CLAIMS

[Claim 1]

A dichroic-mirror array, comprising:

in a right-handed XYZ coordinate system,

a first group of m ($m \geq 2$) different dichroic mirrors DA1 to DAm which are arranged in order parallel to each other along a positive direction of an X axis; and

a second group of n ($n \geq 2$) different dichroic mirrors DB1 to DBn which are arranged in order parallel to each other along a negative direction of the X axis,

wherein $m + n \geq 6$ is satisfied,

wherein X coordinates of the DA2 to DAm are positive,

wherein X coordinates of the DB2 to DBn are negative,

wherein incident surfaces of the DA1 to DAm and incident surfaces of the DB1 to DBn are perpendicular to an XZ plane,

wherein slopes of straight lines obtained by projecting normal lines of the incident surfaces of the DA1 to DAm onto the XZ plane are negative,

wherein slopes of straight lines obtained by projecting normal lines of the incident surfaces of the DB1 to DBn onto the XZ plane are positive, and

wherein at least one incident light that propagates in positive direction of Z axis is divided into at least m+n-1 pieces of emitting light that propagate in positive direction

of Z axis.

[Claim 2]

The dichroic-mirror array according to claim 1,

wherein the DA1 and the DB1 are arranged along a positive direction of a Z axis, and

wherein a Z coordinate of the DA1 is smaller than a Z coordinate of the DB1.

[Claim 3]

The dichroic-mirror array according to claim 2,

wherein the normal lines of the incident surface of the DA1 to DAm are parallel to a straight line Z = -X, and

wherein the normal lines of the incident surfaces of the DB1 to DBn are parallel to a straight line Z = X.

[Claim 4]

The dichroic-mirror array according to claim 1,

wherein, when angles formed by the normal lines of the incident surfaces of the dichroic mirrors and a Z axis are θ_0,

the DA1 to DAm have different transmission spectra at an incident angle θ_0, and

the DB1 to DBn have different transmission spectra at an incident angle θ_0.

[Claim 5]

The dichroic-mirror array according to claim 1,

wherein, when angles formed by the normal lines of the

incident surfaces of the dichroic mirrors and a Z axis are θ_0, and

when the DA1 to DA(m - 1) and the DB1 to DB(n - 1) make up a subgroup,

the dichroic mirrors of the subgroup have different transmission spectra at an incident angle θ_0.

[Claim 6]

The dichroic-mirror array according to claim 5,

wherein, when cut-on wavelengths or cut-off wavelengths of the DA1 to DA(m - 1) and the DB1 to DB(n - 1) in the transmission spectra at the incident angle θ_0 are λ(DA1) to λ(DA(m - 1)) and λ(DB1) to λ(DB(n - 1)) respectively,

when any one of λ(DA2) to λ(DA(m - 1)) is λ(DA), and

when any one of λ(DB1) to λ(DB(n - 1)) is λ(DB),

$\lambda(DA) < \lambda(DA1) < \lambda(DB)$ or $\lambda(DA) > \lambda(DA1) > \lambda(DB)$ is satisfied.

[Claim 7]

The dichroic-mirror array according to claim 6,

wherein each of the cut-on wavelengths or the cut-off wavelengths has a transmittance of about 50%, and is a wavelength at which change in transmittance with wavelength is the steepest.

[Claim 8]

The dichroic-mirror array according to claim 7,

wherein $\lambda(DA2) < \lambda(DA3) < ... < \lambda(DA(m - 1))$ or $\lambda(DA2) > \lambda(DA3) > ... > \lambda(DA(m - 1))$ is satisfied.

[Claim 9]

The dichroic-mirror array according to claim 7,

wherein $\lambda(DB1) < \lambda(DB2) < ... < \lambda(DB(n - 1))$ or $\lambda(DB1) > \lambda(DB2) > ... > \lambda(DB(n - 1))$ is satisfied.

[Claim 10]

The dichroic-mirror array according to claim 2,

wherein Z coordinates of the DA1 to DAm are different from each other,

wherein Z coordinates of the DB1 to DBn are different from each other,

wherein, regarding the DA1 to DAm and the DB1 to DBn,

when angles between the normal lines of the incident surfaces and the Z axis are θ_0, an average refractive index of a base material is n_0, and an average width of the base material is α and an average thickness of the base material is β in a cross section parallel to the XZ plane, and

when an average of an arrangement spacing between DAj ($2 \leq j \leq (m - 1)$) and DA(j + 1), and between DBk ($2 \leq k \leq (n - 1)$) and DB(k + 1) in an X-axis direction is x, and an average of an arrangement spacing between DAj ($2 \leq j \leq (m - 1)$) and DA(j + 1), and between DBk ($2 \leq k \leq (n - 1)$) and DB(k + 1) in a Z-axis direction is z,

θ_0, n_0, α, β, x, and z satisfy a predetermined

relationship so that an aperture width can be expanded or optical-path lengths can be reduced, in the dichroic-mirror array.

[Claim 11]

The dichroic-mirror array according to claim 10,

wherein $\cos\theta_0*\alpha \leq x \leq 2*\cos\theta_0*\alpha + \sin\theta_0*\beta$ is satisfied.

[Claim 12]

The dichroic-mirror array according to claim 10,

wherein, when $\theta_2 = \sin^{-1}(1/n_0*\sin\theta_0)$,

$0 \leq z \leq 2*\sin(\theta_0 - \theta_2)/\cos\theta_2*\beta$ is satisfied.

[Claim 13]

The dichroic-mirror array according to claim 2,

wherein Z coordinates of the DA1 to DAm are different from each other,

wherein Z coordinates of the DB1 to DBn are different from each other,

wherein, regarding the DA1 to DAm and the DB1 to DBn,

when angles between the normal lines of the incident surfaces and the Z axis are θ_0, an average refractive index of a base material is n_0, and an average width of the base material is α and an average thickness of the base material is β in a cross section parallel to the XZ plane, and

when an average of an arrangement spacing between the DA1 and DA2, and between the DB1 and DB2 in an X-axis

direction is x, and an average of an arrangement spacing between the DA1 and DA2, and between the DB1 and DB2 in a Z-axis direction is y,

θ_0, n_0, α, β, x, and y satisfy a predetermined relationship so that an aperture width can be expanded or optical-path lengths can be reduced, in the dichroic-mirror array.

[Claim 14]

The dichroic-mirror array according to claim 13,

wherein $\cos\theta_0*\alpha \leq x \leq 2*\cos\theta_0*\alpha + \sin\theta_0*\beta$ is satisfied.

[Claim 15]

The dichroic-mirror array according to claim 13,

wherein $0 \leq y \leq 2*\cos\theta_0*\beta$ is satisfied.

[Claim 16]

The dichroic-mirror array according to claim 3, further comprising:

a first filter that transmits light in a predetermined wavelength band,

wherein an incident surface of the first filter is parallel to an XY plane,

wherein the first filter and the DA1 are arranged along the positive direction of the Z axis, and

wherein a Z coordinate of the first filter is smaller than the Z coordinate of the DA1.

[Claim 17]

The dichroic-mirror array according to claim 3, further comprising:

a second filter that transmits light in a predetermined wavelength band,

wherein an incident surface of the second filter is parallel to a YZ plane, and

wherein the second filter is arranged between two adjacent dichroic mirrors of the DA1 to DAm or the DB1 to DBn.

[Claim 18]

The dichroic-mirror array according to claim 3, further comprising:

a third filter that transmits light in a predetermined wavelength band,

wherein an incident surface of the third filter is parallel to an XY plane, and

wherein a Z coordinate of the third filter is larger than Z coordinates of the DA1 to DAm and the DB1 to DBn.

[Claim 19]

A photodetector, comprising:

the dichroic-mirror array according to claim 3; and

a sensor array having a plurality of sensor elements,

wherein a sensor surface of the sensor array is arranged parallel to an XY plane, and

wherein a Z coordinate of the sensor surface is larger

than Z coordinates of the DA1 to DAm and the DB1 to DBn.

[Claim 20]

The photodetector according to claim 19,

wherein an incident light traveling in a positive direction of the Z axis is incident on the DA1,

wherein the incident light is split by the dichroic-mirror array into at least (m + n - 1) split lights traveling in the positive direction of the Z axis, and

wherein at least a part of the split lights is incident on the sensor surface.

[Claim 21]

The photodetector according to claim 19,

wherein p ($2 \leq p$) incident lights arranged in a Y-axis direction and traveling in the positive direction of the Z axis are incident on the DA1,

wherein each of the p incident lights is split by the dichroic-mirror array into at least (m + n - 1) split lights traveling in the positive direction of the Z axis, and

wherein at least a part of the split lights is incident on the sensor surface.