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Nanotechnologies – A guideline for ellipsometry application to evaluate the thickness of nanoscale films

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NANOTECHNOLOGIES – A GUIDELINE FOR ELLIPSOMETRY APPLICATION TO EVALUATE THE THICKNESS OF NANOSCALE FILMS

FOREWORD

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IEC TR 63258, which is a Technical Report, has been prepared by IEC technical committee 113: Nanotechnology for electrotechnical products and systems, in collaboration with ISO technical committee 229: Nanotechnologies.

It is published as a double logo document.

The text of this Technical Report is based on the following documents:

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Full information on the voting for the approval of this Technical Report can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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- replaced by a revised edition, or
- amended.

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INTRODUCTION

Ellipsometry is a powerful optical technique to evaluate the dielectric properties of thin films. Ellipsometry can be used to characterize thickness, roughness, composition, crystalline nature, and other properties of nanomaterials, and is frequently used to warrant the quality and the performance of thin-film growth equipment. The signal depends on the change in the optical response of incident light that interacts with the nanomaterial being investigated.

Many current and emerging electrotechnical devices employ nanomaterials in the form of thin films. Therefore, it is important to develop a measurement protocol to evaluate the thickness of such films with sufficient accuracy. This document describes the practical considerations that need to be taken into account in using ellipsometry to evaluate the thickness of nanoscale films.

NANOTECHNOLOGIES – A GUIDELINE FOR ELLIPSOMETRY APPLICATION TO EVALUATE THE THICKNESS OF NANOSCALE FILMS

1 Scope

This document, which is a Technical Report, is focused on the practical protocol of ellipsometry to evaluate the thickness of nanoscale films. This document does not include any specification of the ellipsometers, but suggests how to minimize the data variation to improve data reproducibility.

This document includes

– outlines of the ellipsometry procedures,
– methods of interpretation of results and discussion of data analysis, and
– case studies.

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 80004-1, *Nanotechnologies –Vocabulary – Part 1: Core terms*