Gold Nanorods Synthesized without CTAB

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Kit Catalog # 96-1549: Gold Gemini Nanorods Kit, CTAB Free (Wavelength 650-850 nm)

Each kit contains the following:

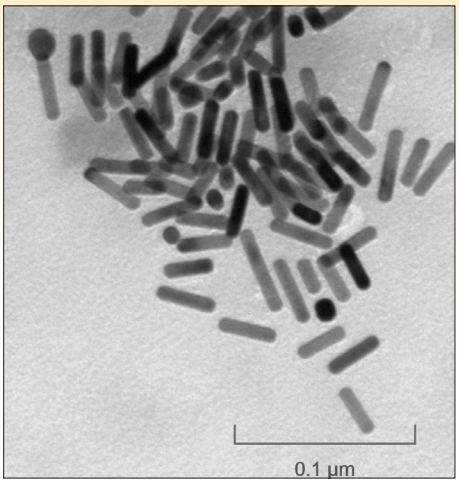
79-7010	Gold Gemini Nanorods, CTAB Free (Wavelength 650 nm)	5ml
79-7015	Gold Gemini Nanorods, CTAB Free (Wavelength 700 nm)	5ml
79-7020	Gold Gemini Nanorods, CTAB Free (Wavelength 750 nm)	5ml
79-7025	Gold Gemini Nanorods, CTAB Free (Wavelength 800 nm)	5ml
79-7030	Gold Gemini Nanorods, CTAB Free (Wavelength 850 nm)	5ml

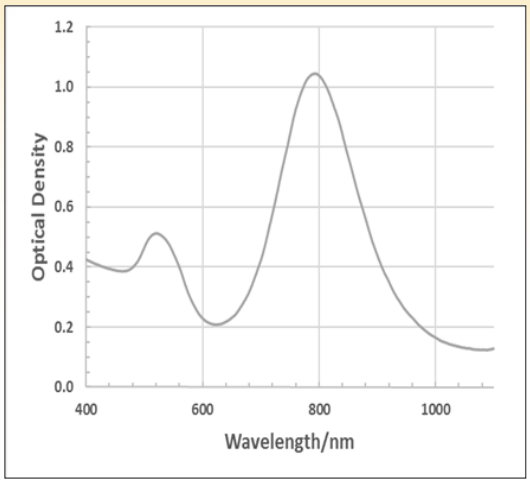
Additional sizes are available. Please inquire.

Product Number	LPSR Maximum (nm)	Length (nm)	Width (nm)	Aspect Ratio	Color & Form
79-7010	640 - 670	25 - 31	13 - 18	1.7 - 1.9	violet liq.
79-7015	685 - 715	37 - 43	13 - 18	2.4 - 2.8	blue liq.
79-7020	735 - 765	37 - 44	10 - 13	3.4 - 3.7	red-purple liq.
79-7025	785 - 815	40 - 50	10 - 13	3.8 - 4.1	red-orange liq.
79-7030	835 - 865	48 - 55	9 - 12	4.6 - 5.3	maroon - purple liq.

Storage Conditions: Store at 4°C - 8°C. Do not freeze.
Concentration: >30 µg/ml
pH: 5.5 - 7.5
Stabilizer: Amphiphilic Agents
Solvent: Stabilized with amphiphilic agents in conductivity grade water (18.0 MΩ cm^{-1})
Optical Density: 1.0 - 1.2
Shelf Life: 12 months

Gold Gemini Nanorods, CTAB Free (Wavelength 800 nm)





Sold in collaboration with SONA Nanotech

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Procedure for Re-dispersing Surfactants

The unique surfactant technology that underpins the production of the SONA gold nanorods (GNR's) has some significant advantages over GNR's prepared using the cetyltrimethylammonium bromide, or CTAB synthesis method. These surfactant technologies lead to remarkably stable gold nanorods; however, in some cases, when your GNR sample is subjected to temperatures well below room temperature for extended periods of time (as would be typical of their recommended storage conditions), precipitated surfactant will be visible in the solution. This does not impact the amount of GNR's suspended in solution, nor is it a sign of an irreversible aggregation process by which GNR's are destroyed, as is often the case with other CTAB prepared GNR's. To homogenize the solutions, the following procedures are recommended.

1. ***650, 700, and 750 nm wavelengths***. Place the GNR containing vial in a warm water bath (30-35° C) for approximately 15 minutes. Remove the vial from the bath, gently swirl the solution inside, and visually examine the contents for remaining precipitated surfactant. If precipitated surfactant is still visible, repeat the process until the solution clears.

2. ***800 and 850 nm wavelengths***. As the surfactants used to prepare these GNR's have longer nonpolar chains, more warming will be required to homogenize the solution. In this case, the vial containing the GNR solution is placed into a warm water bath (around 45°C) for approximately 20-25 minutes. Remove the vial from the bath, gently swirl the solution inside (it will have the appearance of a thick gel), and visually examine the contents for precipitated surfactant. The presence of the high rheology surfactant may necessitate an additional warming for about 15 minutes at 45°C to clear the solution. Note that the solution may look clear at various times during the heating, but upon shaking the solution, the surfactant will come out of solution. The solution is deemed to be homogenized when the shaken solution leads to the entrapment of air bubbles within the viscoelastic gel instead of surfactant precipitating out.

Additional Product Details

Gold nanorods (GNRs) are small particles whose surface plasmon resonance frequencies can be altered as a function of aspect ratio, giving these anisotropic particles optical properties that allows them to be used in a host of applications spanning the electromagnetic spectrum from the visible to the near-infrared region.[1, 2] GNRs have been used in a number of biomedical applications, including as contrast agents for optical biomedical imaging and for their hyperthermal effects.

One of the major barriers in the application of GNR-based materials, especially for in-vivo applications such as hyperthermal cancer treatment, is the efficient exchange and removal of cetyltrimethylammonium bromide (CTAB), the surfactant used exclusively in the large scale synthesis of GNRs. CTAB is a cytotoxic, cationic surfactant with an extremely low critical micelle concentration.[3-5] Its function in the synthesis of the gold nanorods is still a matter of debate, but it is generally thought that the CTAB forms a strongly adsorbed bilayer around the surface of the growing gold particle.[6-8] The concentration of CTAB that is most often used in their synthesis is 0.10 M or 100 times its critical micelle concentration, meaning a significant amount of CTAB remains in the bulk of the solution after the GNRs are made, which serves to stabilize the GNRs (prevents them from self-aggregating in solution).[6] The CTAB surfactant, so critical for GNR synthesis, is a significant impediment to in-vivo applications. A number of methods have been used to "remove" or partially exchange the CTAB including frequent solvent washing, treatments with surface active materials such as PEGylated thiols or other polymers.[9-11] However, CTAB-coated GNR dispersions are invariably destabilized during surfactant exchange, resulting in particle aggregation and low recovery yields of GNRs. In addition, these surface modified GNRs are often contaminated with residual CTAB.[9]

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