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Surface chemical analysis — Determination of the minimum detectability of surface plasmon resonance device

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Foreword

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This document was prepared by Technical Committee ISO/TC 201, *Surface chemical analysis*.

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.

Introduction

The surface plasmon resonance (SPR) is the term used for the real time chemical contents analysing device. The chemical ingredient dissolved in buffer solvent causes the dielectric constant change compared to the buffer solvent. Changes in the dielectric constant of the solution modify the resonance condition of the surface plasmon coupling at the interface between metal (mostly gold or functionalized gold) and solution channel. So the reflection from the interface has the dip corresponding to the surface plasmon components which is evanescent. The change of the reflection spectrum is analysed by a charge coupled device (CCD) and the change of the spectrum dip represents the absolute amount of the surface existing chemical component at the interface. The determination of the dynamic range of the chemical analysis depends on the upper limit and lower limit of the detectability of the SPR device. The objective of this document is to provide the standardized definition of lower limit of detection and experimental protocol of measuring the lowest detectability of the SPR device. To avoid the complex and unwanted chemical interaction between the metal surface and the analyte, a single chemical solute method is presented, suitable for use by non-expert operators. That provides users with the fundamental capability of the SPR device.

Surface chemical analysis — Determination of the minimum detectability of surface plasmon resonance device

1 Scope

This document describes a method for determining the minimum detectability of surface plasmon resonance device. This document is applicable to surface plasmon resonance devices of the white-light illumination type and the laser illumination type with the angle scanning capability.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

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

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/

3.1.1
sensorgram
graph of responses versus time in surface plasmon resonance studies

3.2 Abbreviated terms

SPR	surface plasmon resonance
RU	response unit
CCD	charge coupled device
SD	standard deviation
DI	deionized

4 General information

4.1 Overview

Surface plasmon is the light-matter interaction due to the collective longitudinal coupling between the surface electrons and the excitation light at the metal/dielectric interface. The dispersion relation of surface plasmon mainly depends on the dielectric functions of metal and dielectric materials, thus the change of the dielectric constant of the dielectric material can change the resonant coupling of surface plasmon in different wavelength ranges. The coupled surface plasmon is basically an evanescent wave,