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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 30544.4-2019

**Nanotechnologies -- Vocabulary -- Part 4: Nanostructured
materials**

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1 Scope

2 Describe the basic terminology of nanostructured materials

Foreword

GB/T 30544 "Nano Technology Terminology" is divided into the following sections.

- Part 1. Core terminology;
- Part 2. Nanoparticle nanoparticles, nanofibers and nanosheets;
- Part 3. Carbon nano-objects;
- Part 4. Nanostructured materials;
- Part 5. Nano/biological interface;
- Part 6. Characterization of nano-objects;
- Part 8. Nanofabrication process;
- Part 13. Graphene and related two-dimensional materials.

This part is the fourth part of GB/T 30544.

This part is drafted in accordance with the rules given in GB/T 1.1-2009.

This part replaces GB/T 19619-2004 "Nanomaterial Terms", compared with GB/T 19619-2004, the main changes are as follows.

- The standard name was changed to "Nanotechnical Terminology Part 4. Nanostructured Materials";
- Revised scope (see Chapter 1);
- Revised the terms and definitions of basic terms (see Chapter 2, 3.1 of the.2004 edition);

--- Modify the terminology and definition of the classification of nanostructured materials (see Chapter 3, 3.2 of the.2004 edition);

--- Removed the characteristics of nanomaterials "Preparation methods of nanomaterials" "Processing methods of nanomaterials" "Representation methods of nanomaterials"

Related terms and definitions (see 3.3, 3.4, 3.5, and 3.6 of the.2004 edition).

This section uses the translation method equivalent to ISO /T S80004-4.2011 "Nanotechnology terminology part 4. nanostructured materials".

This part was proposed by the Chinese Academy of Sciences.

This part is under the jurisdiction of the National Nanotechnology Standardization Technical Committee Nanomaterials Subcommittee (SAC/TC279/SC1).

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Introduction

With the continuous development of scientific knowledge in the field of nanomaterials, the number of technical terms in the field of nanomaterials has also increased. The contents of this section

It is an important term for defining nanostructured materials.

Nanostructured materials are characterized by internal or surface structures at the nanoscale. Nano-objects (one-dimensional, two-dimensional or three-dimensional external dimensions are at

Nanoscale materials) may have nanostructures.

A material should not be based solely on its crystallographic characteristics (three-dimensional arrangement of atoms or molecules in the grain, amorphous phase, quasicrystalline phase, grain boundary, intragranular boundary

Surfaces and short-range ordered structures of atoms in dislocations are classified as having nanostructures. In contrast, the grain size distribution is mostly at the nanoscale.

(nanocrystals), voids, and pores at the nanoscale or precipitated (ie, nanoparticles dispersed in a solid medium) at the nanometer scale, these characteristics are sufficient

Materials are classified as having nanostructures (see 2.4 in GB/T 30544.1-2014). Similarly, the surface of almost all materials has

Non-uniformity of morphology and distribution of chemical elements on the meter scale. Only the surface of the material is intentionally modified or structured to be in a

morphological or chemical distribution

A material having nanoscale non-uniformity is defined as a "nanostructured material."

This section covers five categories of nanostructured materials (see Figure 1).

- a) nanostructured powder;
- b) nanocomposites;
- c) solid nano-foam;
- d) nanoporous materials;
- e) Flowing nanodispersions.

Some subcategory terms for the above five types of materials are also included in this section. These terms are not exhaustive, more major categories and subcategories

The language will be added to this section in future revisions.

Figure 1 Types of nanostructured materials defined in this section

In nanopowders and flowing nanodispersions, nanoobjects (or their aggregates or agglomerates) are in a non-randomly distributed state (formation)

a structure of short-range order.) Similarly, under certain conditions nano-objects (or their aggregates or agglomerates) will interact with liquid molecules (especially

its polar liquid) interacts at the thin boundary layer of the particle surface. The uniformity of liquid properties is modified on some "nanostructure". Object

Physical and chemical testing can reveal this effect.

In other words, if the liquid medium acts only as a background solution and does not have any reaction relationship with the nano-objects in the liquid, then in general

This nanodispersion is not considered to be "nanostructured" and is more likely to be considered a collection of nanoobjects. From this perspective,

The term "nanosuspension" as used herein is in the gray zone between the nanostructured material and the material comprising the nanoobject. In general

Since "nano-suspension" is used in this field to describe the existing and expanding applications of materials, the relevant terms should be included in this section.

In the middle.

Nanotechnology terminology Part 4. Nanostructured materials

1 Scope

This part of GB/T 30544 gives one or more components in the field of nanotechnology to the nanoscale category or to exhibit nanoscale

The terminology and definition of the material of the category performance is intended to promote the association of individuals and organizations related to nanotechnology and their related parties.

Exchange with each other.

A material has different characteristics of distribution and composition at the nanometer scale, but this is not enough to classify the material as having a nanostructure.

Materials that are classified as nanostructures have a large number of significant features in their internal and surface structures such as grains, pores or precipitates on the nanometer scale. package

An object containing a nano-object or a nano-structured material is not necessarily a nano-structured material by itself.

This section contains nanodispersions.

2 Describe the basic terminology of nanostructured materials

2.1

Nanoscale nanoscale

It is in the size range between about 1 nm and 100 nm.

Note 1. This size range typically, but not exclusively, exhibits characteristics that cannot be extrapolated from larger sizes. For these characteristics, the upper and lower limits are similar.

Note 2. The purpose of introducing a lower limit (about 1 nm) in this definition is to avoid that a single or a small cluster of atoms is defaulted to a nano-object or nano when no lower limit is set.

Meter structure unit.

[GB/T 30544.1-2014, definition 2.1]

2.2

Nano object nano-object

A material with a one-, two-, or three-dimensional external dimension at the nanoscale (2.1).

Note. A generic term for all nanoscale objects that are separated from each other.