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Microscopes — Vocabulary for light microscopy

Microscopes — Vocabulaire relatif à la microscopie optique

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Foreword

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This document was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 5, *Microscopes and endoscopes*.

This second edition cancels and replaces the first edition ISO 10934:2020, which has been technically revised.

The main changes are as follows:

— added new terms for light microscopy: airy beam, Bessel beam, achromatic condenser, detection path, extinction ratio, focal volume, Gaussian beam, illumination path, spatially coherent illumination, temporally coherent illumination, microlens, immersion objective, water dipping objective, hot pixel, dead pixel, stuck pixel, voxel, digital zoom;

— added new terms for advanced techniques in light microscopy: averaging, sampling, sampling rate, Nyquist sampling, oversampling, undersampling, resonant frequency scanning, multi-view fusion, light sheet fluorescence microscopy, spectral unmixing, computational microscopy, stitching, point spread function engineering, high content screening, high throughput screening, light field microscopy, point detector, photodiode, photomultiplier, avalanche photodiode, area detector, linear array sensor, single-photon avalanche diode array, sCMOS, CCD, EMCCD;

— terms amended;

— editorially revised.

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Microscopes — Vocabulary for light microscopy

1 Scope

This document specifies terms and definitions to be used in the field of light microscopy and advanced techniques in light microscopy.

2 Normative references

There are no normative references in this document.

3 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 Terms and definitions relating to light microscopy

3.1.1
Abbe test plate
device for testing the *chromatic* (3.1.4.2) and *spherical aberration* (3.1.4.7) of *microscope* (3.1.105)*objectives* (3.1.112)

Note 1 to entry: When testing for spherical aberration, the cover glass thickness for which the objective is best corrected is also found. The test plate consists of a slide on which is deposited an opaque metal layer in the form of parallel strips arranged in groups of different width. The edges of these strips are irregularly serrated to allow the aberrations to be judged more easily. In its original and most common form, the slide is covered with a wedge-shaped cover glass, the increasing thickness of which is marked on the slide. Additional versions without the cover glass or with reflective stripes are also in use.

3.1.2
Abbe theory of image formation
explanation of the mechanism by which the *microscope* (3.1.105)*image* (3.1.80) is formed

Note 1 to entry: It assumes coherent illumination and is based on a three-step process involving diffraction.

a) First step: the object diffracts light coming from the source.

b) Second step: the objective collects some of the diffracted beams and focuses them, according to the laws of geometrical optics, in the back focal plane of the objective to form the primary diffraction pattern of the object.

c) Third step: the diffracted beams continue on their way and are reunited; the result of their interference is called the primary image of the microscope.

This explains the necessity for the maximum number of rays diffracted by the object to be collected by the objective, so that they may contribute to the image. Fine detail will not be resolved if the rays it diffracts are not allowed to contribute to the image.

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