

i-colloid™ 40 nm Gold-Platinum (Black)

Passive Conjugation, Lateral Flow Performance like 40 nm Gold (Red)

i-colloid gold-platinum alloy nanoparticles

i-colloid 40 nm gold-platinum nanoparticles (AuPt) are produced by a pulsed-laser ablation process using a gold-platinum alloy target (see Technical Note T11). AuPt exhibits a black optical signature easily distinguishable from the brilliant red of i-colloid 40 nm gold nanoparticles (Au) due to the shifted surface plasmon resonance. Colloidal AuPt is stable without surfactants or capping agents, and antibodies can be efficiently conjugated to the surface by passive adsorption.



Similar passive conjugation conditions for Au and AuPt

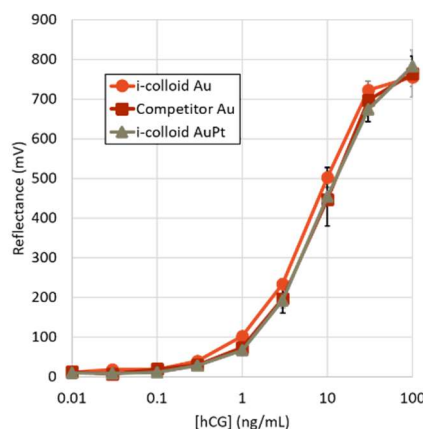
Optimal conjugation conditions for passive adsorption of an anti-hCG (human chorionic gonadotropin) antibody onto Au and AuPt were compared over a combination of pH ranges (5.7 - 9.8) and antibody concentration ranges (0 - 12 µg/mL) in a 96-well plate. After a one hour conjugation reaction, conjugate resistance to salt-induced aggregation was assayed by adding 10 wt% NaCl to each well.

		pH of buffered i-colloid™ nanoparticles											
		5.7	6.2	6.5	7.0	7.4	7.8	8.2	8.7	9.0	9.2	9.4	9.8
[anti-hCG] (µg/mL)	0	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
	2	Red	Red	Red	Red	Red	Red	Red	Red	Black	Red	Red	Red
	4	Red	Red	Red	Green	Green	Green	Green	Green	Green	Red	Red	Red
	6	Red	Red	Red	Green	Green	Green	Green	Green	Green	Red	Red	Red
	8	Red	Red	Yellow	Green	Green	Green	Green	Green	Green	Red	Red	Red
	10	Red	Red	Black	Green	Green	Green	Green	Green	Green	Red	Red	Red
	12	Red	Red	Yellow	Green	Green	Green	Green	Green	Green	Red	Red	Red

The degree of aggregation in each well was determined from absorbance readings using A_{700}/A_{400} ratio for AuPt and A_{650}/A_{530} ratio for Au. A color-coded comparison table is shown, where red (high aggregation), yellow (partial aggregation), and green (no aggregation) indicate the same conjugation results for both AuPt and Au, while black indicates different results. AuPt and Au produced the same results in 86% (72 out of 84) of the tested conditions, indicating that the same passive conjugation processes and parameters can be applied to AuPt and Au.

Similar lateral flow performance of AuPt and Au

The performance of AuPt, Au, and a competitor's 40 nm gold was compared in a half-strip lateral flow immunoassay. Antibodies specific to hCG antigen (test line) and anti-hCG antibody (control line) were striped on a nitrocellulose membrane which was then laminated onto a backing card along with an absorbent pad and cut into strips. Anti-hCG antibodies were passively conjugated to each particle type, and conjugates were incubated with different concentrations of hCG antigen and allowed to flow up a strip for 15 minutes. The dose-response curves of the average replicate (n=3) signal at each hCG antigen concentration were consistent between AuPt and Au, and both were similar to the chemically-synthesized Au.



i-colloid Au strips
(Red lines)



AuPt strips
(Black lines)