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Nanotechnologies — Antibacterial silver nanoparticles — Specification of characteristics and measurement methods

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National foreword

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Foreword

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

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Introduction

Silver nanoparticles have become one of the most widely utilized nanomaterials in consumer products for their antibacterial properties. The application of silver nanoparticles is increasingly being adopted in consumer products to control the growth of microorganisms on the surfaces or interiors of products. When silver nanoparticles interact with microorganisms silver ions are released, and these ions may affect and damage microorganisms in different ways. However, the mechanism behind the bactericidal effect is not well known[1]. There have been several possible mechanisms proposed in the scientific literature: 1) silver ions with positive electricity released from silver nanoparticles are able to rapidly bind to sulfhydryl groups on the surfaces of bacteria, which leads the structures of bacteria to change and become damaged, 2) the uptake of silver ions or small nanoparticles disrupts adenosine triphosphate production and DNA replication, and 3) silver nanoparticles and ions generate reactive oxygen species resulting in oxidative damage[2]-[4]. Other scientific evidence of the antibacterial performance of silver nanoparticle is listed in Annex B. The antibacterial properties of silver nanoparticles are related to their physicochemical characteristics.

Although antibacterial products that utilize silver nanoparticle are widely distributed in the market, most of these products are sold without providing information on the physicochemical and corresponding antibacterial characteristics of nanoparticles. Currently, most manufacturers provide specifications based on their own practices.

This document provides guidance for the specification of characteristics and relevant recommended measurement methods, referenced from other standards for silver nanoparticles in powder and colloidal forms that are intended for antibacterial applications in nanotechnology. The major measurement methods available to industry for the determination of parameters specified in this document are of course recommended in the specification. This document reviews selected measurement methods that are commonly used at present, and therefore will require updating on a regular basis.

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