



BSI Standards Publication

**Nanotechnologies — Characterization of
single-wall carbon nanotubes using near
infrared photoluminescence spectroscopy**

National foreword

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**Nanotechnologies — Characterization
of single-wall carbon nanotubes using
near infrared photoluminescence
spectroscopy**

*Nanotechnologies — Caractérisation de nanotubes de carbone
monofeuillet en utilisant la spectroscopie de photoluminescence dans
le proche infra-rouge*





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Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Principles of band gap photoluminescence of SWCNTs	2
4.1 Structure of SWCNTs.....	2
4.2 Band structure and PL peaks.....	3
4.3 Exciton effects.....	4
5 NIR-PL apparatus	5
5.1 NIR-PL spectrometer.....	5
5.2 Light source.....	5
6 Sample preparation methods	6
6.1 Preparation of dispersion for measurement.....	6
6.2 Preparation of solid film dispersion for measurement.....	6
7 Measurement procedures	7
8 Data analysis and results interpretation	7
8.1 Empirical rules for structural assignment.....	7
8.2 Determination of the chiral indices of the semi-conducting SWCNTs in a sample.....	8
9 Uncertainties	9
10 Test report	9
Annex A (informative) Case studies	10
Bibliography	16

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).

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).

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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.

This document was prepared by Technical Committee ISO/TC 229, *Nanotechnologies*.

This second edition cancels and replaces the first edition (ISO/TS 10867:2010), which has been technically revised.

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.

Introduction

The discovery of the band-gap photoluminescence (PL) of single-wall carbon nanotubes (SWCNTs) has provided a useful method to characterize their unique electronic properties induced by their low-dimensionality. This method is described in this document.

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Nanotechnologies — Characterization of single-wall carbon nanotubes using near infrared photoluminescence spectroscopy

1 Scope

This document gives guidelines for the characterization of single-wall carbon nanotubes (SWCNTs) using near infrared (NIR) photoluminescence (PL) spectroscopy.

It provides a measurement method for the determination of the chiral indices of the semi-conducting SWCNTs in a sample and their relative integrated PL intensities.

The method can be expanded to estimate the relative mass concentrations of semi-conducting SWCNTs in a sample from their measured integrated PL intensities and knowledge of their PL cross-sections.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/TS 80004-4, *Nanotechnologies — Vocabulary — Part 4: Nanostructured materials*

ISO/TS 80004-6, *Nanotechnologies — Vocabulary — Part 6: Nano-object characterization*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TS 80004-4, ISO/TS 80004-6 and the following apply.

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

chirality

vector notation used to describe the structure of a single-wall carbon nanotube (SWCNT)

3.2

chiral indices

two integers that define the chiral vector of a single-wall carbon nanotube (SWCNT)

3.3

relative mass concentration

mass concentration of a nanotube species relative to that of the most common nanotube species