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Fine Ceramics (Advanced Ceramics, Advanced Technical Ceramics) — Determination of antiviral activity of semiconducting photocatalytic materials — Test method using bacteriophage Q-beta

Céramiques techniques — Détermination de l'activité antivirale des matériaux photocatalytiques semi-conducteurs — Méthode d'essai utilisant le bactériophage Q-beta

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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).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 206, *Fine ceramics*.

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Introduction

This International Standard applies to testing the antiviral activity of photocatalytic ceramics and other materials produced by either coating or mixing of a photocatalyst. The International Standard for testing the antibacterial activity that use photocatalytic materials has been published as ISO 27447. The International Standard for testing the antifungal activity that use photocatalytic materials has also been published as ISO 13125.

The test method for cloths or textiles is not included in this International Standard because of lack of photocatalytic cloths or textiles with antiviral activity using photocatalytic activity. When photocatalytic cloths or textiles with antiviral activity using photocatalytic activity have been developed, a test method for photocatalytic cloths or textiles will be proposed with the glass adhesion method in ISO 27447.

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Fine Ceramics (Advanced Ceramics, Advanced Technical Ceramics) — Determination of antiviral activity of semiconducting photocatalytic materials — Test method using bacteriophage Q-beta

WARNING — Only personnel trained in microbiological techniques should carry out tests.

1 Scope

The test method in this International Standard specifies the determination of the antiviral activity of materials that contain photocatalytic materials or have photocatalytic films on the surface, by enumerating the destruction of bacteriophage Q-beta after irradiation of ultraviolet light.

NOTE In this test method, the surrogate microbe is bacteriophage Q-beta, intended as a model for Influenza viruses.

The test method in this International Standard is intended for use with different kinds of semiconducting photocatalytic materials used in construction materials, in flat sheet, board, or plate shape that are the basic forms of materials for various applications. It does not include powder, granular, or porous photocatalytic materials.

The test method in this International Standard is applicable to photocatalytic materials produced for an antiviral application. Other types of performance of photocatalytic materials, i.e. antibacterial activity, antifungal activity, decomposition of water contaminants, self-cleaning, antifogging, and air purification, are not determined by this test method.

The values expressed in this International Standard are in accordance with the International System of Units (SI).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 10677, *Fine ceramics (advanced ceramics, advanced technical ceramics) — Ultraviolet light source for testing semiconducting photocatalytic materials*

ISO 27447, *Fine ceramics (advanced ceramics, advanced technical ceramics) — Test method for antibacterial activity of semiconducting photocatalytic materials*

ISO 80000-1, *Quantities and units — Part 1: General*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
photocatalyst
substance that carries out many functions based on oxidization and reduction reactions under photoirradiation, including decomposition and removal of air and water contaminants, deodorization, and antiviral, antibacterial, antifungal, self-cleaning, and antifogging actions

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3.2
photocatalytic materials
materials in which, or on which, the photocatalyst is added by coating, impregnation, mixing, etc.

Note 1 to entry: Photocatalytic materials are used for building and road construction materials to obtain the functions mentioned in 3.1.

3.3
antiviral
condition decreasing the infectivity of viruses on the surface of materials

3.4
bacteriophage
type of virus which infects bacteria

Note 1 to entry: The bacteriophage used in this test method is Q-beta that is one of F-specific RNA phages. The bacteriophage Q-beta is not pathogenic to humans and animals but serves to simulate Influenza viruses that are pathogenic to humans.

Note 2 to entry: Example of test results with Influenza virus and bacteriophage Q-beta are given in Annex A.

3.5
plaque
visible, clear area which is theoretically the result of infection and lysis of host cells by a single viable bacteriophage

3.6
photocatalyst antiviral activity value
difference value between the logarithms of the total number of bacteriophage plaques on photocatalytic treated materials after UV irradiation and on non-treated materials after UV irradiation

Note 1 to entry: This value includes the decrease of number of bacteriophage plaques without UV irradiation.

3.7
photocatalyst antiviral activity value for UV irradiation
difference between the logarithms of the total number of bacteriophage plaques on photocatalytic treated materials after UV irradiation and on photocatalytic treated materials kept in the dark

4 Symbols

A	average of titre of bacteriophage on non-treated specimens, just after inoculation
B_D	average of titre of bacteriophage on non-treated specimens, after being kept in a dark place
B_L	average of titre of bacteriophage on non-treated specimens, after UV irradiation of intensity L
C_D	average of titre of bacteriophage on photocatalytic treated specimens, after being kept in a dark place
C_L	average of titre of bacteriophage on photocatalytic treated specimens, after UV irradiation of intensity L
D_F	dilution factor
L	UV irradiation intensity
Log_{max}	maximum logarithmic value of titre of bacteriophage
Log_{mean}	average logarithmic value of titre of bacteriophage for three non-treated specimens

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