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**Nanotechnologies — Testing  
the photocatalytic activity of  
nanoparticles for NADH oxidation**

*Nanotechnologies — Test de l'activité photocatalytique des  
nanoparticules pour l'oxydation du NADH*

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# Contents

Page

|                                                                                                   |           |
|---------------------------------------------------------------------------------------------------|-----------|
| <b>Foreword</b>                                                                                   | <b>iv</b> |
| <b>Introduction</b>                                                                               | <b>v</b>  |
| <b>1 Scope</b>                                                                                    | <b>1</b>  |
| <b>2 Normative references</b>                                                                     | <b>1</b>  |
| <b>3 Terms, definitions, symbols and abbreviated terms</b>                                        | <b>1</b>  |
| 3.1 Terms and definitions                                                                         | 1         |
| 3.2 Symbols and abbreviated terms                                                                 | 2         |
| <b>4 Description of the test method</b>                                                           | <b>3</b>  |
| <b>5 Reagents and apparatus</b>                                                                   | <b>3</b>  |
| 5.1 Reagents                                                                                      | 3         |
| 5.2 Apparatus                                                                                     | 4         |
| <b>6 Measurement procedure</b>                                                                    | <b>4</b>  |
| 6.1 Measurement of NP suspension basic properties                                                 | 4         |
| 6.1.1 UV-Vis absorption spectrum measurement                                                      | 4         |
| 6.1.2 NP suspension stability measurement                                                         | 5         |
| 6.2 UV trans-illuminator light intensity calibration based on 2NB actinometry                     | 5         |
| 6.3 Measurement of NADH solution fluorescence intensity                                           | 6         |
| 6.3.1 NADH photo-oxidation rate measurement at various NP concentrations                          | 6         |
| 6.3.2 Calculation of NADH photo-oxidation rate at various NP concentrations                       | 7         |
| <b>7 Test report</b>                                                                              | <b>8</b>  |
| 7.1 Information                                                                                   | 8         |
| 7.2 Report data format                                                                            | 9         |
| 7.2.1 Correction factors $C(i,j)$ obtained by actinometry (see 7.2) with $\lambda(\text{max,TI})$ | 9         |
| 7.2.2 Calibrated slope of NADH fluorescence decrease                                              | 9         |
| 7.2.3 Plot of $k_{\text{app}}$ versus NP concentration                                            | 10        |
| 7.2.4 NADH equivalent specific PCA                                                                | 10        |
| <b>8 Precision</b>                                                                                | <b>10</b> |
| 8.1 Repeatability                                                                                 | 10        |
| 8.2 Reproducibility                                                                               | 10        |
| <b>Annex A (normative) Schematic diagram of 96-well positioning block</b>                         | <b>11</b> |
| <b>Annex B (informative) Sample calibration of UV trans-illuminator light intensity</b>           | <b>12</b> |
| <b>Annex C (informative) Interlaboratory comparison study of <math>\text{TiO}_2</math> NP PCA</b> | <b>17</b> |
| <b>Bibliography</b>                                                                               | <b>22</b> |

## Foreword

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This document was prepared by Technical Committee ISO/TC 229, *Nanotechnologies*.

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## Introduction

Photocatalytic activity (PCA) is the measure of capacity of a material to promote a specific photochemical reaction under defined conditions (as defined in ISO 20507:2014, 2.3.31). With the expanding use of nanomaterials in various industries, the possible impacts on human health and the environment due to the enhancement of detrimental chemical reactions in the presence of light (both natural and artificial) is an ongoing concern. The absorption of a photon with sufficient energy generates an electron-hole pair that can migrate to the nanoparticle (NP) surface and react with water and oxygen, thus forming extremely reactive radicals and reactive oxygen species (ROS). Generation of the ROS by some wide-bandgap materials, such as  $\text{TiO}_2$ ,  $\text{ZnO}$ ,  $\text{WO}_3$ ,  $\text{CeO}_2$ , carbon nanotubes, quantum dots and some metal NPs when illuminated by UV-VIS light, can cause oxidative stress, resulting in toxic effects in living organisms<sup>[5]</sup>. Therefore, measuring the nanomaterial PCA under physiological conditions allows for an assessment of its photo-toxicity potency.

Existing standard test methods for particle and surface PCA measurement (see ISO 10676 and ISO 10678) are not directly applicable to determine nanomaterial PCA leading to photo-toxicity, as they require a large test volume and/or long measurement duration, while utilizing organic dyes as indicators that are not biocompatible.

The in vitro NP PCA test for NADH oxidation is intended to evaluate the nanomaterial photo-toxicity potency when exposed to an ultraviolet (UV) light.

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