



BSI Standards Publication

## Nanotechnologies — Vocabulary

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Part 3: Carbon nano-objects

## National foreword

This Published Document is the UK implementation of CEN ISO/TS 80004-3:2020. It is identical to ISO/TS 80004-3:2020. It supersedes PD CEN ISO/TS 80004-3:2014, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee NTI/1, Nanotechnologies.

A list of organizations represented on this committee can be obtained on request to its committee manager.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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**Nanotechnologies - Vocabulary - Part 3: Carbon nano-objects (ISO/TS 80004-3:2020)**

Nanotechnologies - Vocabulaire - Partie 3: Nano-objets carbonés (ISO/TS 80004-3:2020)

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## European foreword

This document (CEN ISO/TS 80004-3:2020) has been prepared by Technical Committee ISO/TC 229 "Nanotechnologies" in collaboration with Technical Committee CEN/TC 352 "Nanotechnologies" the secretariat of which is held by AFNOR.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes CEN ISO/TS 80004-3:2014.

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## Endorsement notice

The text of ISO/TS 80004-3:2020 has been approved by CEN as CEN ISO/TS 80004-3:2020 without any modification.

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared jointly by Technical Committee ISO/TC 229, *Nanotechnologies*, and Technical Committee IEC/TC 113, *Nanotechnology for electrotechnical products and systems*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 352, *Nanotechnologies*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement). The draft was circulated for voting to the national bodies of both ISO and IEC.

This second edition cancels and replaces the first edition (ISO/TS 80004-3:2010), which has been technically revised throughout.

A list of all parts in the ISO/TS 80004 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

In the last three decades, various new forms of nanoscale carbon materials, including fullerenes, graphene and carbon nanotubes, have been discovered, synthesized and manufactured. These are promising materials for many industrial fields associated with nanotechnologies because of their unique electronic, electromagnetic, thermal, optical and mechanical properties.

In the context of increasing scientific knowledge and a growing number of technical terms in the field of nanotechnologies (see the Bibliography), the purpose of this document is to define important terms and concepts for carbon nano-objects in a precise and consistent manner, while clarifying their interrelationship, as well as their relationship, to existing terms previously used for conventional carbon materials.

This document belongs to a multi-part vocabulary covering the different aspects of nanotechnologies. Most of the definitions in this document are deliberately determined so as to be in harmony with a rational hierarchical system of terminology under development for nanotechnologies, although in some cases the hierarchical approach needs to be compromised due to the specific usage of individual terms. ISO/TS 80004-13 further complements this document by providing terms and definitions for graphene and related two-dimensional (2D) materials. A subset of these terms is only noted herein.

# Nanotechnologies — Vocabulary —

## Part 3: Carbon nano-objects

### 1 Scope

This document defines terms related to carbon nano-objects in the field of nanotechnologies.

It is intended to facilitate communication between organizations' and individuals' research, industry and other interested parties and those who interact with them. Additional terms and definitions for graphene and two-dimensional materials (2D) materials are provided in ISO/TS 80004-13.

Related carbon nanoscale materials are given in [Annex A](#).

### 2 Normative references

There are no normative references in this document.

### 3 Terms and definitions

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

#### 3.1 Basic terms used in the description of carbon nano-objects

##### 3.1.1

##### **nanoscale**

length range approximately from 1 nm to 100 nm

Note 1 to entry: Properties that are not extrapolations from a larger size are predominantly exhibited in this length range.

[SOURCE: ISO/TS 80004-1:2015, 2.1]

##### 3.1.2

##### **nanomaterial**

material with any external dimension in the *nanoscale* (3.1.1) or having internal structure or surface structure in the nanoscale

Note 1 to entry: This generic term is inclusive of *nano-object* (3.1.3) and *nanostructured material* (3.1.4).

Note 2 to entry: See also “engineered nanomaterial”, “manufactured nanomaterial” and “incidental nanomaterial”.

[SOURCE: ISO/TS 80004-1:2015, 2.4]

##### 3.1.3

##### **nano-object**

discrete piece of material with one, two or three external dimensions in the *nanoscale* (3.1.1)

Note 1 to entry: The second and third external dimensions are orthogonal to the first dimension and to each other.