ICS 71.040.50
CCS G 30

NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 24369.3-2017

Characterization of gold nanorods - Part 3: Measurement method for the surface charge density

金纳米棒表征 第3部分：表面电荷密度测量方法

Issued on: July 31, 2017 **Implemented on: February 1, 2018**

Issued by: General Administration of Quality Supervision, Inspection and Quarantine;
Standardization Administration of the PRC

Table of Contents

Foreword

GB/T 24369 "gold nanorod characterization" is divided into three parts.

--- Part 1. UV/Vis/NIR absorption spectrometry;

--- Part 2. Optical properties measurement method;

--- Part 3. Surface charge density measurement method. This section GB/T 24369 Part 3. This section drafted in accordance with GB/T 1.1-2009 given rules. This section is proposed by the Chinese Academy of Sciences. This part of the National Nano Technology Standardization Technical Committee (SAC/TC279) centralized. This part of the drafting unit. National Nano Science Center. The main drafters of this section. Wu Xiaochun, Ji Ying Lu, Hou Shuai.

Gold nanorods are rod-like gold nanoparticles that have potential applications in biological detection, bioimaging, disease diagnosis and treatment value. According to the technical report ISO /T R13014.2012 published by the International Organization for Standardization Nanotechnology Committee "nanotechnology engineering nano Guidelines for Characterization of Physical and Chemical Parameters for Material Toxicity Assessment ", eight key physicochemical parameters that are closely related to toxicity assessment, namely size and Size distribution, agglomeration/aggregation state, shape, surface area/specific surface area, composition, surface chemistry, surface charge, solubility/dispersibility Levy This section corresponds to the characterization of surface charges. The zeta potential is an important parameter for characterizing the surface charge. This section specifies the surface charge of gold nanorods calculated by zeta potential Density method for the evaluation of gold nanorods colloidal solution stability and interaction with other materials to provide the basis. Gold nanorod characterization Part 3. Methods of measuring surface charge density

1 Scope

China's national method for measuring the surface charge density of gold nanorods. It is Part 3 of GB/T 24369 and specifies the measurement of the charge carried on the surface

of gold nanorods in suspension. Surface charge is what keeps a nanoparticle suspension a suspension. Particles at this size are subject to van der Waals attraction that would aggregate them irreversibly within seconds, and what prevents it is electrostatic repulsion from the charged layer on their surfaces - so the surface charge density determines the colloidal stability, and a suspension whose charge falls below a threshold flocculates and is finished. For gold nanorods the charge has a particular origin and a particular consequence. The rods are almost universally synthesised with a cationic surfactant, which forms a bilayer on the surface and gives the particles a strong positive charge; that surfactant is also cytotoxic, so any biological application requires it to be exchanged for something else, and the exchange changes the charge - often to negative, sometimes to near zero, which is where the suspension is least stable and most likely to aggregate during the very step meant to make it usable. Charge is therefore both the stability indicator and the marker of whether a surface modification actually happened. And it governs how the particles behave in a biological environment, since a positively charged particle adsorbs proteins, is taken up by cells readily and is cleared quickly, while a negatively charged one behaves quite differently. The standard specifies the measurement - based on the electrophoretic mobility and its conversion to zeta potential and to charge density - with the instrument, the medium, the ionic strength and pH at which the measurement is valid, and the calculation. Issued on 31 July 2017 and in force since 1 February 2018.

GB/T 24369 provisions of this part of the zeta potential measurement gold nanorods surface charge density method. This section applies to the sol system more than 10nm in diameter, aspect ratio between 1 ~ 4 gold nanorods surface charge density measurement, other The measurement of the surface charge density of the nanoparticles in the sol system can also be performed with reference to this section.

2 Normative references

The following documents for the application of this document is essential. For dated references, only the dated version applies to this article Pieces. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 32269-2015 Nanotechnology Nano-object terms and definitions Nanoparticles, nanofibers and nanosheets General rules for zeta potential analysis of colloidal particles by electrophoresis GB/T 32668-2016

3 Terms and definitions

GB/T 32269-2015 and GB/T 32668-2016 defined terms and definitions apply to this document. For ease of use, below Repeatedly listed GB/T 32269-2015 and GB/T 32668-2016 some of the terms and definitions.

3.1 Surface charge density electricsurfacechargedensity The amount of charge generated

on a unit area interface due to the specific adsorption of liquid phase ions or the dissociation of surface groups.

Note. The unit is Coulombs per square meter (C · m-2). [GB/T 32668-2016, Definition 3.1.1]

3.2 Nanofiber nanofibre The external dimensions of the two dimensions are similar and at the nanometer scale, and the external dimensions of the remaining one dimension are obviously larger than those of the other two dimensions Meter object.

Note 1. Nanofibers can be flexible or rigid.

Note 2. For two dimensions of similar dimensions, the difference in external dimensions should be less than 3 times, while the longest external dimension should be more than 3 times larger than the other two dimensions.

Note 3. The longest external dimension may not be on the nanometer scale. [GB/T 32269-2015, Definition 4.3]

3.3 Nanorods nanorod Solid nanofibers. [GB/T 32269-2015, Definition 4.5]

3.4 Surface potential electricsurfacepotential Potential difference from the particle surface to the homogeneous liquid phase.

Note. The unit is volts (V). [GB/T 32668-2016, definition 3.1.2]