# Transmitted light microscopy

Transmitted light microscopy is one of the techniques of the light microscopy. It's associated for any type of microscopy where the light passes from the source to the opposite side of the lens. This method it’s used to distinguish the morphological characteristics and optics proprieties of the observed material.

## Principle

The light rays are organized and conducted through the instrument so the light can be polarized and redirected.

The light from the condenser (has as function concentrate light on the sample) will fill the plane of the objective and a ray of light will be project to lighten the field, basically the condenser is able to control the angle of the illumination which permits the right balance of resolution and contrast in the microscope.

The light passes through the sample and it will go to the objective where the image will be magnified. The second step it’s going to the oculars when the enlargement can be observe. This type of microscopy permits the capture of high-quality images but the most important factor it’s the illumination because permits the capture of images bright enough to be useful.

## Techniques requiring a transmitted light path

### Bright-field

It is the most used method of microscopy. It helps to observe tissues because it makes the object appear against a bright background this is caused by the absorption of part of the transmitted light in dense areas. The inventor was Köhler that is why its called Köhler illumination.

### Dark-field

This method it is use for biological samples as bacteria and micro-organisms, in this case the entrance of the light it is bigger witch permit the diffraction of the lights rays and it is illuminated obliquely. As a result, the field around the specimen is generally dark so the bright parts can be clearly observed.

### Phase contrast

The light that is passing is retarded so the sample is illuminated by the rays of light. This technique is important in biology because reveals many cellular structures. Sometimes these light rays are associated to the “normal” rays and occurs interference, that could be constructive and destructive, leading to the production of light and dark characteristic in the image.

### Polarisation

Usually polarised light is use to analyse birefringent structures, this one is are structures with two different indices of refraction. From the interaction of the birefringent samples with the polarized light it is obtain the image contrast. Polarised light microscopy has as function the measurement of the quantity of retardation that happens and provides molecular information about birefringent specimen.

### Differential interference contrast optics

This method its use to expand the contrast in transparent/non colored specimens witch permit to see some invisible features and gain some information about the optic density of it. With this technic it is possible to achieve images in black and white on a grey background. The main difference between this type of method and the phase contrast is bright diffraction aureole. The polarize light passes for two birefringent primes and then it will be divided in two different directions having as a result one image in 3D that represents the variations of the optic density.

## Links

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### Bibliography

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