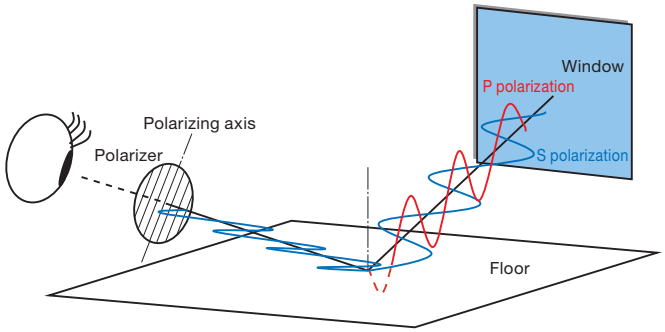
Application Note

Human with naked eye can not make the differencs in between a linear polarized light and a circularly polarized light. But polarizer optics will allow you to see the polarized light situation. Here we introduce the fundamentals of the usage of the polarizer optics.

How to affirm the polarizing axis of a polarizer optics

The following method will show you how to find the polarizing direction when there is no marking shown on the optics neither the direction of the polarizing axis.
Observe the reflection of a slanting ray of light from a window over a brilliant mat. Use the light polarizer to confirm the light direction of the reflected light.
Peep the reflected light with the polarizer by turning the polarizer, the illumination go up and down. When the light is dark, the upside and downside of the polarizer shows the polarization axis of the reflected light. We don't need any particular tool and location to confirm the light direction.



What is the normal coordinate of the polarizer

A single polarizer optic can not perform a circular polarized light. It depends on the object that the light hits. That is the reason why the experiment sample or the experiment target depends on the direction of the normal coordinate.

①Polarizing axis

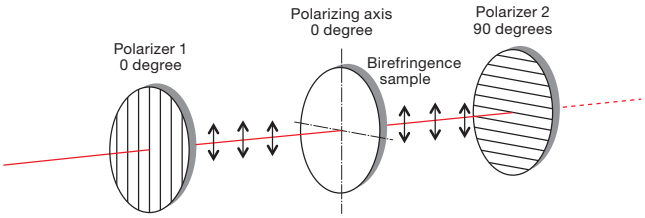
A standard experiment sets up with a laser a fixed polarizer and a linear polarizer axis.

○Polarizer optic case:

⇒ When turning the Polarizer 2 at 90 degrees, the light axis went through the Polarizer 1 disappears.

○Birefringence sample (waveplate):

⇒ Set a standard experiment with a laser, the polarizer 1 and the polarizer 2. A waveplate sample sets in between the Polarizer 1 and Polarizer 2. Turn the waveplate till the darkest position and mark the position as 0 degrees.



②Vertical direction on a table

There is no necessary of any particular setting; the optics can be at any direction. This experiment will be done at a vertical direction.

○In case of none adjusted polarized optics:

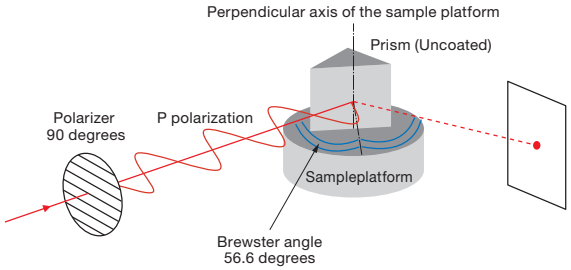
⇒ Take the polarizer optic as a standard and set it up vertically onto holders and adjust the polarizer at 0 degrees. Set other optics according to the standard, see ① setting.

○Requirement of adjusting the polarizer:

⇒ For optics that being sold mounted with a holder, the polarizer direction can be pre-set at 90 degrees before the shipment. For a waveplate to be adjusted at fast direction 90 degrees, the tolerance of 2 degrees or 3 degrees of the polarizer direction mounted with a holder may happen.

③Perpendicular to the sample axis

Experiment with a BK7 prism. Set an incident angle at 56.6 degrees to the polished surface of the prism. Incident with a light-source through the polarizer and turn the polarizer then observe the changing power of reflected light from the prism. When the incident ray angle matches the angle 56.6 degrees which is called Brewster's angle then the reflection ray disappears. The smallest reflection angle from the prism is the P polarization; the polarizer angle is 90 degrees or 0 degrees.



④Match the polarization to the reflective object

Set the polarization axis according to the reflective object and incident direction.

The reflection ray and the laser ray produce a plane oscillation polarization axis is called P polarization, the vertical oscillation polarization axis is called the S polarization.

Place an uncoated BK7 flat window as a test sample.

Incident ray at Brewster s angle 56.6 degrees. Place a polarizer optic in the incident ray. Turn the polarizer and observe the change of the power of the light reflected from the flat window. There is surface reflection and back reflection of light from the flat window.

Similar to ③ setting, turn the angle to the smallest polarization angle of 90 degrees or 0 degrees.

Replace the BK7 window by another sample; similar to ① setting and adjust the waveplate to execute the experiment.