

NANOSCALE RESEARCH COMPONENTS

PELCO® GOLD NANOARRAYS

Substrates of Quasi-Ordered Arrays of Nanoparticles

Nanoparticles serve as significant research tools in better understanding and unraveling the mysteries embodied in nanotechnology research. Colloidal gold particles, in particular, are both excellent catalysts for nanowire growth of a variety of materials and active sites for SERS (Surface Enhanced Raman Scattering). The colloidal gold particles are applied with a proprietary process and baked in air at 250°C to create high purity gold particles secured on the substrate.

Uniform and regular coverage of nanoparticles is highly desirable for systematic and reproducible results. The ordered arrays are ideal.

PELCO® Gold Nanoarrays are available on a variety of substrates:

- **Glass:** 5 x 10mm
- **Quartz:** 5 x 10mm
- **Silicon:** 5 x 10mm

The gold nanoparticles have the following characteristics:

- 15 or 30nm average particle diameter
- Excellent uniformity and particle distribution
- Normal density coating for material growth (Figure 1)
- High density coating for SERS (Figure 2)

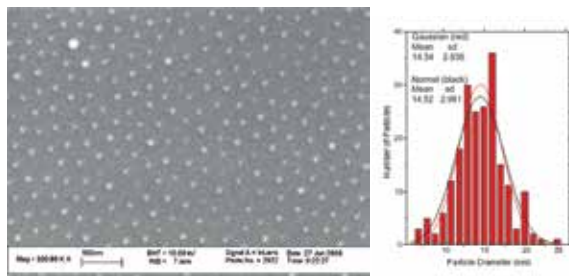


Figure 1: SEM Image of a 15nm PELCO Normal Density Gold Nanoarray. Histogram at right shows size distribution, mean and standard deviation.

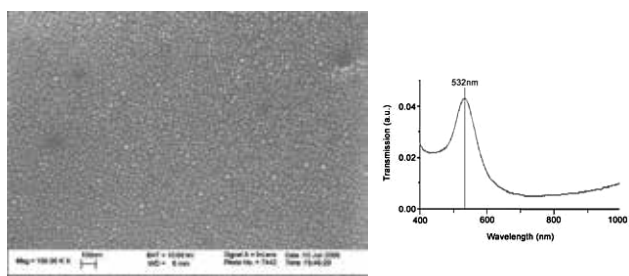


Figure 2: SEM image of a 30nm PELCO High Density Gold Nanoarray. The characteristic plasmon resonance absorption curve is shown at right.

PELCO® 15nm Gold Nanoarrays:

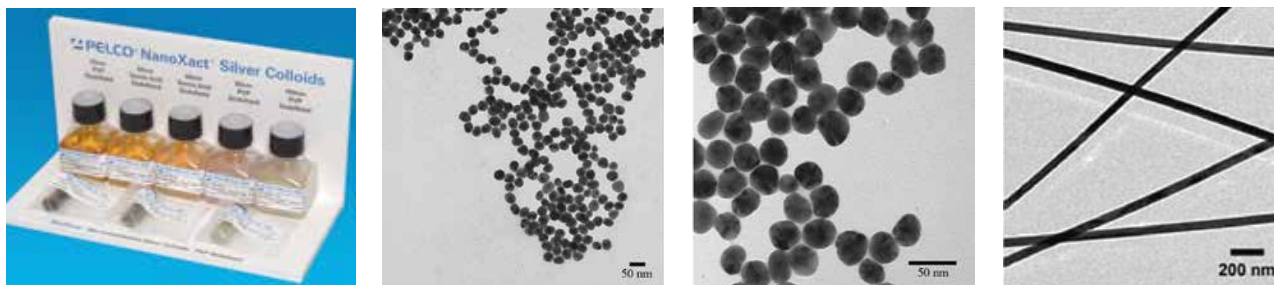
32100	PELCO® 15nm Gold Nanoarray, 5x10mm Glass Substrate, Normal Density	each
32101	PELCO® 15nm Gold Nanoarray, 5x10mm Quartz Substrate, Normal Density	each
32102	PELCO® 15nm Gold Nanoarray, 5x10mm Silicon Substrate, Normal Density	each
32110	PELCO® 15nm Gold Nanoarray, 5x10mm Glass Substrate, High Density	each
32111	PELCO® 15nm Gold Nanoarray, 5x10mm Quartz Substrate, High Density	each
32112	PELCO® 15nm Gold Nanoarray, 5x10mm Silicon Substrate, High Density	each

PELCO® 30nm Gold Nanoarrays:

32200	PELCO® 30nm Gold Nanoarray, 5x10mm Glass Substrate, Normal Density	each
32201	PELCO® 30nm Gold Nanoarray, 5x10mm Quartz Substrate, Normal Density	each
32202	PELCO® 30nm Gold Nanoarray, 5x10mm Silicon Substrate, Normal Density	each
32210	PELCO® 30nm Gold Nanoarray, 5x10mm Glass Substrate, High Density	each
32211	PELCO® 30nm Gold Nanoarray, 5x10mm Quartz Substrate, High Density	each
32212	PELCO® 30nm Gold Nanoarray, 5x10mm Silicon Substrate, High Density	each

NANOSCALE RESEARCH COMPONENTS

PELCO® NanoXact™ & BioPure™ SILVER COLLOIDS AND SILVER NANOWIRES



PELCO® NanoXact™ and BioPure™ silver colloids range in size from 20 to 110nm with 10 different sizes from which to choose. The silver colloids come with comprehensive specification sheets that provide all of the physical and optical characterization data necessary to integrate the nanoparticles into Surface Enhanced Raman Spectroscopy (SERS), plasmonic and photonic applications.

Product Description:

- Two capping/stabilizing agents from which to choose: citrate or tannic acid.
- The colloids are negatively charged. Zeta potential of the NanoXact™ line is in the -50mV range. Zeta potential of BioPure™ is in the -30mV range.
- Silver colloids are stable in the electron beam.
- NanoXact™ silver colloids are available in 25, 100, 500ml volumes, supplied in 2mM citrate buffer, pH 7.4.
- BioPure™ silver colloids are 50x more concentrated than NanoXact™ and available in 1, 2 and 5ml volumes, supplied in 2mM citrate buffer, pH 7.4.
- Both lines have been extensively washed without centrifugation to remove trace elements from the supernatant (<0.000001% of trace elements).
- Silver nanowires, coated with PVP and supplied in water, are available in two size ranges: 2-5µm long or ~20µm long. The diameter of the wire depends on the length, but all diameters are <100nm. Available in 2 or 5ml quantities.

Stability:

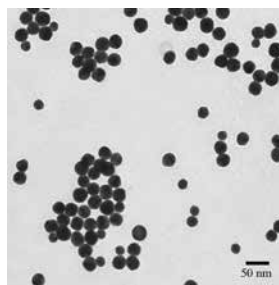
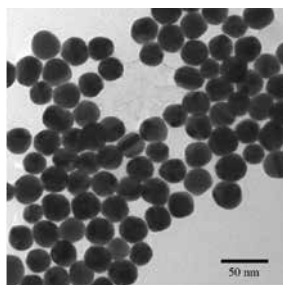
- PELCO® NanoXact™ and BioPure™ silver colloids should be stored at 4°C and shielded from light. The silver colloids are photosensitive.
- NanoXact™ is stable for >6 months after purchase.
- BioPure™ is stable for >3 months after purchase.
- Product testing indicates increased stability can be attained by following the storage recommendations.

84050-30 PELCO® NanoXact™ Citrate Capped Silver Colloids, 30nm	each
84150-30 PELCO® NanoXact™ Tannic Acid Capped Silver Colloids, 30nm	each
85010-30 PELCO® BioPure™ Citrate Capped Silver Colloids, 30nm.....	each
85110-30 PELCO® BioPure™ Tannic Acid Capped Silver Colloids, 30nm.....	each
85720-5 Silver Nanowires, PVP Coated, 2-5 µm long	2ml

1X Concentration - Supplied in 2mM Citrate Buffer, pH 7.4						Particle Diameter (nm)	20X Concentration - Supplied in 2mM Citrate Buffer, pH 7.4					
NanoXact™ Technical Data							BioPure™ Technical Data					
AU Mass Concentration	Atomic Molarity (Ag)	Particle Concentration	Ag Mass Concentration	Max Optical Density	Peak Wavelength		Ag Mass Concentration	Atomic Molarity (Ag)	Particle Concentration	Ag Mass Concentration	Max Optical Density	Peak Wavelength
(mg/mL) ±0.005	(mmol/L)	(particles/mL)	(%)	(cm ⁻¹)	nm	(mg/mL) ±0.02	(mmol/L)	(particles/mL)	(%)	(cm ⁻¹)	nm	
0.02	0.185	450 x 10 ¹¹	0.002	2.46	405	20	1.0	9.25	2.25 x 10 ¹³	0.01	123	405
0.02	0.185	1.30 x 10 ¹¹	0.002	2.49	405	30	1.0	9.25	6.50 x 10 ¹²	0.01	125	405
0.02	0.185	570 x 10 ¹⁰	0.002	2.54	410	40	1.0	9.25	2.85 x 10 ¹²	0.01	127	410
0.02	0.185	2.90 x 10 ¹⁰	0.002	2.39	420	50	1.0	9.25	1.45 x 10 ¹²	0.01	120	420
0.02	0.185	1.70 x 10 ¹⁰	0.002	2.03	435	60	1.0	9.25	8.50 x 10 ¹¹	0.01	101	435
0.02	0.185	1.10 x 10 ¹⁰	0.002	1.74	440	70	1.0	9.25	5.50 x 10 ¹¹	0.01	87	440
0.02	0.185	7.10 x 10 ⁹	0.002	1.34	450	80	1.0	9.25	3.55 x 10 ¹¹	0.01	67	450
0.02	0.185	5.00 x 10 ⁹	0.002	1.09	500	90	1.0	9.25	2.50 x 10 ¹¹	0.01	55	500
0.02	0.185	3.60 x 10 ⁹	0.002	0.89	500	100	1.0	9.25	1.80 x 10 ¹¹	0.01	45	500
0.02	0.185	2.70 x 10 ⁹	0.002	0.82	515	110	1.0	9.25	1.35 x 10 ¹¹	0.01	41	515

Extensively characterized and designed to meet today's rigorous research demands.

PELCO® NanoXact™ & BioPure™ GOLD AND SILICA SHELL GOLD COLLOIDS



PELCO® NanoXact™ and BioPure™ gold colloids range in size from 5 to 100nm with 15 different sizes from which to choose. The gold colloids come with comprehensive specification sheets that provide all of the physical and optical characterization data necessary to integrate the nanoparticles into Surface Enhanced Raman Spectroscopy (SERS), plasmonic and photonic applications.

Product Description:

- Capped/stabilized with tannic acid and negatively charged.
- Tannic acid capped gold is characterized by UVVIS, TEM, DLS and zeta potential. Residual reactants have been removed.
- Available with silica shells.
- Available with functionalized silica shells (amine functionalized for a positively charged gold particle: ~30mV at pH 7.0).
- NanoXact™ gold colloids are available in 25, 100, 500ml volumes, supplied in water.
- BioPure™ gold colloids are 20x more concentrated than NanoXact™ and available in 1, 2 and 5ml volumes, supplied in water.
- Both lines have been extensively washed without centrifugation to remove trace elements from the supernatant (<0.000001% of trace elements).

Stability:

- PELCO® NanoXact™ and BioPure™ gold colloids should be stored at 4°C.
- NanoXact™ is stable for >6 months after purchase.
- BioPure™ is stable for >3 months after purchase.
- Product testing indicates increased stability can be attained by following the storage recommendations.

82150-30 PELCO® NanoXact™ Tannic Acid Capped Gold Colloids, 30nm..... each
 83110-30 PELCO® BioPure™ Tannic Acid Capped Gold Colloids, 30nm each
 83410-30 PELCO® BioPure™ Gold Colloids Capped w/10nm Thick Silica Shell, 30nm each
 83510-30 PELCO® BioPure™ Gold Colloids Capped w/Amine Terminated 10nm Thick Silica Shell, 30nm each

1X Concentration - Supplied in Water						Particle Diameter (nm)	20X Concentration - Supplied in Water					
NanoXact™ Technical Data							BioPure™ Technical Data					
AU Mass Concentration	Atomic Molarity (Au)	Particle Concentration	Au Mass Concentration	Max Optical Density	Peak Wavelength	AU Mass Concentration	Atomic Molarity (Au)	Particle Concentration	Au Mass Concentration	Max Optical Density	Peak Wavelength	
(mg/mL) ±0.005	(mmol/L)	(particles/mL)	(%)	(cm ⁻¹)	nm	(mg/mL) ±0.005	(mmol/L)	(particles/mL)	(%)	(cm ⁻¹)	nm	
0.05	0.254	3.95 x 10 ¹³	0.005	0.80	520	5	1	5.08	7.00 x 10 ¹⁴	0.1	16.0	520
0.05	0.254	1.44 x 10 ¹³	0.005	0.82	520	7	1	5.08	2.88 x 10 ¹⁴	0.1	16.4	520
0.05	0.254	4.94 x 10 ¹²	0.005	0.82	520	10	1	5.08	9.88 x 10 ¹³	0.1	16.4	520
0.05	0.254	2.86 x 10 ¹²	0.005	0.83	520	12	1	5.08	5.72 x 10 ¹³	0.1	16.6	520
0.05	0.254	1.46 x 10 ¹²	0.005	0.83	520	15	1	5.08	2.92 x 10 ¹³	0.1	16.6	520
0.05	0.254	1.01 x 10 ¹²	0.005	0.84	520	17	1	5.08	2.02 x 10 ¹³	0.1	16.8	520
0.05	0.254	6.18 x 10 ¹¹	0.005	0.84	520	20	1	5.08	1.24 x 10 ¹³	0.1	16.9	520
0.05	0.254	1.83 x 10 ¹¹	0.005	1.11	520	30	1	5.08	3.66 x 10 ¹²	0.1	22.1	520
0.05	0.254	7.72 x 10 ¹⁰	0.005	1.13	520	40	1	5.08	1.54 x 10 ¹²	0.1	22.6	520
0.05	0.254	3.95 x 10 ¹⁰	0.005	1.45	525	50	1	5.08	7.90 x 10 ¹¹	0.1	29.1	525
0.05	0.254	2.29 x 10 ¹⁰	0.005	1.59	530	60	1	5.08	4.58 x 10 ¹¹	0.1	31.8	530
0.05	0.254	1.44 x 10 ¹⁰	0.005	1.59	535	70	1	5.08	2.88 x 10 ¹¹	0.1	31.8	535
0.05	0.254	9.65 x 10 ⁹	0.005	1.57	545	80	1	5.08	1.93 x 10 ¹¹	0.1	31.5	545
0.05	0.254	6.78 x 10 ⁹	0.005	1.32	555	90	1	5.08	1.36 x 10 ¹¹	0.1	26.4	555
0.05	0.254	4.94 x 10 ⁹	0.005	1.01	555	100	1	5.08	9.88 x 10 ¹⁰	0.1	20.1	555

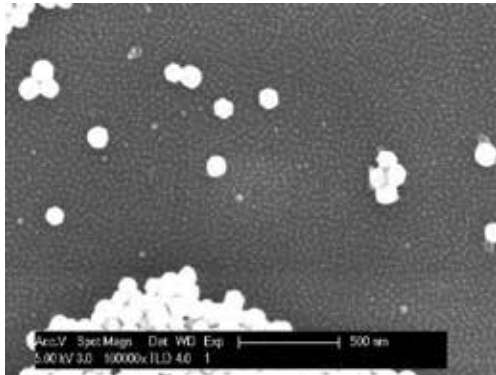
NANOSCALE RESEARCH COMPONENTS

AUSOME™ RESOLUTION AND CALIBRATION STANDARDS

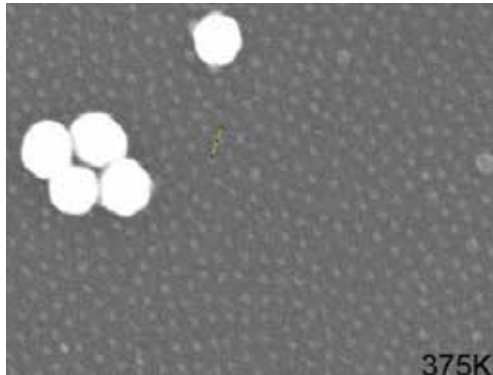
for SEM, FIB and FESEM

Ultra high resolution standards with known size gold particles. The AuSome™ resolution and calibration standard comprises a silicon substrate configured with two discreet populations of large and small gold particles. The larger (117.3nm, STDV 8.4nm) population of gold particles go from individual particles all the way up to large aggregates. These islands of aggregated particles can cover micron-sized areas. The large aggregates provide reference points that are easy to focus on at low magnification; thus making the smaller (27.3nm, STDV 6.3nm) particles easy to find. The small clusters of 117.3nm gold particles provide the sites to check resolution and calibration in the submicron range. The small 27.3nm gold particles represent the AuSome™ coating on the silicon substrate to provide high magnification resolution check. AuSome™ provides a continuous monolayer of gold nanoparticles with uniform particle size and inter-particles spacing over the majority of the substrate with a higher density at the edges and corner. Unmounted or provided on an SEM specimen mount.

AuSome™ Dual Size Gold Particles Standard



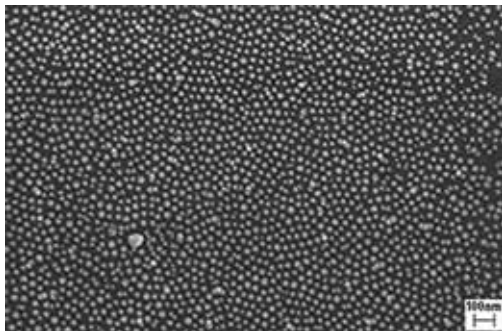
AuSome™ Dual Size 117.3 on 27.3nm



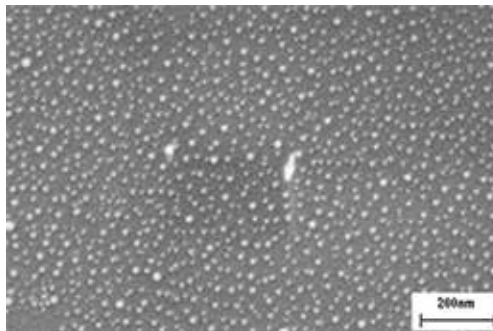
AuSome™ Dual Size 117.3 on 27.3nm

682 AuSome™ Dual Size Resolution and Calibration Standard, Unmounted each

AuSome™ Single Size 38 and 27nm Gold Particles Standard



AuSome™ Single Size 38±4nm



AuSome™ Single Size 27.3nm

680 AuSome™ 38nm SEM Standard, Unmounted each

681 AuSome™ 27.3nm SEM Standard, Unmounted each

