Calcium Peroxide Nanoparticles, 60~70 nm
PRODUCT DATA SHEET

Calcium Peroxide Nanoparticles, 60~70 nm

Cat No: ABCN-60

Description

Metals and metal oxide nanoparticles have received a lot of attention because of their good effects in the treatment of drug-resistant bacterial infections. The oxidative stress caused by reactive oxygen species (ROS) is an important mechanism for the therapeutic effect of these bacteriostatic agents. However, ROS is difficult to form in anoxic environments, affecting the antibacterial activity of most metals and their oxides. As a solid hydrogen peroxide source, calcium peroxide (CaO_2) can effectively generate hydrogen peroxide (H_2O_2) under anaerobic conditions, which provides a strategy for alleviating anaerobic environment, improving endogenous hydrogen peroxide, and improving the clinical therapeutic effect of anti-tumor and bacterial infection. Abvigen provides calcium peroxide nanoparticles, the size of about 60 ~ 70 nm, with good solubility, in water environment will decompose to produce hydrogen peroxide and oxygen, can be used for controlled release of H_2O_2, is widely used to alleviate oxygen poor environment. Combined with nanomases for tumor treatment, bacterial infection treatment, biosensing and corresponding release of microenvironment and other biomedical fields.

Abvigen can provide high quality calcium peroxide nanoparticles. The product has high repeatability between batches, which can meet the needs of different personalized materials such as research and development, testing and production of various customers.

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

Type: Calcium Peroxide Nanoparticles

Surface: PVP

Average particle size: 60 ~ 70 nm

Hydrodynamic dimensions: 200 nm

Zeta potential: 5.29 mV

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Concentration: 5 mg/mL

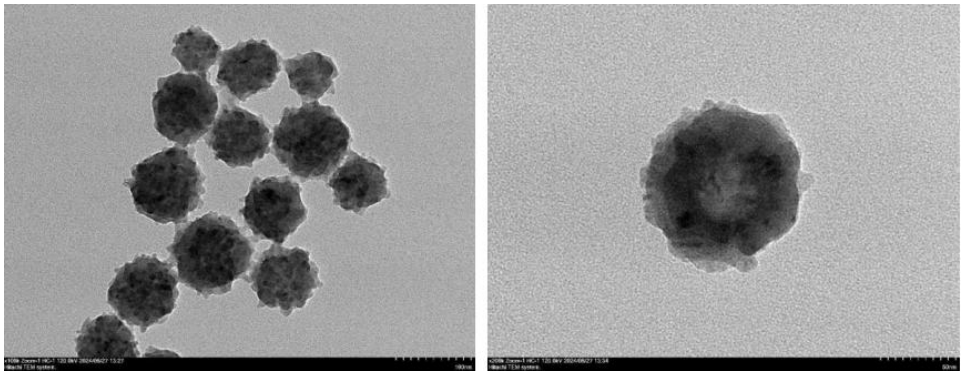
Dispersing solvent: Anhydrous ethanol

Storage condition: Sealed storage at 4°C. Do not freeze. Mix well before use.

Shelf life: 6 months

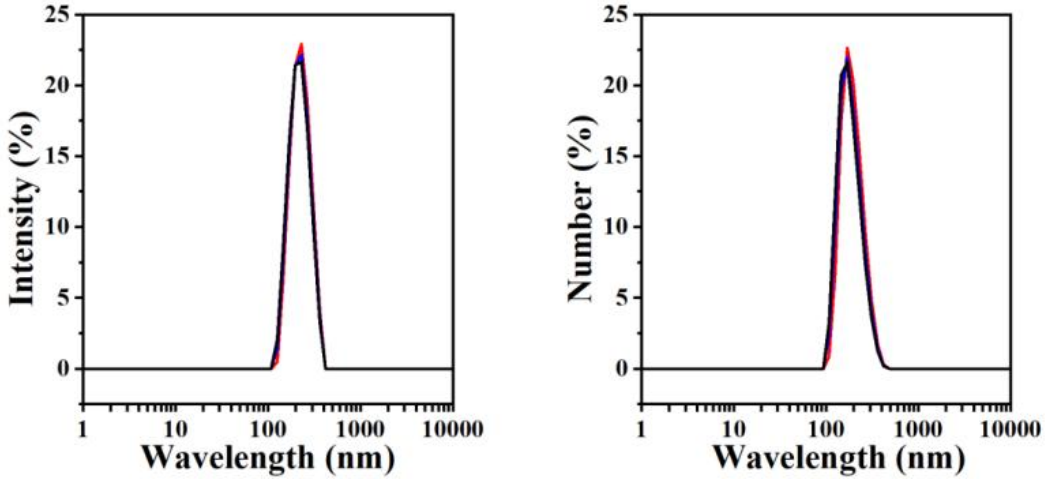
Package: Glass bottle

TEM of Calcium Peroxide Nanoparticles



The above figure shows that CaO_2 nanoparticles are uniformly dispersed nanoparticles with a size of about 60 ~ 70 nm.

Hydrodynamic Dimension



As shown in the figure, the hydrodynamic size of PVP modified CaO_2 nanoparticles is larger than the TEM size.

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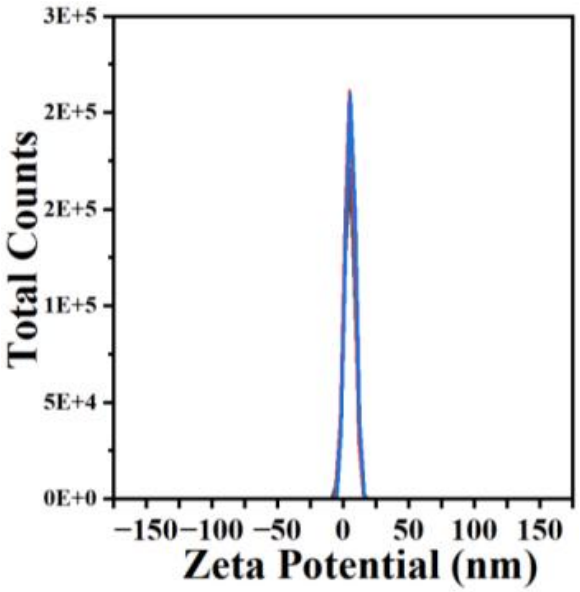
Zeta Potential



It can be seen from the figure that the Zeta potential of PVP modified CaO_2 nanoparticles is 5.29 mV.

Advantages

Good solubility

Can effectively generate hydrogen peroxide (H_2O_2) under anaerobic conditions, alleviating hypoxic environment

Applications

Tumor treatment

Bacterial infection treatment

Biosensing

Corresponding release of microenvironment

Application Example

(1) FeCP/ICG@CaO_2 for the treatment of wound infections (Quoted from pH Switchable Nanozyme Platform for Healing Skin Tumor Wound Infected with Drug-Resistant Bacteria [J]. Advanced Healthcare Materials, 2023, 12(28): 2301375. DOI:10.1002/adhm.202301375)

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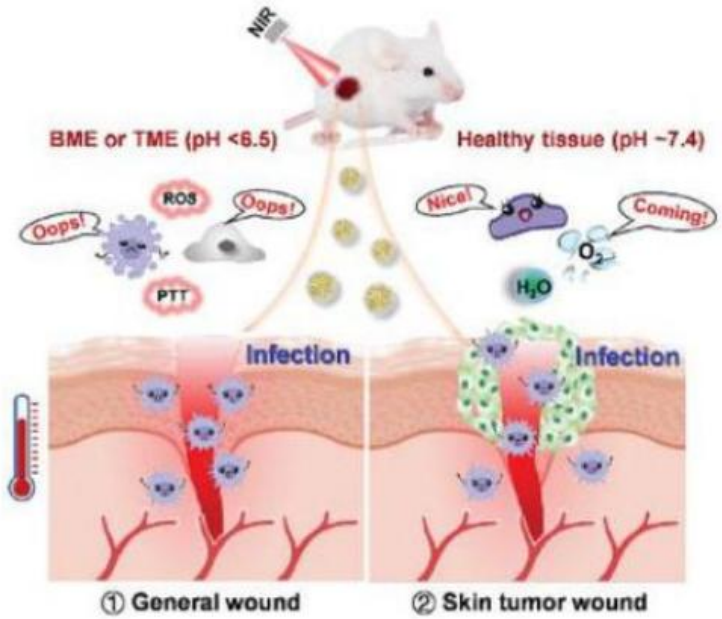

FeCP/ICG@CaO_2 consists of ferrocenyl coordination polymer (FeCP) nanase combined with indocyanine green (ICG) and calcium peroxide (CaO_2) to construct H_2O_2/O_2 self-supply system (FeCP/ICG@CaO_2) for the precise treatment of bacterial infections. At the wound site, CaO_2 reacts with water to form H_2O_2 and O_2. FeCP has peroxide-like (POD) activity in the acidic bacterial microenvironment, catalyzing H_2O_2 into hydroxyl radical (·OH) to kill bacteria and prevent infection. At the same time, FeCP has catalase-like (CAT) activity in neutral tissues, breaking down excess H_2O_2 into H_2O and O_2 to prevent oxidative damage and promote wound healing. In addition, FeCP/ICG@CaO_2 shows the photothermal therapeutic ability, because ICG can emit heat under near-infrared laser irradiation, and heat can enhance the nanoenzyme activity and enhance the therapeutic effect.

(2) CaO_2@ZIF-Fe/Ce6@PEG is used to enhance the combination of CDT/PDT for tumor treatment (Quoted from A robust ROS generation strategy for enhanced chemodynamic/photodynamic therapy via H_2O_2/O_2 self-supply and Ca^{2+} overloading [J]. Advanced Functional Materials, 2021, 31(50): 2106106. DOI: 10.1002/adfm.202106106)

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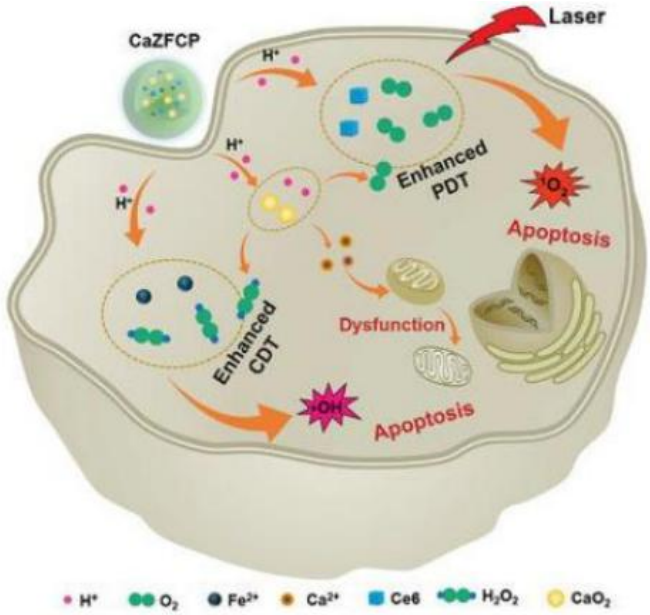

The efficacy of cancer therapy with reactive oxygen species (ROS) as the primary therapeutic medium is affected by the lack of substrates, such as endogenous hydrogen peroxide (H_2O_2) deficiency in chemokinetic therapy (CDT) and hypoxia inherent in photodynamic therapy (PDT). Here, we constructed an intelligent polyethylene glycol (PEG) ized nanosystem CaO_2@ZIF-Fe/Ce6@PEG to simultaneously realize H_2O_2/O_2 self-supply and Ca^{2+} overload in tumor cells for enhancing CDT/PDT. In the weakly acidic tumor microenvironment, zeolite imidazole skeleton 90 (ZIF-90) can degrade and release CaO_2 nanoparticles, Fe^{2+} and the photosensitizer Chlorine6 (Ce6). Among them, CaO_2 nanoparticles further decomposed to produce H_2O_2 and O_2, alleviating endogenous H_2O_2 deficiency and hypoxia in the tumor region, thereby improving the efficiency of CDT and PDT by generating more hydroxyl radical (·OH) and singlet oxygen. In addition, Ca^{2+} overload caused by CaO_2 breakdown can be used to amplify intracellular oxidative stress, leading to mitochondrial dysfunction, thereby further improving the efficacy of CDT/PDT.

Storage

Sealed stored at 2-8°C away from light for 6 months.

Note

CaO_2 nanoparticles will decompose in water, and CO_2 will react with CaO_2 in air to produce $CaCO_3$.

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Ordering Information

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