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Nanotehnologije - Slovar - 6. del: Karakterizacija nanoobjektov (ISO/TS 80004-6:2013)

Nanotechnologies - Vocabulary - Part 6: Nano-object characterization (ISO/TS 80004-6:2013)

Nanotechnologien - Fachwörterverzeichnis - Teil 6: Charakterisierung von Nanoobjekten (ISO/TS 80004-6:2013)

Nanotechnologies - Vocabulaire - Partie 6: Caractérisation des nano-objets (ISO/TS 80004-6:2013)

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Foreword

The text of ISO/TS 80004-6:2013 has been prepared by Technical Committee ISO/TC 229 “Nanotechnologies” of the International Organization for Standardization (ISO) and has been taken over as CEN ISO/TS 80004-6:2015 by Technical Committee CEN/TC 352 “Nanotechnologies” the secretariat of which is held by AFNOR.

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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.

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ISO/TS 80004-6 was prepared jointly by Technical Committee ISO/TC 229, *Nanotechnologies* and Technical Committee IEC/TC 113, *Nanotechnology standardization for electrical and electronic products and systems*. The draft was circulated for voting to the national bodies of both ISO and IEC.

Documents in the 80000 to 89999 range of reference numbers are developed by collaboration between ISO and IEC.

ISO/TS 80004 consists of the following parts, under the general title *Nanotechnologies — Vocabulary*:

- — *Part 1: Core terms*
- — *Part 3: Carbon nano-objects*
- — *Part 4: Nanostructured materials*
- — *Part 5: Nano/bio interface*
- — *Part 6: Nano-object characterization*
- — *Part 7: Diagnostics and therapeutics for healthcare*
- — *Part 8: Nanomanufacturing processes*

The following parts are under preparation:

- — *Part 2: Nano-objects: Nanoparticle, nanofibre and nanoplate*[1)]
- — *Part 9: Nano-enabled electrotechnical products and systems*
- — *Part 10: Nano-enabled photonic components and systems*
- — *Part 11: Nanolayer, nanocoating, nanofilm, and related terms*

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1) Revision of ISO/TS 27687:2008, *Nanotechnologies — Terminology and definitions for nano-objects — Nanoparticle, nanofibre and nanoplate*.

— *Part 12: Quantum phenomena in nanotechnology*

Graphene and other two dimensional materials will form the subject of a future Part 13.

Introduction

Measurement and instrumentation techniques have effectively opened the door to modern nanotechnology. Characterization is key to understanding the properties and function of all nano-objects.

Nano-object characterization involves interactions between people with different backgrounds and from different fields. Those interested in nano-object characterization might, for example, be materials scientists, biologists, chemists or physicists and might have a background that is primarily experimental or theoretical. Those making use of the data extend beyond this group to include regulators and toxicologists. To avoid any misunderstandings, and to facilitate both comparability and the reliable exchange of information, it is essential to clarify the concepts, to establish the terms for use and to establish their definitions.

The terms are classified under the following broad headings:

- Clause 2: General terms
- Clause 3: Terms related to size and shape measurement
- Clause 4: Terms related to chemical analysis
- Clause 5: Terms related to measurement of other properties

These headings are intended as guide only, as some techniques can determine more than one property. Subclause 3.1 lists the overarching measurands that apply to the rest of Clause 3. Other measurands are more technique specific and are placed in the text adjacent to the technique.

It should be noted that most techniques require analysis in a non-native state and involve sample preparation, for example placing the nano-objects on a surface or placing it in a specific fluid or vacuum. This could change the nature of the nano-objects.

The order of the techniques in this document should not be taken to indicate a preference and the techniques listed in this document are not intended to be exhaustive. Equally, some of the techniques listed in this document are more popular than others in their usage in analysing certain properties of nano-objects. Table 1 lists alphabetically the main current techniques for nano-object characterization.

Table 1 — Alphabetical list of main current techniques for nano-object characterization

Property	Current main techniques
Size	atomic force microscopy (AFM), centrifugal liquid sedimentation (CLS), differential mobility analysing system (DMAS), dynamic light scattering (DLS), scanning electron microscopy (SEM), particle tracking analysis (PTA), transmission electron microscopy (TEM)
Shape	atomic force microscopy (AFM), scanning electron microscopy (SEM), transmission electron microscopy (TEM)
Surface area	Brunauer-Emmett-Teller (BET) method
'Surface' chemistry	secondary ion mass spectrometry (SIMS), X-ray photoelectron spectroscopy (XPS)
Chemistry of the 'bulk' sample	inductively coupled plasma mass spectrometry (ICP-MS), nuclear magnetic resonance spectroscopy (NMR)
Charge in suspensions	zeta potential

This document is intended to serve as a starting reference for the vocabulary that underpins measurement and characterization efforts in the field of nanotechnologies.