

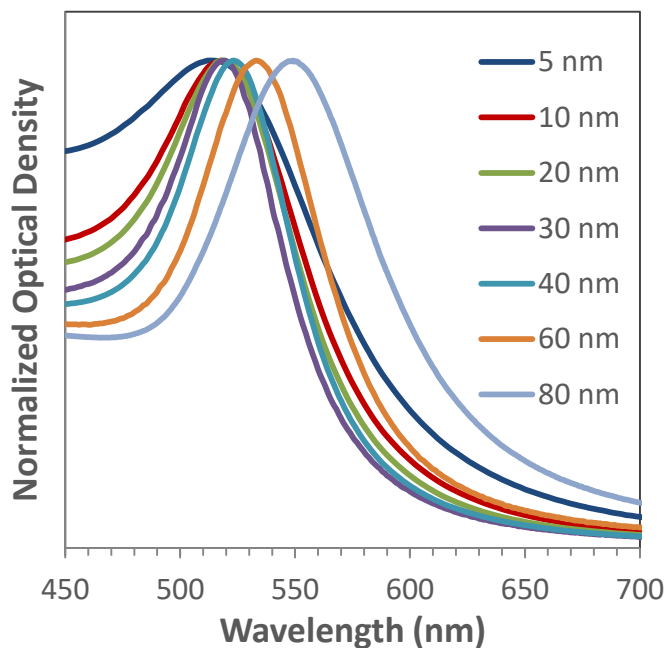


Gold NanoSpheres

Sample Tech Spec Sheets

Citrate and PEG Coatings

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Overview of Citrate-Coated Gold NanoSphere Specifications

	5 nm Gold NanoSpheres	10 nm Gold NanoSpheres	20 nm Gold NanoSpheres	30 nm Gold NanoSpheres	40 nm Gold NanoSpheres	60 nm Gold NanoSpheres	80 nm Gold NanoSpheres
Diameter	4 – 6 nm	9 – 13 nm	20 ± 1.5 nm	30 ± 1.5 nm	40 ± 1.5 nm	60 ± 1.5 nm	80 ± 1.5 nm
Diameter Deviation	< 1.5 nm	< 1.5 nm	< 2.5 nm	< 3.0 nm	< 4.0 nm	< 4.8 nm	< 6.4 nm
Coefficient of Variation [Deviation ÷ Mean × 100]	< 30%	< 15%	< 12%	< 10%	< 10%	< 8%	< 8%
SPR peak	510 – 518 nm	514 – 520 nm	518.0 ± 2.0 nm	519.0 ± 2.0 nm	523.5 ± 1.0 nm	533.5 ± 2.0 nm	549.0 ± 4.0 nm
Particle concentration (per mL) for OD = 1	0.3 – 1.1 × 10 ¹⁴	2.5 – 8.6 × 10 ¹²	5.0 – 8.6 × 10 ¹¹	1.3 – 2.0 × 10 ¹¹	5.2 – 7.2 × 10 ¹⁰	1.5 – 2.0 × 10 ¹⁰	6.3 – 7.9 × 10 ⁹
Mass concentration (Au) (mg/ mL) for OD = 1	0.065 – 0.072	0.057 – 0.063	0.050 – 0.056	0.042 – 0.047	0.037 – 0.042	0.036 – 0.041	0.034 – 0.039
Particle Molar Concentration for OD = 1	0.5 – 1.9 × 10 ⁻⁷	0.4 – 1.4 × 10 ⁻⁸	0.8 – 1.5 × 10 ⁻⁹	2.2 – 3.3 × 10 ⁻¹⁰	8 – 12 × 10 ⁻¹¹	2.5 – 3.4 × 10 ⁻¹¹	1.0 – 1.3 × 10 ⁻¹¹
Zeta potential	-50 ± 20 mV						
pH	7.0 – 8.5						
Product Number	51525	50462	23988	98917	48251	97721	90396

Citrate= Trisodium citrate

SPR = Surface Plasmon Resonance

DIUF = Deionized and ultrafiltrated water (18.1 MΩ-cm)

OD = Optical Density (using a 1 cm path length cuvette)

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Gold NanoSpheres

Overview of PEG-Coated Gold NanoSphere Specifications

	5 nm Gold NanoSpheres	10 nm Gold NanoSpheres	20 nm Gold NanoSpheres	30 nm Gold NanoSpheres	40 nm Gold NanoSpheres	60 nm Gold NanoSpheres	80 nm Gold NanoSpheres
Diameter	4 – 6 nm	9 – 13 nm	20 ± 1.5 nm	20 ± 1.5 nm	40 ± 1.5 nm	60 ± 1.5 nm	80 ± 1.5 nm
Diameter Deviation	< 1.5 nm	< 1.5 nm	< 2.5 nm	< 3.0 nm	< 4.0 nm	< 4.8 nm	< 6.4 nm
Coefficient of Variation [Deviation ÷ Mean × 100]	< 30%	< 15%	< 12%	< 10%	< 10%	< 8%	< 8%
SPR peak	512 – 522 nm	514 – 524 nm	521.5 ± 2.0 nm	521.5 ± 2.0 nm	525.5 ± 2.0 nm	535.5 ± 2.0 nm	552.0 ± 4.0 nm
Particle concentration (per mL) for OD = 1	0.3 – 1.1 × 10 ¹⁴	2.5 – 8.6 × 10 ¹²	5.0 – 8.6 × 10 ¹¹	1.3 – 2.0 × 10 ¹¹	5.2 – 7.2 × 10 ¹⁰	1.5 – 2.0 × 10 ¹⁰	6.3 – 7.9 × 10 ⁹
Mass concentration (Au) (mg/ mL) for OD = 1	0.065 – 0.072	0.057 – 0.063	0.050 – 0.056	0.042 – 0.047	0.037 – 0.042	0.036 – 0.041	0.034 – 0.039
Particle Molar Concentration for OD = 1	0.5 – 1.9 × 10 ⁻⁷	0.4 – 1.4 × 10 ⁻⁸	0.8 – 1.5 × 10 ⁻⁹	2.2 – 3.3 × 10 ⁻¹⁰	8 – 12 × 10 ⁻¹¹	2.5 – 3.4 × 10 ⁻¹¹	1.0 – 1.3 × 10 ⁻¹¹
Zeta potential	-4 ± 5 mV						
pH	6 – 8						
Product Number	45979	22133	10568	96269	56900	71029	38347

PEG = Poly (ethylene glycol)

SPR = Surface Plasmon Resonance

DIUF = Deionized and ultrafiltrated water (18.1 MΩ-cm)

OD = Optical Density (using a 1 cm path length cuvette)

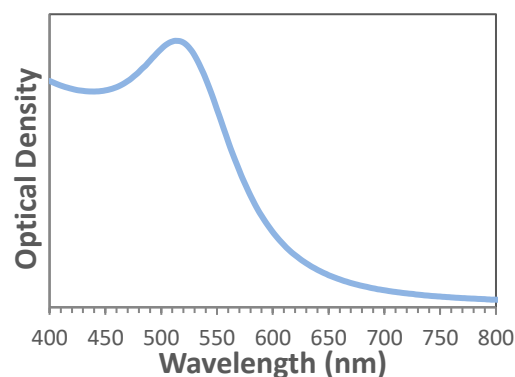
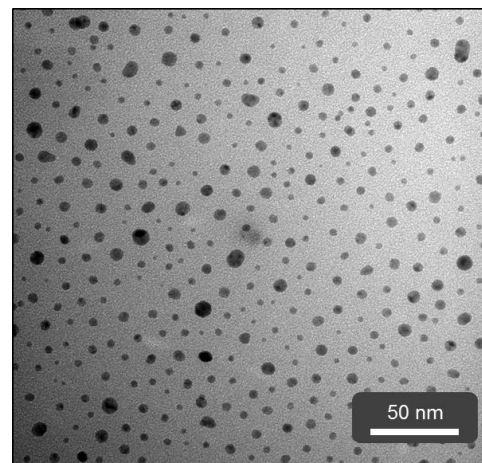
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Gold NanoSpheres

5 nm Gold NanoSpheres, Citrate Coating

	Product Specs	Lot-specific
Diameter	4-6 nm	5.8 nm
Diameter Deviation	< 1.5 nm	1.2 nm
SPR peak	510 – 518 nm	514 nm
Particle concentration (per mL) for OD = 1	$0.3 - 1.1 \times 10^{14}$	0.33×10^{14}
Mass concentration (Au) (mg/ mL) for OD = 1	0.065 – 0.072	0.066
Particle Molar Concentration for OD = 1	$0.5 - 1.9 \times 10^{-7}$	0.55×10^{-7}
Zeta potential	-50 ± 20 mV	-35.4 mV
pH	7.0 – 8.5	7.8
Particle surface	Citrate	
Solvent	DIUF Water	



Citrate= Trisodium citrate

SPR = Surface Plasmon Resonance

DIUF = Deionized and ultrafiltrated water (18.1 MΩ-cm)

OD = Optical Density (using a 1 cm path length cuvette)

Product Numbers

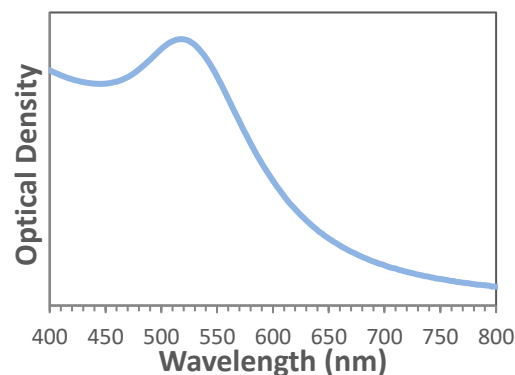
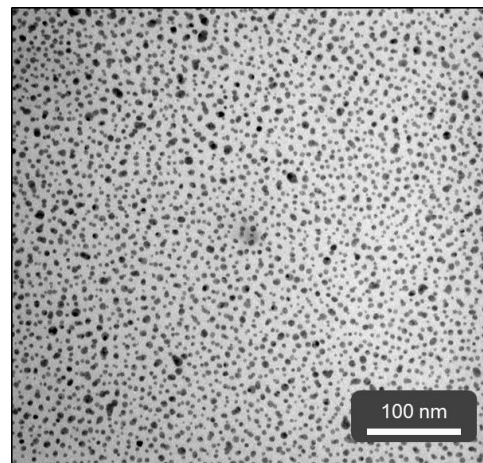
	Standard OD	Standard Volumes	Product #
Citrate	OD = 1, 25	1 – 500 mL	51525

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Gold NanoSpheres

5 nm Gold NanoSpheres, PEG Coating

	Product Specs	Lot-specific
Diameter	4-6 nm	4.7 nm
Diameter Deviation	< 1.5 nm	1.3 nm
SPR peak	512 – 522 nm	518 nm
Particle concentration (per mL) for OD = 1	$0.3 - 1.1 \times 10^{14}$	0.62×10^{14}
Mass concentration (Au) (mg/ mL) for OD = 1	0.065 – 0.072	0.068
Particle Molar Concentration for OD = 1 (M)	$0.5 - 1.9 \times 10^{-7}$	1.04×10^{-7}
Zeta potential	-4 ± 5 mV	-5.6 mV
pH	6 – 8	6.8
Particle surface	PEG	
Solvent	DIUF Water	



PEG = Poly (ethylene glycol), 5kDa

SPR = Surface Plasmon Resonance

DIUF = Deionized and ultrafiltrated water (18.1 MΩ-cm)

OD = Optical Density (using a 1 cm pathlength cuvette)

Product Numbers

	Standard OD	Standard Volumes	Product #
PEG	OD = 1, 100	1 – 500 mL	45979

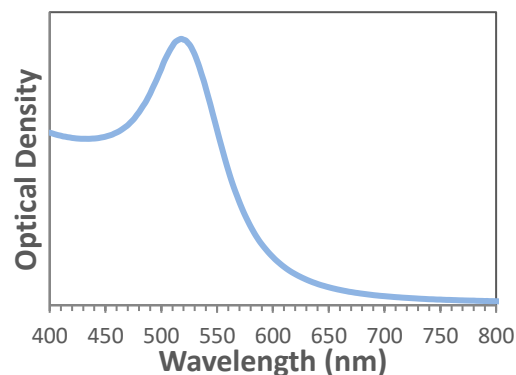
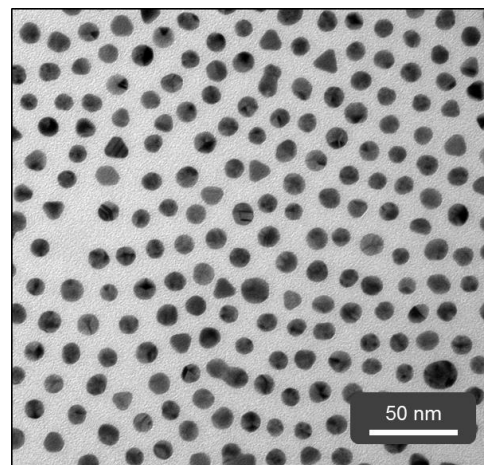
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Gold NanoSpheres

10 nm Gold NanoSpheres, Citrate Coating

	Product Specs	Lot-specific
Diameter	9-13 nm	10.7 nm
Diameter Deviation	< 1.5 nm	1.4 nm
SPR peak	514 – 520 nm	519 nm
Particle concentration (per mL) for OD = 1	$2.5 - 8.6 \times 10^{12}$	4.6×10^{12}
Mass concentration (Au) (mg/ mL) for OD = 1	0.057 – 0.063	0.057
Particle Molar Concentration for OD = 1 (M)	$0.4 - 1.4 \times 10^{-8}$	0.77×10^{-8}
Zeta potential	-50 ± 20 mV	-37.9 mV
pH	7.0 – 8.5	8.3
Particle surface	Citrate	
Solvent	DIUF Water	



Citrate= Trisodium citrate

SPR = Surface Plasmon Resonance

DIUF = Deionized and ultrafiltrated water (18.1 MΩ-cm)

OD = Optical Density (using a 1 cm path length cuvette)

Product Numbers

	Standard OD	Standard Volumes	Product #
Citrate	OD = 1, 25	1 – 2000 mL	50462

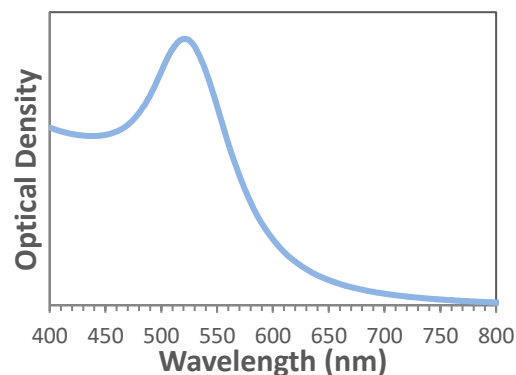
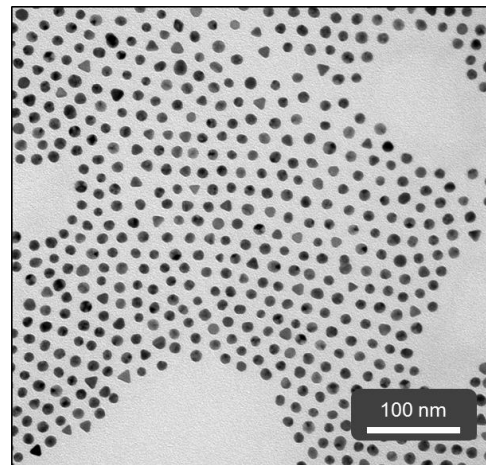
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Gold NanoSpheres

10 nm Gold NanoSpheres, PEG Coating

	Product Specs	Lot-specific
Diameter	9-13 nm	11.5 nm
Diameter Deviation	< 1.5 nm	0.9 nm
SPR peak	514 – 524 nm	518 nm
Particle concentration (per mL) for OD = 1	$2.5 - 8.6 \times 10^{12}$	3.7×10^{12}
Mass concentration (Au) (mg/ mL) for OD = 1	0.057 – 0.063	0.059
Particle Molar Concentration for OD = 1	$0.4 - 1.4 \times 10^{-8}$	0.62×10^{-8}
Zeta potential	-4 ± 5 mV	- 6.1 mV
pH	6 – 8	7.1
Particle surface	PEG	
Solvent	DIUF Water	



PEG = Poly (ethylene glycol), 5kDa

SPR = Surface Plasmon Resonance

DIUF = Deionized and ultrafiltrated water (18.1 MΩ-cm)

OD = Optical Density (using a 1 cm path length cuvette)

Product Numbers

	Standard OD	Standard Volumes	Product #
PEG	OD = 1, 100	1 – 2000 mL	22133

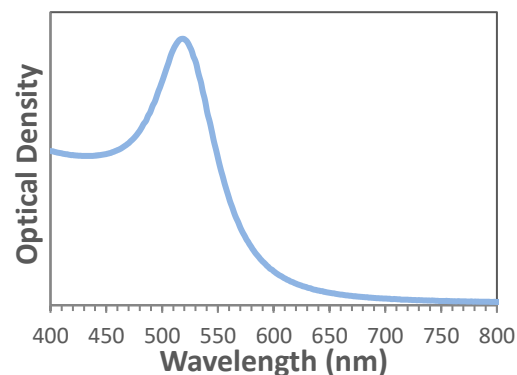
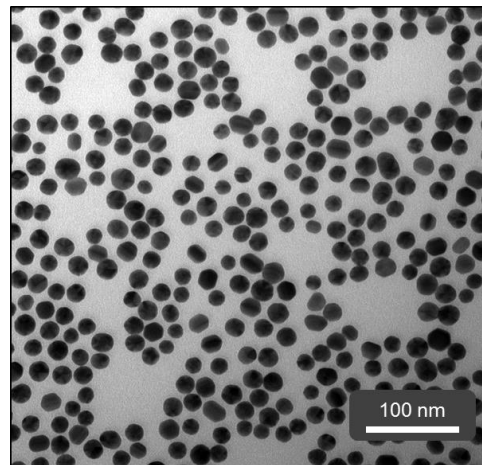
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Gold NanoSpheres

20 nm Gold NanoSpheres, Citrate Coating

	Product Specs	Lot-specific
Diameter	20 ± 1.5 nm	20.0 nm
Diameter Deviation	< 2.4 nm	2.1 nm
SPR peak	518.0 ± 2 nm	518.5 nm
Particle concentration (per mL) for OD = 1	5.0 – 8.6 × 10 ¹¹	6.2 × 10 ¹¹
Mass concentration (Au) (mg/ mL) for OD = 1	0.050 – 0.056	0.050
Particle Molar Concentration for OD = 1	0.8 – 1.5 × 10 ⁻⁹	1.02 × 10 ⁻⁹
Zeta potential	-50 ± 20 mV	-38.2 mV
pH	7.0 – 8.5	7.8
Particle surface	Citrate	
Solvent	DIUF Water	



Citrate= Trisodium citrate

SPR = Surface Plasmon Resonance

DIUF = Deionized and ultrafiltrated water (18.1 MΩ-cm)

OD = Optical Density (using a 1 cm path length cuvette)

Product Numbers

	Standard OD	Standard Volumes	Product #
Citrate	OD = 1, 25	1 – 2000 mL	23988

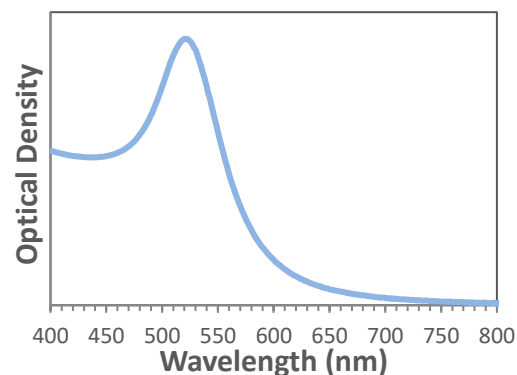
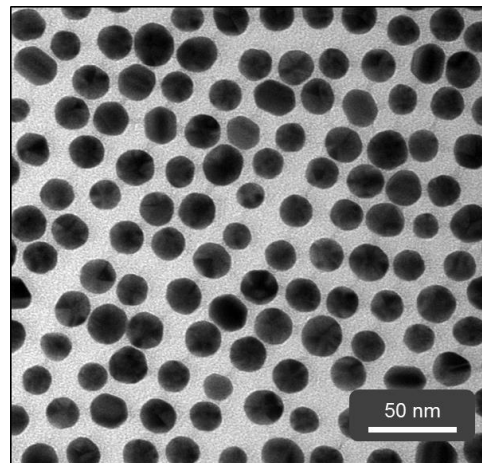
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Gold NanoSpheres

20 nm Gold NanoSpheres, PEG Coating

	Product Specs	Lot-specific
Diameter	20 ± 1.5 nm	19.9 nm
Diameter Deviation	< 2.4 nm	1.9 nm
SPR peak	521.5 ± 2.0 nm	521.0 nm
Particle concentration (per mL) for OD = 1	5.0 – 8.6 × 10 ¹¹	6.2 × 10 ¹¹
Mass concentration (Au) (mg/ mL) for OD = 1	0.050 – 0.056	0.050
Particle Molar Concentration for OD = 1	0.8 – 1.5 × 10 ⁻⁹	1.03 × 10 ⁻⁹
Zeta potential	-4 ± 5 mV	-3.9 mV
pH	6 – 8	7.1
Particle surface	PEG	
Solvent	DIUF Water	



PEG = Poly (ethylene glycol), 5kDa

SPR = Surface Plasmon Resonance

DIUF = Deionized and ultrafiltrated water (18.1 MΩ-cm)

OD = Optical Density (using a 1 cm path length cuvette)

Product Numbers

	Standard OD	Standard Volumes	Product #
PEG	OD = 1, 100	1 – 2000 mL	10568

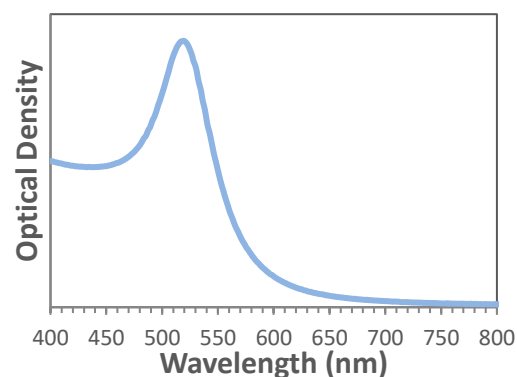
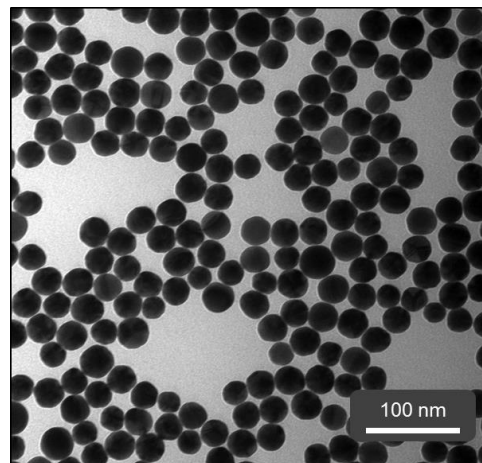
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Gold NanoSpheres

30 nm Gold NanoSpheres, Citrate Coating

	Product Specs	Lot-specific
Diameter	30 ± 1.5 nm	30.6 nm
Diameter Deviation	< 3.0 nm	2.5 nm
SPR peak	519.0 ± 2.0 nm	519.0 nm
Particle concentration (per mL) for OD = 1	1.3 – 2.0 × 10 ¹¹	1.5 × 10 ¹¹
Mass concentration (Au) (mg/ mL) for OD = 1	0.042 – 0.047	0.043
Particle Molar Concentration for OD = 1	2.2 – 3.3 × 10 ⁻¹⁰	2.4 × 10 ⁻¹⁰
Zeta potential	-50 ± 20 mV	-42.4 mV
pH	7.0 – 8.5	7.3
Particle surface	Citrate	
Solvent	DIUF Water	



Citrate= Trisodium citrate

SPR = Surface Plasmon Resonance

DIUF = Deionized and ultrafiltrated water (18.1 MΩ-cm)

OD = Optical Density (using a 1 cm path length cuvette)

Product Numbers

	Standard OD	Standard Volumes	Product #
Citrate	OD = 1, 25	1 – 2000 mL	98917

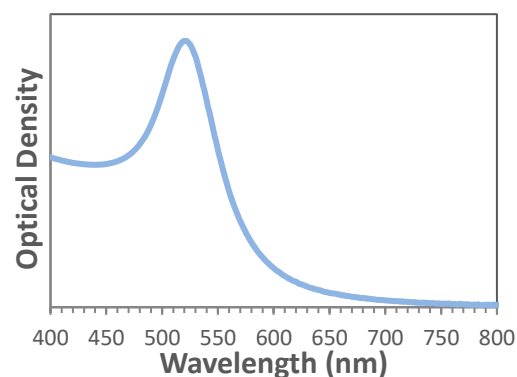
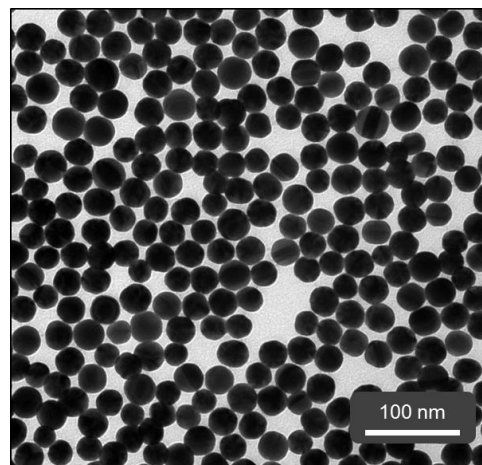
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Gold NanoSpheres

30 nm Gold NanoSpheres, PEG Coating

	Product Specs	Lot-specific
Diameter	30 ± 1.5 nm	30.1 nm
Diameter Deviation	< 3.0 nm	2.3 nm
SPR peak	521.5 ± 2.0 nm	521.0 nm
Particle concentration (per mL) for OD = 1	1.3 – 2.0 × 10 ¹¹	1.6 × 10 ¹¹
Mass concentration (Au) (mg/ mL) for OD = 1	0.042 – 0.047	0.044
Particle Molar Concentration for OD = 1	2.2 – 3.3 × 10 ⁻¹⁰	2.6 × 10 ⁻¹⁰
Zeta potential	-4 ± 5 mV	-3.4 mV
pH	6 – 8	6.9
Particle surface	PEG	
Solvent	DIUF Water	



PEG = Poly (ethylene glycol), 10kDa

SPR = Surface Plasmon Resonance

DIUF = Deionized and ultrafiltrated water (18.1 MΩ-cm)

OD = Optical Density (using a 1 cm path length cuvette)

Product Numbers

	Standard OD	Standard Volumes	Product #
PEG	OD = 1, 100	1 – 2000 mL	96269

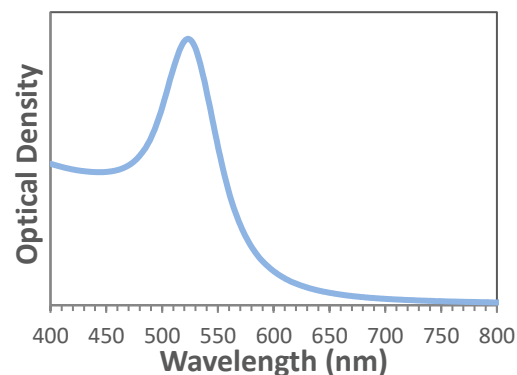
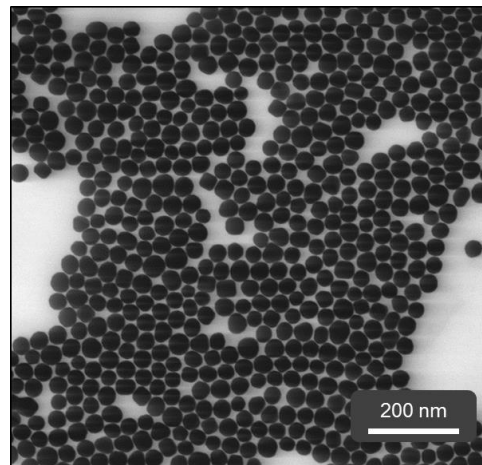
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Gold NanoSpheres

40 nm Gold NanoSpheres, Citrate Coating

	Product Specs	Lot-specific
Diameter	40 ± 1.5 nm	40.0 nm
Diameter Deviation	< 4.0 nm	2.6 nm
SPR peak	523.5 ± 1.0 nm	523.0 nm
Particle concentration (per mL) for OD = 1	5.2 – 7.2 × 10 ¹⁰	5.9 × 10 ¹⁰
Mass concentration (Au) (mg/ mL) for OD = 1	0.037 – 0.042	0.038
Particle Molar Concentration for OD = 1	8 – 12 × 10 ⁻¹¹	9.7 × 10 ⁻¹¹
Zeta potential	-50 ± 20 mV	-38.8 mV
pH	7.0 – 8.5	7.9
Particle surface	Citrate	
Solvent	DIUF Water	



Citrate= Trisodium citrate

SPR = Surface Plasmon Resonance

DIUF = Deionized and ultrafiltrated water (18.1 MΩ-cm)

OD = Optical Density (using a 1 cm path length cuvette)

Product Numbers

	Standard OD	Standard Volumes	Product #
Citrate	OD = 1, 25	1 – 2000 mL	48251

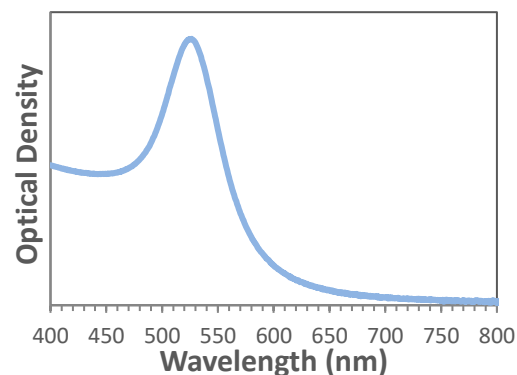
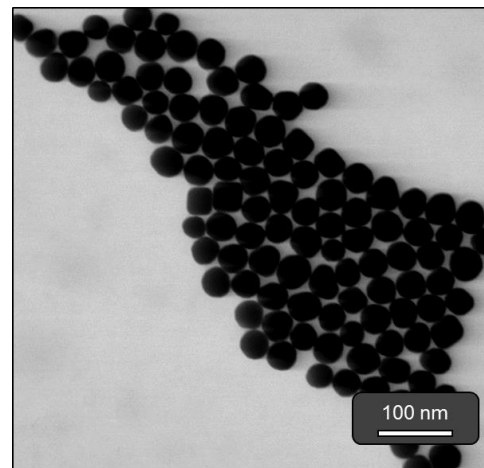
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Gold NanoSpheres

40 nm Gold NanoSpheres, PEG Coating

	Product Specs	Lot-specific
Diameter	40 ± 1.5 nm	40.6 nm
Diameter Deviation	< 4.0 nm	2.9 nm
SPR peak	525.5 ± 2.0 nm	525.0 nm
Particle concentration (per mL) for OD = 1	5.2 – 7.2 × 10 ¹⁰	5.9 × 10 ¹⁰
Mass concentration (Au) (mg/ mL) for OD = 1	0.037 – 0.042	0.038
Particle Molar Concentration for OD = 1	8 – 12 × 10 ⁻¹¹	9.7 × 10 ⁻¹¹
Zeta potential	-4 ± 5 mV	-2.3 mV
pH	6 – 8	7.1
Particle surface	PEG	
Solvent	DIUF Water	



PEG = Poly (ethylene glycol), 10kDa

SPR = Surface Plasmon Resonance

DIUF = Deionized and ultrafiltrated water (18.1 MΩ-cm)

OD = Optical Density (using a 1 cm path length cuvette)

Product Numbers

	Standard OD	Standard Volumes	Product #
PEG	OD = 1, 100	1 – 2000 mL	56900

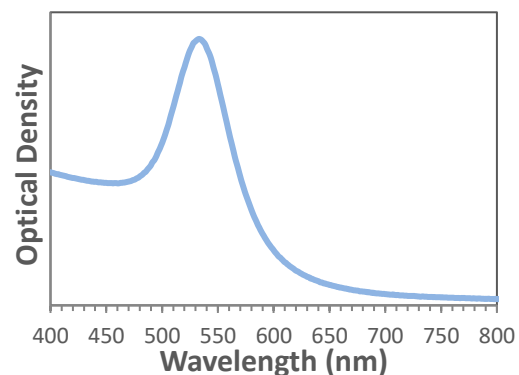
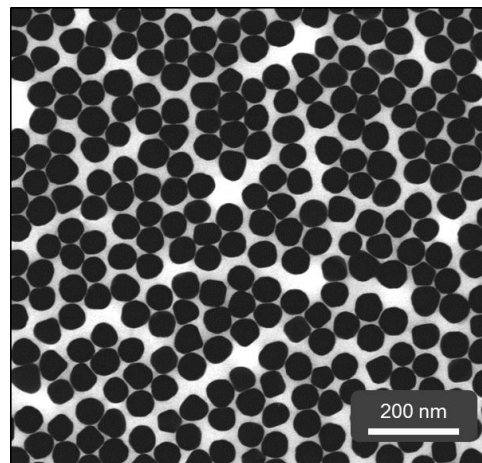
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Gold NanoSpheres

60 nm Gold NanoSpheres, Citrate Coating

	Product Specs	Lot-specific
Diameter	60 ± 1.5 nm	60.0 nm
Diameter Deviation	< 4.8 nm	2.8 nm
SPR peak	533.5 ± 2.0 nm	533.5 nm
Particle concentration (per mL) for OD = 1	1.5 – 2.0 × 10 ¹⁰	1.8 × 10 ¹⁰
Mass concentration (Au) (mg/ mL) for OD = 1	0.036 – 0.041	0.037
Particle Molar Concentration for OD = 1	2.5 – 3.4 × 10 ⁻¹¹	2.9 × 10 ⁻¹¹
Zeta potential	-50 ± 20 mV	-52.0 mV
pH	7.0 – 8.5	7.7
Particle surface	Citrate	
Solvent	DIUF Water	



Citrate= Trisodium citrate

SPR = Surface Plasmon Resonance

DIUF = Deionized and ultrafiltrated water (18.1 MΩ-cm)

OD = Optical Density (using a 1 cm path length cuvette)

Product Numbers

	Standard OD	Standard Volumes	Product #
Citrate	OD = 1, 25	1 – 2000 mL	97721

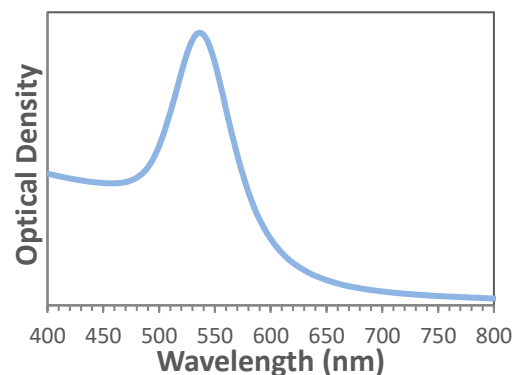
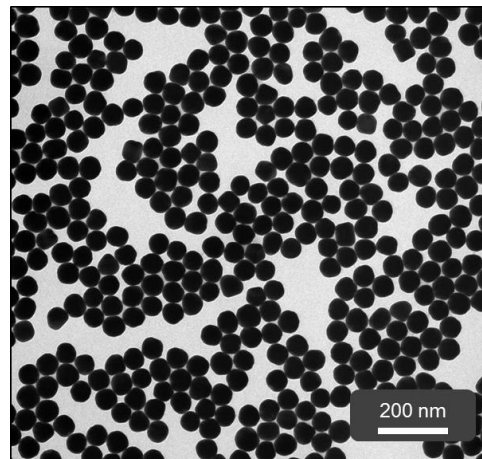
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Gold NanoSpheres

60 nm Gold NanoSpheres, PEG Coating

	Product Specs	Lot-specific
Diameter	60 ± 1.5 nm	60.5 nm
Diameter Deviation	< 4.8 nm	3.6 nm
SPR peak	535.5 ± 2.0 nm	534.5 nm
Particle concentration (per mL) for OD = 1	1.5 – 2.0 × 10 ¹⁰	1.6 × 10 ¹⁰
Mass concentration (Au) (mg/ mL) for OD = 1	0.036 – 0.041	0.037
Particle Molar Concentration for OD = 1	2.5 – 3.4 × 10 ⁻¹¹	2.7 × 10 ⁻⁸
Zeta potential	-4 ± 5 mV	-1.25 mV
pH	6 – 8	6.8
Particle surface	PEG	
Solvent	DIUF Water	



PEG = Poly (ethylene glycol), 30kDa

SPR = Surface Plasmon Resonance

DIUF = Deionized and ultrafiltrated water (18.1 MΩ-cm)

OD = Optical Density (using a 1 cm path length cuvette)

Product Numbers

	Standard OD	Standard Volumes	Product #
PEG	OD = 1, 100	1 – 2000 mL	71029

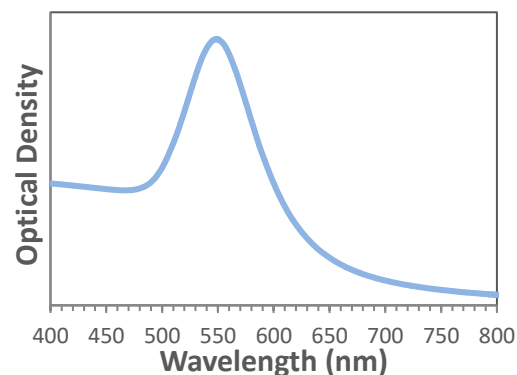
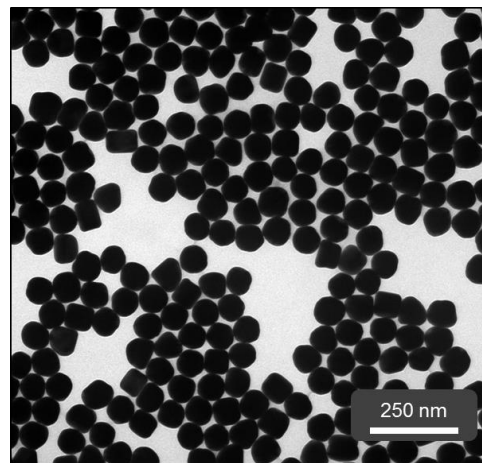
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www.NanoHybrids.net, Email: info@nanohybrids.net, Phone: 512-270-8469

Gold NanoSpheres

80 nm Gold NanoSpheres, Citrate Coating

	Product Specs	Lot-specific
Diameter	80 ± 1.5 nm	80.3 nm
Diameter Deviation	< 6.4 nm	4.1 nm
SPR peak	549.0 ± 4.0 nm	549.0 nm
Particle concentration (per mL) for OD = 1	6.3 – 7.9 x 10 ⁹	6.7 x 10 ⁹
Mass concentration (Au) (mg/ mL) for OD = 1	0.034 – 0.039	0.035
Particle Molar Concentration for OD = 1	1.0 – 1.3 x 10 ⁻¹¹	1.1 x 10 ⁻¹¹
Zeta potential	-50 ± 20 mV	-53.4 mV
pH	7.0 – 8.5	7.8
Particle surface	Citrate	
Solvent	DIUF Water	



Citrate= Trisodium citrate

SPR = Surface Plasmon Resonance

DIUF = Deionized and ultrafiltrated water (18.1 MΩ-cm)

OD = Optical Density (using a 1 cm path length cuvette)

Product Numbers

	Standard OD	Standard Volumes	Product #
Citrate	OD = 1, 25	1 – 2000 mL	90396

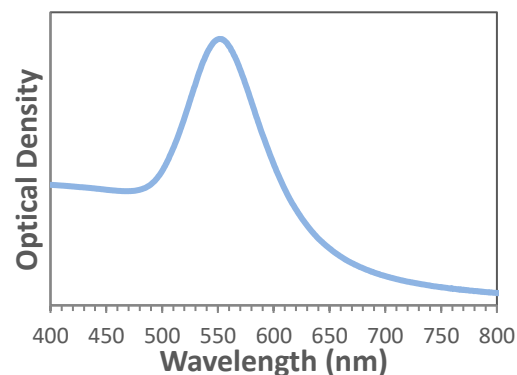
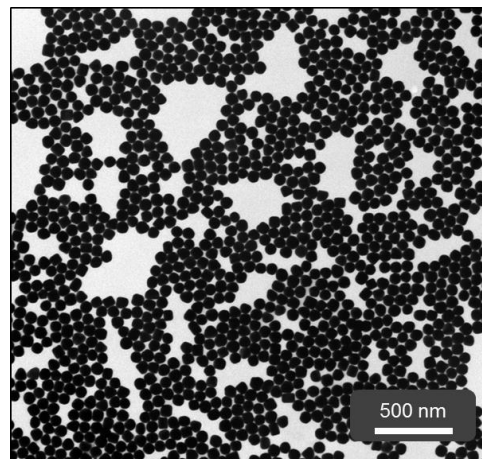
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Gold NanoSpheres

80 nm Gold NanoSpheres, PEG Coating

	Product Specs	Lot-specific
Diameter	80 ± 1.5 nm	80.4 nm
Diameter Deviation	< 6.4 nm	5.4 nm
SPR peak	552.0 ± 4.0 nm	551.0 nm
Particle concentration (per mL) for OD = 1	6.3 – 7.9 × 10 ⁹	6.6 × 10 ⁹
Mass concentration (Au) (mg/ mL) for OD = 1	0.034 – 0.039	0.035
Particle Molar Concentration for OD = 1	1.0 – 1.3 × 10 ⁻¹¹	1.1 × 10 ⁻¹¹
Zeta potential	-4 ± 5 mV	-2.2 mV
pH	6 – 8	7.1
Particle surface	PEG	
Solvent	DIUF Water	



PEG = Poly (ethylene glycol), 30kDa

SPR = Surface Plasmon Resonance

DIUF = Deionized and ultrafiltrated water (18.1 MΩ-cm)

OD = Optical Density (using a 1 cm path length cuvette)

Product Numbers

	Standard OD	Standard Volumes	Product #
PEG	OD = 1, 100	1 – 2000 mL	38347

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Gold NanoSpheres

Suggested Storage and Handling Procedures

Store at 2 – 25 °C in polypropylene containers. Storage at low temperature increases shelf life and stability of the nanoparticles, preventing changes in shape and/or size. Containers composed of other materials can change the colloidal stability of the nanoparticles.

DO NOT FREEZE. Freezing will induce irreversible aggregation of particles and destroy the product.

Bring to room temperature and shake well before each use. Particles may settle to the bottom over time. Shake vigorously for 30 seconds to ensure particles are fully dispersed before use. Visually inspect to ensure all product has redispersed. If particulates or plating remain, sonicate for 1 minute, shake, and repeat as necessary. To minimize heating, do not sonicate for periods longer than 1 minute.

Quality Control. If there are visible particulates or a change in the color or intensity of the dispersion, the nanoparticles may have aggregated. Filter the solution using a 0.45 µm polyvinylidene fluoride filter and save the filtered product. Check quality with spectrophotometry and electron microscopy.