Appeal decision

Appeal No. 2017-5157

South Korea
Appellant SAMSUNG ELECTORONICS CO., LTD.

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The case of appeal against the examiner's decision of refusal for Japanese Patent Application No. 2015-239174, titled "ANTI-REFLECTION FILM AND ORGANIC LIGHT EMISSION DEVICE COMPRISING THE SAME" [Published on June 20, 2016 as Japanese Unexamined Patent Application Publication No. 2016-110153] has resulted in the following appeal decision.

Conclusion
The appeal of the case was groundless.

Reason
1 History of the procedures
The application according to the case of appeals against an examiner's decision of refusal (hereinafter referred to as "the application") was filed on December 8, 2015 (claiming priority under Paris Convention for the Protection of Industrial Property with a priority date of December 8, 2014, South Korea), a written amendment was submitted on May 25, 2016, reasons for refusal were notified on July 12, 2016, a written argument and a written amendment were submitted on October 17, 2016, and a decision of refusal was made on December 2, 2016.
Dissatisfied with this decision, the appeal against the examiner's decision of refusal was filed on April 11, 2017, along with a written amendment submitted simultaneously to the request for appeal, and subsequently reasons for refusal were notified by the collegial body on February 1, 2018, and in response a written argument was submitted on May 7, 2018.

2 Invention according to claim 1
(1) It is recognized that the inventions according to Claims 1 to 7 of the application should be specified by the matters recited in Claims 1 to 7 of the Claims that have been amended by the written amendment on April 11, 2017. Claim 1 is set forth as below:

"An anti-reflection film for an organic light emission device, comprising: a polarizer; and

a compensation film located on a surface of said polarizer, said compensation film comprising a liquid crystal layer having a first major surface and a second major surface positioned at opposite sides from one another,

wherein said liquid crystal layer comprises liquid crystals having an optical axis obliquely inclined toward a thickness direction with respect to a surface of said liquid crystal layer,

wherein a tilt angle of said liquid crystals with respect to the surface of the liquid crystal layer gradually increases from said first surface to said second major surface in a thickness direction of said liquid crystal layer,

wherein the in-plane retardation (Re) of said liquid crystal layer at the wavelengths of 450 nm, 550 nm, and 650 nm satisfy the following Relationships 1 and 2a,

wherein a color shift of said anti-reflection film observed at a viewing angle of 60° is less than 7.0,

wherein said anti-reflection film has a reflectance of 1.0% or less when measured at a viewing angle of 60°:

[Relationship 1]

$R_e(450\text{ nm}) < R_e(550\text{ nm}) \leq R_e(650\text{ nm})$

[Relationship 2a]

$0.72 \leq R_e(450\text{nm})/R_e(550\text{nm}) \leq 0.92$

In the aforesaid Relationships 1 and 2a,

R_e (450 nm) is an in-plane retardation for an incident light at a wavelength of 450 nm,

R_e (550 nm) is an in-plane retardation for an incident light at a wavelength of 550 nm,

R_e (650 nm) is an in-plane retardation for an incident light at a wavelength of 650 nm." (In Claim 1, regarding the symbol representing the in-plane retardation, "R_e" and "Re" are mixedly used, but are unified as "R_e." Hereinafter the invention according to Claim 1 is referred to as "the Invention.")

(2) Additionally, in view of the description that "a compensation film" "located on a surface of said polarizer," it will be understood that when an element such as a layer, film, region, or substrate is referred to as being 'on' another element, it can be directly on the other element, or intervening elements may also be present. In contrast, when an element is referred to as being 'directly on' another element, there are no intervening elements present." ([0029]), it is reasonably construed that the expression of "compensation film" "positioned at a surface of said polarizer" of Claim 1 as pointed out in said item (1) includes not only one where a compensation film is directly in contact with a surface of the polarizer, but also one where any intervening elements are present between the compensation film and the polarizer.

Further, regarding the language of "at a viewing angle of 60°," in view of the whole disclosure of the specification and the drawings and the Appellant's argument in the written argument submitted on May 7, 2018 (hereinafter simply referred to as "written argument") in response to the reason for refusal notified on February 1, 2018 which pointed out the violation of definiteness requirement of the language, it is reasonably construed as meaning "a direction at an angle of 60° from a normal line (a perpendicular line) of a film surface."

Further, regarding the language of "a color shift of the anti-reflection film observed at a viewing angle of 60°," the Appellant does not argue at all in the written argument against the reasons for refusal notified on February 1, 2018 in which the violation of definiteness requirement of the language was pointed out; however, in view of the description of "color shift due to a reflection of external light" in paragraphs [0070] and [0084] of the specification and the explanation of "reflectance measured at a viewing angle of 60°" in the written argument, it is reasonably construed as indicating "an average value of a color shift (Δa*b*) from an incident light of a reflecting light observed in a direction at an angle of 60° from a normal line (a perpendicular line) of a film surface over every angle (360°) when an incident light incident from a direction at an angle of 60° from a normal line (a perpendicular line) of a film surface penetrates an anti-reflection film and reflects on a reflecting surface, and passes through the anti-reflection film again to emit as emitting light."

Furthermore, regarding the language of "reflectance measured at a viewing angle of 60°," in view of the whole disclosure of the specification and the drawing and the Appellant's argument in the written argument notified on February 1, 2018, in which the violation of the definiteness requirement of the language was pointed out, it is reasonably construed as indicating "an average value of a reflectance measured in a direction at an angle of 60° from a normal line (a perpendicular line) of a film surface over every angle (360°) when an incident light incident from a direction at an angle of 60° from a normal line (a perpendicular line) of a film surface passes through an anti-reflection film and reflects on a reflecting surface, and passes through the anti-reflection film again to emit as emitting light."

3 Summary of reasons for refusal notified by the body

In summary, the reasons for refusal notified by the collegial body on February 1, 2018 with respect to the invention according to Claim 1 include the following reason (the reason for the violation of the enablement requirement is hereinafter referred to as "Body's reason for refusal 1," the reason for the identity with the extended prior application with a cited reference of Prior Application 1 (Part 1) is referred to as "Body's reason for refusal 2," the reason for the identity with the extended prior application with a cited reference of Prior Application 2 (Part 2) is referred to as "Body's reason for refusal 3," and the reason for lack of inventive step is referred to as "Body's reason for refusal 4.")

(1) Body's reason for refusal 1 (Violation of enablement requirement)

The Detailed Description of the Invention of the specification is not definitely and sufficiently described to such an extent that a person skilled in the art could implement the Invention, and thus fails to satisfy the requirement of Article 36(4)(i) of the Patent Act.

(2) Body's reason for refusal 2 (Identity with extended prior application (Part 1))

The Invention is the invention described in the specification, the Claims, or the drawings originally attached to the application of Prior Application 1, which was a patent application filed before the priority date of the present application (hereinafter referred to as "the priority date") and laid open after the priority date (the patent application was deemed to be laid open at the time of the international publication of the international application (PCT/JP2015/053538) that claims priority on the basis of the patent application under the provision of Article 41(3) and Article 184-15(2) of the Patent Act.) and is also identical to the invention described in the specification, the Claims, or the drawings originally attached to the application of the international application (PCT/JP2015/053538) with a basic application of Prior Application 1, and thus cannot be granted a patent under the provision of Article 29-2 of the Patent Act.

Prior Application 1: Japanese Patent Application No. 2014-024505 (International Publication No. WO 2015-122387)

(3) Reason 3 for refusal raised by the body (Identity with extended prior application (Part 2))

The Invention is identical to the inventions described in the specification, the Claims, or the drawings originally attached to the application of Prior Application 2, which was filed before and laid open after the prior date of the present application, and thus cannot be granted a patent under the provision of Article 29-2 of the Patent Act.

Prior application 2: Japanese Patent Application No. 2014-35265 (Japanese Unexamined Patent Application Publication No. 2015-161714)

(4) Body's reasons for refusal 4 (Lack of Inventive Step)

The Invention was easily conceivable by a person skilled in the art on the basis of the invention described in Cited Document 1 and well-known matters, and thus it could not be granted a patent under the provision of Article 29(2) of the Patent Act.

Cited Document 1: International Publication No. WO 2007-142037

Cited Document 2: Japanese Unexamined Patent Application Publication No. 2014-215360 (well-known reference)

Cited Document 3: Japanese Unexamined Patent Application Publication No. 2014-203069 (well-known reference)

Cited Document 4: International Publication No. WO 2014-068893 (well-known reference)

4 Determination of Body's reasons for refusal 1 (violation of enablement requirement)

(1) The matters specifying the invention of the Invention

The Invention has the following matters specifying the invention.

The matter specifying the invention 1:

The matter that a color shift of the anti-reflection film observed at a viewing angle of 60° is less than 7.0.

The matter specifying the invention 2:

The matter that a reflectance of 1.0 % or less when measured at a viewing angle of 60°.

(2) The description of the specification and the drawings of the matters specifying the invention 1 and 2

Regarding the matters specifying the invention 1 and 2, the specification and the drawings have the following descriptions:

A "[0050]

The liquid crystal layer 150 includes a plurality of liquid crystals 150a having obliquely-tilted oriented directions, and the tilt angle of the liquid crystals 150a may be changed along the thickness direction of the liquid crystal layer 150, and accordingly circularly-polarized light effect is equally realized in all directions and external light is effectively prevented from reflection at the side as well as the front, resultantly improving side visibility."

B "[0068]

FIG. 3 is a schematic view showing a viewing angle improvement principle of an anti-reflection film according to one exemplary embodiment.

[0069] Referring to FIG. 3, external light passes through a first optical path OP1 in which the light passes through the compensation film 120, reaches the display panel 40, and passes through a second optical path OP2 in which the light is reflected from the display panel 40, and is repassed through the compensation film 120. The light has a polarization direction that is changed through the first and second optical paths OP1 and OP2 and does not pass through the polarizer 110, showing an external light anti-reflection effect.

[0070]

Herein, the first and second optical paths OP1 and OP2 may substantially form a mirror image as a reference of the display panel 40. Accordingly, the compensation film 120 includes liquid crystals that are obliquely tilted and aligned in one direction, but when external light sequentially passes the first optical path OP1 and the second optical path OP2 having opposite directions from each other, a phase difference may be adjusted by summing the oblique alignment of liquid crystals 150aa in the first optical path OP1 and the oblique alignment of liquid crystals 150ab in the second optical path OP2. Accordingly, an anti-reflection effect may be substantially equivalent in all directions, and a color shift due to a reflection of external light at the side and at the front side may be effectively prevented, thereby improving side visibility.

[0071]

The side visibility may be expressed as reflectance and a color shift at the side. In an exemplary embodiment, the reflectance of the anti-reflection film observed at viewing angles of about 60° may be less than or equal to about 1.5 percent (%); for example, less than or equal to about 1.2 %, and, for example, less than or equal to about 1.0 % within the range. In an exemplary embodiment, the color shift of the anti-reflection film at viewing angles of about 60° may be less than about 7.0; for example, less than or equal to about 6.0, and, for example, less than or equal to about 5.0."

C "[0084]

In addition, the anti-reflection film 100 may not only show a substantially equivalent anti-reflection effect in all the directions, but may also effectively prevent a color shift due to refection of external light at the side as well as the front side as described above, and thus improve side visibility."

D "[0085]

Hereinafter, the invention is illustrated in more detail with reference to examples. However, these examples are exemplary, and the invention is not limited thereto.

[0086]

[Simulation evaluation]

[Example 1]

A simulation evaluation (LCD Master (Shintech Inc.)) is performed by simulation-setting of a structure of sequentially disposing a polarizer, a compensation film (R_{e2}=138 nm) including a liquid crystal layer, and a reflector. Herein, the liquid crystal layer of the compensation film has a bottom tilt structure in which a tilt angle becomes larger from top to bottom; that is, a minimum tilt angle (an upper tilt angle) is about 3° and a maximum tilt angle (a lower tilt angle) is about 37°, between which a tilt angle gradually changes. The angle of an axis of the polarizer is set at about 90° and the angle of an axis of the compensation film is set at about 45°.

[0087]

[Example 2]

A simulation condition is set according to the same method as in Example 1, except for setting the maximum tilt angle (the lower tilt angle) of a liquid crystal at about 45° in the liquid crystal layer.

[0088]

[Example 3]

A simulation condition is set according to the same method as in Example 1, except for setting the maximum tilt angle (the lower tilt angle) of a liquid crystal at about 65° in the liquid crystal layer.

[0089]

[Example 4]

A simulation condition is set according to the same method as in Example 1, except for making the liquid crystal layer of the compensation film have a top tilt structure in which a tilt angle becomes larger from bottom to top and setting the maximum tilt angle (the upper tilt angle) of a liquid crystal at about 65° in the liquid crystal layer.

[0090]

[Example 5]

A simulation condition is set according to the same method as in Example 1, except for setting the maximum tilt angle (the lower tilt angle) of a liquid crystal at about 75° in the liquid crystal layer.

[0091]

[Example 6]

A simulation condition is set according to the same method as in Example 1, except for setting the maximum tilt angle (the lower tilt angle) of a liquid crystal at about 30° in the liquid crystal layer.

[0092]

[Comparative Example 1]

A simulation condition is set according to the same method as in Example 1, except that the liquid crystal layer includes a plurality of liquid crystals having a tilt angle of about 0° (plate A).

[0093]
[Comparative Example 2]

A simulation condition is set according to the same method as in Example 1, except that the compensation film includes two liquid crystal layers, of which one liquid crystal layer includes a plurality of liquid crystals having a tilt angle of about 0° (plate A) while the other liquid crystal layer includes a plurality of liquid crystals having a tilt angle of about 90° (plate C).

[0094]
[Evaluation]
[Evaluation 1]

The reflectance and color shift of each anti-reflection film according to Examples 1 to 6 and Comparative Examples 1 and 2 at the front side and the side are evaluated.

[0095]

The reflectance and color shift are evaluated through simulation by use of LCD Master (Shintech Inc.).

[0096]

The results are illustrated referring to Table 1 and FIGS. 5-8.

[0097]

FIG. 5 is a graph showing a relationship between maximum tilt angles of liquid crystals and color shifts at viewing angles o about 60° of the anti-reflection films according to Examples 1 to 6 and Comparative Examples 1 and 2, FIG. 6 is a graph showing reflectance depending on a viewing angle in all directions of the anti-reflection film according to Example 2, FIG. 7 is a graph showing reflectance depending on a viewing angle in all directions of the anti-reflection film according to Comparative Example 1, and FIG. 8 is a graph showing reflectance depending on a viewing angle in all directions of the anti-reflection film according to Comparative Example 2.

[0098]
[Table 1]

	面内位相差（Ｒｅ）（ｎｍ）	正面		側面（６０度）	
		反射率（％）	色ずれ（Δａ＊ｂ＊）	反射率（％）	色ずれ（Δａ＊ｂ＊）
実施例１	１３８	０．１２	３．７	０．６４	５．４
実施例２	１３８	０．１２	３．２	０．５９	３．７
実施例３	１３８	０．１２	３．５	０．９３	４．５
実施例４	１３８	０．１２	３．５	０．８０	５．１
実施例５	１３８	０．１３	４．３	１．４５	６．９
実施例６	１３８	０．１３	３．２	０．７３	６．４
比較例１	１３８	０．１２	３．２	１．０４	８．２
比較例２	１３８	０．１３	４．２８	０．８１	７．０

面内位相差　In-plane retardation
正面　At the front side

側面（６０度）　at the side (60°)
反射率　Reflectance
色ずれ　Color shift
実施例　Example
比較例　Comparative Example

[0099]

Referring to Table 1 and FIG. 5, the anti-reflection films according to Examples 1 to 6 showed remarkably lower color shift at the side (e.g., 60°) than in the anti-reflection film according to Comparative Example 1. In addition, the anti-reflection films according to Examples 1 to 6 include a single compensation film, but show an equivalent or improved color shift as compared with the anti-reflection film including double compensation films according to Comparative Example 2.

[0100]

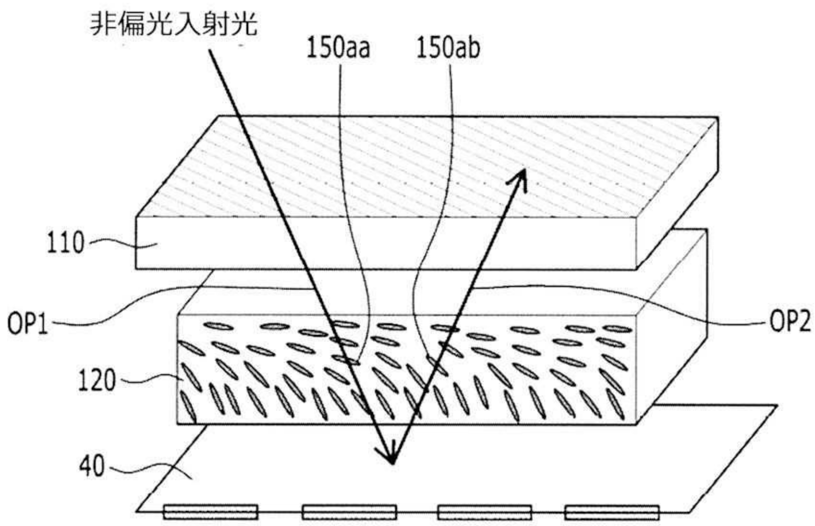
In addition, referring to FIGS. 6-8, the anti-reflection film according to Example 2 shows low reflectance in every direction (0° to 360°) as compared with the anti-reflection films according to Comparative Examples 1 and 2.

[0101]

Accordingly, the anti-reflection films according to Examples 1 to 6 improve visibility at the side without increasing a thickness of the anti-reflection film."

E "[FIG. 3]

FIG. 3

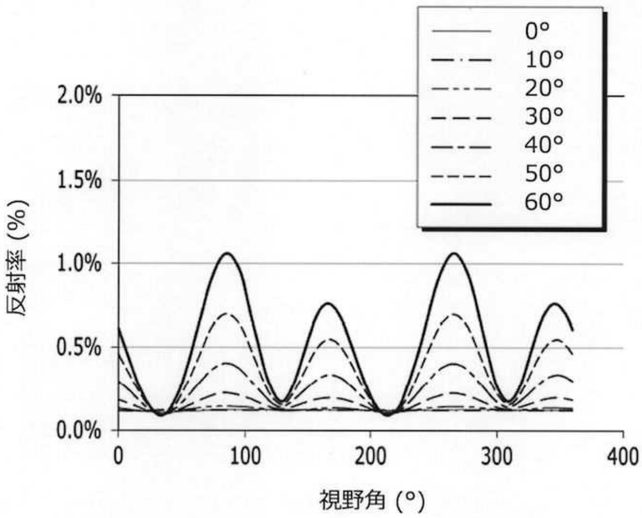


非偏光入射光　Incident unpolarized light

... (Omitted)...

[FIG. 6]

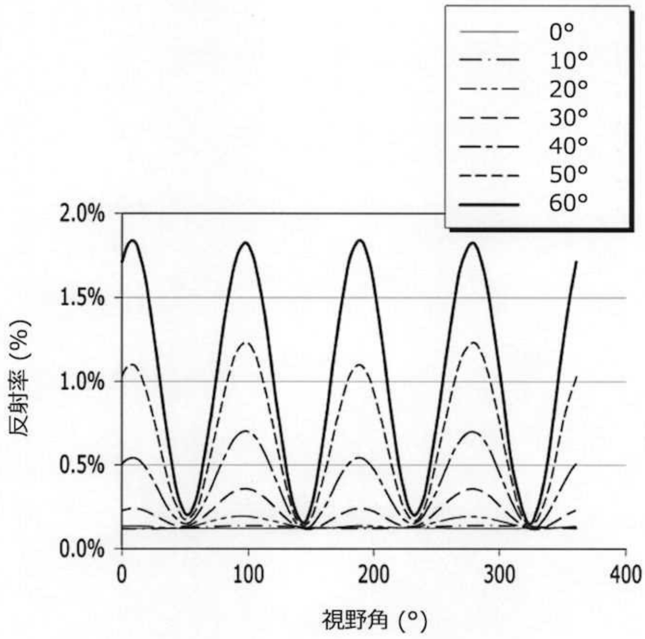
FIG. 6



反射率　Reflectance
視野角　Viewing angle

[FIG. 7]

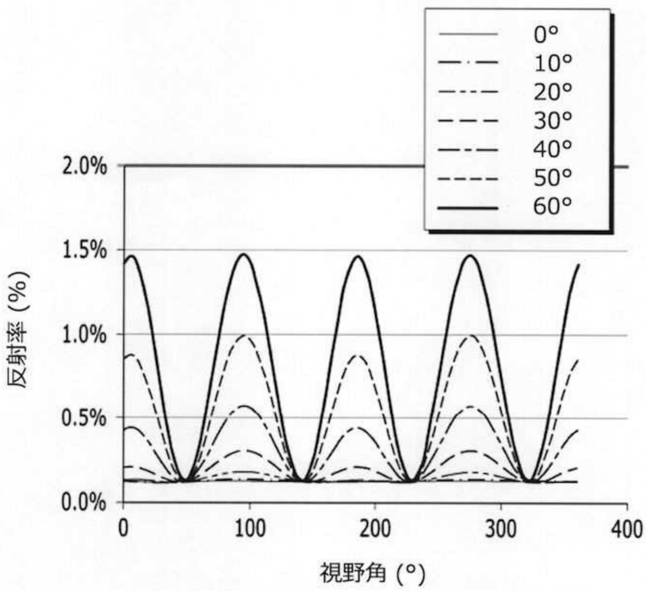
FIG. 7



反射率　Reflectance
視野角　Viewing angle

[FIG. 8]

FIG. 8



反射率　Reflectance
視野角　Viewing angle"

(3) Regarding enablement requirement of the Invention

A　The description pointed out in the aforesaid items A to C and FIG. 3 in the description pointed out in the aforesaid item (2)E explains an action mechanism that the liquid crystal is oriented obliquely, and the tilt angle gradually increases in a thickness direction of the compensation film 120 from a first major surface to a second major surface of the compensation film 120, which can adjust the retardation provided with a liquid crystal obliquely oriented in a light path of incident external light passing through the compensation film 120 to substantially the same value even in the case of different incident angles, thereby achieving the effect of suppressing the generation of color shift or the increase in reflectance observed in an oblique direction.　It can be seen from the action mechanism that the matter specifying the invention 1 and the matter specifying the invention 2 are realized by the change of the tilt angle of liquid crystal.

Further, it can be seen from the description pointed out in the aforesaid item (2)D and FIGS. 6-8 in the description pointed out in the aforesaid item (2)E that, when the structure in which a compensation film comprising a polarizer and a liquid crystal layer and a reflecting plate are disposed in this order is subjected to a simulation evaluation by "LCD master" manufactured by Shintech in a condition of the minimum tilt angle of 3 degrees with varied maximum tilt angles, the cases of the maximum tilt angle of 30 degree to 65 degree (Example 1 to 4 and 6) satisfy the matter specifying the invention 1 and the matter specifying the invention 2 with respect to the "reflectance (%)" in "at the side of 60 degrees" and the "color change (Δa*b*)".

Consequently, it can be seen that an anti-reflection film satisfying the matters specifying the invention 1 and 2 may be implemented (produced, etc.) by at least designing liquid crystals in a liquid crystal layer from which the compensation film is made so that it may "have an optical axis obliquely tilted in a thickness direction from a surface of a liquid crystal layer," and the tilt angle may "gradually increase in a thickness direction of a liquid crystal layer from a first major surface to a second major surface" (hereinafter, for convenience, the constitution of "having an optical axis obliquely tilted in a thickness direction from a surface of a liquid crystal layer," and the tilt angle may gradually increase in a thickness direction of a liquid crystal layer from a first major surface to a second major surface" is referred to as "hybrid orientation") and designing a minimum tilt angle of 3 degrees and a maximum tilt angle of 30 degrees to 65 degrees (or, in addition, making it configured so that the in-plane retardation (Re) of the liquid crystal layer may satisfy Relationships 1 and 2a).

However, it cannot be seen from the description pointed out in the aforesaid item (2)A to D as to how to implement "hybrid orientation" with a minimum tilt angle of 3 degrees and a maximum tilt angle of 30 degrees to 65 degrees.

Accordingly, further consideration is given as to whether a person skilled in the art could understand how to implement "hybrid orientation" with a minimum tilt angle of 3 degrees and a maximum tilt angle of 30 degrees to 65 degrees on the basis of the other description of the specification, etc. and the common general knowledge as of the filing of the present application.

B In connection with "hybrid orientation" with a minimum tilt angle of 3° and a maximum tilt angle of 30° to 65°, the specification and the drawings have the following descriptions:

(A) "[0040]

The liquid crystal layer 150 may include a plurality of liquid crystals 150a having an oriented direction tilting obliquely with respect to the surface. Herein, the tilt with respect to the surface of the liquid crystal layer 150 means that a length direction (longitudinal direction) of the liquid crystal 150a is not vertically or horizontally aligned with respect to a surface of the liquid crystal layer 150, and the length direction of each liquid crystal 150a may be tilted at an angle of greater than 0° to less than 90° with respect to a surface of the liquid crystal layer 150.

[0041]

An angle at which the liquid crystal 150a is tilted with respect to the surface of the liquid crystal layer 150 (hereinafter referred to as 'a tilt angle') may change along the thickness direction of the liquid crystal layer 150; for example, the tilt angle of the liquid crystals 150a may gradually change along the thickness direction of the liquid crystal layer 150.

[0042]

For example, when the liquid crystal layer 150 has a first major surface contacting the alignment layer 140 and a second major surface contacting air, the tilt angle of the liquid crystals 150a may become gradually larger from the first major surface to the second major surface.

[0043]

For example, the tilt angle (θ1) of the liquid crystals 150a at the first major surface close to a lower surface of the liquid crystal layer 150 may be a pretilt angle caused by the alignment layer 140, for example, ranging from greater than about 0° to less than or equal to about 5°. The tilt angle (θ1) may be, for example, in a range of about 2° to about 5° within the range.

[0044]

The tilt angle (θ2) of the liquid crystals 150a at the second major surface may be a maximum tilt angle, for example, in a range of about 30° to about 75°. The maximum tilt angle may be, for example, in a range of about 35° to about 70°, and for example, about 40° to about 60° within the range.

(B) [0051]

The liquid crystal 150a may have a rod shape extended in one direction, and may be, for example, a monomer, an oligomer, and/or a polymer. The liquid crystal 150a may have, for example, positive or negative birefringence values (Δn). The birefringence value (Δn) is a difference found by subtracting the refractive index (ne) of light vibrating parallel to an oriented direction of liquid crystal 150a from the refractive index (no) of light vibrating perpendicular to the oriented direction of liquid crystal 150a.

[0052]

The liquid crystal 150a may be a reactive mesogen liquid crystal, and may include, for example, at least one mesogenic moiety and at least one polymerizable functional group. The reactive mesogen liquid crystal may include at least one of, for example, a rod-shaped aromatic derivative including at least one reactive crosslinking

group, propylene glycol 1-methyl, propylene glycol 2-acetate, and
a compound represented by P^1-A^1- $(Z^1$-$A^2)_n$-P^2 (wherein P^1 and P^2 independently include a polymerizable functional group such as acrylate
methacrylate, acryloyl, vinyl, vinyloxy, epoxy, or a combination thereof, A^1 and A^2 independently include 1,4-phenylene, naphthalene-2,6-diyl group, or a combination thereof, Z^1 includes a single bond, -COO-, -OCO-, or a combination thereof, and n is 0, 1, or 2), but is not limited thereto.

[0053]

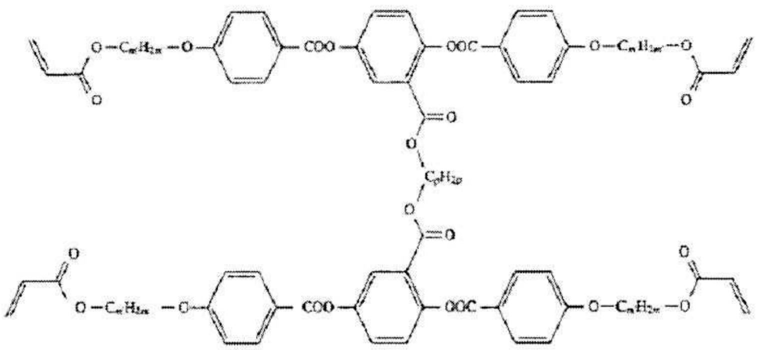
The liquid crystal 150a may be a thermosetting liquid crystal or a photocurable liquid crystal, and for example, the liquid crystal 150a may be a photocurable liquid crystal. When the liquid crystal 150a is a photocurable liquid crystal, the light may be ultraviolet ('UV') rays having a wavelength ranging from about 250 nm to about 400 nm.

[0054]

In an exemplary embodiment, the liquid crystal 150a may be crosslinkable liquid crystals, and for example, may be a compound represented by one of the following Chemical Formulae 1A to 1F.

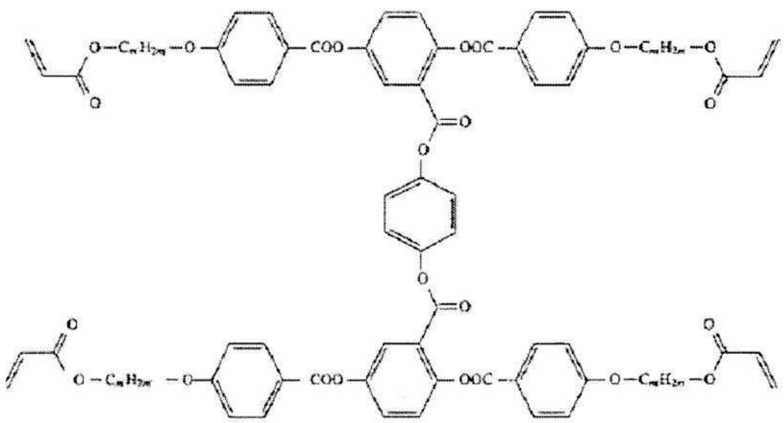
[Chemical formula 1A]

[Chemical Formula 1]



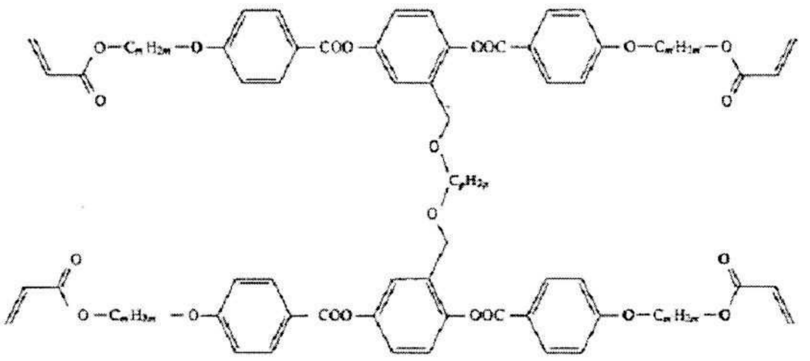
[Chemical formula 1B]

[Chemical Formula 2]



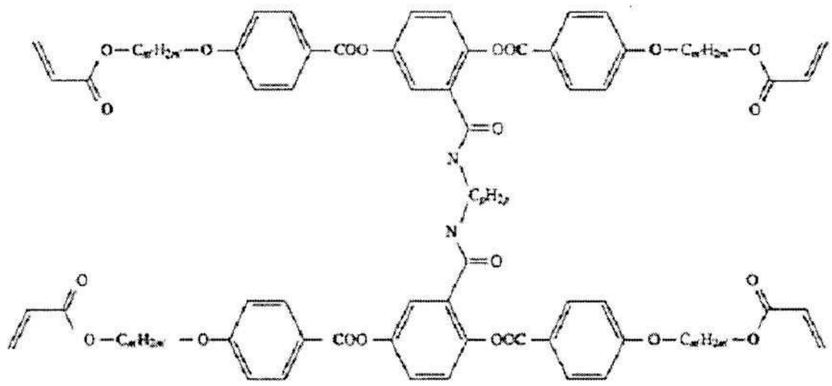
[Chemical formula 1C]

[Chemical Formula 3]



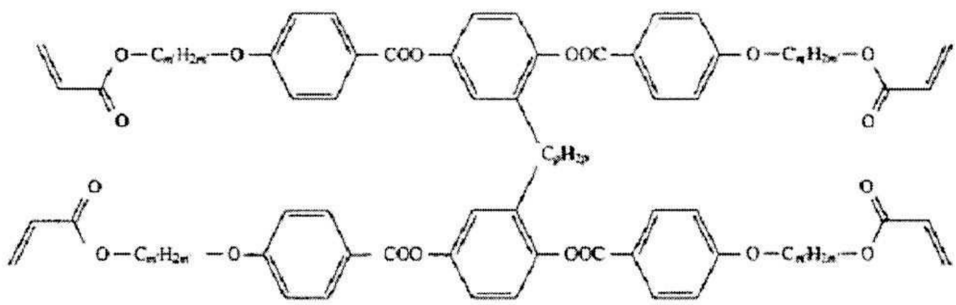
[Chemical formula 1D]

[Chemical Formula 4]



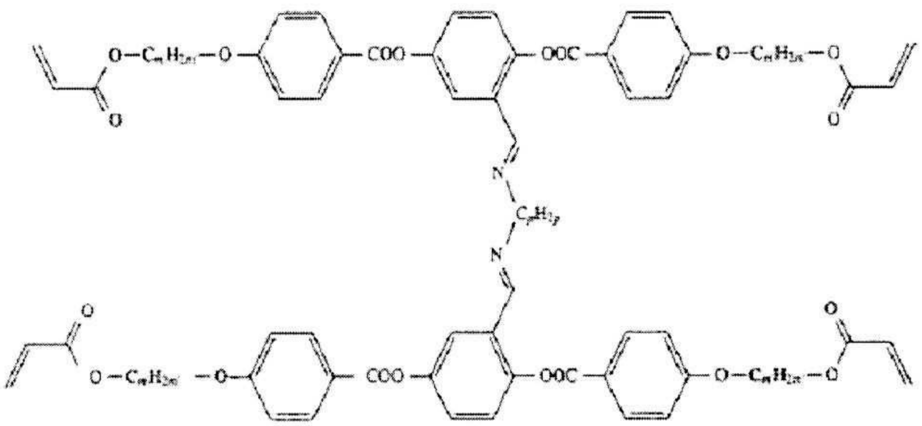
[Chemical formula 1E]

[Chemical Formula 5]



[Chemical formula 1F]

[Chemical Formula 6]



[0055]

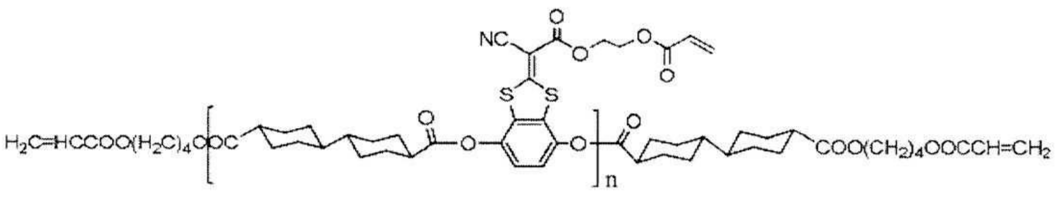
In Chemical Formulae 1A to 1F, m' is an integer of 4 to 12, and p is an integer of 2 to 12.

[0056]

In an exemplary embodiment, the liquid crystal 150a may include a compound represented by the following Chemical Formula 2A.

[Chemical formula 2A]

[Chemical Formula 7]



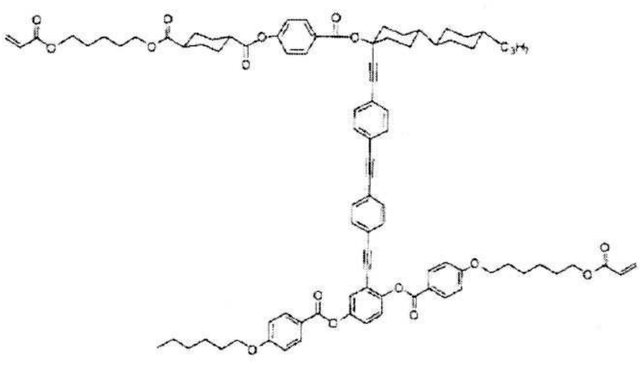
In Chemical Formula 2A, n is an integer of 2 to 10.

[0057]

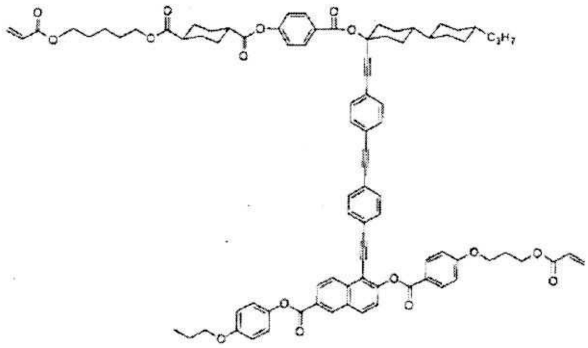
In an exemplary embodiment, for example, the liquid crystal 150a may include a compound represented by one of the following Chemical Formulae 3A to 3E.

[Chemical formula 3A]

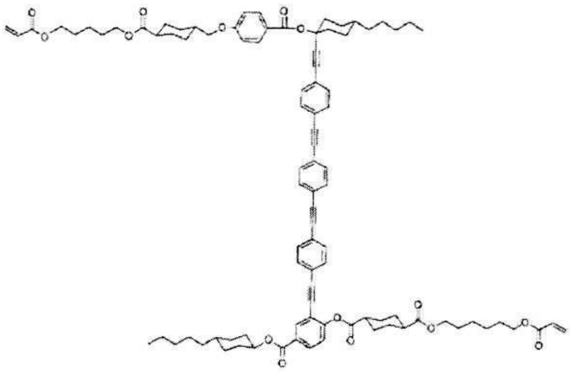
[Chemical Formula 8]



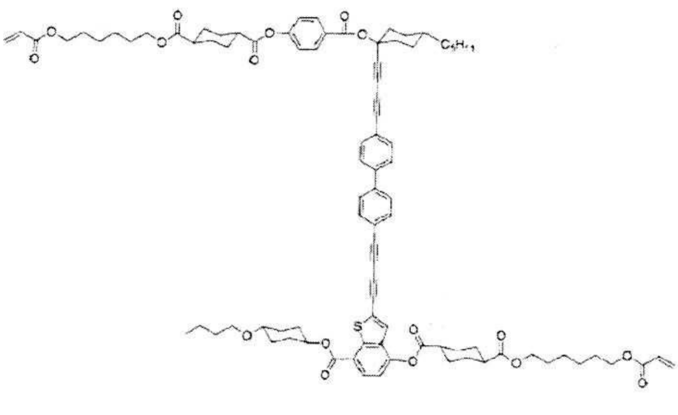
[Chemical formula 3B]
[Chemical Formula 9]



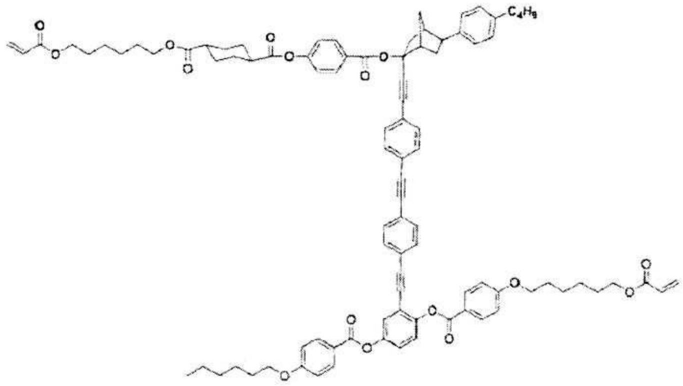
[Chemical formula 3C]
[Chemical Formula 10]



[Chemical formula 3D]
[Chemical Formula 11]



[Chemical formula 3E]
[Chemical Formula 12]

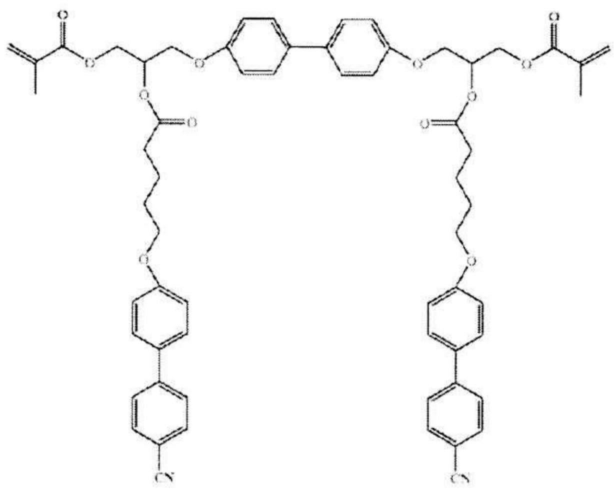


[0058]

In an exemplary embodiment, the liquid crystal 150a may include a compound represented by the following Chemical Formula 4A or 4B.

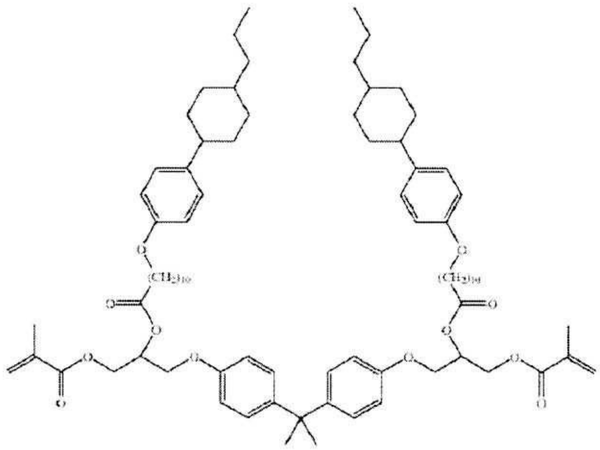
[Chemical formula 4A]

[Chemical Formula 13]



[Chemical formula 4B]

[Chemical Formula 14]



[0059]

The liquid crystal layer 150 may include one, or two or more kinds of liquid crystal 150a.

[0060]

The liquid crystal layer 150 may include a composition including the liquid crystal 150a, and the composition may include various additives such as a reaction initiator, a surfactant, a dissolution assistant and/or a dispersing agent, and a solvent, other than the liquid crystal 150a. The composition may be applied through a solution process, for example, spin coating, slit coating, and/or inkjet coating, and the thickness of the liquid crystal layer 150 may be adjusted in consideration of a refractive index and the like."

C The description pointed out in the aforesaid item B(A) is to make liquid crystals in a liquid crystal layer "hybrid orientation," and to adjust a minimum tilt angle and a maximum tilt angle to prescribed ranges, but it is silent about how to implement these constituent elements.

D Paragraph [0052] in the description pointed out in the aforesaid item B(B) lists "reactive mesogenic liquid crystal" (this language is not a technical term commonly used, but construed as meaning a so-called polymeric liquid crystal in view of the context.) having a structure of comprising at least one selected from a rod-like aromatic derivative having one or more of a polymeric functional group, propyleneglycol-1-methyl, and propyleneglycol-2-acetate, and a compound represented by P^1-A^1-(Z^1-A^2)$_n$-P^2 (the definition of each symbol is omitted) is given as an example of liquid crystal used for liquid crystal layer.

It is technically clear, however, that the structure of [0052] is not a sufficient condition for "hybrid orientation" with a minimum tilt angle of 3 degrees and a maximum tilt angle of 30 degrees to 65 degrees. Therefore, the use of "reactive mesogenic liquid crystal" having the structure of [0052] is not a sufficient condition for the feasibility of liquid crystal layer having a "hybrid orientation" with a minimum tilt angle of 3 degrees and a maximum tilt angle of 30 degrees to 65 degrees.

Therefore, it cannot be seen from [0052] in the description pointed out in the aforesaid item B(B) as to how to implement "hybrid orientation" with a minimum tilt angle of 3 degrees and a maximum tilt angle of 30 degrees to 65 degrees.

E Paragraphs of [0054] to [0058] in the description pointed out in the aforesaid item B(B) list compounds (hereinafter referred to as "exemplified compounds") represented by the chemical formulae 1A to 1F, 2A, 3A to 3E, 4A, and 4B as specific examples of liquid crystals used for a liquid crystal layer.

The description, etc. is totally silent, however, about what values the respective minimum tilt angle and maximum tilt angle of each exemplified compound are when a liquid crystal layer is formed by use of each exemplified compound. Further, it fails to explain means for controlling the minimum tilt angle and maximum tilt angle of each exemplified compound.

In addition, first of all, there are a plurality of examples in the description pointed out in the aforesaid item B(A) that show the numerical ranges including ranges differing from "3 degrees" and "30 degrees to 65 degrees" for the minimum tilt angle and the maximum tilt angle of the liquid crystals. Even a person skilled in the art could not recognize from the description of the specification, etc. as to whether there might be any compound that could realize a "hybrid orientation" with a minimum tilt angle of 3 degrees and a maximum tilt angle of 30 degrees to 65 degrees (or any compound that could realize a "hybrid orientation" satisfying the matters specifying the invention 1 and 2 even if a minimum tilt angle were not 3 degrees, and a maximum tilt angle were not 30 degrees to 65 degrees) in the exemplified compounds, or if present, what kind of compound could realize a "hybrid orientation" with a minimum tilt angle of 3 degrees and a maximum tilt angle of 30 degrees to 65 degrees in the exemplified compounds.

Further, it is not recognized that the values of the minimum tilt angle and the maximum tilt angle of each exemplified compound and the means for controlling the minimum tilt angle and the maximum tilt angle of each exemplified compound to the numerical ranges of "3 degrees" and "30 degrees to 65 degrees" fell within a scope of the common general knowledge as of the filing.

F Furthermore, the other part of the specification, etc. fails to disclose any means for implementing a liquid crystal layer having a "hybrid orientation" with a minimum tilt angle of 3 degrees and a maximum tilt angle of 30 degrees to 65 degrees (or a "hybrid orientation" satisfying the matters specifying the invention 1 and 2 even if the minimum tilt angle were not 3 degrees, and the maximum tilt angle were not 30 degrees to 65 degrees), nor could it be recognized that such a means was a matter of common general knowledge as of the filing for a person skilled in the art.

G When a person skilled in the art implements a liquid crystal layer comprising the matters specifying the invention 1 and 2 on the basis of the description of the specification, etc. and the common general knowledge as of the filing, it is required to find a combination of each exemplified compound and each appropriate means capable of adjusting a minimum tilt angle to 3 degrees and adjusting a maximum tilt angle to the numerical range of 30 to 65 degrees by repeatedly implementing the operations of taking an appropriate means (that falls within the common general knowledge) capable of controlling the minimum tilt angle and the maximum tilt angle respectively to form a liquid crystal layer, and measuring the minimum tilt angle and the maximum tilt angle of each exemplified compound in each of the liquid crystal layer for each exemplified compound. Such an operation is nothing but trial and error that go beyond an expected level for a person skilled in the art or a highly sophisticated experimentation, etc.

Therefore, it cannot be said that the Detailed Description of the Invention in the specification discloses definitely and sufficiently to the extent that a person skilled person can implement the Invention.

H The Applicant argues in the written argument dated May 7, 2018 that
"a maximum tilt angle of liquid crystals of a liquid crystal layer may be adjusted by various ways, and it is submitted that this may be surely realized with common general knowledge of a person skilled in the art.

For example, the tilt angle of the first major surface of liquid crystal layer (a surface at a side with a small tilt angle) may be realized by a pretilt angle due to the rubbing of an orientation film, etc., and a minimum tilt angle of 3 degrees may be surely realized by common general knowledge of a person skilled in the art.

Further, for example, the tilt angle of the second major surface of a liquid crystal layer (the surface at a side of the maximum tilt angle) may be realized by controlling surface properties by use of surfactants, and this may be surely realized by common general knowledge of a person skilled in the art. For example, when a liquid crystal solution comprising liquid crystals and a surfactant is coated on an orientation film and left, a surfactant with a high surface energy is positioned on a surface to control surface properties of a liquid crystal layer, thereby controlling a standing angle of the liquid crystals close to a surface of the liquid crystal layer. In such a manner, a liquid crystal positioned between a liquid crystal of a first major surface and a liquid crystal of a second major surface may be gradually arranged from the liquid crystal of the first major surface to the liquid crystal of the second major surface, and the curing of such a liquid crystal arrangement may realize the arrangement of hybrid liquid crystals as set forth below. In this way, the maximum tilt angle of 30 to 65 degrees may be surely realized by common general knowledge of a person skilled in the art."

The specification, etc. fails to disclose, however, by what means the minimum tilt angle (the pretilt angle) might become 3 degrees respectively for each exemplified compound, and it cannot be recognized as a matter of common general knowledge as of the filing of the application, as discussed in the aforesaid item C. Therefore, it requires undue trial and error and complicating experiments that go beyond an expected level for a person skilled in the art to find a means for adjusting a minimum tilt angle to 3 degrees for each exemplified compound, and thus the Appellant's allegation of not violating the enablement requirement with respect to the adjustment of the minimum tilt angle to 3 degrees is not acceptable.

Further, regarding the Appellant's allegation of the realizing means of the maximum tilt angle of 30 degrees to 65 degrees, even if it was a matter of common general knowledge as of the filing of the application that the maximum tilt angle might be adjusted by use of a surfactant, no specific combination with a surfactant capable of adjusting the maximum tilt angle to the numerical range of 30 degrees to 65 degrees for each exemplified compound was a matter of common general knowledge as of the filing of the application. Therefore, it requires undue trial and error and complicating experiments that go beyond an expected level for a person skilled in the art to find a combination with surfactant for adjusting a maximum tilt angle to 30 degrees to 65 degrees for each exemplified compound, and thus the Appellant's argument of not violating the enablement requirement with respect to the adjustment of the maximum tilt angle to 30 degrees to 65 degrees is not acceptable.

(4) Summary

As described above, the Detailed Description of the Invention of the specification does not satisfy the requirement specified in Article 36(4)(i) of the Patent Act.

5 Determination of Body's reasons for refusal 2 (Identity with extended prior application (Part 1))

(1) Prior Application 1

A The description of the specification, the scope of claims, and the drawings originally attached to the application of Prior Application 1

Prior Application 1 (Japanese Patent Application No. 2014-024505 (International Publication No. WO 2015-122387)) cited in the Body's reason for refusal 2 is a patent application that was filed before the priority date and
laid open after the priority date, and the inventor of the application is not identical to the inventor of Prior Application 1, and the Applicant of the application is not identical to the applicant of Prior Application 1 at the time of the application of the present application.

Consequently, the specification, the claims and the drawings originally attached to the application of Prior Application 1 (hereinafter referred to as "the original specification, etc.") has the following description, and although there are several parts using different expressions, the same content can also be found in the original specification, etc. of the International application (PCT/JP2015/053538) which claims priority on the basis of Prior Application 1. (In addition, the description in parentheses attached at the end of each point denotes the paragraph number, etc. with the same content in the original specification, etc. of the International application (PCT/JP2015/053538).)

(A) "[Technical Field]

[0001]

The present invention relates to ... (Omitted)... a retarder and an elliptical polarization plate using the same ... (Omitted)....

[Background Art]

[0002]

A retarder is an optical element used for obtaining polarized light (linearly polarized light, circularly polarized light, and elliptically polarized light)... (Omitted)... used for many uses such as ... (Omitted)... an anti-reflection film for organic EL display device in which a polarizer and a quarter wavelength plate are combined. A retarder includes a thin piece of plate of inorganic material (calcite, mica, crystal) or a stretched film of a polymer film with a high intrinsic birefringence and a film in which a rod-like or a disk-like liquid crystal material is oriented and fixed in a liquid crystal state.

... (Omitted)...

[0004]

A retarder is usually designed to show necessary optical functions for light with a specific wavelength (monochromatic light), but the aforementioned ... (Omitted)... a quarter wavelength plate used in an anti-reflection film for organic EL display device is required to have an effect of converting linearly polarized light into circularly polarized light, and circularly polarized light into linearly polarized light across the measured wavelengths (given as λ) of 400 to 700 nm ... (Omitted)... in the visible light region. Trying to realize this with a single retarder, the retarder ideally has a retardation one-fourth of a measured wavelength over measured wavelengths of 400 to 700 nm, ... (Omitted)... i.e. λ/4 (nm).

[0005]

The aforementioned retarder is commonly used for a quarter wavelength plate, but these materials have wavelength dispersion (wavelength dependency) in retardation. Here, a dispersive characteristic of obtaining a higher retardation as the measured wavelength shifts to a shorter wavelength and obtaining a lower retardation as it shifts to a longer wavelength is defined as a "positive dispersion," whereas a dispersion characteristic of obtaining a lower retardation as the measured wavelength shifts to a shorter wavelength and obtaining a higher retardation as it shifts to a longer wavelength is defined as a "negative dispersion." FIG. 1 shows a wavelength dispersive characteristic of birefringence (Δn(λ)) at each wavelength of visible light region with a birefringence value at the measured wavelength of 550 nm (Δn(550 nm)) being normalized as 1. In general, the birefringence of polymer film becomes higher as a measured wavelength shifts to a shorter wavelength, whereas it becomes lower as a measured wavelength shifts to a longer wavelength as shown in the solid line of FIG. 1. Specifically, it has "positive dispersion" characteristics. In contrast, the aforesaid ideal quarter wavelength plate has a "negative dispersion" characteristic of the birefringence of obtaining a higher birefringence as the measured wavelength shifts to a longer side, since a birefringence is proportional to a measured wavelength as shown in the dashed line of FIG. 1. Therefore, it is difficult to obtain a "negative dispersion" characteristic ideal for the measured wavelengths of 400 to 700 nm only by a single polymer film. When a retarder with "positive dispersion" characteristics consisting of a common polymer film serves for white light mixed with light of a visible light region, a polarized state at each wavelength is distributed, and a chromatic polarized light is generated.

... (Omitted)...

[0014]

... (Omitted)... Further, the aforementioned circularly polarizer may provide a nearly ideal circular polarization in light incident from a normal line direction of the circularly polarizer by achieving a quarter wavelength plate function in a broad wavelength region. Light incident from an oblique direction is converted into an elliptic polarization largely deviated from a circular polarization ... (Omitted)... there is fear of causing light leakage in an oblique direction for an anti-reflection film of an organic EL display device.

... (Omitted)...

[Problem to be solved by the invention]

[0016]

The present invention has been made in view of the aforementioned current situation ... (Omitted)... the object of the present invention is to provide ... (Omitted)... a retarder having a desired birefringence wavelength dispersion characteristic while suppressing the decrease in transmittance at the minimum, and an elliptical polarization

plate using the same.
[Means for solving the problem]

[0017]

The present inventors have investigated thoroughly to solve the aforesaid problem, and ... (Omitted)... found a novel retarder with a nematic hybrid orientation having a 'negative dispersion' characteristic of obtaining a higher birefringence Δn as the measured wavelength shifts to a longer side in a certain wavelength region of the visible light region. ... (Omitted)...

[0018]

[1] A retarder consisting of a liquid crystal film ... (Omitted)... with a nematic hybrid orientation, the retarder having a 'negative dispersion' characteristic of obtaining a higher birefringence Δn as the measured wavelength shifts to a longer side in a visible light region, wherein the retarder comprises a polymeric liquid crystal compound and at least one kind or more of dichroism pigments.

... (Omitted)...

[5] The retarder of any one of the aforesaid [1] to [4], wherein ratios of the retardation in a normal line direction of the retarder at specific wavelengths satisfy the following formulae (1) and (2):

$0.80<\Delta n \cdot d(500)/\Delta n \cdot d(550)<1.00$ (1)

$1.00<\Delta n \cdot d(600)/\Delta n \cdot d(550)<1.15$ (2)·

(where the retardation is represented by a product of a birefringence Δn and a thickness d of the retarder, and Δn·d(500), Δn·d(550), and Δn·d(600) are the retardation of a retarder at respective wavelengths of 500 nm, 550 nm, and 600 nm.)

... (Omitted)...

[0021]

... (Omitted)... [10] An elliptical polarization plate in which a retarder of any one of the aforesaid items [1] to [9] and a polarizer are bonded with one another. (Omitted)...

[Advantage(s) of the Invention]

[0022]

... (Omitted).... A retarder with such a liquid crystal orientation structure and a wavelength dependency of birefringence and a retardation at the measured wavelength of 550 nm being set to one-fourth the wavelength functions as a retarder that converts a circular polarization into a linear polarization and a linear polarization into a circular polarization in a broad wavelength region in both a front side and an oblique direction. Thus, ... (Omitted)... the use of the retarder for organic electroluminescence display device may drastically improve high protecting performance in the wide viewing angle against specular reflection." ([0001] to [0019])

(B) "[Brief Description of the Drawing(s)]

[0023]

[FIG. 1] A graph showing a comparison of wavelength dispersion between a common polymer film and an ideal birefringence Δn.

... (Omitted)...

[FIG. 14] A schematic view of an orientation structure of a nematic hybrid liquid crystal film.

[FIG. 15] A schematic view illustrating a tilt angle and a twist angle of a liquid crystal molecule.

[FIG. 16] A drawing showing a wavelength dispersive characteristics of birefringence Δn of the liquid crystal films produced in Example 1, Example 2, Example 3, Comparative Example 1, and Comparative Example 3.

[FIG. 17] A measurement result of an apparent retardation value measured by tilting a liquid crystal film produced in Example 1 in an orientation direction of liquid crystals.

[FIG. 18] A drawing showing a layer configuration of the circularly polarizers produced in Example 1, Comparative Example 2, and Comparative Example 3.

[FIG. 19] A drawing that measured viewing angle characteristics of reflectance viewed from every direction when a circularly polarizer produced in Example 1 was mounted on an organic EL display device." ([0020])

(C) "[0033]
... (Omitted)... FIG. 14 shows a cross-sectional structure of a liquid crystal film with a nematic hybrid orientation structure of the present invention. The film with a nematic hybrid orientation structure has directors of a polymeric liquid crystal compound oriented in different angles at all sites in a film thickness direction. Therefore, a retarder of the present invention no longer has an optical axis when viewed as a structure of a film. FIG. 15 shows the definitions of the tilt angle and the twist angle of a liquid crystal molecule. Here, the tilt angle (axis) of a liquid crystal film is defined as a direction that forms an angle between a director of a liquid crystal molecule and a projection component onto a c-surface of a director of an acute angle when viewed from the c-surface from b-surface side through the liquid crystal film as shown in FIG. 14 and is parallel to the projection component.

[0034]

A nematic hybrid orientation structure fixed in the aforesaid liquid crystal film has an absolute value of <u>an angle between a director of a liquid crystal molecule and a film plane at one side of film interfaces of the liquid crystal film</u> of usually 20° to 90°, <u>preferably 30° to 70°</u>, and <u>an angle between a director of a liquid crystal molecule and a film plane at the opposite side</u> of film interfaces of the liquid crystal film of usually 0° to 50°, <u>preferably 0° to 30°</u>. Further, the average tilt angle in the orientation structure is usually 5° to 40°, preferably 10° to 35°, the most preferably 15° to 30° in absolute value. If the average tilt angle deviates from the above range, the orientation structure mounted on a liquid crystal display device or an organic EL display device might cause a decrease in viewing angle properties with a combined polarizer. Here, the average tilt angle means an average value of an angle between a director of a liquid crystal molecule and a film plane in a film thickness direction of a liquid crystal film." ([0033], [0034])

(D) "[0037]

First, dichroism pigments used herein are illustrated.

Dichroism pigments are pigments with different properties in absorbance between a long axis direction and a short axis direction of a molecule. If a molecule has such a property, dichroism pigment is not particularly limited, but may include dyes and pigments. Multiple kinds of dyes may be used in combination, and a pigment may also be used in combination of plural kinds, and dyes and pigments may be combined with each other. Furthermore, such a dichroism pigment may have a polymeric functional group or a liquid crystallinity." ([0036])

(E) "[0062]

The constituent element of retarder consisting of liquid crystal film of the present invention of polymeric liquid crystal material is illustrated.

Such polymeric liquid crystal compound is not particularly limited, but a publicly-known polymeric liquid crystal compound may be utilized as necessary as long as it is a compound with liquid crystallinity whose orientation state may be fixed by polymerization. Further, such polymeric liquid-crystalline compound is preferably a polymeric liquid-crystalline compound that may take a nematic hybrid orientation on a substrate whose orientation state may be fixed. Furthermore, such polymeric liquid crystal compound may include, for example, a low-molecular-weight polymeric liquid crystal compound (a liquid-crystalline monomer having a polymerizable group), a high-molecular-weight polymeric liquid crystal compound (a liquid-crystalline polymer having a polymerizable group), and a mixture thereof."

([0060], [0061])

(F) "[0076]

Further, in the present invention, the retardation $\Delta n \cdot d$ needs to satisfy the following formulae (1) and (2).

$0.80<\Delta n \cdot d(500)/\Delta n \cdot d(550)<1.00$ (1)

$1.00<\Delta n \cdot d(600)/\Delta n \cdot d(550)<1.15$ (2)

In particular, regarding a method for satisfying $0.80<\Delta n \cdot d(500)/\Delta n \cdot d(550)<1.00$, the polymeric polymer compound is a compound having two or more mesogen groups, and at least one mesogen group is oriented almost in an orthogonal direction against a slow axis of a homogeneous orientation of a liquid crystal layer so that the retardation is increased as the wavelength shifts to a longer side, as described in Japanese Unexamined Patent Application Publication No. 2002-267838 and Japanese Unexamined Patent Application Publication No. 2010-31223.

Here, mesogen having a mesogen group is also referred to as a mesophase-forming (= liquid crystal phase) molecule ("Liquid Crystal Encyclopedia", Japan Society For the Promotion of Science, Organic materials for informatics, The 142nd Committee, Edited by Liquid Crystal Division, 1989) with almost the same meaning as a liquid-crystalline molecular structure. In the present invention, a mesogen group in a rod-like liquid crystal (a molecular structure with respect to liquid crystallinity of rod-like liquid crystal) is preferably adopted." ([0075])

(G) "[0126]

An organic electroluminescence device (organic EL display device) to which a retarder of the present invention is applied is explained hereinafter. ... (Omitted)...

[0129]

In such an organic EL display device, an organic light emission layer is formed into an extremely thin film with a thickness of 10 nm or so. Therefore, an organic light emission layer also transmits light almost completely similar to the manner of a transparent electrode. As a result, light incident from a surface of a transparent substrate in non-emission and passing through a transparent electrode and an organic light emission layer and reflecting on a metal electrode goes out again to a surface side of the transparent substrate. Thus when viewed from the outside, a display surface of the organic EL display device can be seen like a mirror surface.

In an organic EL display device comprising an organic electroluminescence light emitter equipped with a transparent electrode on a surface side of the organic light emission layer emitting light by the application of voltage and a metal electrode on a rear surface side of the organic light emission layer, a polarizer may be disposed on a surface side of the transparent electrode and a retarder may be disposed between the transparent electrode and the polarizer.

[0130]

The retarder and polarizer have an effect of polarizing a light incident from the outside and reflected on a metal electrode. Thus, the polarizing effect prevents a mirror surface of the metal electrode from being viewed from the outside. In particular, a quarter wavelength plate is used for a retarder, and a linearly polarized plate and the retarder are combined to form a circularly polarizer, thereby totally shielding a mirror surface of a metal electrode.

Specifically, a polarizer only allows a linearly polarized component of external light entered into this organic EL display device to pass through. This linearly polarized light is generally changed into elliptically polarized light by a retarder, and circularly polarized light particularly when the retarder is a quarter wavelength plate and an angle of a polarized light direction between a polarizer and the retarder is $\pi/4$.

[0131]

This circularly polarized light passes through a transparent substrate, a transparent electrode, and an organic thin film, reflects on a metal electrode, and passes through again the organic thin film, the transparent electrode, and the transparent substrate, and changes again into linearly polarized light at a retarder. Further, this linearly polarized light is orthogonal to a polarized direction of a polarizer, and thus cannot pass through a polarizer. As a result, a mirror surface of the metal electrode can be totally shielded. From the viewpoint of forming a circularly polarizer in which a quarter wavelength plate is combined with a linear polarizer, given the angle between an absorption axis of the aforesaid polarizer and a slow axis of the aforesaid quarter wavelength plate to be p, p is usually 40° to 50°, preferably 42° to 48°, further preferably about 45° in the case of a retarder of the present invention having a nematic hybrid orientation. Except for the above range, the decrease in anti-reflection effect may deteriorate an image quality." ([0125] to [0130])

(H) "[0133]

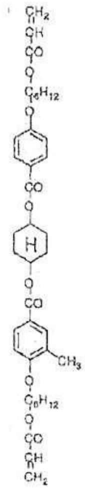
[Example 1]

<Preparation of a mixed solution of polymeric liquid crystal compound (A) and dichroism pigment>

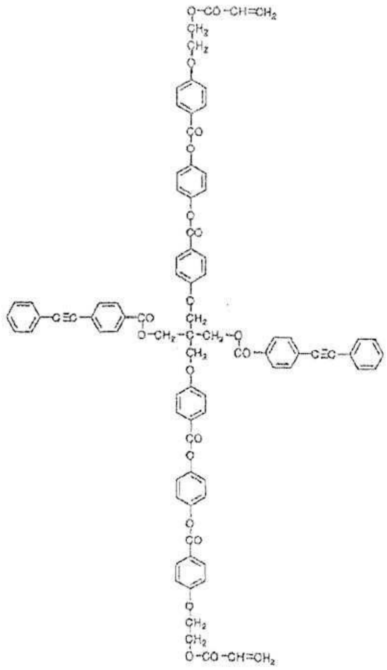
Compound (21) having two kinds or more of mesogen group and rod-like liquid crystal compound (22) as shown in the following formula (Trial Decision's note: In view of the structural formula of each compound shown in [0134], the symbols in parentheses of "compound (21) having two kinds or more of mesogen group" and "rod-like liquid crystal compound (22)" are typographical errors. They are correctly construed as meaning "compound (22) having two kinds or more of mesogen group" and "rod-like liquid crystal compound (21)," respectively. This can similarly apply to the description of "compound (21)" and "rod-like liquid crystal compound (22)" hereinafter.) were respectively prepared. In addition, compound (21) and rod-like liquid crystal compound (22) were produced by the method described in Japanese Unexamined Patent Application Publication No. 2002-267838.

[0134]

[Chemical Formula 20]



(21)



(22)

[0135]

Subsequently, the aforesaid compound (21) and the aforesaid rod-like liquid crystal compound (22) were mixed in a mass ratio of 2 mass% and 17.6 mass% to obtain a first mixture (given as polymeric liquid crystal compound (A)).

Subsequently, to the aforesaid first mixture, there was added a dichroism pigment (G-241 manufactured by NAGASE & CO., LTD., trisazo color, maximum absorption wavelength: 560 nm) in a proportion of 0.08 mass part on the total amount of 100 mass parts, which was followed by the addition of a polymerization initiator (product name 'IRGACURE 651' produced by Ciba-Geigy of Switzerland, solid under room temperature (25°C)) in a proportion of 3 mass parts on the basis of the total amount of 100 mass parts of the aforesaid polymeric liquid crystal compound (A) and dichroism pigment to obtain a second mixture (solid) in which the aforesaid polymeric liquid crystal compound (A), dichroism pigment, and the aforesaid polymerization initiator were mixed together.

Subsequently, the aforesaid second mixture was dissolved into chlorobenzene (solvent), and an insoluble content was filtered with a filter made of polytetrafluoroethylene with a pore size of 0.45 μm to obtain a mixed solution (a third mixture) comprising the aforesaid polymeric liquid crystal compound (A), dichroism, a polymerization initiator, and a solvent. In addition, in producing such a third mixture, a solvent was used so that the content of the solvent in the aforesaid third mixture might become 67 mass%, and the total amount of the aforesaid polymeric liquid crystal compound (B), dichroism pigment and the aforesaid polymerization initiator might become 33 mass%.

[0136]

<Manufacture of liquid crystal film>

The substrate for orientation was prepared in the following manner. A polyethylene naphthalate film with a thickness of 38 μm (PEN manufactured by TEIJIN LIMITED) was cut out into 15 cm square, and 5 weight percent solution of an alkyl-modified polyvinyl alcohol (PVA manufactured by KURARAY CO., LTD., MP-203) (the solvent was a mixed solvent of water and isopropyl alcohol at a weight ratio of 1:1) was coated thereon by a spin coating method, and dried for 30 minutes by a hot plate at 50°C, and heated for 10 minutes in an oven at 120°C. Subsequently, it was subjected to rubbing with a rubbing cloth of rayon. The obtained PVA layer had a film thickness of 1.2 μm. The circumferential velocity ratio in rubbing (moving speed of rubbing cloth/moving speed of substrate film) was set to 4.

[0137]

The substrate for orientation thus obtained was coated by a spin coating method with the mixed solution (a third mixture) comprising the aforesaid compound (21) as obtained above, the aforesaid rod-like liquid crystal compound (22) and a dichroism pigment, a polymerization initiator, and a solvent to form a coat (wet film thickness: 5 μm), and obtain a laminate of the coat and a substrate for orientation.

Subsequently, the aforesaid laminate of the coat and the substrate for orientation was gradually cooled from a temperature of 72°C to 62°C in 10 minutes at a pressure of 1013 hPa, followed by drying and removing a solvent from the aforesaid coat (solvent removal step) and then rapidly cooling down to room temperature.

Subsequently, ultraviolet light was irradiated on a coat after drying by the aforesaid solvent removal process by use of high pressure mercury lamp with an illuminance of 15 mW/cm^2 so that an integrated irradiance level may become 200 mJ/cm^2 (irradiance was measured at a wavelength of 365 nm) to polymerize (cure) the aforesaid liquid crystal compound for fixing the orientation state, and obtain a laminate where a liquid crystal film having the fixed orientation state was laid on the substrate for orientation (a laminate of a liquid crystal film and a substrate for orientation).

[0138]

Polyethylenenaphthalate film used for a substrate has a large birefringence, and thus is not preferable for optical film. Thus the obtained optical anisotropic layer on the substrate for orientation was transferred on a triacetyl cellulose (TAC) film (Z-TAC manufactured by FUJIFILM Corporation, 40 μm (Trial Decision's note: "um" is a typographical error, correctly "μm")) via an ultraviolet curable-type adhesive. Specifically, on a cured liquid crystal film layer disposed on polyethylenenaphthalate film, an adhesive was coated with a thickness of 5 μm, and laminated with TAC film, followed by the irradiation of ultraviolet light from TAC film side to cure an adhesive, from which a substrate for orientation was peeled.

When the obtained optical film (liquid crystal film/adhesive layer/TAC film) was observed under a polarizing microscope, it was found to have no disclination but a mono-domain uniform orientation.

[0139]

The wavelength dispersion characteristic of the retardation (Δnd) in an in-plane direction of a laminate of TAC film and liquid crystal film and TAC film was measured by use of product name 'Axoscan' manufactured by Axometric, and the wavelength dispersion characteristic of the birefringence of a liquid crystal film layer was measured from the subtraction between them. FIG. 16 summarizes the wavelength dispersion characteristics of the birefringence of the liquid crystal film layer, and Table 2 summarizes the optical properties. Δnd at 550 nm was 138 nm, and Δnd (500)/Δnd (550)=0.96, Δnd (600)/Δnd (550)=1.03.

Further, the retardation (Δnd) when the obtained optical film was tilted in a rubbing direction (the orientation direction of liquid crystal molecule) was measured by 'Axoscan.' The measurement result is shown in FIG. 17. As shown in FIG. 17, it was found to have a viewing angle dependency with left-right asymmetry and a tilted orientation. The obtained optical film was confirmed to be a nematic hybrid orientation film, not a liquid crystal film with a uniform tilt orientation by a method described in Example of Japanese Unexamined Patent Application Publication No. H11-194325. The average tilt angle was 34 degrees.

[0140]

<Evaluation of anti-reflection performance of Organic EL display>

The obtained optical film was bonded with a commercially available polarizer 1 (SRW062 manufactured by Sumitomo Chemical Co., Ltd.) via an acrylic-based adhesive so that an absorption axis 2 of polarizer 1 and a tilt direction 5 of a liquid crystal layer 4 of an optical film 3 may form an angle of 45 degrees to manufacture a circularly polarizer 7. In bonding, they were laminated together so that TAC film 6 might contact with polarizer 1. A schematic view of cross-sectional structure in a laminated state of liquid crystal layer 4 of optical film 3 and polarizer 1 is shown in FIG. 18. The liquid crystal layer in optical film 3 had a surface in which a liquid crystal molecule relatively stood up at a side of polarizer 1, whereas a surface in which a liquid crystal molecule relatively laid down at the opposite side of the polarizer 1.

[0141]

The obtained circularly polarizer 7 was bonded with a transparent glass substrate of organic EL device of commercially available organic EL display via an acrylic-based adhesive to manufacture an organic EL display device of the present invention. As a result, it was found that the organic EL display device caused drastic anti-reflection effect of external light and had excellent visibility in comparison with the case without the circularly polarizer 7.

Further, the viewing angle characteristics of reflectance of incident external light was measured by a reflection viewing angle measurement device EZ-CONTRAST manufactured by ELDIM, and the result is shown together with the front side reflectance in FIG. 19 and Table 2."

([0132] to [0140])

(I) "[0153]

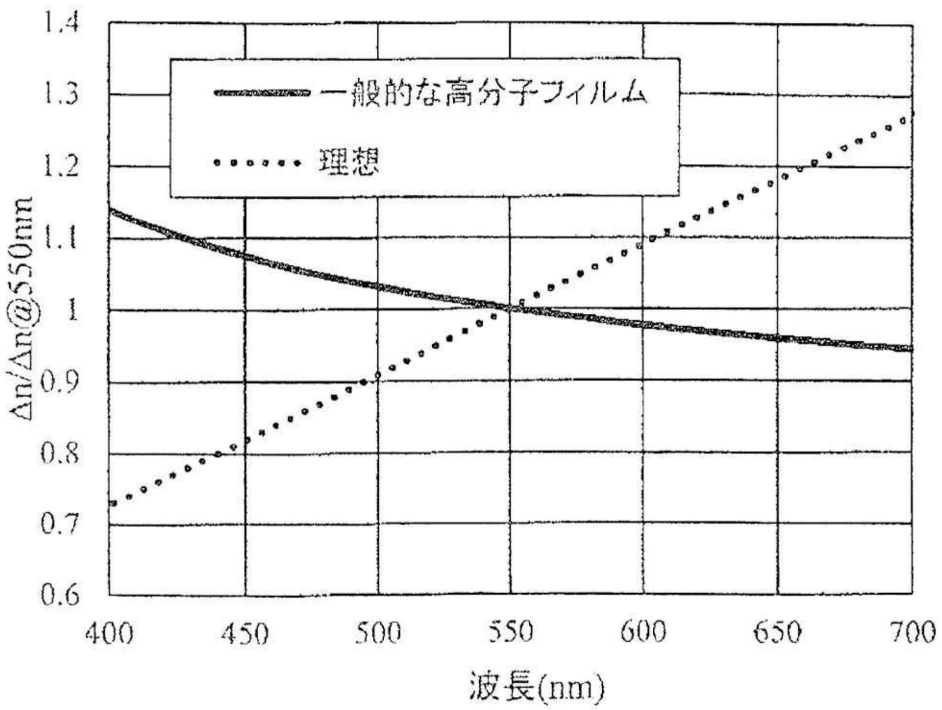
[Table 2]

	実施例１	実施例２	実施例３	実施例４	比較例１	比較例２	比較例３
Δnd (@550nm)	138.0	138.0	138.0	209.0	138.0	138.0	138.0
Δd(500)/ Δnd(550)	0.96	0.96	0.96	0.96	0.96	0.98	1.05
Δd(600)/ Δnd(550)	1.03	1.03	1.03	1.03	1.03	1.01	0.97
平均チルト	34 度	34 度	34 度	25 度	34 度	34 度	34 度
ツイスト角	0 度	0 度	0 度	55 度	0 度	0 度	0 度
正面反射率	0.85%	0.85%	0.85%	0.85%	0.85%	1.20%	1.72%
反射視野角特性	良好	良好	良好	良好	劣	良好	良好

実施例　Example
比較例　Comparative Example
平均チルト　Average tilt
ツイスト角　Twist angle
正面反射率　Reflectance at the front side
反射視野角特性　Reflection viewing angle characteristics
度　Degrees
良好　Good
劣　Poor

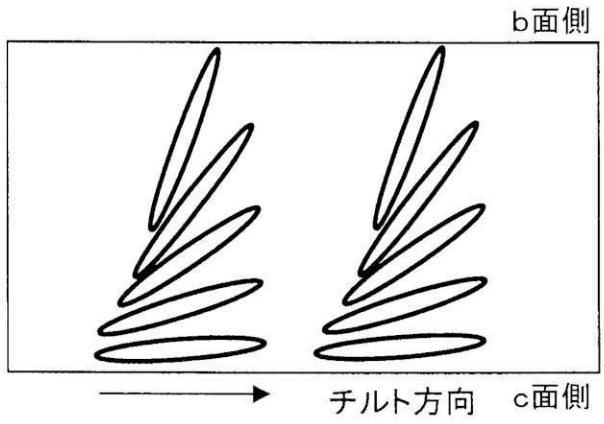
" ([0152])

(J) "[FIG. 1]



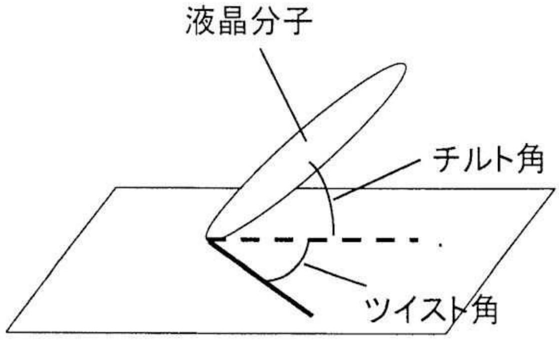
一般的な高分子フィルム　Common polymer film
理想　Ideal
波長　Wavelength

... (Omitted)...
[FIG. 14]



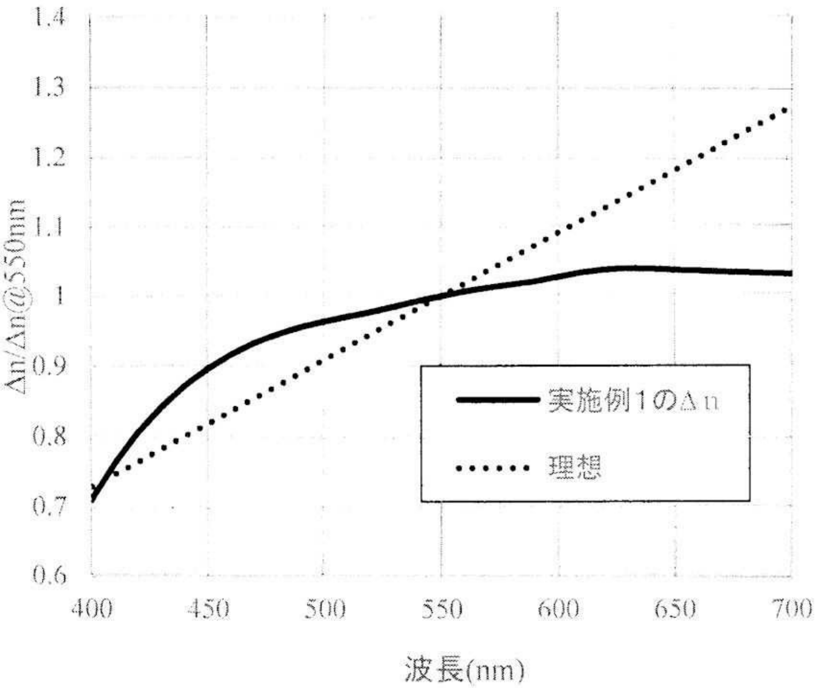
b 面側　b surface side
c 面側　c surface side
チルト角　Tilt angle

[FIG. 15]



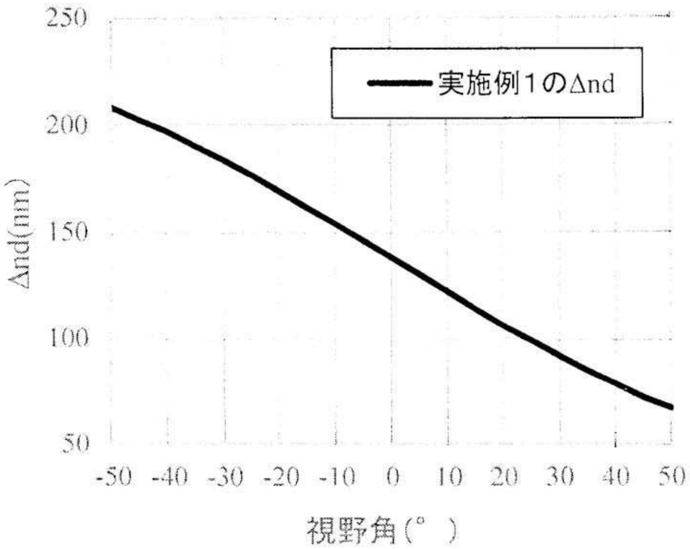
液晶分子　　　　Liquid crystal molecule
チルト角　　　　Tilt angle
ツイスト角　　　Twist angle

[FIG. 16]



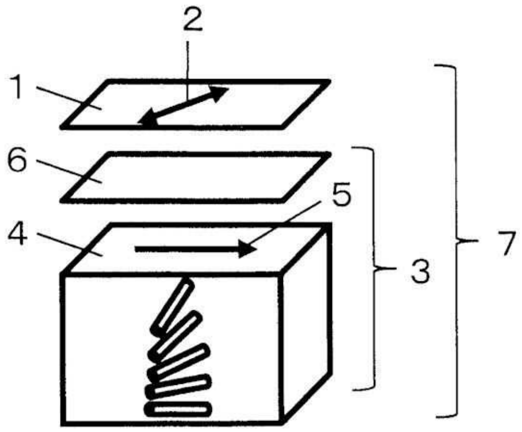
実施例１のΔｎ　Δn of Example 1
理想　Ideal
波長　Wavelength

[FIG. 17]

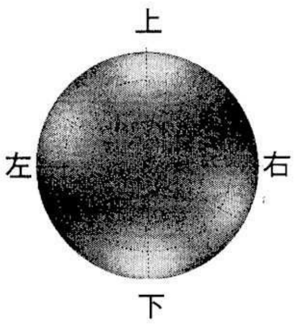


実施例１のΔｎｄ　Δnd of Example 1
視野角　 Viewing angle

[FIG. 18]



[FIG. 19]



上　　Upper

下　Bottom
右　Right
左　Left

" (FIG. 1, FIGS. 14-19)

B　The invention described in the original specification, etc. of Prior Application 1

"Liquid crystal layer 4" of [0140] obviously denotes "liquid crystal film layer" of [0138], etc. Thus, the originally attached description, etc. of Priority Application 1 describes the following invention as an invention corresponding to Example 1, and it is recognized that the invention is also described in the original specification, etc. of the International application claiming priority on the basis of Prior Application 1:

"A circularly polarizer of organic EL display for anti-reflection of external light, manufactured by the steps of:

mixing a compound (22) having two kinds or more of mesogen group and a rod-like liquid crystal compound (21) represented by the following formula in a mass ratio of 2 mass% and 17.6 mass% to obtain a first mixture; adding a dichroism pigment G-241 (trisazo color manufactured by NAGASE & CO., LTD., maximum absorption wavelength: 560 nm) in a proportion of 0.08 mass part on the total amount of 100 mass parts; further adding a polymerization initiator IRGACURE 651 produced by Ciba-Geigy in a proportion of 3 mass parts on the total amount of 100 mass parts of the aforesaid first mixture and the aforesaid dichroism pigment to obtain a second mixture; dissolving the second mixture into chlorobenzene; filtering an insoluble content with a filter made of polytetrafluoroethylene with a pore size of 0.45 μm to obtain a third mixture; cutting out a polyethylene naphthalate film with a thickness of 38 μm manufactured by TEIJIN LIMITED into 15 cm square; coating thereon a 5 weight percent solution of an alkyl-modified polyvinyl alcohol MP-203 manufactured by KURARAY CO., LTD. by a spin coating method; drying at 50°C with a hot plate for 30 minutes; heating at 120°C in an oven for 10 minutes; and then rubbing with a rubbing cloth made of rayon at a circumferential velocity ratio (moving speed of rubbing cloth/moving speed of substrate film) of 4 to obtain a substrate for orientation having a PVA layer with a film thickness of 1.2 μm; coating the aforesaid third mixture on the substrate for orientation by a spin coating method to form a coat with a wet film thickness of 5 μm and obtain a laminate of the coat and the substrate for orientation; gradually cooling from a temperature of 72°C to 62°C for 10 minutes at a pressure of 1013hPa; removing a solvent from the aforesaid coat by drying; and then rapidly cooling down to room temperature; subsequently irradiating ultraviolet light on the aforesaid coat by use of a high pressure mercury lamp with an illuminance of 15 mW/cm^2 so that an integrated irradiance level may become 200 mJ/cm^2 (irradiance was measured at a wavelength of 365 nm) to polymerize the aforesaid liquid crystal compound to fix an oriented state and obtain a laminate where a liquid crystal film having the fixed orientation state was laid on a substrate for orientation; coating an adhesive on the aforesaid liquid crystal film layer so as to attain a thickness of 5 μm;

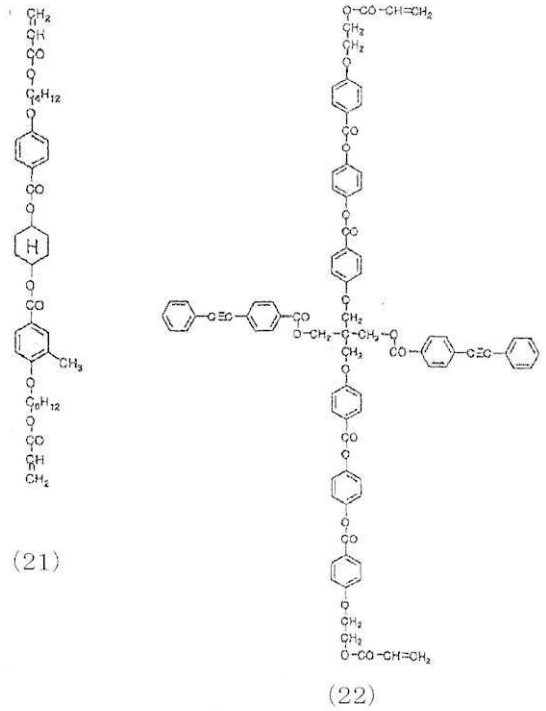
bonding thereto a triacetyl cellulose film Z-TAC with a thickness of 40 μm manufactured by FUJIFILM Corporation; radiating an ultraviolet light from a side of the aforesaid triacetyl cellulose film Z-TAC to cure the adhesive; and then peeling a substrate for orientation to obtain an optical film with a layer structure of liquid crystal film layer/adhesive layer/TAC film;

bonding the optical film with a polarizer SRW062 manufactured by Sumitomo Chemical Co., Ltd. via an acrylic-based adhesive so that an absorption axis of the polarizer and a tilt direction of a liquid crystal film layer in an optical film may form an angle of 45 degree so that the side of the aforesaid triacetyl cellulose film Z-TAC may face the polarizer,

wherein said liquid crystal film layer is a nematic hybrid orientation film with an average tilt angle of 34 degrees, and the wavelength dispersion characteristic of birefringence is shown in the following [Graph showing a wavelength dispersion characteristic of birefringence of liquid crystal film layer], and the retardation (Δnd) at 550 nm is 138 nm,

wherein said optical film has the retardation (Δnd) with an optical film being tilted in a rubbing direction (orientation direction of liquid crystal molecule) as shown in the following [Graph showing retardation (Δnd) with an optical film being tilted in a rubbing direction].

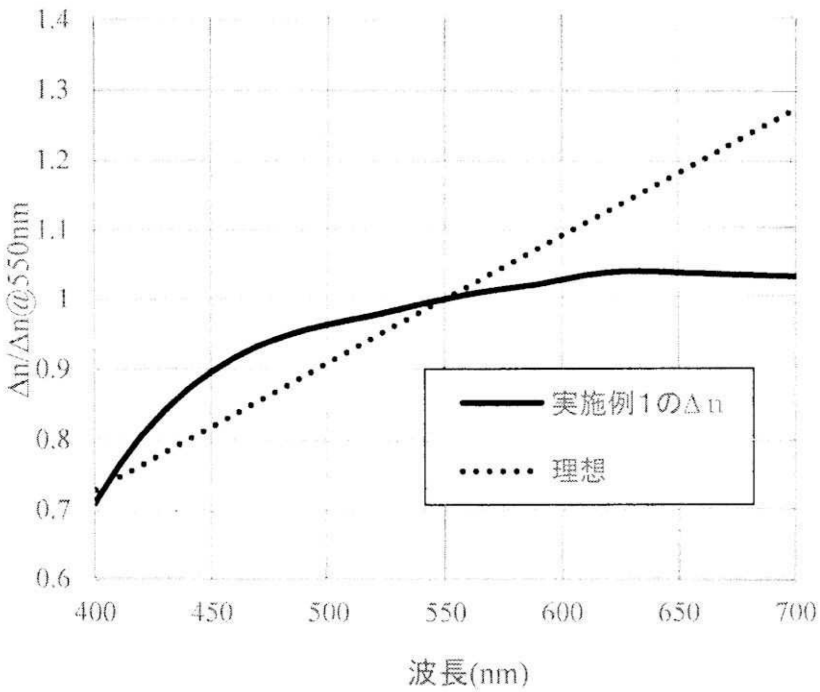
[Formulae of compound (22) having two kinds or more of mesogen group and rod-like liquid crystal compound (21)]



(21)

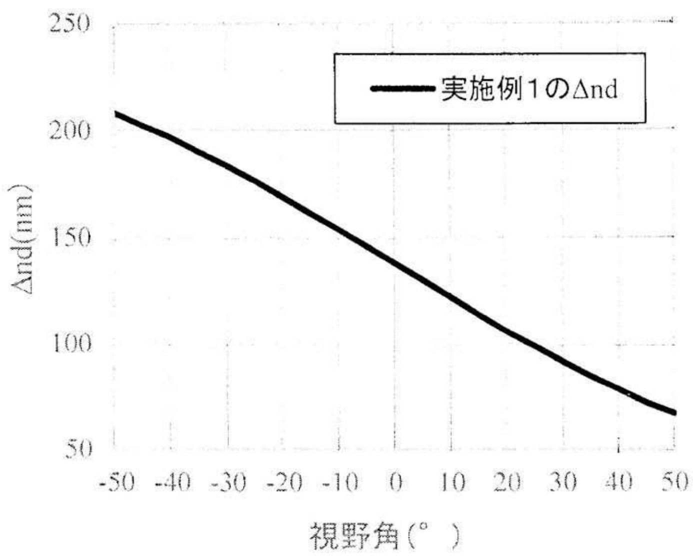
(22)

[Graph showing a wavelength dispersion characteristics of birefringence of liquid crystal film layer]



実施例１のΔｎ　 Δn of Example 1
理想　Ideal
波長　Wavelength

[Graph showing retardation (Δnd) with an optical film being tilted in a rubbing direction]



実施例１のΔｎｄ Δnd of Example 1
視野角　 Viewing angle" (hereinafter referred to as "Prior Application 1 invention".)

(2) Comparison

A It is obvious to a person skilled in the art that "polarizer SRW062 manufactured by Sumitomo Chemical Co., Ltd." of Prior Application 1 invention is a polarizer with "a polarizer."

Further, "liquid crystal film layer" of "optical film" of Prior Application 1 invention is a "liquid crystal layer" in view of the material, and of course has "a first major surface and a second major surface positioned at opposite sides from one another."

Furthermore, as can be seen from the description etc. of [0004], [0005], [0014], and [0016] of the originally attached description, etc. of Prior Application 1 pointed out in the aforesaid item (1)A(A), the "optical film" of the Prior Application 1 invention has a function to suppress the generation of chromatic polarized light or suppress the generation of light leak in an oblique direction by the wavelength dispersion characteristics and nematic hybrid orientation structure of "liquid crystal film layer" of the layer structure. Therefore, it can be said to be a "compensation film." Further, the "optical film" is bonded with the polarizer SRW062 manufactured by Sumitomo Chemical Co., Ltd. having "a polarizer," and thus it is located on one surface of a polarizer."

Therefore, the Prior Application 1 invention comprises the constitution corresponding to the matters specifying the Invention to "comprise a polarizer and a compensation film located on a surface of said polarizer, the compensation film comprising a liquid crystal layer having a first major surface and a second major surface positioned at the opposite side from one another."

B The "liquid crystal film layer" of the Prior Application 1 invention is a copolymer in which the major constituent materials of "compound (22) having two kinds or more of mesogen group" and "rod-like liquid crystal compound (21)" are subjected to copolymerization in view of the formation method. The constituents of the copolymer of "compound (22) having two kinds or more of mesogen group" and "rod-like liquid crystal compound (21)" are both "liquid crystals" in view of the structural formulae.

Further, the constituent element of "liquid crystal film layer is a nematic hybrid orientation film with an average tilt angle of 34 degrees" of the Prior Application 1 invention is nothing but a tilted light axis of "liquid crystals" of "compound (22) having two kinds or more of mesogen group" and "rod-like liquid crystal compound (21)" in a thickness direction against a surface of "liquid crystal film layer" and the gradual increase of tilted angle in a thickness direction of "liquid crystal film layer" from a first major surface to a second major surface against a surface of "liquid crystal film layer."

Therefore, the Prior Application 1 invention satisfies the constituent element corresponding to the matters specifying the Invention that "the liquid crystal layer comprises a liquid crystal having an optical axis obliquely tilted in a thickness direction from a surface of said liquid crystal layer, and the tilt angle of said liquid crystal against the surface of the liquid crystal layer may gradually increase in a thickness direction of said liquid crystal layer from said first major surface to said second major surface."

C It can be seen from [Graph showing a wavelength dispersion characteristic of birefringence of liquid crystal film layer] of the Prior Application 1 invention that the

in-plane retardation Re(450 nm), Re(550 nm), and Re(650 nm) of "liquid crystal film layer" of Prior Application 1 invention
at the wavelengths of 450 nm, 550 nm, and 650 nm satisfy the relationship 1 of "Re(450nm)<Re(550nm)≤Re(650nm)" of the Invention and satisfy the relationship 2a of "0.72≤Re(450nm)/Re(550nm)≤0.92."

Further, the Prior Application 1 invention is "a circularly polarizer of organic EL display for anti-reflection of external light." Thus this can be said to be an "anti-reflection film" and an "anti-reflection film for organic light emission device."

Therefore, the Prior Application 1 invention is "an anti-reflection film with an in-plane retardation (Re) of said liquid crystal layer at the wavelengths of 450 nm, 550 nm, and 650 nm satisfying Relationships 1 and 2a" and satisfies the constituent element corresponding to matters specifying the Invention to be an "anti-reflection film for an organic light emission device."

D In view of the aforesaid items A to C, the Invention and the Prior Application invention 1 have in common that
"An anti-reflection film for an organic light emission device, comprising: a polarizer; and

a compensation film located on a surface of said polarizer, said compensation film comprising a liquid crystal layer having a first major surface and a second major surface positioned at opposite sides from one another,

wherein said liquid crystal layer comprises liquid crystals having an optical axis obliquely inclined toward a thickness direction with respect to a surface of said liquid crystal layer,

wherein a tilt angle of said liquid crystals with respect to the surface of the liquid crystal layer gradually increases from said first surface to said second major surface in a thickness direction of said liquid crystal layer,

wherein in-plane retardation (Re) of said liquid crystal layer at the wavelengths of 450 nm, 550 nm, and 650 nm satisfies the following Relationship 1 and 2a:
[Relationship 1]

$R_e(450\text{ nm}) < R_e(550\text{ nm}) \leq R_e(650\text{ nm})$

[Relationship 2a]

$0.72 \leq R_e(450\text{nm})/R_e(550\text{nm}) \leq 0.92$

In the aforesaid Relationship 1 and 2a,

R_e (450 nm) is an in-plane retardation for an incident light at a wavelength of 450 nm,

R_e (550 nm) is an in-plane retardation for an incident light at a wavelength of 550 nm,

R_e (650 nm) is an in-plane retardation for an incident light at a wavelength of 650 nm."
but they are different from each other in the following point:

Different feature 1:

The Invention specifies a color shift of the anti-reflection film observed at a viewing angle of 60° as less than 7.0 and a reflectance as 1.0 % or less when measured at a viewing angle of 60°, whereas

The Prior Application 1 Invention fails to specify a color shift of the anti-reflection film observed at a viewing angle of 60° and a reflectance measured at a viewing angle of 60°.

(3) Regarding Different feature 1

A In the Prior Application 1 invention, a liquid crystal film layer has an orientation layer of PVA layer formed by alkyl-modified polyvinyl alcohol MP-203 manufactured by KURARAY CO., LTD. It is used exclusively for rod-like liquid crystal compound as a liquid crystal. Although the originally attached description, etc. of Prior Application 1 fails to disclose a minimum tilt angle (pretilt angle), in view of the minimum tilt angle (a value of "tilt angle at an interface of oriented layer" of [Table 2] of [0107]) of rod-like liquid crystal compound "LC-1" ([0097] to [0101]) formed on an "oriented film A-1" ([0090]) formed by alkyl-modified polyvinyl alcohol MP-203 manufactured by KURARAY CO., LTD. as described in Japanese Unexamined Patent Application Publication No. 2002-207121, the minimum tilt angle of liquid crystal film layer of Prior Application 1 invention is assumed to be 1 degree or so.

Further, the average tilt angle of Prior Application 1 invention is 34 degrees, and thus if the minimum tilt angle is 1 degree or so, the maximum tilt angle is assumed to be 67 degrees or so. In addition, the assumed values of pretilt angle and the maximum tilt angle are also consistent with the respective numerical values of "0 to 30°" and "30° to 70°" that are considered to be preferable and described in [0034] of the original specification of Prior Application 1.

B The values of the minimum tilt angle and the maximum tilt angle of the Prior Application 1 invention assumed in the aforesaid item A are almost comparable to the minimum tilt angle and the maximum tilt angle of "Example 3" described in [0088] of the specification. In view of this, it is recognized that "a color shift of the anti-reflection film observed at a viewing angle of 60°" and "a reflectance measured at a viewing angle of 60°" of the Prior Application 1 invention are likely to be "a color shift of the anti-reflection film observed at a viewing angle of 60°" and "a reflectance measured at a viewing angle of 60°" of "Example 3" described in [0088] of the specification of "4.5" or so and "0.93%" or so.

Otherwise, the paragraph [0034] of the originally attached description, etc. of Prior Application 1 describes a preferable range of an angle between a director of liquid crystal molecule and a film plane at one film interface of liquid crystal film of 30° to 70°, and a preferable range of an angle between a director of liquid crystal molecule and a film plane at the opposite side of the film of 0° to 30°. It should be only a minor difference in means for realizing a technique as to what value is appropriate within these preferable ranges. Therefore, it is only a minor difference in means for realizing a technique to adjust the values of the minimum tilt angle and the maximum tilt angle respectively to "3 degrees" and "a value within a numerical range of 30 degrees to 65 degrees." It is strongly suggested from Examples 1 to 4 and 6 described in the specification that "a color shift of the anti-reflection film observed at a viewing angle of 60°" and "a reflectance measured at a viewing angle of 60°" of the Prior Application 1 invention become "3.7 to 6.4" and "0.59% to 0.93%," respectively.

C As aforementioned, Different feature 1 is not a difference, otherwise only a very minor difference in realizing means to achieve excellent viewing angle properties.

Therefore, the Invention is identical or substantially identical to the Prior Application 1 Invention.

(4) Summary

The Invention is identical or substantially identical to the Prior Application 1 Invention, and thus cannot be granted a patent under the provision of Article 29-2 of the Patent Act.

6 Determination of Body's reason for refusal 3 (Identity with extended prior application (Part 2))

(1) Prior Application 2

A The description of the specification originally attached to Prior Application 2

Prior Application 2 (Japanese Patent Application No. 2014-35265 (Japanese Unexamined Patent Application Publication No. 2015-161714)) cited in the Body's reason for refusal 3 is a patent application that was filed before the priority date and laid open after the priority date, and the inventor of the application is not identical to the inventor of Prior Application 2, and the Applicant of the application is not identical to the applicant of Prior Application 2 at the time of the application of the present application.

Consequently, the specification originally attached to Prior Application 2 has the following descriptions:

(A) "[Technical Field]

[0001]

The present invention relates to a retarder used in a liquid crystal display device and organic electroluminescence display device, etc., and a display device using the same such as an elliptical polarization plate, and an image display device, a liquid crystal display device, and an organic electroluminescence display device.

[Background Art]

[0002]

A retarder is an optical element used for obtaining polarized light (linearly polarized light, circularly polarized light and elliptically polarized light)... (Omitted)... used for many uses such as ... (Omitted)... an anti-reflection film for organic EL display device in which a polarizer and a quarter wavelength plate are combined. A retarder includes a thin piece of plate of inorganic material (calcite, mica, crystal) or a stretched film of a polymer film with a high intrinsic birefringence and a film in which a rod-like or a disk-like liquid crystal material is oriented and fixed in a liquid crystal state.

... (Omitted)...

[0004]

A retarder is usually designed to show necessary optical functions for light with a specific wavelength (monochromatic light), but the aforementioned ... (Omitted)... a quarter wavelength plate used in an anti-reflection film for organic EL display device is required to have an effect of converting linearly polarized light into circularly polarized light, and circularly polarized light into linearly polarized light over a measured wavelength (given as λ) of 400 to 700 nm, preferably 400 to 780 nm, in the visible light region. Trying to realize this with a single retarder, the retarder ideally has a retardation of one-fourth of a measured wavelength across the measured wavelengths of 400 to 700 nm, preferably 400 to 780 nm; i.e., λ/4 (nm).

[0005]

The aforementioned retarder is commonly used in a quarter wavelength plate, but these materials have wavelength dispersion (wavelength dependency) in retardation. Here, a dispersive characteristic of obtaining a higher retardation as the measured wavelength shifts to a shorter wavelength and obtaining a lower retardation as it shifts to a longer wavelength is defined as a "positive dispersion," whereas a dispersion characteristic of obtaining a lower retardation as the measured wavelength shifts to a shorter wavelength and obtaining a higher retardation as it shifts to a longer wavelength is defined as a "negative dispersion." FIG. 1 shows a wavelength dispersive characteristic of birefringence ($\Delta n(\lambda)$) at each wavelength of visible light region with a birefringence value at the measured wavelength of 550 nm (Δn(550 nm)) being normalized as 1. In general, the birefringence of polymer film becomes higher as a measured wavelength shifts to a shorter wavelength, whereas it becomes lower as a measured wavelength shifts to a longer wavelength as shown in the solid line of FIG. 1. Specifically, it has a "positive dispersion" characteristic. In contrast, the aforesaid ideal quarter wavelength plate has a "negative dispersion" characteristic of the birefringence of obtaining a higher birefringence as the measured wavelength shifts to a longer side since a birefringence is proportional to a measured wavelength as shown in the dashed line of FIG. 1. Therefore, it is difficult to obtain a "negative dispersion" characteristic ideal for the measured wavelengths of 400 to 700 nm only by a single polymer film. When a retarder with a "positive dispersion" characteristic consisting of a common polymer film is used in white light mixed with light of a visible light region, a polarized state at each wavelength is distributed, and chromatic polarized light is generated.

... (Omitted)...

[0013]

The aforementioned circularly polarizer may obtain a circular polarization close to ideal in light incident from a normal line direction of the circularly polarizer by employing a quarter wavelength plate in a broad wavelength region; however, light incident from an oblique direction is converted into an elliptic polarization largely deviated from a circular polarization ... (Omitted)... there is fear of causing a light leakage in an oblique direction for an anti-reflection film of organic EL display device. ... (Omitted)...

[Problem to be solved by the invention]

[0015]

The present invention has been made in view of the aforementioned current situation and the object of the present invention is to provide a retarder having a desired birefringence wavelength dispersion with one film, an elliptical polarization plate using the same, and a wide viewing angle image display device using the same.

[Means for solving the problem]

[0016]

The present inventors have investigated thoroughly to solve the aforesaid problem, and finally found a novel retarder with a fixed nematic hybrid orientation mechanism having a 'negative dispersion' characteristic of the birefringence Δn becoming higher as the measured wavelength shifts to a longer side at a certain wavelength region of visible light region by optimizing a birefringence wavelength dispersion characteristics of polymeric liquid crystal compound and a film production condition. Specifically, the present invention is set forth as below.

[0017]

[1] A retarder consisting of a liquid crystal film with a fixed nematic hybrid orientation, the retarder having a "negative dispersion" characteristic of the birefringence Δn becoming higher as the measured wavelength shifts to a longer side in a visible light region.

... (Omitted)...

[0020]

[5] The retarder of any one of the aforesaid [1] to [4], wherein ratios of the retardation in a normal line direction of the retarder at specific wavelengths satisfy the following formulae (1) and (2):

$0.80<\Delta n\cdot d(500)/\Delta n\cdot d(550)<1.00$ (1)

$1.00<\Delta n\cdot d(600)/\Delta n\cdot d(550)<1.15$ (2)

(where the retardation is represented by a product of a birefringence Δn and a thickness d of the retarder, and Δn·d(500), Δn·d(550) and Δn·d(600) are the retardation of a retarder at respective wavelengths of 500 nm, 550 nm, and 600 nm.)

[0021]

... (Omitted)... [8] An elliptic polarizer in which a retarder of any one of the aforesaid items [1] to [7] and a polarizer are attached to one another. (Omitted)...

[Advantage(s) of the Invention]

[0022]

... (Omitted)... A retarder with such a liquid crystal orientation structure and a wavelength dependency of birefringence and a retardation at the measured wavelength of 550 nm being set to one-fourth wavelength functions as a retarder that converts a circular polarization into a linear polarization and a linear polarization into a circular polarization in a broad wavelength region in both a front side and an oblique direction. Thus, the use of the retarder for a liquid crystal display device may improve display characteristics such as brightness and contrast ratio in a front side and an oblique direction, and the use of retarder for an organic electroluminescence display device drastically improve high protecting performance against specular reflection in the wide viewing angle."

(B) "[Brief Description of the Drawing(s)]

[0023]

[FIG. 1] A graph showing a comparison of wavelength dispersion between a common polymer film and an ideal birefringence Δn.

... (Omitted)...

[FIG. 7] A schematic view of a nematic hybrid liquid crystal film orientation structure.

[FIG. 8] A schematic view illustrating a tilt angle and a twist angle of a liquid crystal molecule.

[FIG. 9] A drawing showing wavelength dispersive characteristics of the birefringence Δn of liquid crystal film produced in Example 1, Example 2, Example 3, Example 4, and Comparative Example 1.

[FIG. 10] A measurement result of apparent retardation value measured by tilting a liquid crystal film produced in Example 1 in an orientation direction of liquid crystal.

[FIG. 11] A drawing showing a layer configuration of a circularly polarizer produced in Example 1 and Comparative Example 2.

[FIG. 12] A drawing that measured viewing angle characteristics of reflectance viewed from every direction when a circularly polarizer manufactured in Example 1 was mounted on an organic EL display device."

(C) "[Description of Embodiments]

[0024]

The present invention is hereinafter discussed in detail.

The retarder of the present invention is a retarder consisting of a liquid crystal film with a fixed nematic hybrid orientation structure of polymeric liquid crystal compound and having a 'negative dispersion' characteristic of the birefringence Δn becoming higher as the measured wavelength shifts to a longer side in visible light region.

[0025]

The retarder of the present invention is a retarder having a "negative dispersion" characteristic of the birefringence Δn becoming higher as the measured wavelength shifts to a longer side in visible light region. Visible light region generally denotes a region of 380 nm to 780 nm. More specifically, given that the retardation of polymer film at 500 nm, 550 nm, and 600 nm to be Δn·d(500), Δn·d(550), and Δn·d(600),

$0.80<\Delta n\cdot d(500)/\Delta n\cdot d(550)<1.00$ (1)

and

$1.00<\Delta n\cdot d(600)/\Delta n\cdot d(550)<1.15$ (2)

are preferable. Here, the retardation is represented by a product of a birefringence Δn and a film thickness d (Δn·d). ... (Omitted)... When deviating from these values, for example, when used as a quarter wavelength plate, it might cause a problem that linearly polarized light at 400 to 700 nm incident in this film results in a polarized state of absolutely circularly polarized light at a certain wavelength, but results in a polarized state largely deviated from circularly polarized light at other wavelengths.

... (Omitted)...

[0027]

Further, the retarder of the present invention consists of a liquid crystal film with a fixed nematic hybrid orientation structure. FIG. 7 shows a cross-sectional structure of a liquid crystal film with a nematic hybrid orientation structure of the present invention. The film with a nematic hybrid orientation structure has directors of a polymeric liquid crystal compound oriented in different angles at all sites in a film thickness direction. Therefore, a retarder of the present invention no longer has an optical axis when viewed as a structure of a film. FIG. 8 shows the definitions of tilt angle and twist angle of a liquid crystal molecule. Here, the tilt direction (axis) of a liquid crystal film is defined as a direction that makes an angle between a director of a liquid crystal molecule and a projection component onto a c-surface of the director an acute angle when viewed from the c-surface through the liquid crystal film from the b-surface side as shown in FIG. 7 and is parallel to the projection component.

[0028]

The nematic hybrid orientation structure fixed in the aforesaid liquid crystal film has an absolute value of an angle between a director of a liquid crystal molecule and a film plane at one side of film interfaces of the liquid crystal film of usually 20° to 90°, preferably 30° to 70°, and an angle between a director of a liquid crystal molecule and a film plane at the opposite side of film interfaces of the liquid crystal film of usually 0° to 50°, preferably 0° to 30°. Further, the average tilt angle in the orientation structure is usually 5° to 40°, preferably 10° to 35°, most preferably 15° to 30° in absolute value. If the average tilt angle deviates from the above range, the orientation structure mounted on a liquid crystal display device or an organic EL display device might cause the decrease in viewing angle properties with combined polarizer. Here, the average tilt angle means an average value of an angle between a director of a liquid crystal molecule and a film plane in a film thickness direction of a liquid crystal film.

... (Omitted)...

[0046]

Further, in the present invention, the retardation $\Delta n \cdot d$ needs to satisfy the following formulae (1) and (2).

$0.80<\Delta n \cdot d(500)/\Delta n \cdot d(550)<1.00$ (1)

$1.00<\Delta n \cdot d(600)/\Delta n \cdot d(550)<1.15$ (2)

In particular, regarding a method for satisfying $0.80<\Delta n \cdot d(500)/\Delta n \cdot d(550)<1.00$, the polymeric polymer compound is a compound having two or more mesogen groups, and at least one mesogen group is oriented almost in an orthogonal direction against a slow axis of a homogeneous orientation of a liquid crystal layer so that the retardation is increased as the wavelength shifts to a longer side, as described in Japanese Unexamined Patent Application Publication No. 2002-267838 and Japanese Unexamined Patent Application Publication No. 2010-31223. Here, mesogen having a mesogen group is also referred to as a mesophase-forming (= liquid crystal phase) molecule ("Liquid Crystal Encyclopedia", Japan Society For the Promotion of Science, Organic materials for informatics, The 142nd Committee, Edited by Liquid Crystal Division, 1989) with almost the same meaning as a liquid-crystalline molecular structure. In the present invention, a mesogen group in a rod-like liquid crystal (molecular structure with respect to liquid crystallinity of rod-like liquid crystal) is preferably adopted. Mesogen group in a rod-like liquid crystal is described in various documents (e.g. Flussige Kristalle in Tabellen, VEB Deutscher Verlag fur Grundstoff industrie, Leipzig (1984), Vol. 2).

... (Omitted)...

[0058]

Subsequently, the substrate for orientation is explained.

First, the substrate for orientation preferably has a smooth surface, and may include a film or a sheet consisting of organic polymer materials, a glass plate, and a metal plate. From the viewpoint of cost and continuous productivity, materials of organic polymer may be preferably used. ... (Omitted)...

[0064]

These films show sufficient orientation ability for liquid crystal material used in the present invention without implementing the treatment for developing the orientation ability by the manufacturing method, but in the case of insufficient or no orientation ability, a film with developed orientation ability may be used as necessary by stretching these films under proper heating, subjecting to a so-called rubbing treatment of rubbing a film surface with a rayon cloth in one direction, subjecting to a rubbing treatment with an orientation film consisting of publicly-known orientating agent such as polyimide, polyvinyl alcohol, and a silane coupling agent being disposed on a film, coating a light orientation film on a film, and heating at an appropriate temperature, followed by the radiation of linearly polarized ultraviolet light to form an orientation film, oblique evaporation treatment of silicon oxide, etc., or a combination thereof as necessary. Alternatively, metal plates such as aluminum, iron, and copper or various glass plates with regular fine grooves on a surface may be used as a substrate for orientation. Among them, in the field of liquid crystal, it is usual to implement the rubbing treatment by rubbing with cloth against a substrate. One of the most important parameters for specifying a rubbing condition is a circumferential velocity ratio. This represents a ratio of a moving speed of a cloth and a moving speed of a substrate when a rubbing cloth is wound around a roll and rubbing a substrate while rotating. In the present invention, a circumferential velocity ratio is 50 or less, more preferably 25 or less, particularly preferably 10 or less. If a circumferential velocity ratio is greater than 50, the rubbing effect is too great to absolutely orient a liquid crystal material, which might possibly result in poor orientation and deteriorated properties.

... (Omitted)...

[0092]

An organic electroluminescence device (organic EL display device) to which a retarder of the present invention is applied is explained hereinafter. ... (Omitted)...

[0095]

In such an organic EL display device, an organic light emission layer is formed into an extremely thin film with a thickness of 10 nm or so. Therefore, an organic light emission layer also transmits light almost completely similar to the manner of a transparent electrode. As a result, light incident from a surface of a transparent substrate in non-emission and passing through a transparent electrode and an organic light emission layer and reflecting on a metal electrode goes out again to a surface side of the transparent substrate. Thus when viewed from the outside, a display surface of the organic EL display device can be seen like a mirror surface.

In an organic EL display device comprising an organic electroluminescence light emitter equipped with a transparent electrode on a surface side of the organic light emission layer emitting light by the application of voltage and a metal electrode on a rear surface side of the organic light emission layer, a polarizer may be disposed on a surface side of the transparent electrode and a retarder may be disposed between the transparent electrode and the polarizer.

[0096]

The retarder and polarizer have an effect of polarizing a light incident from the outside and reflected on a metal electrode. Thus, the polarizing effect prevents a mirror surface of the metal electrode from being viewed from the outside. In particular, a quarter wavelength plate is used in a retarder, and a linearly polarized plate and the retarder are combined to form a circularly polarizer, thereby totally shielding a mirror surface of a metal electrode.

Specifically, a polarizer only allows a linearly polarized component of an external light entered into this organic EL display device to pass through. This linearly polarized light is generally changed into an elliptically polarized light by a retarder, and a circularly polarized light particularly when the retarder is a quarter wavelength plate and an angle of a polarized light direction between a polarizer and the retarder is $\pi/4$.

[0097]

This circularly polarized light passes through a transparent substrate, a transparent electrode, and an organic thin film, and reflects on a metal electrode, and passes through again the organic thin film, the transparent electrode, and the transparent substrate, and changes again into linearly polarized light at a retarder. Further, this linearly polarized light is orthogonal to a polarized direction of a polarizer, and thus cannot pass through a polarizer. As a result, a mirror surface of the metal electrode can be totally shielded. From the viewpoint of forming a circularly polarizer in which a quarter wavelength plate is combined with a linear polarizer, given the angle between an absorption axis of the aforesaid polarizer and a slow axis of the aforesaid quarter wavelength plate to be p, p is usually 40° to 50°, preferably 42° to 48°, further preferably about 45° in the case of a retarder of the present invention having a nematic hybrid orientation. Except for the above range, the decrease in anti-reflection effect may deteriorate an image quality."

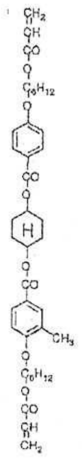
(D) "[0099]

(Example 1) <Preparation of mixed solution of polymeric liquid crystal compound (A)>

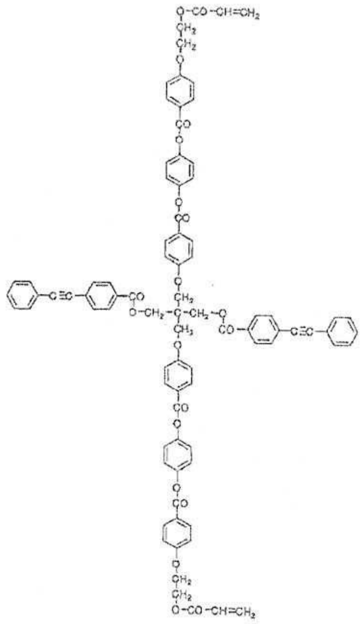
Compound (21) having two kinds or more of mesogen group and rod-like liquid crystal compound (22) as shown in the following formula (Trial Decision's note: In view of the structural formula of each compound shown in [0100], the symbols in parentheses of "compound (21) having two kinds or more of mesogen group" and "rod-like liquid crystal compound (22)" are typographical errors. They are correctly construed as meaning "compound (22) having two kinds or more of mesogen group" and "rod-like liquid crystal compound (21)," respectively. This can similarly apply to the description of "compound (21)" and "rod-like liquid crystal compound (22)" hereinafter.) were respectively prepared. In addition, compound (21) and rod-like liquid crystal compound (22) were produced by the method described in Japanese Unexamined Patent Application Publication No. 2002-267838.

[0100]

[Chemical Formula 3]



(21)



(22)

[0101]

Subsequently, the aforesaid compound (21) and the aforesaid rod-like liquid crystal compound (22) were mixed in a mass ratio of 2 weight parts and 17.6 weight parts to obtain a first mixture (given as polymeric liquid crystal compound (A)).

Subsequently, to the aforesaid first mixture, there was added a polymerization initiator (product name "IRGACURE 651" produced by Ciba-Geigy of Switzerland, solid under room temperature (25°C)) in a proportion of 3 mass parts on the basis of the total amount of 100 mass parts of the aforesaid polymeric liquid crystal compound (A) to obtain a second mixture (solid) in which the aforesaid polymeric liquid crystal compound (A) and the aforesaid polymerization initiator were mixed together.

Subsequently, the aforesaid second mixture was dissolved into chlorobenzene (solvent), and an insoluble content was filtered with a filter made of polytetrafluoroethylene with a pore size of 0.45 μm to obtain a mixed solution (a third mixture) comprising the aforesaid polymeric liquid crystal compound (A), a polymerization initiator, and a solvent. In addition, in producing such a third mixture, a solvent was used so that the content of the solvent in the aforesaid third mixture might become 67 mass%, and the total amount of the aforesaid polymeric liquid crystal compound (A) and the aforesaid polymerization initiator might become 33 mass%.

[0102]

<Manufacture of liquid crystal film>

The substrate for orientation was prepared in the following manner. A polyethylene naphthalate film with a thickness of 38 μm (PEN manufactured by TEIJIN LIMITED) was cut out into 15 cm square, and a 5 weight percent solution of an alkyl-modified polyvinyl alcohol (PVA manufactured by KURARAY CO., LTD., MP-203) (the solvent was a mixed solvent of water and isopropyl alcohol at a weight ratio of 1:1) was coated thereon by a spin coating method, and dried for 30 minutes by a hot plate at 50°C, and heated for 10 minutes in an oven at 120°C. Subsequently, it was subjected to rubbing with a rubbing cloth of rayon. The obtained PVA layer had a film thickness of 1.2 μm. The circumferential velocity ratio in rubbing (moving speed of rubbing cloth/moving speed of substrate film) was set to 4.

The substrate for orientation thus obtained was coated by a spin coating method with a mixed solution (a third mixture) comprising the aforesaid compound (21) as obtained above, the aforesaid rod-like liquid crystal compound (22), and a polymerization initiator and a solvent to form a coat (wet film thickness: 5 μm), and obtain a laminate of the coat and a substrate for orientation.

Subsequently, the aforesaid laminate of the coat and the substrate for orientation was gradually cooled from a temperature of 72°C to 62°C in 10 minutes at a pressure of 1013 hPa, followed by drying and removing a solvent from the aforesaid coat (solvent removal step) and rapidly cooling down to room temperature.

Subsequently, ultraviolet light was irradiated on a coat after drying by the aforesaid solvent removal process by use of a high pressure mercury lamp with an illuminance of 15 mW/cm^2 so that an integrated irradiance level may become 200 mJ/cm^2 (irradiance was measured at a wavelength of 365 nm) to polymerize (cure) the aforesaid liquid crystal compound for fixing the orientation state, and obtain a laminate where a liquid crystal film having the fixed orientation state was laid on the substrate for orientation (a laminate of a liquid crystal film and a substrate for orientation).

[0103]

Polyethylenenaphthalate film used in a substrate has a large birefringence, and thus is not preferable for optical film. Thus the obtained optical anisotropic layer on the substrate for orientation was transferred on a triacetyl cellulose (TAC) film (Z-TAC manufactured by FUJIFILM Corporation, 40 μm (Trial Decision's note: "um" is a typographical error, correctly "um")) via an ultraviolet curable-type adhesive. Specifically, on a cured liquid crystal film layer disposed on polyethylenenaphthalate film, an adhesive was coated with a thickness of 5 μm, and laminated with TAC film, followed by the irradiation of ultraviolet light from TAC film side to cure an adhesive, and a substrate for orientation was peeled.

When the obtained optical film (liquid crystal film/adhesive layer/TAC film) was observed under a polarizing microscope, it was found to have no disclination but a mono-domain uniform orientation.

[0104]

The wavelength dispersion characteristics of the retardation (Δnd) in an in-plane direction of a laminate of TAC film and liquid crystal film and TAC film was measured by use of product name 'Axoscan' manufactured by Axometric, and the wavelength dispersion characteristic of the birefringence of a liquid crystal film layer was measured from the subtraction between them. FIG. 9 summarizes a wavelength dispersion characteristic of birefringence of liquid crystal film layer, and Table 1 summarizes a result of optical properties. Δnd at 550 nm was 138 nm, and Δnd (500)/Δnd (550)=0.98, Δnd (600)/Δnd (550)=1.01.

Further, the retardation (Δnd) when the obtained optical film was tilted in a rubbing direction (the orientation direction of liquid crystal molecule) was measured by 'Axoscan.' The measurement result is shown in FIG. 10. As shown in FIG. 10, it was found to have a viewing angle dependency with left-right asymmetry and tilted orientation. The obtained optical film was confirmed to be a nematic hybrid orientation film, not a liquid crystal film with a uniform tilt orientation by a method described in Example of Japanese Unexamined Patent Application Publication No. H11-194325. The average tilt angle was 34 degrees.

[0105]

<Evaluation of anti-reflection performance of Organic EL display>

The obtained optical film was bonded with a commercially available polarizer 4 (SRW062 manufactured by Sumitomo Chemical Co., Ltd.) via an acrylic-based adhesive so that an absorption axis 5 of the polarizer 4 and a tilt direction 8 of a liquid crystal layer 7 of an optical film 6 may form an angle of 45 degrees, to thereby manufacture a circularly polarizer 10. In bonding, they were laminated together so that a TAC film 9 might contact with the polarizer 4. A schematic view of cross-sectional structure in a laminated state of the liquid crystal layer 7 of the optical film 6 and the polarizer 4 is shown in FIG. 11. The liquid crystal layer in the optical film 6 had a surface in which a liquid crystal molecule relatively stood up at a side of the polarizer 4, whereas a surface in which a liquid crystal molecule relatively laid down at the opposite side of the polarizer 4.

The obtained circularly polarizer 10 was bonded with a transparent glass substrate of an organic EL device of a commercially available organic EL display via an acrylic-based adhesive to manufacture an organic EL display device of the present invention. As a result, it was found that the organic EL display device caused drastic anti-reflection effect of external light and had excellent visibility in comparison with the case without the circularly polarizer 10.

Further, the viewing angle characteristic of reflectance of incident external light was measured by a reflection viewing angle measurement device EZ-CONTRAST manufactured by ELDIM, and the result is shown together with the front side reflectance in FIG. 12 and Table 1.

... (Omitted)...

[0115]

[Table 1]

	実施例 1	実施例 2	実施例 3	実施例 4	比較例 1	比較例 2
Δnd (@550nm)	138.0	138.0	138.0	209.0	138.0	138.0
Δnd(500)/Δnd(550)	0.98	0.98	0.98	0.98	0.98	1.05
Δnd(600)/Δnd(550)	1.01	1.01	1.01	1.01	1.01	0.97
平均チルト	34 度	34 度	34 度	25 度	34 度	34 度
ツイスト角	0 度	0 度	0 度	55 度	0 度	0 度
正面反射率	1.20%	1.20%	1.20%	1.20%	1.20%	1.72%
反射視野角特性	良好	良好	良好	良好	劣	良好

実施例　Example

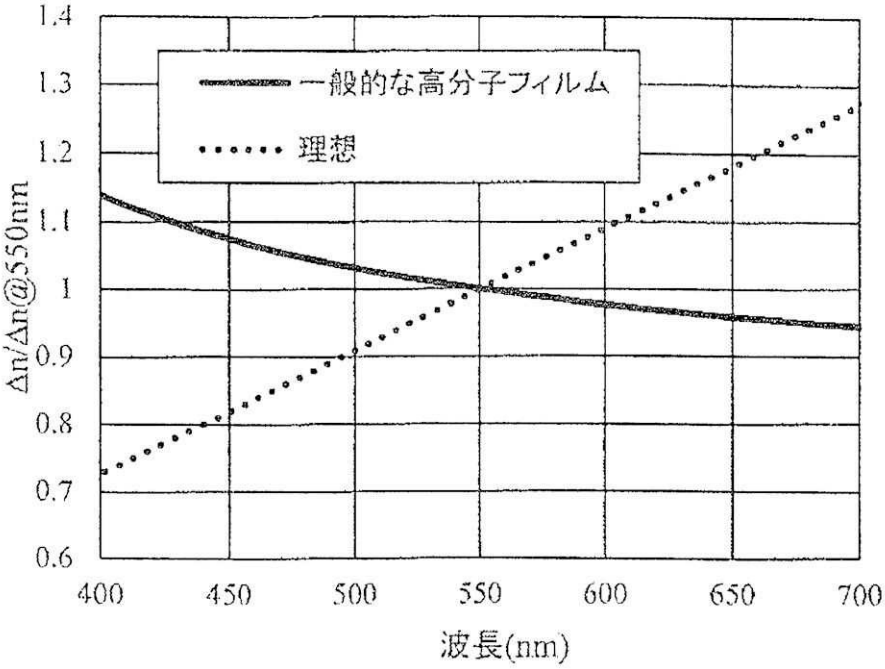
比較例　Comparative Example

平均チルト　Average tilt

ツイスト角　Twist angle
正面反射率　Reflectance at the front side
反射視野角特性　Reflection viewing angle characteristics
度　Degree
良好　Good
劣　Poor"

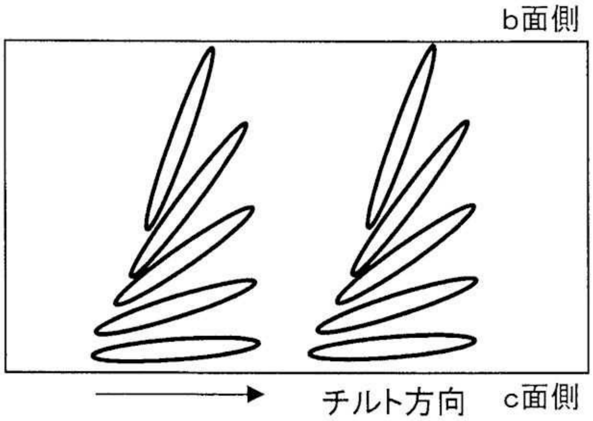
(E)

"[FIG. 1]



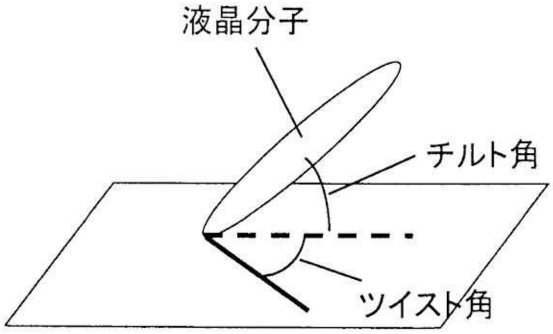
一般的な高分子フィルム　Common polymer film
理想　Ideal
波長　Wavelength

... (Omitted)...
[FIG. 7]



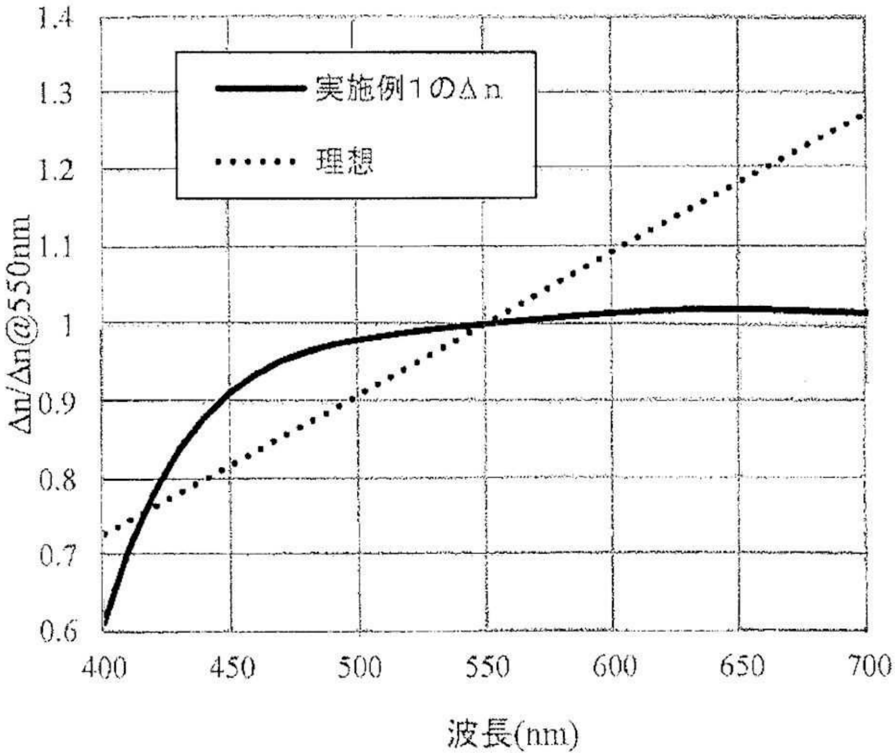
b 面側　b surface side
c 面側　c surface side
チルト角　Tilt angle

[FIG. 8]



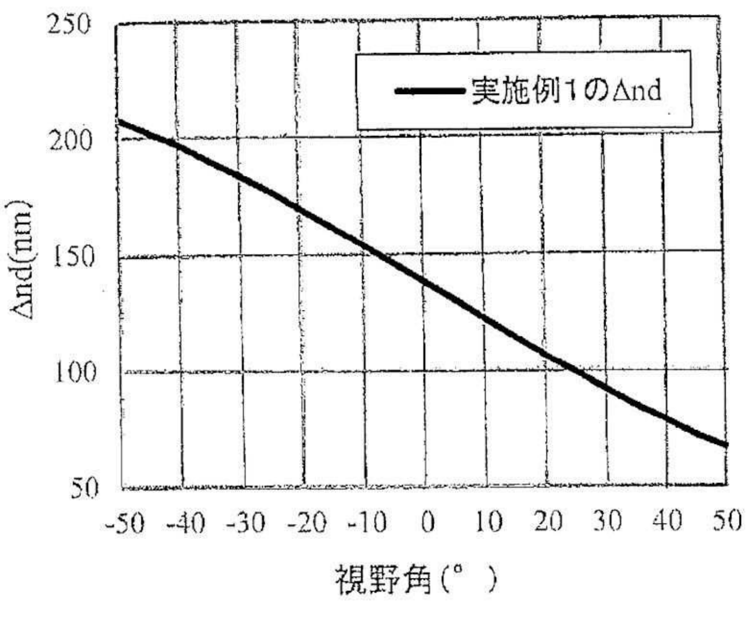
液晶分子　Liquid crystal molecule
チルト角　Tilt angle
ツイスト角　Twist angle

[FIG. 9]



実施例１のΔｎ　　Δn of Example 1
理想　Ideal
波長　Wavelength

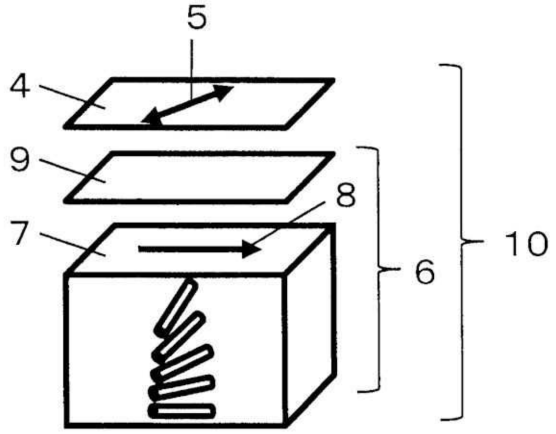
[FIG. 10]



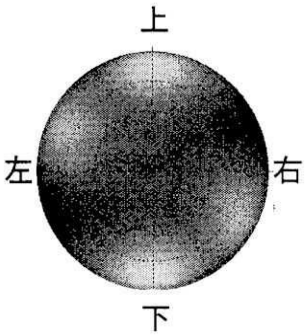
実施例１のΔｎｄ　Δnd of Example 1

視野角　Viewing angle

[FIG. 11]



[FIG. 12]



上　Upper
下　Bottom
右　Right
左　Left

"

B　The Invention described in the original specification, etc. of Prior Application 2

"Liquid crystal layer 7" of [0105] obviously denotes "liquid crystal film layer" of [0103], etc. Thus, the originally attached description etc. of Priority Application 2 describes the following invention as an invention corresponding to Example 1:

"A circularly polarizer of organic EL display for anti-reflection of external light, manufactured by the steps of: mixing a compound (22) having two kinds or more of mesogen group and a rod-like liquid crystal compound (21) represented by the following formula in a mass ratio of 2 mass% and 17.6 mass% to obtain a first mixture; adding thereto a polymerization initiator IRGACURE 651 produced by Ciba-Geigy in a proportion of 3 mass parts on the total amount of 100 mass parts of the first mixture to obtain a second mixture; dissolving the second mixture into chlorobenzene; filtering an insoluble content with a filter made of polytetrafluoroethylene with a pore size of 0.45 μm to obtain a third mixture;

cutting out a polyethylene naphthalate film with a thickness of 38 μm manufactured by TEIJIN LIMITED into 15 cm square; coating thereon a 5 weight percent solution of an alkyl-modified polyvinyl alcohol MP-203 manufactured by KURARAY CO., LTD. by a spin coating method; drying at 50°C with a hot plate for 30 minutes; heating at 120°C with oven for 10 minutes; and then rubbing with a rubbing cloth made of rayon at a circumferential velocity ratio (moving speed of rubbing cloth/moving speed of substrate film) of 4 to obtain a substrate for orientation having a PVA layer with a film thickness of 1.2 μm;

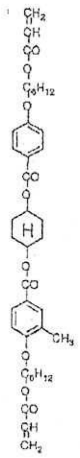
coating the aforesaid third mixture on the substrate for orientation by a spin coating method to form a coat with a wet film thickness of 5 μm and obtain a laminate of the coat and the substrate for orientation; gradually cooling from a temperature of 72°C to 62°C for 10 minutes at 1013 hPa; removing a solvent from the aforesaid coat by drying; and then rapidly cooling down to room temperature; subsequently irradiating ultraviolet light on the aforesaid coat by use of a high pressure mercury lamp with an illuminance of 15 mW/cm^2 so that an integrated irradiance level may become 200 mJ/cm^2 (irradiance was measured at a wavelength of 365 nm) to polymerize the aforesaid liquid crystal compound to fix an oriented state and obtain a laminate where a liquid crystal film having the fixed orientation state was laid on a substrate for orientation; coating an adhesive on the aforesaid liquid crystal film layer so as to attain a thickness of 5 μm; bonding thereto a triacetyl cellulose film Z-TAC with a thickness of 40 μm manufactured by FUJIFILM Corporation; radiating ultraviolet light from a side of the aforesaid triacetyl cellulose film Z-TAC to cure the adhesive; and then peeling a substrate for orientation to obtain an optical film with a layer structure of liquid crystal film layer/adhesive layer/TAC film;

bonding the optical film with a polarizer SRW062 manufactured by Sumitomo Chemical Co., Ltd. via an acrylic-based adhesive so that an absorption axis of the polarizer and a tilt direction of a liquid crystal film layer in an optical film may form an angle of 45 degrees so that the side of the aforesaid triacetyl cellulose film Z-TAC may face the polarizer,

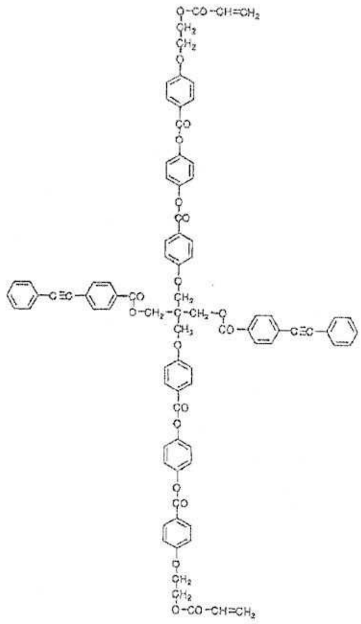
wherein said liquid crystal film layer is a nematic hybrid orientation film with an average tilt angle of 34 degrees, and the wavelength dispersion characteristics of birefringence is shown in the following [Graph showing a wavelength dispersion characteristic of birefringence of liquid crystal film layer], and the retardation (Δnd) at 550 nm is 138 nm,

wherein said optical film has the retardation (Δnd) with an optical film being tilted in a rubbing direction as shown in the following [Graph showing retardation (Δnd) with an optical film being tilted in a rubbing direction].

[Formulae of compound (22) having two kinds or more of mesogen group and rod-like liquid crystal compound (21)]

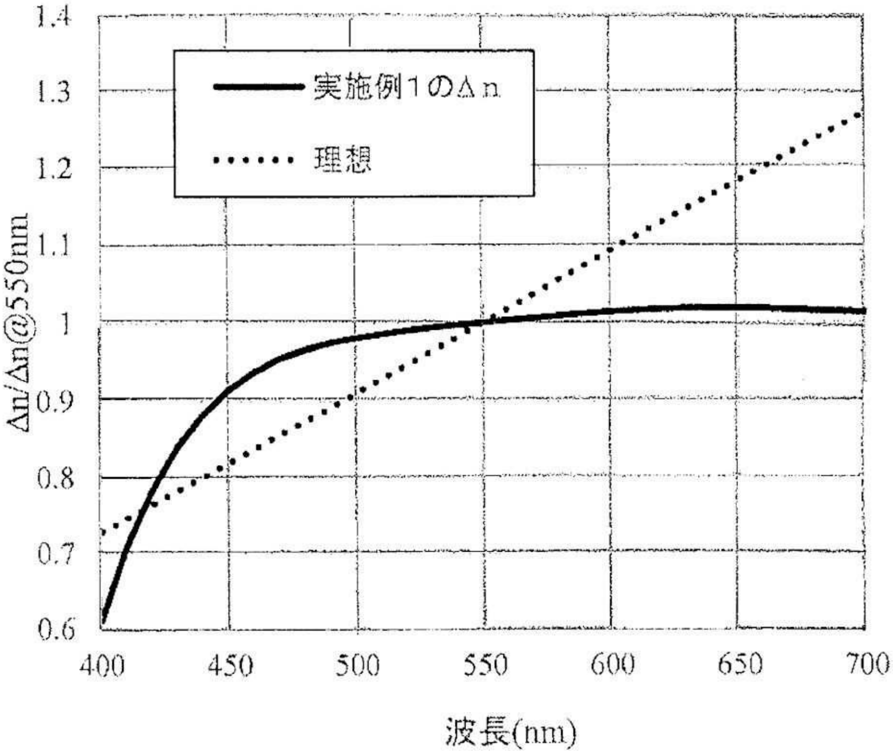


(21)



(22)

[Graph showing a wavelength dispersion characteristic of birefringence of liquid crystal film layer]

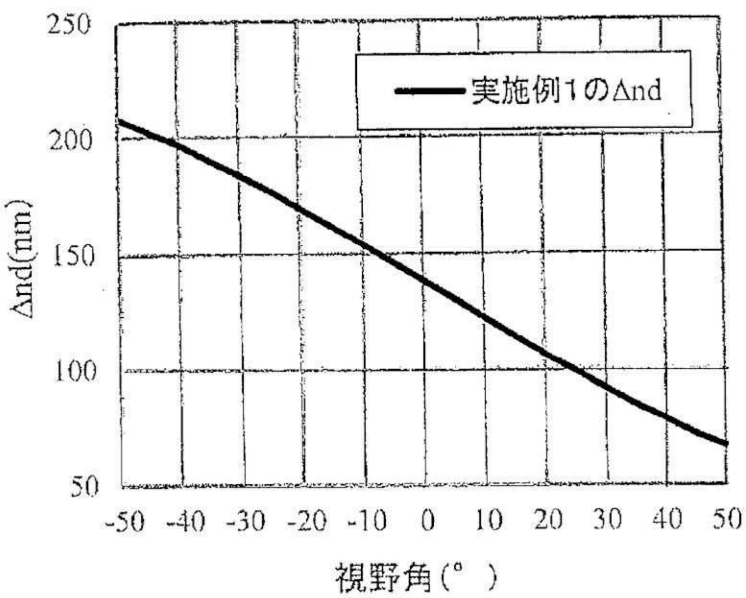


実施例１のΔｎ　Δn of Example 1

理想　Ideal

波長　Wavelength

[Graph showing retardation (Δnd) with an optical film being tilted in a rubbing direction]



実施例１のΔｎｄ Δnd of Example 1
視野角 Viewing angle

" (hereinafter referred to as the "Prior Application 2 invention".)

(2) Comparison

A It is obvious to a person skilled in the art that "polarizer SRW062 manufactured by Sumitomo Chemical Co., Ltd." of Prior Application 2 invention is a polarizer with "a polarizer."

Further, "liquid crystal film layer" of "optical film" of the Prior Application 2 invention is a "liquid crystal layer" in view of the material, and of course has "a first major surface and a second major surface positioned at opposite sides from one another."

Furthermore, as can be seen from the description, etc. of [0004], [0005], [0013], and [0015] of the originally attached description, etc. of Prior Application 2 pointed out in the aforesaid item (1)A(A), the "optical film" of the Prior Application 2 invention has a function to suppress the generation of chromatic polarized light or suppress the generation of light leak in an oblique direction by the wavelength dispersion characteristics and nematic hybrid orientation structure of "liquid crystal film layer" of the layer structure. Therefore, it can be said to be a "compensation film."

Further, the "optical film " is bonded with the polarizer SRW062 manufactured by Sumitomo Chemical Co., Ltd. having "a polarizer," and thus it is located "on one surface of a polarizer."

Therefore, the Prior Application 2 invention comprises the constitution corresponding to the matters specifying the Invention to "comprise a polarizer and a compensation film located on a surface of said polarizer, the compensation film comprising a liquid crystal layer having a first major surface and a second major surface positioned at opposite sides from one another."

B The "liquid crystal film layer" of the Prior Application 2 invention is a copolymer in which the major constituent materials of "compound (22) having two kinds or more of mesogen group" and "rod-like liquid crystal compound (21)" are subjected to copolymerization in view of the formation method. The constituents of the copolymer of "compound (22) having two kinds or more of mesogen group" and "rod-like liquid crystal compound (21)" are both "liquid crystals" in view of the structural formulae.

Further, the constituent element of "liquid crystal film layer is a nematic hybrid orientation film with an average tilt angle of 34 degrees" of the Prior Application 2 invention is nothing but a tilted light axis of "liquid crystals" of "compound (22) having two kinds or more of mesogen group" and "rod-like liquid crystal compound (21)" in a thickness direction against a surface of "liquid crystal film layer" and the gradual increase of tilted angle in a thickness direction of "liquid crystal film layer" from a first major surface to a second major surface against a surface of "liquid crystal film layer."

Therefore, the Prior Application 2 invention satisfies the constituent element corresponding to the matters specifying the Invention that "the liquid crystal layer comprises a liquid crystal having an optical axis obliquely tilted in a thickness direction from a surface of said liquid crystal layer, and the tilt angle of said liquid crystal against the surface of the liquid crystal layer may gradually increase in a thickness direction of said liquid crystal layer from said first major surface to said second major surface."

C It can be seen from [Graph showing a wavelength dispersion characteristics of birefringence of liquid crystal film layer] of the Prior Application 2 invention that the in-plane retardation R_e(450 nm), R_e(550 nm), and R_e(650 nm) of "liquid crystal film layer" of the Prior Application 2 invention at the wavelengths of 450 nm, 550 nm, and 650 nm satisfy the relationship 1 of "$Re(450nm)<Re(550nm)\leq Re(650nm)$" of the Invention and satisfy the relationship 2a of "$0.72\leq Re(450nm)/Re(550nm)\leq 0.92$."

Further, the Prior Application 2 invention is "a circularly polarizer of organic EL display for anti-reflection of external light." Thus this can be said to be an "anti-reflection film" and an "anti-reflection film for organic light emission device."

Therefore, the Prior Application 2 invention is "an anti-reflection film with an in-plane retardation (Re) of said liquid crystal layer at the wavelengths of 450 nm, 550 nm, and 650 nm satisfying Relationships 1 and 2a" and satisfies the constituent element corresponding to matters specifying the Invention to be "anti-reflection film for organic light emission device."

D In view of the aforesaid items A to C, the Invention and the Prior Application invention 2 have in common that

"An anti-reflection film for an organic light emission device, comprising: a polarizer; and

a compensation film located on a surface of said polarizer, said compensation film comprising a liquid crystal layer having a first major surface and a second major surface positioned at opposite sides from one another,

wherein said liquid crystal layer comprises liquid crystals having an optical axis obliquely inclined toward a thickness direction with respect to a surface of said liquid crystal layer,

wherein a tilt angle of said liquid crystals with respect to the surface of the liquid crystal layer gradually increases from said first surface to said second major surface in a thickness direction of said liquid crystal layer,

wherein in-plane retardation (Re) of said liquid crystal layer at the wavelengths of 450 nm, 550 nm, and 650 nm satisfy the following Relationship 1 and 2a:

[Relationship 1]

$R_e(450\ nm) < R_e(550\ nm) \leq R_e(650\ nm)$

[Relationship 2a]

$0.72 \leq R_e(450nm)/R_e(550nm) \leq 0.92$

In the aforesaid Relationships 1 and 2a,

R_e (450 nm) is an in-plane retardation for incident light at a wavelength of 450 nm,

R_e (550 nm) is an in-plane retardation for an incident light at a wavelength of 550 nm,

R_e (650 nm) is an in-plane retardation for an incident light at a wavelength of 650 nm.",

whereas they are at least different from each other in the following point:

Different feature 2:

The Invention specifies a color shift of the anti-reflection film observed at a viewing angle of 60° as less than 7.0 and a reflectance as 1.0 % or less when measured at a viewing angle of 60°, whereas

The Prior Application 2 invention fails to specify a color shift of the anti-reflection film observed at a viewing angle of 60° and a reflectance measured at a viewing angle of 60°.

(3) Regarding Different feature 2

A In the Prior Application 2 invention, a liquid crystal film layer has an orientation layer of a PVA layer formed by alkyl-modified polyvinyl alcohol MP-203 manufactured by KURARAY CO., LTD. It is used exclusively for a rod-like liquid crystal compound as a liquid crystal. Although the originally attached description, etc. of Prior Application 2 fails to disclose a minimum tilt angle (pretilt angle), in view of the minimum tilt angle (a value of "tilt angle at an interface of oriented layer" of [Table 2] of [0107]) of rod-like liquid crystal compound "LC-1" ([0097] to [0101]) formed on an "oriented film A-1" ([0090]) formed by alkyl-modified polyvinyl alcohol MP-203 manufactured by KURARAY CO., LTD. as described in Japanese Unexamined Patent Application Publication No. 2002-207121, the minimum tilt angle of liquid crystal film layer of the Prior Application 2 invention is assumed to be 1 degree or so. Further, the average tilt angle of the Prior Application 2 invention is 34 degrees, and thus if the minimum tilt angle is 1 degree or so, the maximum tilt angle is assumed to be 67 degree or so. In addition, the assumed values of pretilt angle and the maximum tilt angle are also consistent with the respective numerical values of "0 to 30°" and "30° to 70°" that are considered to be preferable and described in [0028] of the original specification of Prior Application 2.

B The values of the minimum tilt angle and the maximum tilt angle of the Prior Application 2 invention assumed in the aforesaid item A are almost comparable to the minimum tilt angle and the maximum tilt angle of "Example 3" described in [0088] of the specification. In view of this, it is recognized that "a color shift of the anti-reflection film observed at a viewing angle of 60°" and "a reflectance measured at a viewing angle of 60°" of the Prior Application 2 invention are likely to be "a color shift of the anti-reflection film observed at a viewing angle of 60°" and "a reflectance measured at a viewing angle of 60°" of "Example 3" described in [0088] of the specification of "4.5" or so and "0.93%" or so.

Otherwise, paragraph [0028] of the originally attached description, etc. of Prior Application 2 describes a preferable range of an angle between a director of a liquid crystal molecule and a film plane at one film interface of a liquid crystal film of 30° to 70°, and a preferable range of an angle between a director of a liquid crystal molecule and a film plane at the opposite side of the film of 0° to 30°. It should be only a minor difference in means for realizing a technique as to what value is appropriate within these preferable ranges. Therefore, it is only a minor difference in realizing a technique to adjust the values of the minimum tilt angle and the maximum tilt angle to "3 degrees" and "a value within a numerical range of 30 degrees to 65 degrees," respectively in the Prior Application 2 invention. Consequently, it is strongly suggested from Examples 1 to 4 and 6 described in the specification that "a color shift of the anti-reflection film observed at a viewing angle of 60°" and "a reflectance measured at a viewing angle of 60°" of the Prior Application 2 invention become "3.7 to 6.4" and "0.59% to 0.93%," respectively.

C As aforementioned, Different feature 2 is not a difference, otherwise is only a very minor difference in realizing means to achieve excellent viewing angle properties.

Therefore, the Invention is identical or substantially identical to Prior the Application 2 Invention.

(4) Summary

The Invention is identical or substantially identical to the Prior Application 2 Invention, and thus cannot be granted a patent under the provision of Article 29-2 of the Patent Act.

7 Determination of Body's reason for refusal 4 (Lack of inventive step)

(1) Cited Document

A Description of Cited Document 1

Cited Document 1 cited in the Body's reason for refusal 4 (International Publication No. WO 2007-142037) had been available to the public via a telecommunication line before the priority date of the present application (hereinafter referred to as "the priority date"), and the Cited Document 1 has the following descriptions (The underlined portion is a part particularly related to the finding of the below-mentioned Cited Document 1 invention.):

(A) "[Technical field]

The present invention relates to an elliptical polarization plate consisting of an optical anisotropic element having a liquid crystal layer with a fixed twist nematic orientation structure or a hybrid nematic orientation structure and to a method for manufacturing the same. Further, the present invention relates to a liquid crystal display device and an electroluminescence display device using the aforesaid elliptical polarization plate.

[Background Art]

... (Omitted)...

A liquid crystal display device has advantages of thin, light weight, and low power consumption, but has inavoidable problems of viewing angle, e.g. ... (Omitted)... the decrease in display contrast when viewed from an oblique direction, the change of display color, or the gradation conversion due to the refractive index anisotropy of liquid crystal molecule, especially when TN type liquid display device in transmission mode, and improvement on these problems is desired. As seen above, a liquid crystal display device with excellent display performance has not yet been sufficiently realized at this stage.

... (Omitted)...

Further, in a conventional transparent-type liquid crystal display device using TN mode (twist angle of liquid crystal of 90 degrees), a proposal for disposing an optical compensation film in between a liquid crystal cell and upper and bottom polarizers has been made and put into practice. For example, it may include the constitutions where an optical compensation film with a discotic liquid crystal being subjected to hybrid orientation is disposed between a liquid crystal cell and upper and bottom polarizers, and where an optical compensation film with a liquid crystalline polymer being subjected to hybrid nematic orientation is disposed between a liquid crystal cell and upper and bottom polarizers (Patent Documents 5 to 7).

Further, it is necessary from a viewpoint of display principle in a semi-transparent reflection-type liquid crystal display device to dispose a circularly polarizer consisting of one or a plurality of uniaxial retardation films and a polarizer on the upper side and the bottom side of a liquid crystal cell in a transparent mode.

For the expansion of the viewing angle of a transparent mode of this semi-transparent reflection-type liquid crystal display device, a method for using an optical compensation film with nematic hybrid orientation for a circularly polarizer disposed between a liquid crystal cell and a back light is proposed (Patent Document 8).

In a trend of increased functionality of optical properties, like the case of an sTN-type liquid crystal display device, there is an increasing need for thinner and weight savings as represented by cell phones or portable digital assistant devices widely prevalent recently. Accordingly, there is a desire for a thinner and lightweight optical film used in a display device. ... (Omitted)...

The lamination of the aforesaid optical element may involve concerns about handleability and resistance without support substrate film. On the other hand, the direct lamination of the optical element on one support substrate film with a polarized element may provide a further thinner film free of an adhesive layer as well as extremely excellent resistance, but an industrial production method to lay the optical element has not been established." (Specification, page 1, line 4 to page 3, line 3 from the bottom)

(B) "[Disclosure of the Invention]

The object of the present invention is to provide an elliptical polarization plate with a simplified layer structure, while reducing thickness without causing troubles such as peeling at a high temperature and high humidity condition, and further to provide an elliptical polarization plate capable of continuously bonding from an elongated film form by arbitrarily designing an angle of orientation axis of optically anisotropic element against an absorption axis of a polarizer, a method for producing the same, and a liquid crystal display device using the same and an electroluminescence display device.

Specifically, the present invention relates to an elliptical polarization plate in which a transparent protection film, a polarization element, and an optically anisotropic element are laminated in this order, and the optically anisotropic element comprises a liquid crystal layer with a fixed orientation after making a liquid-crystalline composition with at least positive uniaxial property aligned in a twist nematic orientation or a hybrid nematic orientation." (Specification, page 4, lines 8 to 19)

(C) "[Advantage of the Invention]

The elliptical polarization plate of the present invention resists damage to an optically anisotropic element layer in a bonding process between the optically anisotropic element and a polarization element, and has excellent adhesiveness of the optically anisotropic element. Furthermore, due to the low number of laminate layers constituting an elliptical polarization plate, the delamination or the generation of bubbles in the interface does not take place in a resistance test. In a bonding process with a polarization element, bonding can be implemented in the form of an elongated film, which gives and advantage on streamlined bonding process as compared with the conventional method." (Specification, page 5, lines 16 to line 5 from the bottom)

(D) "[Best Mode for Carrying Out the Invention]

The present invention is hereinafter discussed in detail.

The present invention manufactures an elliptical polarization plate by adhering an optically anisotropic element to a polarization element, directly or via an adhesive. In doing so, the obtained elliptical polarization plate allows us to decrease the number of layers as compared to an elliptical polarization plate obtained by bonding a polarizer in which both sides of the conventional polarization element are protected by an optical film such as triacetyl cellulose film with an optically anisotropic element. It results in a thinner total thickness of an elliptical polarization plate and decreased effects of shrinking strain due to a difference in elastic behavior of each layer caused by heat or humidity, which eliminates defects such as delamination at a bonding interface.

<u>The layer structure of an elliptical polarization plate obtained by the present invention is a constitution of</u> either the following <u>(I)</u> or (II), to which a member such as a transparent overcoat layer is further added as necessary. It is not particularly limited, but there may be used an optically anisotropic element consisting of a liquid crystal layer with a fixed orientation of a twist nematic orientation or a hybrid nematic orientation of a liquid crystalline composition showing a positive uniaxial property in the present invention in a liquid crystal phase. Either constitution of (I) or (II) may be used to obtain an elliptical polarization plate with a thin thickness.

(I) Transparent protection film/adhesive layer 1/polarization element/adhesive layer 2/optical anisotropic element
(II) Transparent protection film/adhesive layer 1/polarization element/optical anisotropic element" (Specification, page 5, line 4 from the bottom to page 6, line 14)

(E) "First, a liquid crystalline composition used herein is illustrated.

The optically anisotropic element used in an elliptical polarization plate of the present invention comprises a liquid crystal layer with a fixed orientation after making a liquid-crystalline composition with at least an optically positive uniaxial property aligned in a twist nematic orientation or a hybrid nematic orientation. Specifically, it may be obtained by cooling a liquid crystalline composition mainly composed of a liquid crystalline polymer oriented on a substrate for orientation to a glass transition temperature (Tg) or less and fixing the orientation. Such liquid crystalline composition consists of a liquid crystalline polymer composition mainly composed of a liquid crystalline polymer showing an optically positive uniaxial property. The liquid crystalline polymer may include a thermotropic liquid crystal polymer showing liquid crystallinity in melting. The thermotropic liquid crystal polymer to be used is required to retain a molecular orientation state of liquid crystal phase even if cooled from a melted state (liquid crystalline state) to Tg or less.

Liquid crystal phase in melting a liquid crystalline polymer may be any molecular alignment structure of smectic, nematic, twist nematic, and cholesteric, and further it has homogeneous orientation and a homeotropic orientation state in the vicinity of the substrate for orientation and air interface, and may have a so-called hybrid orientation in which an average director of a liquid crystalline polymer is tilted from a normal line direction of a film.

... (Omitted)...

Tg of liquid-crystalline composition is preferably room temperature or higher, further preferably 50°C or more, since it affects the orientation stability after fixing the orientation. Tg may be adjusted by a liquid crystalline polymer, a low molecular weight liquid crystal used in the liquid crystalline composition, a chiral agent, and optionally various compounds, etc., but may be adjusted by the aforesaid crosslinking means.

The aforesaid various compounds to be added as necessary may be a compound that neither interferes with the orientation of a liquid crystalline composition to be used in the present invention, nor deviates from the purpose of the present invention, including a leveling agent, a surfactant, and a stabilizer for the uniform formation of a layer of the liquid crystalline composition." (Specification, page 6, line 16 to page 8, last line)

(F) "Subsequently, the substrate for orientation is explained.

The substrate for orientation may include ... (Omitted)... a polymer film. Further, in order to control the orientation of liquid-crystalline composition on a surface of a polymer film, an organic thin film consisting of resin such as polyvinyl alcohol and polyimide derivatives may be formed. The aforesaid polymer film is subjected to a substrate for orientation by subjecting to an orientation treatment such as a rubbing treatment.

As seen above, a rubbing treatment is usually implemented to orient a liquid-crystalline composition on a substrate for orientation. Rubbing treatment may be implemented at any predetermined angle against the MD direction of an elongated substrate for orientation. The angle of rubbing direction against the MD direction is set as necessary according to the function of an optically anisotropic element. In the case where a function as a color compensation plate is required, it is usually preferable to be rubbed in an oblique direction against the MD direction. The angle of the oblique direction may be preferably -45 degrees to +45 degrees." (Specification, page 9, lines 1 to 18)

(G) "A method for disposing a liquid crystalline composition on a rubbing treatment surface of a substrate for orientation and forming a layer of a liquid crystalline composition may include, for example, a method of dissolving a liquid crystalline composition into an appropriate solvent and coating and drying, or a method of directly subjecting a liquid crystalline composition to a melt extrusion by T die, etc. In terms of the uniformity of film thickness, a method of coating a solution and drying is appropriate. ... (Omitted)...

After coating, a solvent is removed by an appropriate drying method, and then a liquid crystalline composition is subjected to heating at a prescribed temperature for a certain period to orient in a twist nematic orientation or a hybrid nematic orientation, followed by cooling down to Tg or less, otherwise there may be employed any method suitable for a liquid crystalline composition used, e.g. conducting a reaction (curing) by light irradiation and/or heating treatment to fix the orientation to form a liquid crystalline composition layer with a fixed orientation structure." (Specification, page 9, line 25 to page 10, line 6)

(H) "The optically anisotropic element used in an elliptical polarization plate of the present invention comprises a liquid crystal layer with a fixed liquid crystal orientation structure of a twist nematic orientation or a hybrid nematic orientation.
... (Omitted)...

A hybrid nematic orientation liquid crystal layer is a layer at least comprising a hybrid nematic orientation liquid crystal layer with a fixed hybrid nematic orientation structure having an average tilt angle of 5° to 45° formed by a liquid crystalline composition in a liquid crystal phase.

Here, the hybrid nematic orientation used herein is a form of orientation in which a liquid crystal molecule is a hybrid nematic orientation, and an angle between a director of the liquid crystal molecule and a liquid crystal layer plane at the time differs between the upper surface and the bottom surface of the layer. Therefore, an angle between the director and the layer plane differs between the vicinity of upper surface interface and the bottom surface interface. It can thus be said that the angle continuously changes between the upper surface and the bottom surface of the layer.

Further, a hybrid nematic orientation liquid crystal layer with a fixed nematic hybrid orientation structure has directors of liquid crystal molecule oriented in different angles at all sites in a film thickness direction of the layer. Therefore, the layer no longer has an optical axis when viewed as a structure of a layer.

Further, the average tilt angle used herein means an average value of an angle between a director of a liquid crystal molecule and a hybrid nematic orientation liquid crystal layer in a film thickness direction of a liquid crystal film. A hybrid nematic orientation liquid crystal layer to serve for the present invention usually has an absolute value of an angle between a director and a layer plane at one interface of the layer of 25 to 90 degrees, preferably 35 to 85 degrees, and further preferably 45 to 80 degrees, and an absolute value of 0 to 20 degrees, preferably 0 to 10 degrees in usual circumstances at the opposite side, and an absolute value of the average tilt angle of 5 to 45 degrees, preferably 15 to 43 degrees, further preferably 25 to 40 degrees in usual circumstances. If the average tilt angle is deviated from the above range, it might cause the decrease in contrast when viewed from an oblique direction, and is thus not desirable. Further, the average tilt angle may be calculated using the crystal rotation method." (Specification, page 10, line 23 to page 12, line 24)

(I) "A specific configuration of a hybrid nematic orientation liquid crystal layer in a liquid crystal display device of the present invention is illustrated. In illustrating a further specific configuration condition, the upper and bottom sides of the hybrid nematic orientation liquid crystal layer, the tilt angle of the liquid crystal layer, and the pretilt direction of liquid crystal cell layer are respectively defined hereinafter by use of FIGS. 1-3.

First, if the upper and bottom sides of an optically anisotropic element consisting of hybrid nematic orientation liquid crystal layer are respectively defined by an angle between a liquid crystal molecule director and the liquid crystal layer plane in the vicinity of hybrid nematic interface constituting the optically anisotropic element, a surface with an angle between a director of a liquid crystal molecule and said liquid crystal layer plane of 25 to 90 degrees at a side of acute angle is defined as a b-surface, whereas an angle of 0 to 20 degrees at a side of acute angle is defined as a c-surface

The tilt angle of a hybrid nematic orientation liquid crystal layer is defined as a direction that makes an angle between a director of a liquid crystal molecule and a projection component onto a c-surface of director an acute angle and is parallel to the projection component when the c-surface is viewed from the b-surface of this optically anisotropic element through a liquid crystal layer (FIGS. 1 and 2)." (Specification, page 13, lines 14 to line 4 from the bottom)

(J) "A polarization element usable for the present invention is not particularly limited, but may include various ones. ... (Omitted)... a preferable one among them is obtained by stretching a polyvinyl alcohol-based film and absorbing and orienting a dichroic material (iodide, dye). The thickness of polarizing element is not particularly limited, but commonly is 5 to 50 μm or so.

... (Omitted)...

As a transparent protection film disposed on one surface of a polarizing element is preferably an optically isotropic film, ... (Omitted)... in terms of planarity, heat resistance, and humidity resistance when it is used as an elliptical polarization plate, etc., triacetyl cellulose and cycloolefin-based polymer are preferable. In general, the thickness of the transparent protection film is preferably 1 to 100 μm, particularly preferably 5 to 50 μm." (Specification, page 15, line 5 from the bottom to page 16, line 24)

(K) "The organic electroluminescence display device (organic EL display device) to which an elliptical polarization plate of the present invention is applied is set forth as below.

In general, the organic EL display device forms a light emitting body (organic electroluminescence light emitting body) by laying a transparent electrode, organic light emitting layer and metal electrode on a transparent substrate in this order. ... (Omitted)...

In such an organic EL display device, an organic light emission layer is formed into an extremely thin film with a thickness of 10 nm or so. Therefore, an organic light emission layer also transmits light almost completely similar in manner to a transparent electrode. As a result, light incident from a surface of a transparent substrate in non-emission and passing through a transparent electrode and an organic light emission layer and reflecting on a metal electrode goes out again to a surface side of the transparent substrate. Thus when viewed from the outside, a display surface of the organic EL display device can be seen like a mirror surface.

In an organic EL display device comprising an organic electroluminescence light emitter equipped with a transparent electrode on a surface side of the organic light emission layer emitting light by the application of voltage and a metal electrode on a rear surface side of the organic light emission layer, a polarizer may be disposed on a surface side of the transparent electrode and a retarder may be disposed between the transparent electrode and the polarizer.

The retarder and polarizer have an effect of polarizing light incident from the outside and reflected on a metal electrode. Thus the polarizing effect prevents a mirror surface of the metal electrode from being viewed from the outside. In particular, if a quarter wavelength plate is used as a retarder and an angle of polarized direction between a polarized plate and a retarder is adjusted to $\pi/4$, it results in the complete shielding of a mirror surface of a metal electrode.

Specifically, a polarizer only allows a linearly polarized component of external light entered into this organic EL display device to pass through. This linearly polarized light is generally changed into elliptically polarized light by a retarder, and circularly polarized light particularly when the retarder is a quarter wavelength plate and an angle of polarized light direction between a polarizer and a retarder is $\pi/4$.

This circularly polarized light passes through a transparent substrate, a transparent electrode, and an organic thin film, and reflects on a metal electrode, and passes through again the organic thin film, the transparent electrode, and the transparent substrate, and changes again into linearly polarized light at a retarder. Further, this linearly polarized light is orthogonal to a polarized direction of a polarizer, and thus cannot pass through a polarizer. As a result, a mirror surface of the metal electrode can be totally shielded.

When the elliptical polarization plate of the present invention is applied to an organic EL display device, it is better to dispose in an observer side (the front side) of organic EL display device as viewed from the observer to prevent the reflection of external light as described above." (Specification, page 24, line 18 to page 26, line 4)

(L) "<Example 1>
(Manufacture of laminate A)

TAC film (40 μm, manufactured by FUJIFILM Corporation) was subjected to saponification treatment by immersion into a 2 mass% potassium hydroxide aqueous solution for 5 minutes at room temperature, and cleaned in flowing water and dried. On one surface of polarized element in which an iodide was absorbed into a stretched polyvinyl alcohol, saponified TAC film was bonded by use of an adhesive layer 1 of acrylic-based adhesive to manufacture a laminate A. The total film thickness was about 65 μm, which was successfully thinner than the usual one (105 μm).

... (Omitted)...

<Example 7>

(Preparation of liquid crystalline polymer solution C and manufacture of laminate P)

Using 100 mmol 6-hydroxy-2-naphthoic acid, 100 mmol terephthalic acid, 50 mmol chlorohydroquinone, 50 mmol tert-butylcathechol, and 600 mmol acetic anhydride under a nitrogen atmosphere, acetylation reaction was conducted at 140°C for 2 hours. Subsequently, it was subjected to polymerization at 270°C for 2 hours, at 280°C for 2 hours, and at 300°C for 2 hours. Subsequently, the reaction product thus obtained was dissolved into tetrachloroethane, and purified by reprecipitation with methanol to obtain 40.0 g liquid-crystalline polyester (Polymer 1). The logarithm viscosity of this liquid-crystalline polyester was 0.35 (dl/g), and this polyester has a nematic phase as a liquid crystal phase, and the isotropic phase-liquid crystal phase transition temperature was 300°C or more, and the glass transition temperature was 135°C.

An eight mass% of γ-butyrolactone solution of Polymer 1 (liquid crystalline polymer solution C) was prepared.

While transporting an elongated PEEK film with a width of 650 mm and a thickness of 100 μm, a rubbing roll with 150 mmφ winding a rayon cloth was obliquely disposed, and rotated at a high speed to implement rubbing continuously to obtain a substrate for orientation film with a rubbing angle of 45°. Here, a rubbing angle is defined as an angle in a direction of anticlockwise motion from the MD direction viewed from the upper side of a rubbing surface. Liquid crystalline polymer solution C was continuously coated and dried by a die coater on the aforesaid substrate for orientation film, and oriented by subjecting to heating treatment at 150°C x for 10 minutes to orient a liquid crystalline polymer, and then cooling down to room temperature to fix the orientation to obtain a laminate P consisting of a liquid crystalline polymer layer and PEEK film. The thickness of the obtained laminate P was 0.6 μm.

The PEEK film used as a substrate for orientation has a large birefringence. The measurement of optical parameters of a liquid crystalline polymer layer was thus difficult in the form of laminate P. Accordingly, the liquid crystalline polymer layer was transferred on a triacetyl cellulose (TAC) film in the following manner.

Specifically, on a liquid crystalline polymer layer disposed on PEEK film, an UV-curable type adhesive for optical use was coated with a thickness of 5 μm, and laminated with TAC film (40 μm, manufactured by FUJIFILM Corporation), followed by the irradiation of ultraviolet light from a side of TAC film to cure an adhesive, which was followed by the delamination of PEEK film to obtain a laminate consisting of liquid crystalline film layer/adhesive layer/TAC film. As a result of measuring parameters of an obtained laminate by automatic birefringence meter KOBRA21ADH manufactured by Oji Scientific Instruments, this liquid crystalline polymer layer had a hybrid nematic orientation structure, and had Δnd of the layer of 90 nm, and an average tilt angle of 28 degree.

(Manufacture of elliptical polarization plate Q)

A commercially available UV-curable type adhesive (UV-3400, manufactured by TOAGOSEI CO., LTD.) was coated on a liquid crystalline polymer layer (optically anisotropic element) of laminate P with a thickness of 5 μm as an adhesive layer 2, and a polarization element side of the laminate A produced in Example 1 was laminated thereon and the adhesive layer 2 was cured by about 600 mJ UV radiation. Thereafter, a PEEK film was peeled from an integrated laminate of PEEK film/optically anisotropic element/adhesive layer 2/polarization element/adhesive layer 1/TAC film to transfer an optically anisotropic element onto a laminate A to obtain an elliptical polarization plate Q consisting of TAC film/adhesive layer 1/polarization element/adhesive layer 2/optically anisotropic element. The total thickness of the elliptical polarization plate Q was 75 μm.

The optical inspection of this elliptical polarization plate Q resulted in no damage such as blot and scratch. A side of optically anisotropic element of this elliptical polarization plate Q was bonded to a glass plate via an acrylic-based adhesive, and put into a homeothermal constant humidity bath at 60°C and 90%RH, and taken out after 500 hours and observed, but no abnormality such as delamination and the generation of bubbles was observed." (Specification, page 27, line 4 to page 34, last line)

(M) "[Brief Description of the Drawing(s)]

FIG. 1 is a schematic view illustrating a tilt angle and a twist angle of a liquid crystal molecule.

FIG. 2 is a schematic view of an orientation structure of a liquid crystal film constituting an optical anisotropic element." (Specification, page 38, lines 4 to 6)

(N)

"

図 1

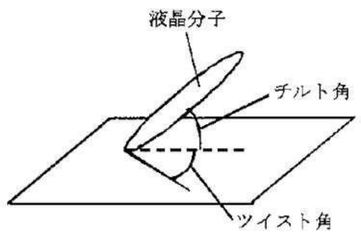


図 2

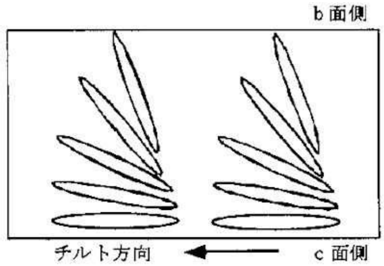


図１　FIG. 1
液晶分子　　　　Liquid crystal molecule
チルト角　　　　Tilt angle
ツイスト角　　　Twist angle
図２　FIG. 2
ｂ面側　b surface side
ｃ面側　c surface side
チルト方向　　　Tilt direction

" (Drawings 1/4 page)

B　Invention described in Cited Document 1

It is technically obvious that the "retarder" in the description pointed out in the aforesaid item A(K) indicates an "optically anisotropic element" in the description pointed out in the aforesaid item A(D). Further, the "elliptical polarization plate" in which "a quarter wavelength plate is used as a retarder, and an angle of polarized direction between a polarized plate and a retarder is adjusted to π/ 4" in the description pointed out in the aforesaid item A(K) is nothing but a "circularly polarizer."

Furthermore, it can be seen from FIG. 2 shown in the aforesaid item A(N) that an angle between a director of a liquid crystal molecule and a liquid crystal layer plane falls within a range of 0 to 90 degrees at any position between a b surface and a c surface in a thickness direction; i.e., an angle between a director of a liquid crystal molecule and a liquid crystal layer plane has the same symbol.

Therefore, it is recognized from the description pointed in the aforesaid items A(A) to (N) that Cited Document 1 describes the following invention:

"A circularly polarizer used in the anti-reflection of external light in an organic electroluminescence display device, having a layer structure of transparent protection film/adhesive layer 1/polarization element/adhesive layer 2/optically anisotropic element, and

wherein said transparent protection film is formed by triacetyl cellulose or cycloolefin-based polymer,

wherein said polarization element is obtained by stretching a polyvinyl alcohol-based film and absorbing and orienting a dichroic material,

wherein said optically anisotropic element comprises a liquid crystal layer, and the liquid crystal layer is formed by coating a liquid-crystalline composition showing an optically positive uniaxial property on a rubbing treatment surface of a substrate for orientation, drying, and making the composition assume a hybrid nematic orientation, and fixing the orientation, said hybrid nematic orientation is an oriented state where an angle between a director of a liquid crystal molecule and a liquid crystal layer plane differs between the upper surface and the bottom surface of said liquid crystal layer, and continuously changes between the upper surface and the bottom surface of said liquid crystal layer,

wherein in the vicinity of one surface of the aforesaid liquid crystal layer, the angle between a director of a liquid crystal molecule and a liquid crystal layer plane is

45 to 80 degrees, and 0 to 10 degrees at the opposite surface,

and wherein said optically anisotropic element is formed as a quarter wavelength plate, and an angle of a polarization direction between said polarization element and said quarter wavelength plate is set to π/4." (hereinafter, the invention is referred to as the "Cited Document 1 invention".)

(2) Comparison

A The "polarization element," "liquid crystal layer," "optically anisotropic element," "liquid crystal molecule," and "an angle between a director of the liquid crystal molecule and a liquid crystal layer plane" of the Cited Document 1 invention respectively correspond to "polarizer," "liquid crystal layer," "compensation film," "liquid crystal," and "'tilt angle of liquid crystal' against 'a surface of liquid crystal layer.'"

B The Cited Document 1 invention includes a "polarization element" (corresponding to "polarizer" of the Invention. hereinafter in the column of "(2) Comparison," the language in parentheses continued to "" surrounding the constituent element of Cited Document 1 invention indicates matters specifying the Invention corresponding to the constituent element of the Cited Document 1 invention) and "optically anisotropic element" (compensation film) in the layer structure.

Further, "optically anisotropic element" of the Cited Document 1 invention comprises "liquid crystal layer" (liquid crystal layer), and the upper surface and the bottom surface of the "liquid crystal layer" can be said to be "a first major surface and a second major surface positioned at opposite sides from one another."

Therefore, the Cited Document 1 invention comprises the constitution corresponding to the matters specifying the Invention to "comprise a polarizer and a compensation film located on a surface of said polarizer, the compensation film comprising a liquid crystal layer having a first major surface and a second major surface positioned at opposite sides from one another."

C "Liquid crystal" (liquid crystal) in a "liquid crystal layer" (liquid crystal layer) has a hybrid nematic orientation in the Cited Document 1 invention (i.e., "an angle between a director and a liquid crystal layer plane" (a tilt angle of liquid crystal against a surface of a liquid crystal layer) differs between "the upper surface and the bottom surface of the liquid crystal layer" (a first major surface and a second major surface), and continuously changes between the upper surface and the bottom surface of the liquid crystal layer), and thus has an optical axis obliquely tilted in a thickness direction against a surface of "liquid crystal layer."

Further, in the vicinity of one surface of "liquid crystal layer" of the Cited Document 1 invention; i.e. "one surface of the upper surface and the bottom surface" of the Cited Document 1 invention, "an angle between a director of a liquid crystal molecule and said liquid crystal layer plane" (a tilt angle of liquid crystal against a surface of a liquid crystal layer) is 45 to 80 degrees, whereas it is 0 to 10 degrees at the opposite surface; i.e., "another surface," and continuously changes between them. Therefore, given the aforesaid "one surface of the upper surface and the bottom surface" to be "a first major surface," and the aforesaid "other surface" be "a second major surface," it can be said that "an angle between a director of a liquid crystal molecule and said liquid crystal layer plane" (a tilt angle of liquid crystal against a surface of a liquid crystal layer) gradually increases from "the first major surface" to "the second major surface" in a thickness direction of the "liquid crystal layer" (liquid crystal layer).

Therefore, "the liquid crystal layer" of the Cited Document 1 invention comprises the matters specifying the Invention that "the liquid crystal layer comprises a liquid crystal having an optical axis obliquely tilted in a thickness direction from a surface of said liquid crystal layer, and the tilt angle of said liquid crystal against the surface of the liquid crystal layer may gradually increase in a thickness direction of said liquid crystal layer from said first major surface to said second major surface."

D "Circularly polarizer" of the Cited Document 1 invention is used in the anti-reflection of external light in an organic electroluminescence display device. Thus it can be said to be an "anti-reflection film."

Therefore, the Cited Document 1 invention and the Invention are common in that they are "anti-reflection films."

E In view of the aforesaid items A to D, the Invention and the Cited Document 1 invention have in common that

"An anti-reflection film for an organic light emission device, comprising: a polarizer; and

a compensation film located on a surface of said polarizer, said compensation film comprising a liquid crystal layer having a first major surface and a second major surface positioned at opposite sides from one another,

wherein said liquid crystal layer comprises liquid crystals having an optical axis obliquely inclined toward a thickness direction with respect to a surface of said liquid crystal layer,

wherein a tilt angle of the liquid crystals with respect to the surface of the liquid crystal layer gradually increases from said first major surface to said second major surface in a thickness direction of said liquid crystal layer.", whereas
they are prima facie different or different from each other in the following points:

Different feature 3-1:

In the Invention, the in-plane retardation (Re) of said liquid crystal layer at the wavelengths of 450 nm, 550 nm, and 650 nm satisfies the relationship 1 of "Re(450 nm)$<R_e$(550 nm)$\leq R_e$(650 nm)" and
the relationship 2a of "0.72 $\leq R_e$(450 nm)/R_e(550 nm)$\leq$0.92", whereas the Cited Document 1 invention fails to specify that a liquid crystal layer has such a structure.

Different feature 3-2:

The Invention specifies a color shift of the anti-reflection film observed at a viewing angle of 60° as less than 7.0 and a reflectance as 1.0 % or less when measured at a viewing angle of 60°, whereas the Cited Document 1 invention fails to specify a color shift of the anti-reflection film observed at a viewing angle of 60° and a reflectance measured at a viewing angle of 60°.

(3) Regarding Different feature 3-1

A Since in-plane retardation Re of a retarder has a wavelength dependency, if

the retarder has a desired retardation at a certain wavelength, it does not necessarily provide a desired value of retardation at a different wavelength. Thus, in order to provide a wide-range retarder capable of providing a desired retardation,
it is necessary to adjust the value of "R_e(450 nm)/R_e(550 nm)" as close as possible to about 0.82 (≈450/550),
and the value of "R_e(650 nm)/R_e(550 nm)" as close as possible to about 1.18 (≈650/550), which is a matter of common general knowledge for a person skilled in the art (Example: Cited Document 2, [0053] and [0054] etc., Cited Document 3, [0048] to [0054] etc., Cited Document 4, [0059] and [0060], etc.).

B The Cited Document 1 invention is a circularly polarizer used in the anti-reflection of external light in an organic electroluminescence display device, and it is presumed that the external light for anti-reflection not only includes a specific wavelength, but also includes light with various wavelengths (generally a whole range of visible light), and the optically anisotropic element is required to be a wide bandwidth quarter wavelength plate in which the in-plane retardation is one-fourth wavelength within a wide wavelength range to allow Cited Invention to perform a good anti-reflection function for such external light including various wavelengths, which are obvious to a person skilled in the art.

Consequently, it is easily conceivable for a person skilled in the art to take an appropriate measure and adjust the value of "R_e(450 nm)/R_e(550 nm)" close to about 0.82 (≈450/550), and adjust the value of "R_e(650 nm)/R_e(550 nm)" close to about 1.18 (≈650/550) in the Cited Invention for the purpose of performing a good anti-reflection function against an external light containing various wavelengths; i.e., make the Cited Document 1 invention comprise the constituent element corresponding to matters specifying the Invention according to Different feature 3-1, on the basis of the common general knowledge stated in the aforesaid item A.

(4) Regarding Different feature 3-2

A In the Cited Document 1 invention, it is merely a design matter that a person skilled in the art could have done as necessary to set "an angle between a director of a liquid crystal molecule and said liquid crystal layer plane" in the vicinity of one surface and the opposite surface of the liquid crystal layer to a value within the range of "45 to 80 degrees" and a value of "0 to 10 degrees," respectively.

Therefore, it is merely a design matter that a person skilled in the art could have done as necessary to select a value within the range of "45 to 65 degrees" and a value of "3 degrees" respectively as "an angle between a director of a liquid crystal molecule and said liquid crystal layer plane" in the vicinity of one surface and the opposite surface of the liquid crystal layer.

B In the Cited Document 1 invention with a modified constituent element as mentioned in the aforesaid item A, it is strongly suggested from Examples 1 to 4 and 6 described in the specification that "a color shift of the anti-reflection film observed at a viewing angle of 60°" and "a reflectance measured a viewing angle of at 60°" of the Prior Application 1 invention would become "3.7 to 6.4" and "0.59% to 0.93%," respectively.

Specifically, the Cited Document 1 invention with modified constituent elements as mentioned in the aforesaid item A comprises matters specifying the Invention according to Different feature 3-2.

(5) Regarding the effect

The effect of the Invention could be expected by a person skilled in the art on the basis of the description of Cited Document 1 and the common general knowledge.

(6) Summary

As seen in the aforesaid items (2) to (5), the Invention was easily conceivable by a person skilled in the art on the basis of the invention described in Cited Document 1 and common general knowledge, and thus it could not be granted a patent under the provision of Article 29(2) of the Patent Act.

8 Closing

The Detailed Description of the Invention of the present application does not satisfy the requirement of Article 36(4)(i) of the Patent Act.

Further, the Invention is identical or substantially identical to the Prior Application 1 Invention, and identical or substantially identical to the Prior Application 2 Invention, and thus cannot be granted a patent under the provision of Article 29-2 of the Patent Act, without making a determination of the other remaining claims.

Furthermore, the Invention was easily conceivable by a person skilled in the art on the basis of the description of the Cited Document 1 invention in view of common general knowledge, and thus cannot be granted a patent under the provision of Article 29(2) of the Patent Act, without making a determination of the other remaining claims.

Therefore, the appeal decision shall be made as described in the Conclusion.

July 13, 2018

Chief administrative judge: HIGUCHI, Nobuhiro
Administrative judge: SHIMIZU, Yasushi
Administrative judge: SEKINE, Hiroyuki