
**Fine ceramics (advanced ceramics,
advanced technical ceramics) — Test
method for self-cleaning performance of
semiconducting photocatalytic
materials — Measurement of water
contact angle**

*Céramiques techniques — Méthode d'essai de la performance auto
nettoyante des matériaux photocatalytiques semiconducteurs —
Mesurage de l'angle de contact de l'eau*



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Foreword

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 27448 was prepared by Technical Committee ISO/TC 206, *Fine ceramics*.

Introduction

Under the illumination of ultraviolet (UV) light, photocatalysts show diverse functions, such as the decomposition of air and water contaminants, as well as deodorization, self-cleaning, antifogging and antibacterial actions. These functions of photocatalysts are generally based on the action of active oxygen species such as hydroxyl (OH) radicals formed on the surface of photocatalysts. The energy- and labour-saving nature of photocatalysis has attracted keen interest when the photocatalyst is activated by sunlight (or artificial lighting).

Practical applications of photocatalysts, for both indoor and outdoor use, have rapidly expanded in recent years. Many kinds of photocatalytic materials have been proposed or are already commercialized, based on ceramics, glass, concrete, plastics, paper, etc. Such materials are produced by either coating or mixing of a photocatalyst, in most cases, titanium dioxide (TiO₂).

However, the effect of photocatalysts is not easily inspected visually, and no appropriate and official evaluation methods have been available to date. Some confusion has thus arisen as photocatalytic products have been introduced. Furthermore, the above-mentioned diverse functions of photocatalysts cannot be evaluated with a single method; thus, different evaluation methods are provided for self-cleaning, water decontamination, air purification and anti-bacterial actions, respectively.

As a result of continuing efforts to provide test methods for photocatalytic materials, this International Standard (covering the measurement of the water contact angle) for self-cleaning performance was prepared. For permeable, rough, or highly hydrophobic surfaces, etc., other test methods are required and are being developed.

It must be noted that self-cleaning performance could be evaluated with photo-induced hydrophylic property and photocatalytic decomposition ability, because many field test results concerning the self-cleaning properties of TiO₂-coated materials are in good agreement with the indexes obtained by measurement of the water contact angle and degradation of methylene blue.

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1 Scope

This International Standard deals with fine ceramics.

This International Standard specifies a test method for the determination of the self-cleaning performance of materials that contain a photocatalyst or have photocatalytic films on the surface, and which are usually made from semiconducting metal oxides such as titanium dioxide.

This method is used to measure the water contact angle under illumination with ultraviolet light, which is one of the indices influencing the self-cleaning performance of photocatalytic materials.

This International Standard does not include water-permeable substrates, rough surfaces which do not have exposed water droplets, highly hydrophobic, powder or granular materials, or visible light-sensitive photocatalysts.

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 3534-1:2006, *Statistics — Vocabulary and symbols — Part 1: General statistical terms and terms used in probability*

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 one or more functions based on oxidization and reduction reactions under photoirradiation, including decomposition and removal of air and water contaminants, deodorization, and antibacterial, self-cleaning and antifogging actions

3.2

photocatalytic materials

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

NOTE Such photocatalytic materials are intended for use as building and road construction materials to obtain the functions mentioned in 3.1.