entering an inside of the eyeball, and damaging the retina.

Citation List

Patent Literature

[0004] Patent Literature 1: JP H6-503245 A
Patent Literature 2: JP 2018-175760 A
Patent Literature 3: JP 2018-175481 A
Patent Literature 4: JP 2011-83342 A

Summary

Technical Problem

[0005] However, according to results of anatomical researches conducted by the present inventors on a shape of a corneal ring and a trial calculation based on data relating to the divergence of a light flux to be introduced or a movement of the eyeball, in order to achieve a light path that causes transverse transmission through aqueous humor in eyes of many subjects, it is necessary to control an angle of incidence of light on a subject eye with an error that is smaller than 1°, and it is considered difficult to achieve the light path.

[0006] Embodiments of the present invention provide an eyepiece optical lens, a light measurement system, and a light measurement method that enable a non-invasive analysis of substances contained in aqueous humor of a subject eye.

Solution to Problem

[0007] According to a first aspect of the present invention, there is provided an eyepiece optical lens including: a base that has a plurality of faces; a concave portion configured to form one face of the base, the concave portion being concave in a spherical shape; and a reflection portion configured to form a face on an outer peripheral side of the concave portion of the base, the reflection portion reflecting, toward the concave portion,

light that has been made incident on the base from a face that is included in the plurality of faces and is different from the concave portion.

[0008] In the eyepiece optical lens according to the above aspect of the present invention, the reflection portion is configured to reflect the light that has been made incident on the base, in a direction that is roughly orthogonal to an incident direction.

[0009] In the eyepiece optical lens according to the above aspect of the present invention, the reflection portion is configured to reflect the light that has been made incident on the base, in an axial direction that passes through an apex of the concave portion.

[0010] In the eyepiece optical lens according to the above aspect of the present invention, the reflection portion has a critical angle that is determined according to a refractive index of a medium forming the eyepiece optical lens, the critical angle causing light made incident on the reflection portion to be totally reflected.

[0011] In the eyepiece optical lens according to the above aspect of the present invention, the reflection portion is configured to form a face surrounding an outer periphery of the concave portion of the base.

[0012] In the eyepiece optical lens according to the above aspect of the present invention, the reflection portion includes: a first reflection portion configured to form the face on the outer peripheral side of the concave portion of the base, the first reflection portion reflecting, toward the concave portion, the light that has been made incident on the base from the face that is included in the plurality of faces and is different from the concave portion; and a second reflection portion configured to form the face of the outer peripheral side of the concave portion of the base, the second reflection portion reflecting the light that has been reflected by the first reflection portion, toward the face that is included

in the plurality of faces and is different from the concave portion.

[0013] According to a second aspect of the present invention, there is provided a light measurement system including: the above-mentioned eyepiece optical lens; and a light measurement apparatus that includes a light source unit configured to irradiate the eyepiece optical lens with light, and a light receiver configured to receive the light from the eyepiece optical lens.

[0014] In the light measurement system according to the above aspect of the present invention, the light receiver is configured to receive Raman scattered light in aqueous humor of a subject eye that has been brought into contact with the eyepiece optical lens.

[0015] According to a third aspect of the present invention, there is provided a light measurement method that uses an eyepiece optical lens including: a base that has a plurality of faces; a concave portion configured to form one face of the base, the concave portion being concave in a spherical shape; and a reflection portion configured to form a face on an outer peripheral side of the concave portion of the base, the reflection portion reflecting, toward the concave portion, light that has been made incident on the base from a face that is included in the plurality of faces and is different from the concave portion, the light measurement method including: an adjustment step of irradiating a subject eye with examination light, and adjusting an incident position of the light to cause a position of a spot of the examination light to be formed in the reflection portion, the subject eye having been brought into contact with the eyepiece optical lens; and a measurement light irradiation step of irradiating the eyepiece optical lens with measurement light having a light intensity that is greater than a light intensity of the examination light; and a light reception step of receiving the measurement light.

[0016] The light measurement method according to the above aspect of the present invention further includes, before the light reception step, a disposition step of disposing a light receiver configured to receive the measurement light, in a position that causes Raman scattered light in aqueous humor of the subject eye to have a maximum light intensity.

Advantageous Effects of Invention

[0017] Embodiments of the present invention can achieve an eyepiece optical lens, a light measurement system, and a light measurement method that enable a non-invasive analysis of substances contained in aqueous humor of a subject eye.

Brief Description of Drawings

[0018] FIG. 1 is a schematic diagram of a Raman scattered light spectroscopic measurement system according to an embodiment of the present invention.

FIG. 2 is an enlarged view of an eyepiece optical lens.

FIG. 3 is a partial enlarged view of a light source unit.

FIG. 4 is a flowchart illustrating a procedure of a Raman spectroscopic measurement method.

FIG. 5 is an enlarged view of an eyepiece optical lens of a first variation.

FIG. 6 is an enlarged view of a light source unit of a second variation.

FIG. 7 is an enlarged view of a light source unit of a third variation.

Description of Embodiments