

Gold nanoparticle assembly and disassembly in colorimetric immunoassay to detect 17β -estradiol and determine gynecological disorder

Abstract

17β -Estradiol (17β -E₂) is the reproductive hormone playing a major role in female reproductive system and acts as an important component of metabolic processes. Quantifying 17β -E₂ level helps to identify the reproductive endocrine related problems. Herein, a salt-induced (from 60 mM) gold nanoparticle (GNP) based immunoassay was introduced to quantify 17β -E₂. Polyclonal antibody (50 nM) was immobilized on the surface of GNP and the color with GNPs was changed (blue to red shift) upon adding the target in the presence of high monovalent salt (NaCl) concentration. The sensitivity was at 10 pM with the point of GNPs assembly to disassembly. Negative control experiments did not show any color changes with GNPs indicate the specific detection of 17β -E₂. In addition, selective detection was proved in the presence of other organic-, inorganic-, biological-molecules and the serum. This simple bare eye detection is quantifying the level of 17β -E₂ and diagnosing the reproductive endocrine related disorders.

Keywords

17β -Estradiol; Colorimetric assay; Gold nanoparticle; Reproductive endocrinology