ICS 71.040.40
CCS A 43

NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 36083-2018

Nanotechnology - Silver nanomaterials - Guidance for the characterization of biological effect-related physicochemical properties

纳米技术 纳米银材料 生物学效应相关的理化性质表征指南

Issued on: March 15, 2018 **Implemented on: October 1, 2018**

Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009. This standard was proposed by the Chinese Academy of Sciences. This standard is under the jurisdiction of the National Nanotechnology Standardization Technical Committee (SAC/TC279). This standard was drafted by: National Nano Science Center, China Food and Drug Testing Institute. The main drafters of this standard. Xie Liming, Liu Ying, Li Ruiru, the Yellow River, Liu Haining, Ge Guanglu, Xu Liming.

Nano-silver has a broad spectrum of antibacterial properties and is widely used in the biomedical field. Biological Effects and Use of Nanosilver Products The physicochemical properties of nanosilver materials are closely related to [1-4], such as particle size and particle size distribution, morphology, and surface properties. The physical and chemical properties of nanosilver materials Quality characterization involves the characterization method of commonality, so this standard is formulated. The physicochemical properties suggested by this standard include the average particle size and particle size distribution, zeta potential, pH, UV absorption absorption maximum absorption Peak, total silver content, silver valence. This standard mainly refers to the International Organization for Standardization Nano Standards Technical Committee (ISO /TC229) promulgated The relevant standards [5-6] and the National Nanotechnical Characterization Laboratory under the National Cancer Institute (Nano- technologyCharacterizationLaboratory, NCL) published related standard characterization methods, and nano-silver biological effect analysis Physical and chemical characterization methods commonly used in academic literature. Although some physicochemical properties are closely related to biological effects, such as surface functional groups and aggregation processes, Degree, but there is no corresponding standard method, so the characterization of such physical and chemical properties is not included in this standard. Nanotechnology nano-silver material biological effects Related physical and chemical properties characterization guidelines

1 Scope

China's national guidance on characterising the physicochemical properties of silver

nanomaterials that bear on their biological effects. Silver nanoparticles are the most widely used engineered nanomaterial in consumer products - in textiles, coatings, wound dressings, food packaging and appliances - because silver is antibacterial and dividing it finely makes a little go a long way. The same property raises the obvious question about effects on cells that are not bacteria, and about what happens to the silver released into wastewater. The difficulty in answering it is that the biological effect of a silver nanomaterial is not a property of silver. It depends on the particle size and distribution, the shape, the surface coating, the state of aggregation, and above all the rate at which silver ions dissolve from the surface - and a toxicology study that does not report those has measured something that cannot be reproduced. This guidance says which properties to characterise and why each one matters.

This standard specifies a general method for characterization of the physical and chemical properties associated with the biological effects of nanosilver materials, including the average particle size of nanosilver materials. Diameter and particle size distribution, zeta potential, pH, UV-visible absorption spectrum maximum absorption peak, total silver content, silver valence state detection method. This standard applies to the physical and chemical properties of nano-silver powder and nano-silver solution.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only dated versions apply to this article Pieces. For undated references, the latest version (including all amendments) applies to this document.

GB/T 11907 Water quality silver Determination by flame atomic absorption spectrophotometry General principles of

GB/T 19500 X-ray photoelectron spectroscopy

GB/T 19619 nanomaterials General

GB/T 20307 nanometer-length scanning electron microscope measurement method

GB/T 21510 Nano Inorganic Material Antibacterial Performance Test Method

GB/T 21649.1 Particle size analysis image analysis Part 1. Static image analysis

GB/T 23942 Chemical reagents General principles of inductively coupled plasma atomic emission spectrometry

GB/T 29022 Particle Size Analysis Dynamic Light Scattering (DLS)

GB/T 32671.1 Methods for measuring zeta potential in colloidal systems - Part 1. Electroacoustic and electrodynamic phenomena

GB/T 33714 nanotechnology nanoparticle size measurement atomic force microscopy

HJ700 Water Quality Determination of

65 Elements Inductively Coupled Plasma Mass Spectrometry JY/T 011 General principles of TEM Pharmacopoeia of the People's Republic of China (2015 Edition, Part 4)

3 Terms and definitions

The following terms and definitions as defined by GB/T 19619 and GB/T 21510 apply to this document.

3.1 Nanosilver material silver nanomaterials An elemental silver material that is at least one dimension in the nanometer range (1 nm to 100 nm) in three-dimensional dimensions, which may be in the form of powder or dispersed In solution.

4 Physical and chemical properties of the detection method

4.1 General rules In the analysis of biological effects of nanosilver materials, relevant physicochemical properties should be determined, including but not limited to the following indicators.