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Optics and photonics — Optical materials and components — Characterization of optical materials used in the infrared spectral range from 0,78 µm to 25 µm

Optique et photonique — Matériaux et composants optiques — Caractérisation des matériaux optiques utilisés dans la bande spectrale infrarouge de 0,78 µm à 25 µm

Reference number
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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.

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 172, *Optics and photonics*, Subcommittee SC 3, *Optical materials and components*.

This second edition cancels and replaces the first edition (ISO 11382:2010), which has been technically revised.

The main changes are as follows:

— update of Clause 2 and Bibliography;

— update of Table 1 and Table 2.

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.

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Introduction

Many standards for optical glass exist that are primarily used for the visible range, however, it is not easy to apply these standards directly to infrared materials.

Often, the properties of infrared materials are known with less certainty than those used in the visible range because the methods of measurements are different, incomplete or inaccurate.

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Optics and photonics — Optical materials and components — Characterization of optical materials used in the infrared spectral range from 0,78 µm to 25 µm

1 Scope

This document provides guidelines for the description of data sheets for infrared materials. It specifies the nomenclature and the properties of infrared materials which are reported on such data sheets. These data sheets do not necessarily contain information on every property identified in this document.

This document also specifies the parameters needed to characterize optical materials intended for use in the infrared spectral range from 0,78 µm to 25 µm and provides various methods to be used for measuring these parameters.

This document is applicable only to materials used in the manufacture of passive optical components. The properties of materials used in active applications (e.g. optoelectronics) are not taken into account.

Materials specified in this document can also transmit in other spectral domains (microwaves, visible or ultraviolet).

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 10110-18, *Optics and photonics — Preparation of drawings for optical elements and systems — Part 18: Stress birefringence, bubbles and inclusions, homogeneity, and striae*

ISO 12123:2018, *Optics and photonics — Specification of raw optical glass*

ISO 15368, *Optics and photonics — Measurement of reflectance of plane surfaces and transmittance of plane parallel elements*

ISO 80000-7, *Quantities and units — Part 7: Light and radiation*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12123, ISO 80000-7 and the following apply[1)].

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
regular transmittance
ratio of the regularly transmitted part of the (whole) transmitted flux to the incident flux

1) These terms and definitions are consistent with those given in IEC 60050-845 and ISO/IEC Guide 98-3.

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3.2
regular reflectance
specular reflectance
ratio of the regularly reflected part of the (whole) reflected flux to the incident flux

3.3
absorptance
ratio of the absorbed radiant flux to the incident flux

3.4
scatter
scatterance
ratio of the scattered radiant flux to the incident flux

3.5
standard uncertainty
uncertainty of the result of a measurement expressed as a standard deviation

3.6
expanded uncertainty
quantity defining an interval about the result of a measurement that may be expected to encompass a large fraction of the distribution of values that could reasonably be attributed to the measurand

4 Symbols and units

For the purposes of this document, the following symbols and units apply.

d thickness of the sample, expressed in millimetres

α absorptance

δ scatter

λ wavelength, expressed in micrometres

ρ reflectance

τ transmittance

5 Nomenclature

5.1 General

The optical materials covered by this document shall be identified as follows:

a) the name (see 5.2);

b) the manufacturer reference (see 5.3);

c) the material structure (optional) (see 5.4);

d) the manufacturing process (see 5.5);

e) a reference to this document, i.e. ISO 11382:2022.

5.2 Name

Either the trademark or the generic name (e.g. germanium or sapphire), followed by reference to the method of manufacture, shall be given in the nomenclature.

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