Carboxyl Silver Nanoparticles-PEG5K
PRODUCT DATA SHEET

Carboxyl Silver Nanoparticles-PEG5K

Description

Carboxyl functionalized silver nanoparticles are ideal for conjugation of proteins and other primary amine containing ligands using standard EDC/NHS coupling chemistry.

Our carboxylated silver nanoparticles are available in 9 different sizes ranging from 5 ~ 100 nm, are more than 95% spherical and have uniform size distribution (CV < 18%). In addition, the choice of two different length PEG surface spacer (3000Da and 5000Da) allows control of the distance between a conjugated molecule and the silver surface.

For custom sizes, formulations or bulk quantities please contact our customer service department.

Website: www.abvigen.com Phone: +1 929-202-3014 Email: info@abvigenus.com

Characteristics

Core diameter: 5 ~ 100 nm

Size dispersity: Coefficient of Variance (CV) < 18%

Surface functional group: PEG5K-COOH

Concentration: 1 mg/ml

Polydispersity Index (PDI): < 0.25

Absorbance (λmax): 390 ~ 490 nm

Carboxyl surface density: ~ $1/nm^2$

Supplied in ddH_2O

Properties

The carboxyl functionalized silver nanoparticle surface allows for covalent conjugation of antibodies, proteins and other ligands using standard EDC/NHS coupling chemistry.

The precisely engineered silver nanoparticle surface with extended carboxyl groups maximizes conjugation efficiency by minimizing steric hindrance while still maintaining low non-specific protein binding. These features results in reliable and reproducible conjugates.

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Features

Superior size distribution compared to the leading competitor; available from 5 nm to 100 nm.

Precisely engineered surface with an optimized carboxyl group density for easy conjugation.

Application

Ideal for development of silver conjugates for use in for example:

Immunoblotting

Lateral Flow Assays

LSPR Assays

Microscopy Applications (e.g. TEM, Darkfield)

Storage

This product should be stored away from light at 4°C. **DO NOT FREEZE.** If stored as specified, the product is stable for at least 4 months.

Handling

When stored for a long period of time silver nanoparticles may sediment at the bottom of the vial, which is especially true for larger particle sizes. Prior to use, re-suspend the sedimented particles by swirling until a homogenous solution is obtained.

Note

These products are for R&D use only, not for drug, household, or other uses.

Covalent Conjugation to Cytodiagnostics Carboxylated Silver Nanoparticles

Our Carboxyl Silver Nanoparticles rely on EDC/NHS chemistry for conjugation. EDC and NHS “activate” the carboxyl groups on the particle surface to form an intermediate that can subsequently react with primary amine groups on the specific protein or other ligand to be conjugated.

The following protocol provides general guidelines for coupling biomolecules to our Carboxyl Silver Nanoparticles, with conjugation of a standard IgG to our 20nm Carboxyl Silver Nanoparticles given as an example. For conjugation of other biomolecules, the optimal conjugation conditions may vary. To obtain maximum conjugation to the particle surface, the amount of protein for conjugation is about 1 to 10X excess that of its theoretical quantity needed for full coverage.

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Materials and Equipment Required

- Carboxyl Silver Nanoparticles
- Negative control: Methyl Silver Nanoparticles
- 1-Ethyl-3-[3-dimethylaminopropyl]carbodiimide hydrochloride (EDC) (Sigma, Cat# E1769)
- N-hydroxysulfosuccinimide (Sulfo-NHS) (Sigma, Cat# 56485)
- Blocker: Bovine Serum Albumin (BSA) (Sigma, Cat#A3059)
- Activation buffer: 2-(N-morpholino)ethanesulfonic acid (MES) buffer (10 mM, pH 5.5)
- Coupling buffer: 1X Phosphate Buffered Saline (PBS)
- Washing buffer: 1X Phosphate Buffered Saline +0.05% Tween 20 (PBST)
- UV-VIS Spectrophotometer
- Protein of interest to be conjugated.

Note: For effective conjugation, the purity of the protein needs to be considered. Any other molecules containing primary amines (e.g. TRIS) may compete with the protein to be conjugated and reduce the conjugation efficiency. The protein should also have enough accessible primary amine groups for conjugation. Lysine residues are the primary target sites for EDC/NHS conjugation. A higher number of lysine groups on the outer surface of the protein will probably lead to higher conjugation efficiency. For example, bovine serum albumin (BSA) has 30 to 35 lysine groups available on its surface for EDC conjugation. An IgG antibody molecule typically has about 90 lysine residues, and 30 are potentially useful for conjugation.

Procedure

1. Prepare fresh EDC/NHS mix solution in 10 mM MES buffer (pH 5.5) at a concentration of 30 and 36 mg/mL, respectively.

Note: EDC/NHS rapidly hydrolyzes in aqueous solutions and should be prepared fresh just prior to conjugation.

2. Remove a 10 µL aliquot of 20 nm carboxyl silver nanoparticles from the stock vial and mix with 10 µL of EDC/NHS mix solution as prepared in step 1.
3. Incubate for 30 min at room temperature.
4. Add 1 mL of PBST and vortex thoroughly**
5. Spin down by centrifugation at 6,500 g for 30 min
6. Remove most of the supernatant.
7. Add 10 µL of IgG (1 mg/mL in 1 X PBS)***

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8. Sonicate in a water bath sonicator for 10 sec.

9. Incubate for 2 to 4 h at room temperature with mixing.

10. Add 1 mL of PBST and vortex thoroughly.

11. Spin down by centrifugation at 3,500 g for 30 min

12. Remove most of the supernatant.

13. Add 50 µL PBS with 1% BSA

14. Store at 4 degrees and ready to use.

** For smaller proteins, peptides, and amine-modified oligonucleotides or other ligands a one-step conjugation procedure may be employed, i.e. simultaneous activation and conjugation.

*** The concentration of protein may vary depending on the particle size and protein to be conjugated. In general, the amount of protein should be 1X to 10X excess of the amount of full surface coverage. The total surface area of particles and the docking area should be estimated to calculate the optimal amount of protein, see table I.

Ordering Information

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