

INTERNATIONAL
STANDARD

ISO
8576

First edition
1996-12-15

**Optics and optical instruments —
Microscopes — Reference system of
polarized light microscopy**

*Optique et instruments d'optique — Microscopes — Système de
référence en microscopie de polarisation*

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Reference number
ISO 8576:1996(E)

ISO 8576:1996(E)**Foreword**

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International Standard ISO 8576 was prepared by Technical Committee ISO/TC 172, *Optics and optical instruments*, subcommittee SC 5, *Microscopes and endoscopes*.

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International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Optics and optical instruments — Microscopes — Reference system of polarized light microscopy

1 Scope

This International Standard establishes a reference system incorporating all calibrated motions of rotation and displacement on the microscope and its accessories so that the measuring procedures are uniform. Particular attention is given to the polarization parameters and measuring accessories such as rotary microscope stages, polarizing devices, and compensators.

2 Principles

The optical properties of an anisotropic, non-absorbing crystal of minimum symmetry under constant conditions of pressure, temperature and wavelength are described by a triaxial index ellipsoid. The lengths of the semi-axes are given by the principal refractive indices n_α and n_β and n_γ of the crystal. A random plane through the index ellipsoid containing the centre of the ellipsoid generally has the shape of an ellipse with the axes of length $n_{\alpha'}$ and $n_{\gamma'}$. By definition, the relationship $n_\alpha \leq n_{\alpha'} \leq n_\beta \leq n_{\gamma'} \leq n_\gamma$ is true.

All directions specified in observations in polarized light are referred to the direction of the highest refractive index n_γ .

NOTE — To emphasize that $|n_{\gamma'}| > |n_{\alpha'}|$ in an object, the subscripts γ and α are often used instead of γ' and α' .

The index ellipsoid of uniaxial crystals is a rotation ellipsoid. This is characterized by two principal axes specified by n_ω and n_ϵ , where ω refers to the ordinary and ϵ refers to the extraordinary vibration direction. The latter is the direction of the rotation axis. The following definitions are true:

$$n_\alpha = n_\beta = n_\omega \neq n_\gamma = n_\epsilon \text{ (positive)}$$

$$n_\gamma = n_\beta = n_\omega \neq n_\alpha = n_\epsilon \text{ (negative)}$$

i.e. if n_ϵ is larger than n_ω the crystal is uniaxial and optically positive; if n_ω is larger than n_ϵ the crystal is uniaxial and optically negative.

3 Reference system for rotation directions and displacements (see figure 1)

3.1 General

Generally, a positive Cartesian reference coordinate system x, y, z is used as a basis whose z -direction is determined by the privileged direction of light propagation from the lamp towards the observer. Accordingly, in observation through the ocular, rising angles u in planes perpendicular to z are read off in a counterclockwise direction, in the mathematically positive sense. This is true for upright and inverted microscopes.