For highly sensitive detection

Gold Nanoplates

■ Features

1) An aqueous dispersion of disk shaped Gold Nanoparticles.
2) Exhibits a vivid blue color due to absorption caused by localized surface plasmon resonance.
3) By applying Gold Nanoplates to diagnostic agents, it is expected to enable highly sensitive detection and reduce the cost of antibodies.

■ Characteristics of Gold Nanoplates

Shape

Gold Nanoplates are disk shaped triangle nano particle

Maximum length

Thickness
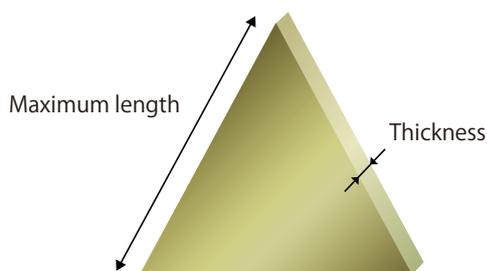
Electron microscope image
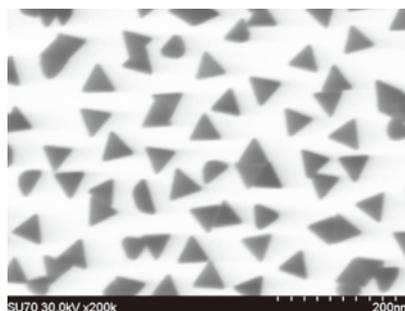
Absorption characteristics

Gold Nanoplates have a sharp optical absorption waveform and exhibits a vivid blue color.
The maximum absorption wavelength of Gold Nanoplates are determined by the particle size and aspect ratio (maximum length/thickness).

Absorption spectrum
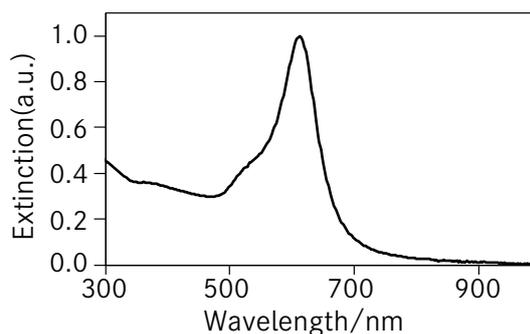
	Gold Nanoplates
Name	Au-WPPLC1-C
Dispersion medium	Water
Dispersion materials	Trisodium citrate, etc.
Gold content	0.04～0.06 mg/g
Absorption properties (The maximum absorption wavelength)	615 ± 15nm
Particle size (Maximum length)	Approximately 50 nm
pH[*1]	4～7

※1 pH: HORIBA, Ltd. Twin pH meter
※2 Electron microscope image: Hitachi, Ltd. Scanning Electron Microscope SU 70
※3 Spectral characteristics : Diluted with water to an arbitrary concentration and measured. (Shimadzu Corpration UV Visible Spectrophotometer MPC3100UV)

Note: The above values are for reference only and are not standard values.

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■ Example of the specimen detection

1, Immunochromatography method

By combining Gold Nanoplates with antibodies, The complex can be used as a coloring agent in immunochromatographic tests. The detection line shows a clear color tone of the dispersion liquid. Also, the same sensitivity can be obtained with a smaller amount of antibody compared to spherical gold nanoparticles.

Schematic diagram of immunochromatography test

Gold Nanoplate
Antibody
Antigen

Antibody binding to Gold Nanoplates
Development
Gold Nanoplate integration (line appearance)

The immunochromatographic test strip
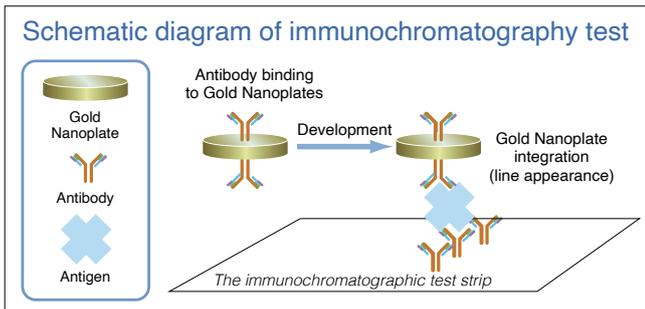
Human chorionic gonadotropin (hCG) detection result (Visual judgement)

Metal nanoparticles	Antibody addition amount [μg/mL(Abs. 1.0)]	Amount of hCG [mlU]			
		100	10	1	Blank
① Gold Nanoplates (Au-WPPLC1-C)	1.25	++	++	+	—
②Spherical gold nanoparticles (Commercial product)	2.50	++	++	+	—

Judgement results : ++...Strong positive + ...Positive —... Negative

hCG detection result (immunochromatographic test strips after test)

Amount of hCG	100 mIU		10 mIU		1 mIU		Blank	
	①	②	①	②	①	②	①	②
Detection results								
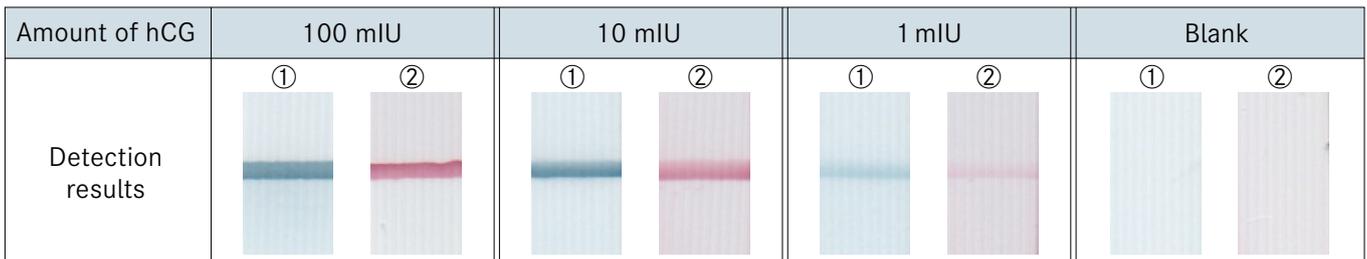
2, Agglutination method

The antigen can be detected by observing the change in absorption characteristics of nanoplate-antibody complex, because of the complex interact with the antigen. Gold nanoplates show a more conspicuous change than spherical gold nanoparticles.

Nanoplate-antibody complex

Antigen (hCG)

Antigen-antibody reaction

Agglutination and Precipitation
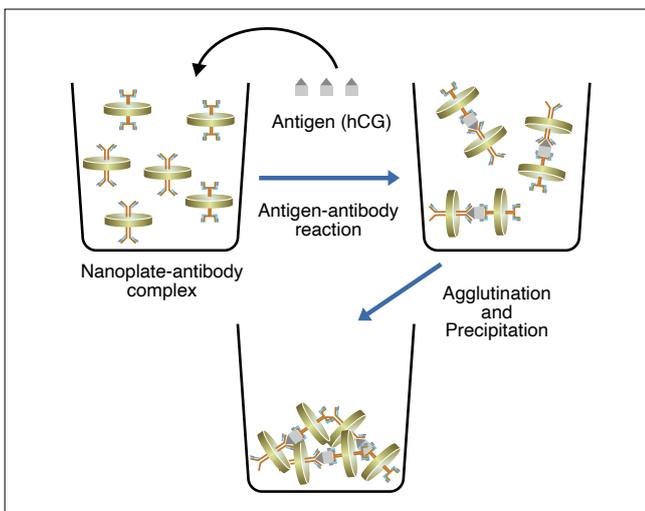
Schematic diagram of the agglutination method

The nanoplate-antibody complex agglutinate around the antigen and precipitates.

Gold Nanoplates

hCG final concentration: 10mlU /60 μL dispersion

After hCG addition
5 min. later
10 min. later
20 min. later
30 min. later
60 min. later

Spherical gold nanoparticle

hCG final concentration:10mlU /60 μL dispersion
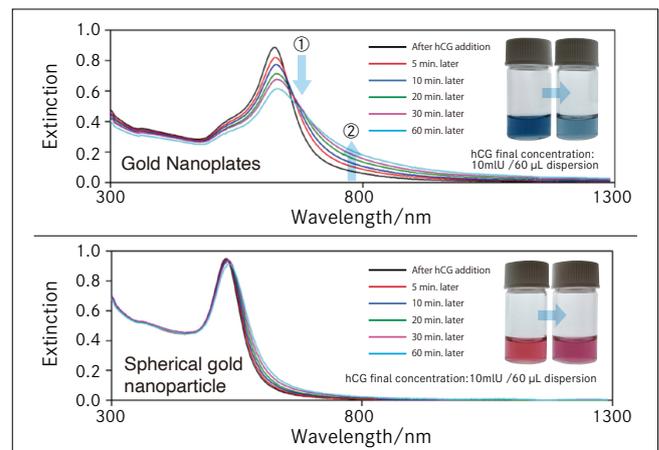
Changes in spectral characteristics over time after addition of hCG Inset: color change)

When the nanoplate-antibody complex agglutinate and precipitate due to the antigen antibody reaction, two changes occur.
①Decreased extinction of maximum absorption wavelength.
②Increased extinction in the long wavelength range.