle aggregation. The degree of nanoparticle aggregation, as measured by dynamic light scattering, can be correlated to antigen concentration.

Invention

The invention is a highly sensitive, fast and convenient one-step homogeneous immunoassay for monitoring and detecting biotargets including, for example, cancer biomarkers.

Application

This one-step immunoassay can be used to determine the amount of biotarget leading to medical diagnosis or further tests to base a diagnosis.

Advantages

- This is an extremely easy-to-conduct one-step and washing-free immunoassay.
- The assay requires a small amount of sample, approximately 0.1-5 ul of human serum or other sample type.
- Due to the homogenous nature of the assay, this assay provides excellent reproducibility and reliability compared to heterogeneous immunoassays.
- nanoDLSAY uses inexpensive, user friendly and commercial available equipment for reading the assay results.

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Selected References

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