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

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Foreword

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Introduction

Discovery of band gap photoluminescence (PL) of single-wall carbon nanotubes (SWCNTs) has provided a new way to characterize their unique electronic properties induced by their low dimensionality. The method can provide the chiral indices of the semi-conducting SWCNTs in a sample and their relative integrated PL intensities. With the knowledge of their PL cross-sections, the relative mass concentrations of semi-conducting SWCNTs in a sample can be estimated.

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

1 Scope

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

This Technical Specification provides a measurement method for the determination of the chiral indices of the semi-conducting SWCNT in a sample and their relative integrated PL intensities.

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

2 Normative references

The following referenced documents are indispensable for the application 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 80004-3, *Nanotechnologies — Vocabulary — Part 3: Carbon nano-objects*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TS 80004-3 and the following apply.

3.1
chiral vector of SWCNT
vector notation used to describe the helical structure of a single-wall carbon nanotube

[ISO/TS 80004-3:2010, definition 4.5]

3.2
chiral indices
two integers that define the chiral vector of a single-wall carbon nanotube

3.3
relative mass concentration
mass concentration of nanotube species relative to that of the most common nanotube species

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