Contrast of optical microscope

The contrast of optical microscope consists in reinforcing the contrast between the transparent specimens with the images of living cells, microorganisms, and other samples. There are many ways of making contrast in a sample observed in the Optical Microscope:

Colouring the samples

Colouring the samples with different substances in it, which some of them (with specific characteristics) will absorb the colour and some of them won’t, making this way a colour contrast in a sample, facilitanting the observation in the Optical Microscope.

Polarized light microscope

A polarized light microscope visualizes birefringent materials by generating contrast through the differential interaction of plane polarized light with the material and an upstream polarizing filter. Light can be polarized with the use of polarizing filters, also known as polarizers. Polarizers only let light vibrating along their polarizing axis pass through completely. These filters have particles that are aligned in one direction entirely, and absorb light waves moving in other directions. When a polarizing filter is exactly 90 degrees from its set polarizing axis, it blocks all light from passing.

Phase contrast technique

The phase contrast technique is based on the variations in phase of the amplitude change and the most important concept of the phase contrast microscope design is the isolation of wavefronts, both surround (undiffracted) and diffracted, that arise from the sample. To differentiate intensity profiles between a sample and its surroundings, the undeviated light must be reduced and the phase retarded by a quarter-wave retardance. A brightfield illumination microscope can be upgraded to a brightfield-phase microscope with the introduction of two components to the optical train.

Ultrasound contrast factors

Ultrasound contrast factors have different ways in which the waves of the ultrasound (sound waves) are reflected from the sample, particularly between the substances observed. This technique can be used in all size substances with any complexity level. Contrasting in ultrasound involves the use of microbubble contrast factors and specific imaging techniques in order to show sensitive blood flow and tissue perfusion information. This technique is safe and easily performed with no requirement for ionizing radiation and no risk of nephrotoxicity.

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