



SLOVENSKI STANDARD
SIST-TS CEN ISO/TS 80004-13:2024

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Nanotehnologije - Slovar - 13. del: Grafen in drugi dvodimenzionalni (2D) materiali (ISO/TS 80004-13:2024)

Nanotechnologies - Vocabulary - Part 13: Graphene and other two-dimensional (2D) materials (ISO/TS 80004-13:2024)

Nanotechnologien - Fachwörterverzeichnis - Teil 13: Graphen und andere zweidimensionale (2D) Werkstoffe (ISO/TS 80004-13:2024)

Nanotechnologies - Vocabulaire - Partie 13: Graphène et autres matériaux bidimensionnels (2D) (ISO/TS 80004-13:2024)

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[SIST-TS CEN ISO/TS 80004-13:2024](https://standards.metatatalog.com/standards/sist-ts/80004-13:2024)

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**Nanotechnologies - Vocabulary - Part 13: Graphene and
other two-dimensional (2D) materials (ISO/DTS 80004-
13:2024)**

Nanotechnologies - Vocabulaire - Partie 13: Graphène
et autres matériaux bidimensionnels (2D) (ISO/DTS
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Graphen und andere zweidimensionale (2D)
Werkstoffe (ISO/DTS 80004-13:2024)

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European foreword

This document (CEN ISO/TS 80004-13:2024) 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.

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Endorsement notice

The text of ISO/TS 80004-13:2024 has been approved by CEN as CEN ISO/TS 80004-13:2024 without any modification.

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Technical Specification

ISO/TS 80004-13

Nanotechnologies — Vocabulary — Part 13: Graphene and other two- dimensional (2D) materials

Nanotechnologies — Vocabulaire —

Partie 13: Graphène et autres matériaux bidimensionnels (2D)

**Second edition
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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

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 document 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 or www.iec.ch/members_experts/refdocs).

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This document was prepared jointly by Technical Committee ISO/TC 229, *Nanotechnologies*, and Technical Committee IEC/TC 113, *Nanotechnology for electrotechnical products and systems*, and 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 80004-13:2017) which has been technically revised.

The main changes are as follows:

- addition of the term "graphene-related 2D material (GR2M)";
- expansion of defined terms to include "enhanced", "modified", "enabled" and "based", and derivatives thereof;
- indication that use of some terms are deprecated.

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

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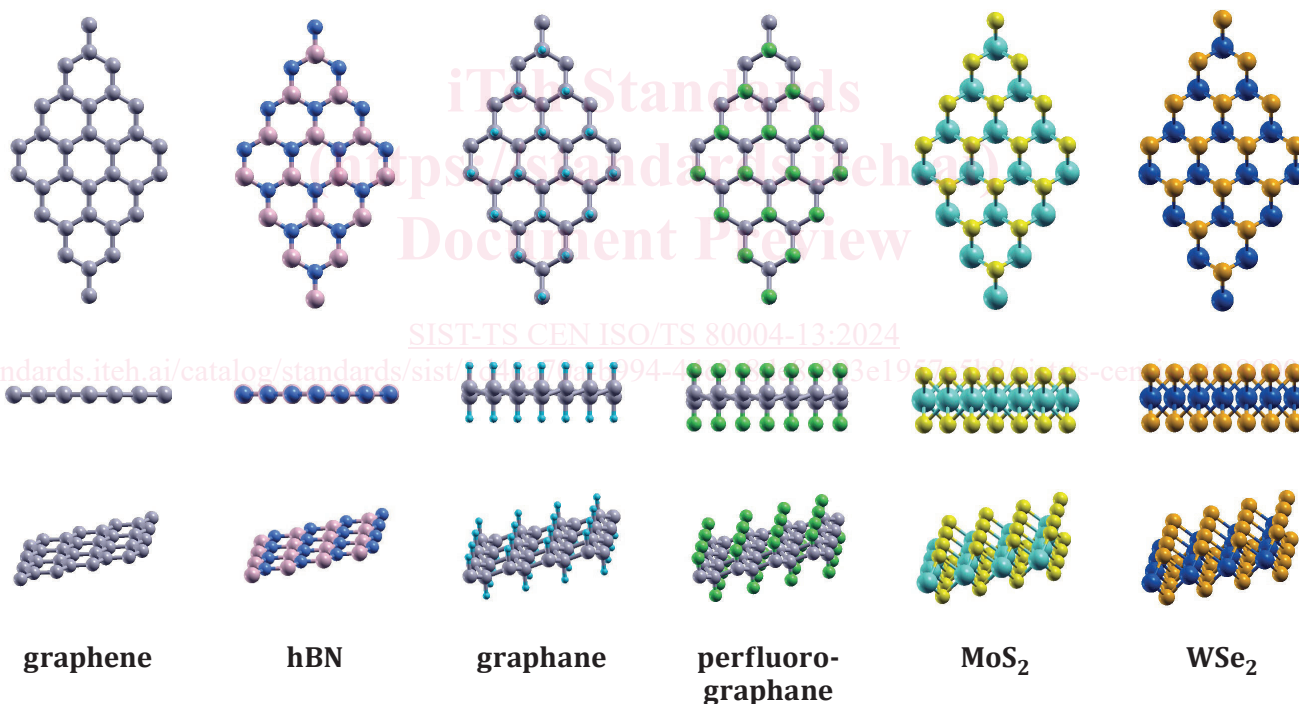
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Introduction

Over the last decade, huge interest has arisen in graphene, both scientifically and commercially, due to the many exceptional properties associated with this material, such as the electrical and thermal conductivity. More recently, other materials with a structure similar to that of graphene have also shown promising properties, including:

- monolayer and few-layer versions of hexagonal boron nitride (hBN);
- transition metal dichalcogenides such as molybdenum disulphide (MoS_2) and tungsten diselenide (WSe_2);
- silicene and germanene;
- layered assemblies of mixtures of these materials.

These materials have their thickness constrained within the nanoscale or smaller and consist of between one and several layers. These materials are thus termed two-dimensional (2D) materials as they have one dimension at the nanoscale or smaller, with the other two dimensions generally at scales larger than the nanoscale. A layered material consists of 2D layers weakly stacked or bound to form three-dimensional structures. Examples of 2D materials and the different stacking configurations in graphene are shown in [Figure 1](#). 2D materials are not necessarily topographically flat in reality and can have a buckled structure. They can also form aggregates and agglomerates which can have different morphologies. 2D materials are an important subset of nanomaterials.



- a) Examples of different 2D materials consisting of different elements and structures, as shown by the different coloured orbs and top-down and side views**