
**Surface chemical analysis — Analysis of
metal oxide films by glow-discharge
optical-emission spectrometry**

*Analyse chimique des surfaces — Analyse de films d'oxyde de métal
par spectrométrie d'émission optique à décharge lumineuse*



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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

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ISO/TS 25138 was prepared by Technical Committee ISO/TC 201, *Surface chemical analysis*, Subcommittee SC 8, *Glow discharge spectroscopy*.

Surface chemical analysis — Analysis of metal oxide films by glow-discharge optical-emission spectrometry

1 Scope

This Technical Specification describes a glow-discharge optical-emission spectrometric method for the determination of the thickness, mass per unit area and chemical composition of metal oxide films.

This method is applicable to oxide films 1 nm to 10 000 nm thick on metals. The metallic elements of the oxide can include one or more from Fe, Cr, Ni, Cu, Ti, Si, Mo, Zn, Mg, Mn and Al. Other elements that can be determined by the method are O, C, N, H, P and S.

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 14284, *Steel and iron — Sampling and preparation of samples for the determination of chemical composition*

ISO 14707, *Surface chemical analysis — Glow discharge optical emission spectrometry (GD-OES) — Introduction to use*

ISO 16962:2005, *Surface chemical analysis — Analysis of zinc- and/or aluminium-based metallic coatings by glow-discharge optical-emission spectrometry*

3 Principle

The analytical method described here involves the following processes:

- Cathodic sputtering of the surface metal oxide in a direct-current or radio-frequency glow-discharge device.
- Excitation of the analyte atoms in the plasma formed in the glow-discharge device.
- Spectrometric measurement of the intensities of characteristic spectral-emission lines of the analyte atoms as a function of sputtering time (depth profile).
- Conversion of the depth profile in units of intensity versus time to mass fraction versus depth by means of calibration functions (quantification). Calibration of the system is achieved by measurements on calibration specimens of known chemical composition and measured sputtering rate.