Trial decision

Invalidation No. 2014-800013

Tokyo, Japan
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The case of trial regarding the invalidation of Japanese Patent No. 4094047, entitled "Light-Emitting Device," between the parties above has resulted in the following trial decision:

Conclusion

The correction shall be approved as requested.

The patent regarding the invention according to Claim 1 of Japanese Patent No. 4094047 was invalidated.

The costs in connection with the trial shall be borne by the demandee.

Reason

No. 1 Outline of the case

The present case is to request that the patent for the invention according to Claim 1 of Japanese Patent No. 4094047 (hereinafter referred to as the "Patent." The number of claims is one.), of which patentee is the demandee, should be invalidated.

No. 2 History of the procedures

1 The brief history of the procedures in connection with the Patent is as follows:

August 13, 2007	Application of the Patent (Japanese Patent Application No. 2007-210888 (Divisional application of Japanese Patent Application No. 2004-363534), the dates of priority claim April 27, 2004, June 21, 2004, and June 30, 2004)
March 14, 2008	Registration of establishment
January 22, 2014	Request for trial
April 7, 2014	Written reply for the trial case submitted (demandee)
May 28, 2014	Notification of trial examination
July 2, 2014	Oral proceedings statement brief submitted (demandant)
July 2, 2014	Oral proceedings statement brief submitted (demandee)
July 10, 2014	Written statement submitted (demandant)
July 16, 2014	Oral proceeding
July 18, 2014	Written statement submitted (demandee)
August 1, 2014	Written statement (second) submitted (demandant)
August 1, 2014	Written statement submitted (demandee)
August 25, 2014	Written statement (third) submitted (demandant)
September 24, 2014	Advance notice of a trial decision
November 28, 2014	Request for correction
November 28, 2014	Written statement submitted (demandee)
January 7, 2015	Written statement (fourth) submitted (demandant)
February 20, 2015	Written reply for the trial case submitted (demandee)

2 The brief history of the procedures in connection with Japanese Patent Application No. 2004-363534 (hereinafter referred to as the "original application") is as follows:

December 15, 2004	Application of the patent (the dates of priority claim April 27, 2004, June 21, 2004, and June 30, 2004)
May 23, 2008	Registration of establishment (Japanese Patent No. 4128564)
March 15, 2011	Request for trial (Invalidation No. 2011-800043)
May 26, 2011	Written reply for the trial case submitted (demandee)
August 16, 2011	Oral proceedings statement brief submitted (demandant)
August 23, 2011	Written reply for the trial case submitted (demandee)
August 30, 2011	Written refutation submitted (demandant)

August 30, 2011	Oral proceeding
September 1, 2011	Written statement submitted (demandant)
September 7, 2011	Written statement of a trial case submitted (demandee)
December 12, 2011	Trial decision (The request approved)
January 20, 2012	Access to Intellectual Property High Court (2012 (Gyo-Ke) 10020)
April 18, 2012	Request for trial for correction (correction 2012-390050)
January 31, 2013	Rendition of a court decision of revocation of the trial decision (hereinafter referred as the "previous court decision")
March 4, 2013	Written statement submitted (demandant)
March 11, 2013	Written reply for the trial case submitted (demandee)
March 12, 2013	Withdrawal of request for trial for correction (correction 2012-390050)
May 31, 2013	Trial decision (The request approved)

No. 3 Request for correction

1 Contents of correction

The correction requested by the demandee on November 28, 2014 (hereinafter referred to as the "correction of the case") is to correct the description (hereinafter referred to as the "description of the Patent") and scope of claims attached to the application of the patent as in the corrected description (hereinafter referred to as the "corrected description of the case") and the scope of claims attached to the written correction request, and Correction A and Correction B below indicate the contents of the correction.

(1) Correction A

"The red phosphor is a nitride aluminosilicate-based nitride phosphor that is excited by light that the light-emitting element emits, activated by Eu^{2+}, and has a light emission peak in the wavelength range from at least 600 nm to less than 660 nm" in Claim 1 of the scope of claims is corrected to read "the red phosphor is a nitride aluminosilicate-based nitride phosphor that is excited by light that the light-emitting element emits, activated by Eu^{2+}, and has a light emission peak in the wavelength range from at least 600 nm to less than 660 nm (provided that $Sr_2Si_4AlON_7:Eu^{2+}$ shall be excluded.)".

(2) Correction B

"The red phosphor is a nitride aluminosilicate-based nitride phosphor that is excited by light that the light-emitting element emits, activated by Eu^{2+}, and has a light emission peak in the wavelength range from at least 600 nm to less than 660 nm" in paragraph [0010] in the description attached to the application is corrected to read "the red phosphor is a nitride aluminosilicate-based nitride phosphor that is excited by light that the light-emitting element emits, activated by Eu^{2+}, and has a light emission peak in the wavelength range from at least 600 nm to less than 660 nm (provided that $Sr_2Si_4AlON_7:Eu^{2+}$ shall be excluded.)".

2 Judgment on Propriety of Correction

(1) Correction A

A The red phosphor is specified as a "nitride aluminosilicate-based nitride phosphor" in the invention relating to Claim 1 before correction, while the red phosphor is specified as "a nitride aluminosilicate-based nitride phosphor (provided that $Sr_2Si_4AlON_7:Eu^{2+}$ shall be excluded.)" in the invention relating to Claim 1 after correction.

Thus, Correction A is recognized to restrict the scope of claims by excluding the "$Sr_2Si_4AlON_7:Eu^{2+}$ " from the possible aspects of the red phosphor.

B The description of the Patent describes the following matters (The underlines are applied by the body; the same applies hereinafter).

(a) "[0012] When the properties of the phosphor activated by Eu^{2+} were investigated in detail, it was found that the phosphors indicated in (1) to (3) below not only had high internal quantum efficiency under the excitation of the violet-light-emitting element having a light emission peak to a near-ultraviolet region to a violet region with a wavelength from at least 360 nm to less than 420 nm, but also had high internal quantum efficiency under the excitation of the blue-light-emitting element having a light emission peak to a blue region with a wavelength from at least 420 nm to less than 500 nm, in particular a blue region with a wavelength from at least 440 nm to less than 500 nm, and some preferable phosphors had internal quantum efficiency of 90% to 100%.

...;

(3) nitride-based (such as nitride silicate-based, and nitride aluminosilicate-based) red phosphors that are activated by Eu^{2+}, and have a light emission peak in the wavelength range from at least 600 nm to less than 660 nm such as phosphors of $Sr_2Si_5N_8:Eu^{2+}$, $SrSiN_2:Eu^{2+}$, $SrAlSiN_3:Eu^{2+}$, $CaAlSiN_3:Eu^{2+}$, and $Sr_2Si_4AlON_7:Eu^{2+}$."

(b) " [0057] The above-described nitride phosphor or oxynitride phosphor activated by Eu^{2+} is a phosphor that emits warm colored light that has a light emission peak in the wavelength range from at least 600 nm to less than 660 nm, preferably a phosphor that emits red colored light that has a light emission peak in the wavelength range from at least 610 nm to 650 nm or less, and corresponds to a phosphor having high internal quantum efficiency under the excitation light with the wavelength from at least 360 nm to less than 500 nm mentioned above. To be more specific, the nitride aluminosilicate phosphor represented by a composition formula $(M_{1-x}Eu_x)AlSiN_3$ such as an $SrAlSiN_3:Eu^{2+}$ red phosphor illustrated in FIG. 13 and a $CaAlSiN_3:Eu^{2+}$ red phosphor, a nitride silicate phosphor represented by a composition formula $(M_{1-x}Eu_x)SiN_2$ such as an $SrSiN_2:Eu^{2+}$ red phosphor illustrated in FIG. 12 and a $CaSiN_2:Eu^{2+}$ red phosphor, a nitride silicate phosphor represented by a composition formula $(M_{1-x}Eu_x)_2Si_5N_8$ such as an $Sr_2Si_5N_8:Eu^{2+}$ red phosphor illustrated in FIG. 14 and a $Ca_2Si_5N_8:Eu^{2+}$ red phosphor or a $Ba_2Si_5N_8:Eu^{2+}$ red phosphor, and an oxo-nitride aluminosilicate phosphor represented by a composition formula $(M_{1-x}Eu_x)_2Si_4AlON_7$ such as an $Sr_2Si_4AlON_7:Eu^{2+}$ red phosphor may be used. However, M in the above composition formulae is at least one element chosen from Mg, Ca, Sr, Ba, and Zn, and x is a numerical value that satisfies the formula $0.005 \leq x \leq 0.3$."

(c) "[0150]

In addition, while in Example 3, there is explained a case where an $SrAlSiN_3:Eu^{2+}$ red phosphor is used, any phosphor may be used and are not particularly limited so long as they are represented by a composition formula $(M_{1-x}Eu_x)AlSiN_3$, where M is at least one element chosen from Mg, Ca, Sr, Ba, and Zn, and x is a numerical value that satisfies the formula $0.005 \leq x \leq 0.3$. In addition, the green phosphor is not limited to the ones used in the above-described examples, and is not particularly limited so long as it emits light having a light emission peak in the wavelength range from at least 500 nm to less than 560 nm. A yellow phosphor that emits light having a light emission peak in the wavelength range from at least 560 nm to less than 600 nm may be used instead of the above-described green phosphor. It is to be noted that a phosphor having preferable light emitting output among the above-described green or yellow phosphors is a phosphor activated by Eu^{2+} or Ce^{3+}.

[0151]

It is to be noted that the properties of the $SrAlSiN_3:Eu^{2+}$ red phosphor are similar to those of a conventional red phosphor such as a nitride phosphor or an oxynitride phosphor such as an $SrSiN_2:Eu^{2+}$, an $Sr_2Si_5N_8:Eu^{2+}$, or an $Sr_2Si_4AlON_7:Eu^{2+}$, so that the same operation/working-effect is recognized also when the above-described conventional nitride phosphor or oxynitride phosphor is used in Example 2 or Example 3 instead of the $SrAlSiN_3:Eu^{2+}$ red phosphor."

According to the above-described description, the "nitride aluminosilicate-based nitride phosphor" of the corrected invention of the case is recognized to have technical significance as a red phosphor that "not only has high internal quantum efficiency under the excitation of the violet-light-emitting element having a light emission peak to a near-ultraviolet region to a violet region with a wavelength from at least 360 nm to less than 420 nm, but also has high internal quantum efficiency under the excitation of the blue-light-emitting element having a light emission peak to a blue region with a wavelength from at least 420 nm to less than 500 nm, in particular a blue region with a wavelength from at least 440 nm to less than 500 nm."

As a red nitride aluminosilicate-based nitride phosphor, a variety of compositions such as a phosphor represented by a composition formula $(M_{1-x}Eu_x)AlSiN_3$ and a phosphor represented by a composition formula $(M_{1-x}Eu_x)_2Si_4AlON_7$, to be more specific, an $SrAlSiN_3:Eu^{2+}$ phosphor, a $CaAlSiN_3:Eu^{2+}$ phosphor, and an $Sr_2Si_4AlON_7:Eu^{2+}$ phosphor, and there are also descriptions as described above; "any phosphor may be used and are not particularly limited so long as they are represented by a composition formula $(M_{1-x}Eu_x)AlSiN_3$, where M is at least one element chosen from Mg, Ca, Sr, Ba, and Zn, and x is a numerical value that satisfies the formula $0.005 \leq x \leq 0.3$": and "the properties of the $SrAlSiN_3:Eu^{2+}$ red phosphor are similar to those of a conventional nitride phosphor or an oxynitride phosphor such as ... an $Sr_2Si_4AlON_7:Eu^{2+}$ phosphor, so that the same operation/working-effect is recognized also when the above-described conventional nitride phosphor or oxynitride phosphor is used in Example 2 or Example 3 instead of the $SrAlSiN_3:Eu^{2+}$ red phosphor," and in view of these descriptions, the "nitride aluminosilicate-based nitride phosphor" used in the corrected invention of the case is understood to be able to have any composition so long as the phosphor is a red nitride aluminosilicate-based nitride phosphor, and Correction A is understood to exclude, from those nitride aluminosilicate-based nitride phosphors, an "$Sr_2Si_4AlON_7:Eu^{2+}$ phosphor," which is specifically named.

There is found no reason to change the technical description of the "nitride aluminosilicate-based nitride phosphor" before and after correction of the case; the change in technical description is, for example, that only the excluded "$Sr_2Si_4AlON_7:Eu^{2+}$" has some particular technical significance, or only the phosphors after the exclusion have some particular technical significance.

In view of the above, it cannot be said that new technical matters were introduced by excluding the "$Sr_2Si_4AlON_7:Eu^{2+}$" from the "nitride aluminosilicate-based nitride phosphor," so that Correction A is within the scope of the matters described in the description, the scope of claims, or the drawing attached to the application of the patent.

C As described above in A, since Correction A is to exclude the "$Sr_2Si_4AlON_7:Eu^{2+}$ " from the aspect that the red phosphor is capable of taking, so that Correction A does not substantially enlarge or modify the scope of claims.

(2) Correction B

A Correction B is to correct "the red phosphor is a nitride aluminosilicate-based nitride phosphor that is excited by light that the light-emitting element emits, activated by Eu^{2+}, and has a light emission peak in the wavelength range from at least 600 nm to less than 660 nm" in paragraph [0010] in the description attached to the application to read "the red phosphor is a nitride aluminosilicate-based nitride phosphor that is excited by light that the light-emitting element emits, activated by Eu^{2+}, and has a light emission peak in the wavelength range from at least 600 nm to less than 660 nm (provided that $Sr_2Si_4AlON_7:Eu^{2+}$ shall be excluded.)" in order to provide consistency between the description in the scope of claims and the detailed description of the invention in accordance with the correction relating to Correction A.

In view of the above, Correction B is to clarify an ambiguous description.

B Based on a reason similar to that of the above (1) B, Correction B is within the scope of the matters described in the description, the scope of claims, or the drawing attached to the application of the patent.

C Based on a reason similar to that of the above (1) C, Correction B does not substantially enlarge or modify the scope of claims.

3 Summary

As described above, since Correction A and Correction B described above are intended to restrict the scope of claims in accordance with Article 134-2(1)(i) of the Patent Act or to clarify an ambiguous description as prescribed in Article 134-2(1)(iii) of the Patent Act, are within the scope of the matters described in the scope of the description of the Patent, and do not substantially enlarge or modify the scope of claims, Correction A and Correction B fall under the provisions of Article 126(5) and (6) of the Patent Act which is applied mutatis mutandis pursuant to Article 134-2(9) of the Patent Act.

Therefore, the Correction of the case shall be approved.

No. 4 Corrected invention of the case

1 As described above, since the correction of the case is approved, the invention according to Claim 1 of the Patent (hereinafter referred to as the "corrected invention of the case") is approved as the invention described in Claim 1 indicated below.

"[Claim 1] A light-emitting device, the device comprising: a phosphor layer comprising a red phosphor and a green phosphor; and a light-emitting element, wherein the light-emitting device is arranged to emit output light that comprises a red colored light emission component that the red phosphor emits, a green colored light emission component that the green phosphor emits, and a light emission component that the light-emitting element emits, wherein the output light comprises white light, wherein the red phosphor comprises a nitride aluminosilicate-based nitride phosphor that is excited by light that the light-emitting element emits, activated by Eu^{2+}, and has a light emission peak in the wavelength range from at least 600 nm to less than 660 nm (provided that $Sr_2Si_4AlON_7:Eu^{2+}$ shall be excluded.)", wherein the green phosphor is excited by light that the light-emitting element emits, activated by Eu^{2+} or Ce^{3+}, and has a light emission peak in the wavelength range from at least 500 nm to less than 560 nm, wherein the light-emitting element comprises a blue-light-emitting element arranged to emit light having a light emission peak in the wavelength range from at least 440 nm to less than 500 nm, wherein the phosphors that the phosphor layer comprises comprise only phosphors activated by Eu^{2+} or Ce^{3+}, wherein the red phosphor under the excitation of the light that the blue-light-emitting element emits has internal quantum efficiency of 80% or more, wherein excitation spectrums of the phosphors that the phosphor layer comprises have an excitation peak in a shorter wavelength range than a wavelength of the light that the blue-light-emitting element emits, and wherein the phosphor layer substantially comprises no inorganic phosphor other than a nitride phosphor or an oxynitride phosphor."

2 The corrected invention of the case is separately described as follows.

"(K) A light-emitting device,

(A) the device comprising: a phosphor layer comprising a red phosphor and a green phosphor; and a light-emitting element,

(B) wherein the light-emitting device is arranged to emit output light that comprises a red colored light emission component that the red phosphor emits, a green colored light emission component that the green phosphor emits, and a light emission component that the light-emitting element emits,

(C) wherein the output light comprises white light,

(D) wherein the red phosphor comprises a nitride aluminosilicate-based nitride phosphor that is excited by light that the light-emitting element emits, activated by Eu^{2+}, and has a light emission peak in the wavelength range from at least 600 nm to less than 660 nm (provided that $Sr_2Si_4AlON_7:Eu^{2+}$ shall be excluded.)",

(E) wherein the green phosphor is excited by light that the light-emitting element emits, activated by Eu^{2+} or Ce^{3+}, and has a light emission peak in the wavelength range from at least 500 nm to less than 560 nm,

(F) wherein the light-emitting element comprises a blue-light-emitting element arranged to emit light having a light emission peak in the wavelength range from at least 440 nm to less than 500 nm,

(G) wherein the phosphors that the phosphor layer comprises comprise only phosphors activated by Eu^{2+} or Ce^{3+},

(H) wherein the red phosphor under the excitation of the light that the blue-light-emitting element emits has internal quantum efficiency of 80% or more,

(I) wherein excitation spectrums of the phosphors that the phosphor layer comprises have an excitation peak in a shorter wavelength range than a wavelength of the light that the blue-light-emitting element emits, and

(J) wherein the phosphor layer substantially comprises no inorganic phosphor other than a nitride phosphor or an oxynitride phosphor."

No. 5 Outline of the demandant's allegation and Means of proof

1 Reasons for invalidation

(1) Reason for invalidation 1 (violation of requirements for support)

A Violation of requirements for support No. 1 (pages 9 to 10 and pages 12 to 23 in the written demand for trial, pages 3 to 8 in the oral proceedings statement brief, and pages 2 to 17 in the (second) written statement dated August 1, 2014)

The corrected invention of the case reads "wherein the red phosphor under the excitation of the light that the blue-light-emitting element emits has internal quantum efficiency of 80% or more," which is constituent component (H).

However, there is no disclosure of the matters specifying the invention, "the red phosphor" under the excitation of the light that the blue-light-emitting element emits "has internal quantum efficiency of 80% or more" in the detailed description of the invention. In fact, it is explicitly disclosed that a nitride aluminosilicate-based nitride red phosphor has internal quantum efficiency of less than 80%.

The corrected invention of the case is directed to "provide a light-emitting device having both high luminous flux and high color rendering property, and more specifically a light-emitting device for emitting warm white light"; however, described in the detailed description of the invention is that the internal quantum efficiency of the nitride red phosphor is not 80% or more, but is less than 80%, so that it naturally cannot be acknowledged that a person skilled in the art could solve the problems of the invention by the corrected invention of the case based on the above description.

In addition, a person skilled in the art had no common general technical knowledge, "a nitride aluminosilicate-based nitride red phosphor has internal quantum efficiency of more than 80%" upon filing the application of the case. Further, the meaning to numerically limit the internal quantum efficiency while "80%" is determined as a boundary value is not clear.

Thus, it cannot be said that "the description in the scope of claims for patent is the invention described in the detailed description of the invention, and it can be acknowledged that a person skilled in the art could solve the problems of the invention based on the detailed description of the invention, and a person skilled in the art could solve the problems of the invention by means of referring to the common general technical knowledge upon filing the application even in the absence of the descriptions or the suggestions," so that the description in the corrected description of the case of the corrected invention of the case does not comply with the requirements for support (pages 9 to 10 and pages 12 to 19 in the written demand for trial).

Although "there is no direct description about a red phosphor having internal quantum efficiency of 80% or more," the Patent is to make the definition, "the red phosphor under the excitation of the light that the blue-light-emitting element emits has internal quantum efficiency of 80% or more," in constituent component (H). Thus, "the description in the scope of claims obviously exceeds the scope in the detailed description of the invention when they are compared with each other," and accordingly does not comply with Article 36(6)(i) of the Patent Act (requirements for support) (pages 5 to 6 in the (second) written statement).

There is no disclosure about the invention where a red phosphor having internal quantum efficiency of 80% or more is used in the corrected description of the case and the drawing, and thus "the description in the scope of claims exceeds the scope in the detailed description of the invention when they are compared with each other," and the Patent does not comply with the requirements for support (page 8 in the (second) written statement dated August 1, 2014).

Optimization of a manufacturing condition varies with and is diversified among those skilled in the art. Thus, since common general technical knowledge that the internal quantum efficiency of a red phosphor improved in direct proportion by using one manufacturing condition or a group of manufacturing conditions did not exist upon filing the application of the Patent, the allegation by the demandee, "a red phosphor can be made to have internal quantum efficiency of 80% or more by optimizing a manufacturing condition by means of referring to the common general technical knowledge of a person skilled in the art upon filing the application," is incorrect. Described only in the corrected description of the case is the possibility that "a red phosphor can be made to have internal quantum efficiency of 80% or more by optimizing a manufacturing condition," while there is no description about the technical matter, "a red phosphor has internal quantum efficiency of 80% or more" (page 14 in the (second) written statement dated August 1, 2014).

Therefore, the Patent is granted on a patent application that does not meet the requirement stipulated in Article 36(6)(i) of the Patent Act (requirements for support), and falls under Article 123(1)(iv) of the Patent Act and should be invalidated (page 10 in the written demand for trial).

B Violation of requirements for support No. 2 (pages 10 to 11 and pages 24 to 26 in the written demand for trial, pages 8 to 11 in the oral proceedings statement brief)

The corrected invention of the case reads "wherein the phosphor layer substantially comprises no inorganic phosphor other than a nitride phosphor or an oxynitride phosphor" in constitution component (J), and according to the detailed description of the invention, "substantially comprising no inorganic phosphor other than a nitride phosphor or an oxynitride phosphor" means that "90% by weight or more, preferably 95% by weight or more, and more preferably 98% by weight or more of phosphors contained in the phosphor layer are nitride phosphors or oxynitride phosphors."

On the other hand, Example 1 to Example 3 do not have a configuration where a phosphor layer "substantially does not include an inorganic phosphor other than a nitride phosphor or an oxynitride phosphor" ([0052]).

Thus, none of Example 1 to Example 3 described is the corrected invention of the case.

As described above, in the detailed description of the invention, not only are examples not described in the corrected invention of the case, but also technical significance to make a phosphor layer have a configuration of "substantially not including an inorganic phosphor other than a nitride phosphor or an oxynitride phosphor"; that is, to make "90% by weight or more, preferably 95% by weight or more, and more preferably 98% or more by weight of phosphors contained in the phosphor layer is nitride phosphors or oxynitride phosphors," in particular, technical significance about "90% by weight" thereof is not described.

Therefore, the Patent is granted on a patent application that does not meet the requirement stipulated in Article 36(6)(i) of the Patent Act (requirements for support), and falls under Article 123(1)(iv) of the Patent Act and should be invalidated.

(2) Reason for invalidation 2 (lack of inventive step due to illegal division) (pages 11 to 12 and pages 26 to 37 in the written demand for trial)

The corrected invention of the case relates to a divisional application (Japanese Patent Application No. 2007-210888) of Japanese Patent Application No. 2004-363534 dated December 15, 2004; however, the configurations of the corrected invention of the case, "(H) the red phosphor under the excitation of the light that the blue-light-emitting element emits has internal quantum efficiency of 80% or more," and "(J) the phosphor layer substantially comprises no inorganic phosphor other than a nitride phosphor or an oxynitride phosphor" are not disclosed in the description, the scope of claims, or the drawing of the original application initially filed.

In view of the above, the requirement that the matters described in the description, the scope of claims, or the drawing of the divisional application should be within the matters described in the description, the scope of claims, or the drawing of the original application initially filed (the requirement provided in the main paragraph of Article 44(1) of the Patent Act) is not met.

Thus, the divisional application relating to the corrected invention of the case does not go back to the time of the filing date, and is regarded to be filed on the actual filing date; that is, August 13, 2007.

On the date of the above-described divisional application, however, the original application had already been published as Japanese Unexamined Patent Application Publication No. 2006-49799 on February 16, 2006, and the prior art that can be recognized to be substantially the same as the corrected invention of the case is described in the published description and the drawing.

Meanwhile, only one difference between the corrected invention of the case and the prior art is that the corrected invention of the case requires the red phosphor to have internal quantum efficiency of 80% or more whereas the prior art requires the red phosphor to have internal quantum efficiency of less than 80%.

However, according to the descriptions, "a light-emitting device including a light-emitting element having a light emission peak in the above-described wavelength range and a phosphor having low internal quantum efficiency under the excitation of the light that the light-emitting element emits is not able to efficiently convert light energy that the light-emitting element emits, has low luminous flux." ([0027]), and "a phosphor having the lowest internal quantum efficiency under the excitation of the light that the light-emitting element emits among the phosphors substantially contained in the phosphor layer is made to have internal quantum efficiency (absolute value) of 80% or more, preferably 85% or more, and more preferably 90% or more in order to obtain a light-emitting device capable of emitting high luminous flux." ([0054]), since it is taught that it is better for the phosphor to have higher internal quantum efficiency, for example, "80% or more," in order to obtain a light-emitting device capable of emitting high luminous flux, it is obvious that a person skilled in the art, motivated thereby, could have easily achieved constituent component (H) of the corrected invention of the case, "the red phosphor under the excitation of the light that the blue-light-emitting element emits has internal quantum efficiency of 80% or more." In addition, it cannot be admitted that the expected operation/working-effect is remarkable.

Therefore, the corrected invention of the case could be easily invented by a person skilled in the art according to the invention described in Evidence A No. 1 (Japanese Unexamined Patent Application Publication No. 2006-49799), and thus the Patent is granted for the invention contrary to the provisions of Article 29(2) of the Patent Act, and falls under Article 123(1)(ii) of the Patent Act and should be invalidated.

(3) Reason for invalidation 3 (lack of inventive step) (page 12 and pages 37 to 62 in the written demand for trial, pages 18 to 21 in the Oral proceedings statement brief, pages 2 to 20 in the (third) written statement dated August 25, 2014, and pages 4 to 18 in the (fourth) written statement dated January 7, 2015)

The constituent component (H) of the corrected invention of the case, "the red phosphor under the excitation of the light that the blue-light-emitting element emits has internal quantum efficiency of 80% or more," and the constituent component (I) of the corrected invention of the case, "excitation spectrums of the phosphors that the phosphor layer comprises have an excitation peak in a shorter wavelength range than a wavelength of the light that the blue-light-emitting element emits," are not described In Evidence A No. 3, and in this regard, the invention described in Evidence A No. 3 is different from the corrected invention of the case, while Evidence A No. 3 and the corrected invention of the case are obviously common except for the differences (pages 59 to 60 in the written demand for trial).

As for the constituent component (H) of the corrected invention of the case, it is recognized that making the $Sr_2Si_4AlON_7:Eu^{2+}$ aluminosilicate-based oxynitride (red) in the invention described in Evidence A No. 3 have internal quantum efficiency of especially 80% or more could have easily been derived by a person skilled in the art based on the well-known arts described in Evidences A Nos. 4 to 6 (page 61 in the written demand for trial).

The constituent component (I) of the corrected invention of the case is merely to define optical properties that the presented phosphor has according to the descriptions of the paragraphs [0012] to [0013] of the corrected description of the case, so that the constituent component (I) is not remarkable (page 60 in the written demand for trial).

In addition, as for the constituent component (I), an emission spectrum and a reflectance spectrum of a phosphor used in a light-emitting device of Evidence A No. 3 are described in FIGS. 4a and 4b. It is well known that the reflectance spectrum of a phosphor defines a spectrum of light that is not absorbed in phosphor particles, is inextricably associated with the excitation spectrum of the phosphor, and is approximately in reverse proportion to the excitation spectrum. According to FIG. 4b, the smallest value of reflectance ratio is in the vicinity of 300 to 350 nm, and the peak wavelength of the excitation spectrum is assumed to be in the vicinity of 350 nm, so that it is certain that the peak wavelength of the excitation spectrum has a shorter wavelength than 450 nm. Thus, it is obvious that when a phosphor is excited with a blue LED having a light emission peak in 450 nm in the light-emitting device of Evidence A No. 3, the excitation spectrums of the phosphors have their excitation peaks in a shorter wavelength than the wavelength of the light that a blue-light-emitting element emits (page 20 to 21 in the oral proceedings statement brief).

The corrected invention of the case could be easily invented by a person skilled in the art according to the inventions described in Evidence A No. 3 to Evidence A No. 6, and thus the Patent is granted for the invention contrary to the provisions of

Article 29(2) of the Patent Act, and falls under Article 123(1)(ii) of the Patent Act and should be invalidated (page 62 in the written demand for trial).

It is obvious that Evidence A No. 3 describes "a white-light-emitting device that includes an LED indicating primary radiation between 300 to 470 nm, a green phosphor including oxynitride activated by Eu^{2+} having an emission region of 490 nm to 510 nm, and a nitride aluminosilicate-based red phosphor:Eu^{2+} having an emission region of 625 nm to 640 nm " (page 7 in the (third) written statement dated August 25, 2014).

Evidence A No. 3 discloses that "Sr," "Ca," or "Ba" can be substituted for a cation M at least in a nitride aluminosilicate-based phosphor. Thus, even if "$Sr_2Si_4AlON_7$:Eu^{2+}" is excluded in the request for correction, the invention of Evidence A No. 3 still discloses "$Ca_2Si_4AlON_7$:Eu^{2+}" and "$Ba_2Si_4AlON_7$:Eu^{2+}" as a nitride aluminosilicate-based nitride phosphor, and also since "having a light emission peak in the wavelength range from at least 600 nm to less than 660 nm" is not remarkable, the reason for invalidation 3 is not resolved (pages 2 to 7 in the (fourth) written statement dated January 7, 2015).

2 Evidences A

Evidences A and a reference material submitted by the demandant are as follows:

Evidence A No. 1:	Japanese Unexamined Patent Application Publication No. 2006-49799
Evidence A No. 2:	Description and drawing of Japanese Patent Application No. 2004-363534
Evidence A No. 3:	Japanese Unexamined Patent Application Publication No. 2003-206481
Evidence A No. 4-1:	International Publication No. WO2003/080763
Evidence A No. 4-2:	National Publication of International Patent Application No. 2005-520916 (as a translation of Evidence A No. 4-1)
Evidence A No. 5:	Japanese Unexamined Patent Application Publication No. 2003-277746
Evidence A No. 6:	National Publication of International Patent Application No. 2002-531955
Evidence A No. 7:	2012 (Gyo-Ke) 10020 a court decision of a request to revoke the trial decision

Reference material:	2005(Gyo-Ke) 10042 a court decision of council

(The above-described evidences A and reference material were submitted attached to the written demand for trial.)

Evidence A No. 8-1:	Japanese Unexamined Patent Application Publication No. 2008-16861
Evidence A No. 8-2:	The notice of reasons for refusal dated September 12, 2007 in the prosecution history of the Patent
Evidence A No. 8-3:	The written opinion dated October 30, 2007 in the prosecution history of the Patent
Evidence A No. 8-4:	The written amendment dated October 30, 2007 in the prosecution history of the Patent
Evidence A No. 8-5:	The notice of reasons for refusal dated December 21, 2007 in the prosecution history of the Patent
Evidence A No. 8-6:	The written opinion dated January 31, 2008 in the prosecution history of the Patent
Evidence A No. 8-7:	The written amendment dated January 31, 2008 in the prosecution history of the Patent

(The above-described evidences A were submitted attached to the oral proceedings statement brief.)

Evidence A No. 9:	U.S. Patent No. 6,670,748
Evidence A No. 9-1:	A partial translation of U.S. Patent No. 6,670,748

(The above-described evidences A were submitted attached to the written statement dated July 10, 2014.)

Evidence A No. 10:	Comparison table for a method for producing nitride phosphors
Evidence A No. 10-1:	Journal of Physics and Chemistry of Solids 61(2000)2001-2006 "Luminescence in Eu^{2+}-doped $Ba_2Si_5N_8$: fluorescence, thermoluminescence, and upconversion", and the abstract
Evidence A No. 10-2:	Journal of Solid State Chemistry 165, 19-24 (2002) "Luminescence Properties of Terbium-, Cerium-, or Europium-Doped α-Sialon Materials", and the abstract
Evidence A No. 10-3:	Applied Physics Letters Volume 84, Number 26 5404-5406, 28 June 2004 "Eu^{2+}-doped Ca-α-SiAlON: A yellow

phosphor for white-light-emitting diodes", and the abstract

Evidence A No. 10-4: Electrochemical and Solid-State Letters, 9(4) H22-H25 2006 "Luminescence Properties of a Red Phosphor, $CaAlSiN_3:Eu^{2+}$, for White-Light-Emitting Diodes", and the abstract

Evidence A No. 10-5: Chem. Eur. J. 2009, 15, 5311-5319, "$Sr_5Al_{5+x}Si_{21-x}N_{35-x}O_{2+x}:Eu^{2+}$(x~0) – A Novel Green Phosphor for White-Light pc LEDs with Disordered Intergrowth Structure", and the abstract (note by the body: the code "~" in the title is actually a double undulating line.)

Evidence A No. 10-6: Chem. Mater. 2009, 21, 1595-1601 "$SrAlSi_4N_7:Eu^{2+}$- A Nitridoalumosilicate Phosphor for Warm White Light (pc) LEDs with Edge-Sharing Tetrahedra", and the abstract

Reference material 2: "The flibanserin case" January 28, 2010 court decision (2009 (Gyo-Ke) 10033 a request to revoke the trial decision)

(The above-described evidences A and reference material were submitted attached to the (second) written statement dated August 1, 2014.)

Evidence A No. 11: "Standard specification for ultraviolet luminescence LED" by Nichia Corporation

(The above-described evidence A was submitted attached to the (third) written statement dated August 25, 2014.)

Evidence A No. 12: Japanese Unexamined Patent Application Publication No. 2002-76434

Evidence A No. 13: Japanese Unexamined Patent Application Publication No. 2003-124527

Evidence A No. 14-1: U.S. Patent No. 5998925

Evidence A No. 14-2: The abstract of U.S. Patent No. 5998925

(The above-described evidences A were submitted attached to the (fourth) written statement dated January 7, 2015.)

No. 6 Outline of the demandee's allegation and Means of proof

1 Reasons for invalidation

(1) Reason for invalidation 1 (violation of requirements for support)

A Violation of requirements for support No. 1 (pages 2 to 12 in the written reply for the trial case dated April 7, 2014, and pages 5 to 12 in the oral proceedings statement brief)

The corrected description of the case describes, as Embodiment 2, a white-light-emitting device including a blue-light-emitting element having a light emission peak in the wavelength range from at least 440 nm to less than 500 nm, a red phosphor consisting of a nitride aluminosilicate-based nitride phosphor that is excited by light that the blue-light-emitting element emits, activated by Eu^{2+}, and has a light emission peak in the wavelength range from at least 600 nm to less than 660 nm, and a green phosphor consisting of a nitride phosphor or an oxynitride phosphor that is excited by light that the blue-light-emitting element emits, activated by Eu^{2+} or Ce^{3}, and has a light emission peak in the wavelength range from at least 500 nm to less than 560 nm, wherein excitation spectrums of the phosphors that a phosphor layer contains have an excitation peak in a shorter wavelength range than a wavelength of the light that the blue-light-emitting element emits, and wherein the phosphor layer substantially includes no inorganic phosphor other than a nitride phosphor or an oxynitride phosphor, and discloses that a phosphor having the lowest internal quantum efficiency under the excitation of the light that the blue-light-emitting element emits among the phosphors substantially contained in the phosphor layer is made to have internal quantum efficiency (an absolute value) of 80% or more in order to obtain a light-emitting device capable of emitting high luminous flux.

Thus, because the phosphor obviously includes a red phosphor, the corrected description of the case can be said to disclose that the red phosphor under the excitation of the light that the blue-light-emitting element emits is made to have internal quantum efficiency of 80% or more, and thus the corrected invention of the case is described in the detailed description of the invention.

Even if there is no explicit description in the corrected invention of the case, a person skilled in the art can consider that the matters can be understood to be almost described therein in the light of common general technical knowledge. Example 3 in the corrected description of the case, in which a violet LED chip that emits light having a light emission peak in the vicinity of 405 nm is used as a light-emitting layer, describes that an $SrAlSiN_3:Eu^{2+}$ red phosphor can improve internal quantum efficiency 1.5 times or more by optimizing a manufacturing condition. Thus, a person skilled in the art understands that it is almost described therein that the internal quantum efficiency of the $SrAlSiN_3:Eu^{2+}$ red phosphor in Example 2, which the demandant alleges to have internal quantum efficiency of about 58 to 76% on page 17, lines 2 to 6 in the written demand for trial, and can also be improved 1.5

times or more by optimizing a manufacturing condition in the light of common general technical knowledge upon filing the application in a similar manner. That is, the corrected description of the case indicates that the $SrAlSiN_3:Eu^{2+}$ red phosphor can have internal quantum efficiency of about 87% (= 58% × 1.5) or more.

As described above, since the corrected description of the case discloses or indicates that the red phosphor under the excitation of the light that the blue-light-emitting element emits is made to have internal quantum efficiency of 80% or more, the corrected invention of the case meets the requirements for support (pages 2 to 8 in the written reply for the trial case dated April 7, 2014).

In addition, making the internal quantum efficiency of the red phosphor 80% or more can be read from the description in the corrected description of the case, a description to the effect that it is desirable that the internal quantum efficiency of each phosphor is 80% or more, and a description to the effect that the internal quantum efficiency of a red phosphor at a research stage can be improved by optimizing a future manufacturing condition, so that a person skilled in the art can recognize that the problems of the corrected invention of the case can be solved in the light of common general technical knowledge upon filing the application (page 11 in the written reply for the trial case dated April 7, 2014).

B Violation of requirements for support No. 2 (pages 12 to 13 in the written reply for the trial case dated April 7, 2014)

The corrected description of the case discloses that it is preferable to have a configuration where a phosphor layer substantially does not include an inorganic phosphor other than a nitride phosphor or an oxynitride phosphor in order to obtain a light-emitting device capable of emitting high luminous flux as Embodiment 2 while not described as an example. Thus, the corrected description of the case discloses a configuration that a phosphor layer substantially does not include an inorganic phosphor other than a nitride phosphor or an oxynitride phosphor in order to solve the problems of the corrected invention of the case in which a phosphor keeps relatively high internal quantum efficiency under the operating temperatures of 100 degrees C to 150 degrees C and the ambient air temperatures, and has an emission spectrum whose wavelength peak does not shift to the short wavelength side (page 13 in the written reply for the trial dated April 7, 2014).

(2) Reason for invalidation 2 (lack of inventive step due to illegal division) (pages 13 to 14 in the written reply for the trial case dated April 7, 2014)

As described in the above-described (1), the corrected invention of the case is disclosed or indicated in the corrected description of the case, and meets the requirements for support.

The corrected invention of the case is, similar to the corrected description of the case, within the scope of the matters described in the description, the scope of claims, or the drawing of the original application initially filed, and thus meets the requirements for division of the original application, and the filing date of the divisional application is December 15, 2004, which is the filing date of the original application.

Note that in the application of the Patent, it is obvious that the corrected invention of the case meets the requirements for division, also from the viewpoint that the decision to grant a patent was made with its filing date (retroactive date) as December 15, 2004 (Evidence B No. 3).

As described above, the allegation by the demandant that the corrected invention of the case lacks inventive step due to illegal division is wrong on that premise. (pages 13 to 14 in the written reply for the trial case dated April 7, 2014).

(3) Reason for invalidation 3 (lack of inventive step) (page 14 and page 22 in the written reply for the trial case dated April 7, 2014, pages 2 to 8 in the written statement dated August 1, 2014, pages 2 to 22 in the written statement dated November 28, 2014, and pages 2 to 10 in the written reply for the trial case dated February 20, 2015)

A Acknowledgment of corresponding features and different features

Identification of the claimed invention described in Evidence A No. 3 in the written demand for trial is only describing descriptions in Evidence A No. 3 together with a series of its portions describing those descriptions without identifying whether or not the claimed invention is acknowledged as one invention, and the relation between the components is not described explicitly (page 15 in the written reply for the trial dated April 7, 2014).

To be specific, particularly disclosed as a white LED is only a white LED including an InGaN-chip having a peak emission of 360 nm, a blue phosphor of a sialon $SiAl_2O_3N_2$: Ce^{3+} (4%), a green phosphor of $SrSiAl_2O_3N_2$:Eu^{2+} (4%), and a red phosphor of $Sr_2Si_5N_8$:Eu^{2+}.

Three kinds of phosphors are indicated in Table 3, while seven kinds of phosphors are indicated in Table 4; however, there is no description about how they are combined to be used, and there is described only a light-emitting element having peak emission wavelengths of 400 nm and 360 nm, so that it is reasonable to understand that these phosphors are blue, green, and red phosphors that are used together with a violet or UV light-emitting element (pages 16 to 17 in the written reply for the trial case dated April 7, 2014).

From the foregoing, it is wrong to identify the red phosphor as an $Sr_2Si_4AlON_7:Eu^{2+}$ nitride silicate-based oxynitride (red) phosphor that emits red light of 625 to 640 nm indicated in [Table 4] at least in the identification of the claimed invention (D) that the demandant described in Evidence A No. 3 (page 18 in the written reply for the trial case dated April 7, 2014).

In addition, constituent component (I) in the corrected invention of the case, "excitation spectrums of the phosphors that the phosphor layer comprises have an excitation peak in a shorter wavelength range than a wavelength of the light that the blue-light-emitting element emits" is also a substantially different feature between the invention described in Evidence A No. 3 and the corrected invention of the case (pages 19 to 20 in the written reply for the trial case dated April 7, 2014).

B The different feature (Using a red phosphor having internal quantum efficiency of 80% or more)

It has to be said that it is unclear what arts the well-known arts described in Evidence A No. 4 to Evidence A No. 6 are (page 21 in the written reply for the trial case dated April 7, 2014).

Since it is the $Sr_2Si_4AlON_7:Eu^{2+}$ that the demandant identifies as the red phosphor in the invention described in Evidence A No. 3 (this is wrong as already indicated above), there is no motivation to use the arts based on Evidence A No. 4 to Evidence A No. 6 in the invention described in Evidence A No. 3.

As described above, the demandant's allegation about the inventive step based on the inventions described in Evidence A No. 3 to Evidence A No. 6 is absolutely irrational (page 21 in the written reply for the trial case dated April 7, 2014).

C Allegation in the written statement dated August 1, 2014

(a) It cannot be said that the light emission peak of the red phosphor of constituent component (D), the light emission peak of the green phosphor of constituent component (E), and constituent component (F), "the light-emitting element comprises a blue-light-emitting element arranged to emit light having a light emission peak in the wavelength range from at least 440 nm to less than 500 nm" are described as the configuration of the invention described in Evidence A No. 3 that

the demandant identified (pages 2 to 3 in the written statement dated August 1, 2014).
(b) There is no reason to associate the phosphor described in Table 4 with a white LED including a blue LED (page 4 in the written statement dated August 1, 2014).
(c) The $Sr_2Si_4AlON_7:Eu^{2+}$ cannot be identified as the red phosphor in the invention described in Evidence A No. 3. In addition, there is no description about quantum efficiency QE of the red phosphor (page 7 in the written statement dated August 1, 2014).
(d) As for constituent component (I), upon filing the application of the Patent, it was common general technical knowledge to increase luminous flux by conforming the excitation peak of the phosphor to the wavelength of the light that the blue-light-emitting element emits. In contrast, in the corrected invention of the case, it was found that even if the excitation peak of the phosphor is shifted to a shorter wavelength range than the wavelength of the light that the blue-light-emitting element emits, the phosphor can be used as a phosphor having high luminous flux if the phosphor has high internal quantum efficiency. Thus, in the well-known art having no finding of the corrected invention of the case, a phosphor having an excitation peak in the shorter wavelength range than the wavelength of the light that the blue-light-emitting element emits has never been used as a phosphor in a white light-emitting device including a blue-light-emitting element. In addition, as for a nitride silicate, it has been known that also a blue LED has good luminance efficiency or quantum efficiency based on Evidence A No. 4 and Evidence A No. 5, and used; however, nitride aluminosilicate was recognized to have very low quantum efficiency as described in Evidence A No. 3 which states that nitride aluminosilicate has quantum efficiency of 43% in paragraph [0067], and quantum efficiencies of 29 and 51% in Table 3, so that excitation light in an ultraviolet region is usually used, and using excitation light in a blue region was never thought of (pages 5 to 7 in the written statement dated August 1, 2014).

The allegation by the demandant is groundless based on the above-described (a) to (d) and the like, and the corrected invention of the case could not be easily made by a person skilled in the art according to the inventions described in Evidence A No. 3 to Evidence A No. 6.

D Allegation in the written statement dated November 28, 2014
(a) Because even if a "phosphor having a composition of $Sr_2Si_4AlON_7:Eu^{2+}$ and having an emission region of 625 to 640 nm" is used as a nitride-containing phosphor that emits red light that is described in Evidence A No. 3, the matters specifying the

invention in the corrected invention of the case cannot be obtained, so that it cannot be said that the matters specifying the invention are easily made (pages 2 to 3 in the written statement dated November 28, 2014).
(b) The identified invention described in Evidence A No. 3 describes the matters described in various portions in Evidence A No. 3, so that the invention is wrongly identified in terms of identification of an invention that can be understood based on the matters described in Evidence A No. 3 (pages 3 to 5 in the written statement dated November 28, 2014).
(c) The illumination unit in Claim 1 in Evidence A No. 3 is not written so as to be implementable in the description of Evidence A No. 3, and thus the illumination unit cannot be identified as a "cited invention" (pages 5 to 6 in the written statement dated November 28, 2014).
(d) The description at the paragraph [0057] in Evidence A No. 3 is not clear, and thus it is unreasonable to identify some technical matters based on this description (pages 6 to 8 in the written statement dated November 28, 2014).
(e) The only disclosure about the phosphor indicated in Table 3 and Table 4 in Evidence A No. 3 is its being combined with a light source having a peak emission wavelength of 400 nm or less, so that the phosphor cannot be combined with a blue LED (pages 8 to 9 in the written statement dated November 28, 2014).
(f) In the identification of a claimed invention described in Evidence A No. 3, the limitation is made by a specific matter while it is specified that another phosphor may be used, so that the two configurations are contradictory (page 10 in the written statement dated November 28, 2014).
(g) The corrected invention of the case exerts a working-effect of making it possible to combine the phosphor that was considered to be used only in a light source having a light emission peak to a near-ultraviolet or violet region with a blue-light-emitting element having a light emission peak with a wavelength from at least 440 nm to less than 500 nm, and opening up the selection of a phosphor to be combined with a blue-light-emitting element (pages 10 to 19 in the written statement dated November 28, 2014).
(h) Evidence A No. 3 does not disclose an illumination unit that is a combination of a blue-light-emitting element and the phosphor indicated in Claim 1 or Table 3 and Table 4, so even if attention can be focused on the internal quantum efficiency, only to increase the internal quantum efficiency in a region of 360 nm to 400 nm can be conceived, and increasing the internal quantum efficiency of a blue-light-emission region cannot be conceived (pages 20 to 21 in the written statement dated November

28, 2014).

(i) The technical significance of the corrected invention of the case is having found that the internal quantum efficiency in the blue region is high and that a phosphor is made selectable, the "phosphor having an excitation peak in a shorter wavelength range than the wavelength of the light that the blue-light-emitting element emits" as a phosphor to be combined with a blue-light-emitting element in order to obtain white light that have both high luminous flux and high color rendering property, and thus, the corrected invention of the case, including its working-effects, cannot easily be conceived even by a person skilled in the art judging collectively from different features 1 to 6 (pages 21 to 22 in the written statement dated November 28, 2014).

E Allegation in the written reply for the trial case dated February 20, 2015

(a) Since Evidence A No. 3 discloses only the "$Sr_2Si_4AlON_7:Eu^{2+}$" as a nitride aluminosilicate-based red phosphor, Reason for invalidation 3 can be cancelled only with the fact that the "$Sr_2Si_4AlON_7:Eu^{2+}$" was deleted by the request for correction (pages 2 to 4 in the written reply for the trial case dated February 20, 2015).

(b) Even if a nitride aluminosilicate-based red phosphor is described in Evidence A No. 3, this description does not mean that the technical significance of the corrected invention of the case, "the nitride aluminosilicate-based red phosphor activated by Eu^{2+} and the nitride-based green phosphor activated by Eu^{2+} or Ce^{3+}, which have high internal quantum efficiency, are combined with a blue-light-emitting element to obtain white light that has both high luminous flux and high color rendering property," is disclosed in Evidence A No. 3 (pages 7 to 8 in the written reply for the trial case dated February 20, 2015).

(c) The finding of the corrected invention of the case that attention is focused on the internal quantum efficiency to make it possible to select "a group of specific phosphors that have an excitation peak in the shorter wavelength range than the wavelength of the light that the blue-light-emitting element emits" as a phosphor to be combined with a blue-light-emitting element is novel, and the corrected invention of the case is accordingly inventive (pages 8 to 10 in the written reply for the trial case dated February 20, 2015).

2 Evidences B

Evidences B and reference materials submitted by the demandee are as follows:

Evidence B No. 1: Notice of reasons for refusal dated September 12, 2007 in the prosecution history of the Patent

Evidence B No. 2:	The written amendment dated October 30, 2007 in the prosecution history of the Patent
Evidence B No. 3:	Decision to grant a patent in the prosecution history of the Patent Evidence B No. 4: Notice of reasons for refusal dated December 20, 2007 in the prosecution history of Evidence A No. 3
Evidence B No. 5:	The written amendment dated March 19, 2008 in the prosecution history of Evidence A No. 3
Evidence B No. 6:	Decision of refusal dated April 8, 2008 in the prosecution history of Evidence A No. 3
Evidence B No. 7:	The written amendment dated July 1, 2008 in the prosecution history of Evidence A No. 3
Evidence B No. 8:	Notice of reasons for refusal dated September 4, 2008 in the prosecution history of Evidence A No. 3
Evidence B No. 9:	The written amendment dated September 19, 2008 in the prosecution history of Evidence A No. 3
Evidence B No. 10:	Decision to grant a patent dated October 9, 2008 in the prosecution history of Evidence A No. 3

(The above-described evidences B were submitted attached to the written reply for the trial case dated April 7, 2014.)

Evidence B No. 11:	Written opinion by Associate Professor Kunimoto Takashi (Evidence A No. 12 in the previous court decision)
Evidence B No. 12:	"Handbook for phosphors" (December 25, 1987), Ohmsha, Ltd., pages 50 to 59, 64 to 69, 74 to 79, 166 to 175 (Evidence A No. 13 in the previous court decision)
Evidence B No. 13:	Written opinion by Associate Professor Miura Noboru (Evidence A No. 14 in the previous court decision)
Evidence B No. 14:	Japanese Patent No. 4659741 (Evidence A No. 15 in the previous court decision)
Evidence B No. 15:	Solid-state physics, vol. 35, No. 6 (2000) pages 401 to 409 "Synthesis of nitride and oxynitride phosphors, and their optical properties" (Evidence A No. 16 in the previous court decision)
Evidence A No. 16:	The proceedings of the 53rd lecture meeting by the Japan

Society of Applied Physics, (2006), page 1557, "The quantum efficiency of a 25p-ZR-11 sialon phosphor" (Evidence A No. 18 in the previous court decision)

Evidence B No. 17: Science and Technology of Advanced Materials 8 (2007) pages 588 to 600," Silicon-based oxynitride and nitride Phosphors for white LEDs-A review", and the abstract

Evidence B No. 18: Physica status solidi (a), 203, No. 11, (2006) pages 2712 to 2717, "Host lattice materials in the system Ca_3N_2-AlN-Si_3N_4 for white light-emitting diode", and the abstract

(The above-described Evidences B were submitted attached to the oral proceedings statement brief.)

Evidence B No. 19: Technical explanatory material by the demandee

(The above-described Evidence B was submitted attached to the written statement dated July 18, 2014.)

Evidence B No. 20: The proceeding of the 298th lecture meeting by KEIKOUTAIDOUGAKUKAI, (June 20, 2003) page 1 to 4, "α-sialon phosphor New oxynitride phosphor for a white LED"

Evidence B No. 21: Japanese Unexamined Patent Application Publication No. 2006-49799

Evidence B No. 22: "Physics of Light Emission" by Kobayashi Hiroshi (June 25, 2012) ASAKURA PUBLISHING CO., LTD., pages 46 to 66

Evidence B No. 23: Journal of the American Ceramic Society, 88[10] (2005) pages 2883 to 2888 "Photoluminescence of Rare-Earth-Doped Ca-α-SiAlON Phosphors: Composition and Concentration Dependence", and the abstract

Evidence B No. 24: APPLIED PHYSICS LETTERS 91, 041908 (2007) Pages 1 to 3 "Self-propagating high temperature synthesis of yellow-emitting $Ba_2Si_5N_8:Eu^{2+}$ phosphors for white light-emitting diodes", and the abstract

(The above-described Evidences B were submitted attached to the written statement dated August 1, 2014.)

Evidence B No. 25: SHARP TECHNICAL JOURNAL, No. 91, April 2005, pages 50 to 53 "InGaN-based light-emitting element excitation Sm doped red phosphor"

(The above-described Evidence B was submitted attached to the written statement dated November 28, 2014.)

Evidence B No. 26: Revision of the examination guidelines about "Amendment to the description, the scope of claims or the drawing (New matter)"

(The above-described Evidence B was submitted attached to the written reply for the trial case dated February 20, 2015.)

No. 7 Judgment by the body

1 Reason for invalidation 1 (violation of requirements for support)

The above-described "No. 5 Outline of the demandant's allegation and Means of proof, 1 Reason for invalidation, (1) Reason for invalidation 1 (violation of requirements for support), A violation of requirements for support No. 1" and the above-described " No. 5 Outline of the demandant's allegation and Means of proof, 1 Reason for invalidation, (1) Reason for invalidation 1 (violation of requirements for support), B violation of requirements for support No. 2" will be discussed as a whole.

(1) As for constituent components (H) and (J), the corrected description of the case or the drawing describes as follows.

A "[Problem to be Solved by the Invention]

[0008]

However, as for the actual condition, among the above-described light-emitting devices including the light-emitting elements and the phosphors, there are few light-emitting devices that have both high luminous flux and high color rendering property. On the other hand, requirements required of the light-emitting devices are more diversified every year, and in particular, development of light-emitting devices for emitting warm white light is expected.

[0009]

The present invention is made in order to solve such a problem, and a purpose of the invention is to provide a light-emitting device that has both high luminous flux and high color rendering property, and more specifically a light-emitting device for emitting warm white light.

[Means for Solving the Problem]

[0010]

The present invention provides a light-emitting device, the device comprising: a phosphor layer comprising a red phosphor and a green phosphor; and a light-emitting element, wherein the light emitting device is arranged to emit output light that comprises a red colored light emission component that the red phosphor emits, a green colored light emission component that the green phosphor emits, and a light emission component that the light-emitting element emits, wherein the output light comprises white light, wherein the red phosphor comprises a nitride aluminosilicate-based nitride phosphor that is excited by light that the light-emitting element emits, activated by Eu^{2+}, and has a light emission peak in the wavelength range from at least 600 nm to less than 660 nm provided that $Sr_2Si_4AlON_7:Eu^{2+}$ shall be excluded.), wherein the green phosphor is excited by light that the light-emitting element emits, activated by Eu^{2+} or Ce^{3+}, and has a light emission peak in the wavelength range from at least 500 nm to less than 560 nm, wherein the light-emitting element comprises a blue-light-emitting element arranged to emit light having a light emission peak in the wavelength range from at least 440 nm to less than 500 nm, wherein the phosphors that the phosphor layer comprises only comprise phosphors activated by Eu^{2+} or Ce^{3+}, wherein the red phosphor under the excitation of the light that the blue-light-emitting element emits has internal quantum efficiency of 80% or more, wherein excitation spectrums of the phosphors that the phosphor layer comprises have an excitation peak in a shorter wavelength range than a wavelength of the light that the blue-light-emitting element emits, and wherein the phosphor layer substantially comprises no inorganic phosphor other than a nitride phosphor or an oxynitride phosphor."

[Effect of the Invention]

[0011]

According to the present invention, there can be provided a light-emitting device that has both high luminous flux and high color rendering property, and more specifically a light-emitting device for emitting warm white light.

[Best Mode for Carrying Out the Invention]

[0012]

When the properties of the phosphor activated by Eu^{2+} were investigated in detail, it was found that the phosphors indicated in (1) to (3) below not only had high internal quantum efficiency under the excitation of the violet-light-emitting element having a light emission peak to a near-ultraviolet region to a violet region with a wavelength from at least 360 nm to less than 420 nm, but also had high internal quantum efficiency under the excitation of the blue-light-emitting element having a light emission peak to a blue region with a wavelength from at least 420 nm to 500 nm or more, in particular a blue region with a wavelength from at least 440 nm to less than 500 nm, and some preferable phosphors had internal quantum efficiency of 90% to 100%;

(1) alkaline-earth-metal orthosilicate-based, thiogallate-based, aluminate-based, and nitride-based (such as nitride silicate-based and sialon-based) green phosphors activated by Eu^{2+} and having a light emission peak in the wavelength range from at least 500 nm to less than 560 nm such as phosphors of $(Ba, Sr)_2SiO_4:Eu^{2+}$, $SrGa_2S_4: Eu^{2+}$, $SrAl_2O_4:Eu^{2+}$, $BaSiN_2: Eu^{2+}$, and $Sr_{1.5}Al_3Si_9N_{16}:Eu^{2+}$.

(2) alkaline-earth-metal orthosilicate-based, thiogallate-based, and nitride-based (such as nitridesilicate-based and sialon-based) yellow phosphors activated by Eu^{2+} and having a light emission peak in the wavelength range from at least 560 nm to less than 600 nm such as phosphors of $(Sr, Ba)_2SiO_4:Eu^{2+}$, $CaGa_2S_4:Eu^{2+}$, $0.75(Ca_{0.9}Eu_{0.1})O\bullet 2.25AlN\bullet 3.25Si_3N_4:Eu^{2+}$, $Ca_{1.5}Al_3Si_9N_{16}:Eu^{2+}$, $(Sr, Ca)_2SiO_4:Eu^{2+}$, $CaSiAl_2O_3N_2:Eu^{2+}$, and $CaSi_6AlON_9:Eu^{2+}$.

(3) nitride-based (such as nitride silicate-based and nitride aluminosilicate-based) red phosphors that are activated by Eu^{2+} and have a light emission peak in the wavelength range from at least 600 nm to less than 660 nm such as phosphors of $Sr_2Si_5N_8:Eu^{2+}$, $SrSiN_2:Eu^{2+}$, $SrAlSiN_3:Eu^{2+}$, $CaAlSiN_3:Eu^{2+}$, and $Sr_2Si_4AlON_7:Eu^{2+}$."

[0013]

Since the excitation spectrums of these phosphors have an excitation peak in a shorter wavelength range than a wavelength of the light that the blue-light-emitting element emits while many of them have an excitation peak to a near-ultraviolet region to a violet region with a wavelength from at least 360 nm to less than 420 nm, the phosphors do not necessarily have high external quantum efficiency under the excitation of the blue-light-emitting element. However, it was found that the internal quantum efficiency of the phosphors is 70% or more, which is higher than expected based on the excitation spectrums, and is 90% to 100% in an especially preferable case.

[0014]

As an example, the internal quantum efficiency 16, the external quantum efficiency 17, and the excitation spectrum 18 of the $SrSiN_2:Eu^{2+}$ red phosphor are illustrated in FIG. 12, and the emission spectrum 19 of the phosphor is also illustrated in FIG. 12, for reference. In addition, the $SrAlSiN_3:Eu^{2+}$ red phosphor (FIG. 13), the $Sr_2Si_5N_8:Eu^{2+}$ red phosphor (FIG. 14), the $(Ba, Sr)_2SiO_4:Eu^{2+}$ green phosphor (FIG. 15), the $(Sr, Ba)_2SiO_4:Eu^{2+}$ yellow phosphor (FIG. 16), the $(Sr, Ca)_2SiO_4:Eu^{2+}$ yellow phosphor (FIG. 17), and the $0.75(Ca_{0.9}Eu_{0.1})O•2.25AlN•3.25Si_3N_4:Eu^{2+}$ yellow phosphor (FIG. 18) are indicated in FIG. 13 to FIG. 18, similarly to FIG. 12. For example, the external quantum efficiency of the $(Sr, Ba)_2SiO_4:Eu^{2+}$ yellow phosphor, which is an alkaline-earth-metal orthosilicate-based phosphor activated by Eu^{2+} illustrated in FIG. 16, is about 75% under the excitation of the blue-light-emitting element with a wavelength of 440 nm, about 67% under the excitation of the blue-light-emitting element with a wavelength of 460 nm, and about 60% under the excitation of the blue-light-emitting element with a wavelength of 470 nm. However, it is found that the internal quantum efficiency is 85% or more in the blue region with a wavelength from at least 440 nm to less than 500 nm, which is higher than expected based on the excitation spectrums, and is about 94% in an especially preferable case."

B "[0029]
(Embodiment 1)

As an example of the light-emitting device according to the present invention, a light-emitting device includes a phosphor layer containing a nitride phosphor, and a light-emitting element, the light-emitting element having a peak emission in the wavelength range from at least 360 nm to less than 500 nm, the nitride phosphor being excited by the light that the light-emitting element emits to emit light, and the light-emitting device is arranged to emit light that at least contains a light emission component that the nitride phosphor emits as output light. In addition, the nitride phosphor is activated by Eu^{2+} and represented by a composition formula, $(M_{1-x}Eu_x)AlSiN_3$, where M is at least one element chosen from Mg, Ca, Sr, Ba, and Zn, and the above-described x is a numerical value satisfying the formula $0.005 \leq x \leq 0.3$.
[0030]

The light emitting element is a photoelectric conversion element that converts electrical energy into light, and is not particularly limited so long as the element emits light having a peak emission in the wavelength range from at least 360 nm to less than 420 nm, or from at least 420 nm to less than 500 nm, or more preferably in the wavelength range from at least 380 nm to less than 420 nm, or from at least 440 nm to less than 500 nm, and for example, a light emitting diode (LED), a laser diode

(LD), a surface emitting LD, an inorganic electroluminescence (EL) element, an organic EL element, and the like can be used.

[0031]

In using an LED or an LD having a GaN-based compound in its light-emitting layer, as a light emitting device, it is preferable to use a violet-light-emitting element that emits light having a light emission peak preferably in the wavelength range from at least 380 nm to less than 420, more preferably in the wavelength range from at least 395 nm to 415 nm or less, or a blue-light-emitting element that emits light having a peak emission preferably in the wavelength range from at least 440 nm to less than 500, more preferably in the wavelength range from at least 450 nm to 480 nm or less, because a high output can be obtained.

[0032]

It is preferable that the output light should contain a light emission component that the light-emitting element emits. Especially, when the light-emitting element has a light emission peak to a blue region, it is more preferable that the output light should contain a light emission component that the nitride phosphor emits and a light emission component that the light-emitting element emits, because white light having higher color rendering property can be obtained.

[0033]

The nitride phosphor is a nitride phosphor represented by the composition formula, $(M_{1-x}Eu_x)AlSiN_3$, that emits warm colored light that has a light emission peak in the wavelength range from at least 600 nm to less than 660 nm, preferably a nitride phosphor that emits red colored light that has a light emission peak in the wavelength range from at least 610 nm to 650 nm or less, and corresponds to a nitride phosphor having high internal quantum efficiency under the excitation light with the wavelength from at least 360 nm to less than 500 nm such as an $SrAlSiN_3:Eu^{2+}$ red phosphor illustrated in FIG. 13, and a $CaAlSiN_3:Eu^{2+}$ red phosphor."

C "[0039]

(Embodiment 2)

As an example of the light-emitting device according to the present invention, the above-described phosphor layer of Embodiment 1 may further include a green phosphor that is activated by Eu^{2+} or Ce^{3+} and has a light emission peak in the wavelength range from at least 500 nm to less than 560 nm. The green phosphor is not particularly limited so long as it emits light that is excited by the light that the light-emitting element described in Embodiment 1 emits and has a light emission peak in the wavelength range from at least 500 nm to less than 560 nm, preferably in the wavelength range from at least 510 nm to 550 nm or less, and more preferably in the wavelength range from at least 525 nm to 550 nm or less.

[0040]

For example, when using a blue-light-emitting element, the green phosphor may be used, which has an excitation peak on the longest wavelength side of the excitation spectrum that is not in the wavelength range from at least 420 nm to less than 500 nm, that is, an excitation peak on the longest wavelength side of the excitation spectrum that is in the wavelength of less than 420.

[0041]

The green phosphor corresponds to a phosphor having high internal quantum efficiency under the excitation light with a wavelength from at least 360 nm to less than 500 nm, such as the $(Ba, Sr)_2SiO_4:Eu^{2+}$ green phosphor illustrated in FIG. 15. A light-emitting device including a phosphor layer containing at least the phosphor, and the light-emitting element is preferred because the device efficiently outputs light energy. In the light-emitting device, the green colored emission intensity contained in the output light is stronger, and the color rendering property is improved. In addition, green colored light has high visibility and has higher luminous flux. In particular, it is possible to obtain output light having high color rendering property having a general color rendering index (Ra) of 90 or more, depending on the combination of the phosphors contained in the phosphor layer.

[0042]

It is more preferable to use, as the green phosphor, a nitride phosphor or an oxynitride phosphor activated by Eu^{2+} such as $BaSiN_2:Eu^{2+}$, $Sr_{1.5}Al_3Si_9N_{16}:Eu^{2+}$, $Ca_{1.5}Al_3Si_9N_{16}:Eu^{2+}$, $CaSiAl_2O_3N_2:Eu^{2+}$, $SrSiAl_2O_3N_2:Eu^{2+}$, $CaSi_2O_2N_2:Eu^{2+}$, $SrSi_2O_2N_2:Eu^{2+}$, or $BaSi_2O_2N_2:Eu^{2+}$, an alkaline-earth-metal orthosilicate phosphor activated by Eu^{2+} such as $(Ba, Sr)_2SiO4:Eu^{2+}$ or $(Ba, Ca)_2SiO_4:Eu^{2+}$, a thiogallate phosphor activated by Eu^{2+} such as $SrGa_2S_4:Eu^{2+}$, an aluminate phosphor activated by Eu^{2+} such as $SrAl_2O_4:Eu^{2+}$, an aluminate phosphor coactivated by Eu^{2+} and Mn^{2+} such as $BaMgAl_{10}O_{17}:Eu^{2+}, Mn^{2+}$, a nitride phosphor or an oxynitride phosphor activated by Ce^{3+} such as $Sr_2Si_5N_8:Ce^{3+}$, $Ca_{1.5}Al_3Si_9N_{16}:Ce^{3+}$, or $Ca_2Si_5N_8:Ce^{3+}$, or a phosphor having a garnet structure activated by Ce^{3+} such as $Y_3(Al, Ga)_5O_{12}:Ce^{3+}$, $Y_3Al_5O_{12}:Ce^{3+}$, $BaY_2SiAl_4O_{12}:Ce^{3+}$, or $Ca_3Sc_2Si_3O_{12}:Ce^{3+}$, because the internal quantum efficiency under the excitation of the light-emitting element is increased.

[0043]

Therefore, the light-emitting device according to the present embodiment includes a phosphor layer including at least the nitride phosphor of Embodiment 1 and the green phosphor, and the light-emitting element of Embodiment 1; the light emitting device is arranged to emit output light that contains red colored light emission component that the nitride phosphor emits, and green colored light emission component that the green phosphor emits."

D "[0052]

In Embodiments 1 to 4, it is preferable to have a configuration where the phosphor layer substantially does not include a phosphor other than a phosphor activated by Eu^{2+} or Ce^{3+}, and it is preferable to have a configuration where the phosphor layer substantially does not include an inorganic phosphor other than a nitride phosphor or an oxynitride phosphor, in order to achieve high luminous flux. Having a configuration where the phosphor layer substantially does not include a phosphor other than a phosphor activated by Eu^{2+} or Ce^{3+} means that 90% by weight or more, preferably 95% by weight or more, and more preferably 98% by weight or more of phosphors contained in the phosphor layer are phosphors activated by Eu^{2+} or Ce^{3+}. In addition, having a configuration where the phosphor layer substantially does not include an inorganic phosphor other than a nitride phosphor or an oxynitride phosphor means that 90% by weight or more, preferably 95% by weight or more, and more preferably 98% by weight or more of phosphors contained in the phosphor layer are nitride phosphors or oxynitride phosphors. The nitride phosphor and the oxynitride phosphor keep relatively high internal quantum efficiency under the operating temperatures of 100 degrees C to 150 degrees C and the ambient air temperatures, and have wavelength peaks in the emission spectrums that are not shifted toward the shorter wavelength side like the above-described alkaline-earth-metal orthosilicate phosphor or phosphor having a garnet structure. Thus, the light-emitting device having the above-described configuration has little variation in emission color even when used with its excitation light intensity enhanced by increasing input power or even used under a high-temperature atmosphere, whereby stable output light is obtained, which is preferable.

[0053]

In order to obtain a light-emitting device that emits high luminous flux, the phosphor having the lowest internal quantum efficiency under the excitation of the light that the light-emitting element emits among the phosphors substantially included in the phosphor layer has internal quantum efficiency (absolute value) of

80% or more, preferably 85% or more, and more preferably 90% or more."

E "[Example 3]
[0124]
In the present example, the card-shaped lighting module light source illustrated in FIG. 24 and FIG. 25 was produced by mounting a purple LED chip while bringing it into conduction, the purple LED chip being arranged to emit light having a light emission peak in the vicinity of 405 nm and including GaInN in its light-emitting layer instead of the blue LED chip 26 described in Example 1 or 2, and emitting properties of the lighting module light source were evaluated. The output light in the present example is a mixed-colored light mainly consisting of light that the phosphor included in the phosphor layer 3 emits that is emitted by being excited at least by light that the above-described purple LED chip emits. As the output light, any white light could be obtained by choosing the kind and quantity of a phosphor as appropriate.
[0125]
Hereinafter, a detailed description of the phosphor layer 3 according to the present example will be provided.
[0126]
The phosphor layer 3 was formed by drying to harden an epoxy resin to which a phosphor was added. In the present example, three kinds of phosphors were used as a phosphor: an $SrAlSiN_3:Eu^{2+}$ red phosphor having a light emission peak in the vicinity of the wavelength of 625 nm (center particle diameter: 2.2 micrometers, maximum internal quantum efficiency: about 60 %, internal quantum efficiency under the excitation of 405 nm: about 60 %): a $(Ba, Sr)_2SiO_4:Eu^{2+}$ green phosphor having a light emission peak in the vicinity of the wavelength of 535 nm (center particle diameter: 15.2 micrometers, maximum internal quantum efficiency: 97%, internal quantum efficiency under the excitation of 405 nm: about 97%), a $BaMgAl_{10}O_{17}:Eu^{2+}$ blue phosphor having a light emission peak in the vicinity of the wavelength of 450 nm (center particle diameter: 8.5 micrometers, maximum internal quantum efficiency: about 100%, internal quantum efficiency under the excitation of 405 nm: about 100%), and an epoxy resin was used as the epoxy resin, which was of a two-liquid mixing type and consisted of an epoxy resin (main material) mainly containing a bisphenol A type liquid epoxy resin and an epoxy resin (hardening material) mainly containing an alicyclic acid anhydride. It is to be noted that manufacturing conditions of the $SrAlSiN_3:Eu^{2+}$ red phosphor are not yet optimized,

so that the red phosphor has low internal quantum efficiency; however, optimizing manufacturing conditions in the future can improve the internal quantum efficiency by 1.5 times or more. The $SrAlSiN_3$:Eu^{2+} red phosphor, the (Ba, Sr)$_2SiO_4$:Eu^{2+} green phosphor, and the $BaMgAl_{10}O_{17}$:Eu^{2+} blue phosphor were mixed at a weight ratio of about 6:11:30, and the resulting mixed phosphors and the epoxy resin were mixed at a weight ratio of about 1:3 (phosphor concentration = 25% by weight)."

F "[0139]

Hereinafter, the manufacturing conditions of the phosphors used in Example 3 and Comparative Example 2 are assumed to be sufficiently optimized to obtain phosphors having maximum internal quantum efficiency of 100%, and the results of simulation evaluations of luminous flux obtained by using these ideal phosphors are indicated. In the simulations, the internal quantum efficiency of the phosphors under the excitation of 405 nm is estimated and evaluated based on FIG. 13, FIG. 15, FIG. 20, and FIG. 23 as illustrated in Table 3 below."

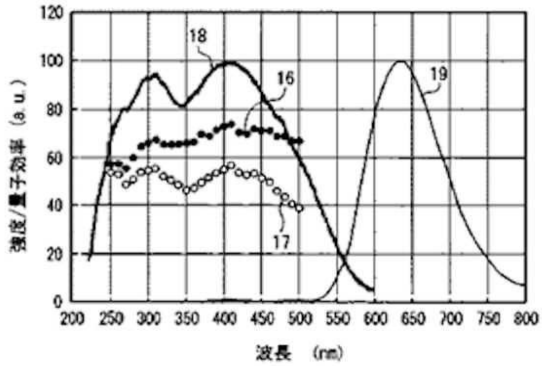
G Table 3, FIG. 13, and FIG. 14 are as follows.

【表３】

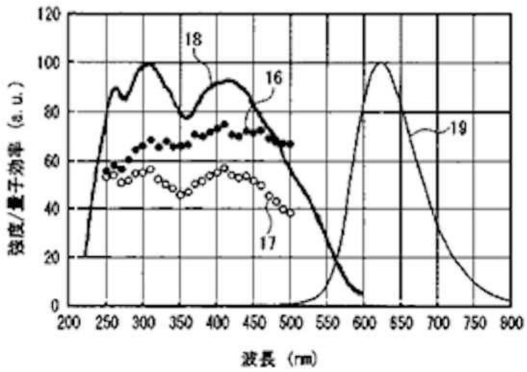
蛍光体	内部量子効率（％）
$SrAlSiN_3$：Eu^{2+}赤色蛍光体	１００
La_2O_2S：Eu^{3+}赤色蛍光体	６０
（Ｂａ，Ｓｒ）$_2SiO_4$：Eu^{2+}緑色蛍光体	１００
$BaMgAl_{10}O_{17}$：Eu^{2+}青色蛍光体	１００

【表３】	[Table 3]
蛍光体	Phosphor
内部量子効率（％）	Internal quantum efficiency (%)
$SrAlSiN_3$：Eu^{2+}赤色蛍光体	$SrAlSiN_3$:Eu^{2+} red phosphor
La_2O_2S：Eu^{3+}赤色蛍光体	La_2O_2S:Eu^{3+} red phosphor
（Ｂａ，Ｓｒ）$_2SiO_4$：Eu^{2+}緑色蛍光体	(Ba,Sr)$_2SiO_4$:Eu^{2+} green phosphor
$BaMgAl_{10}O_{17}$：Eu^{2+}青色蛍光体	$BaMgAl_{10}O_{17}$:Eu^{2+} blue phosphor

【図１３】



【図１４】



【図１３】	[FIG. 13]
強度／量子効率（ａ．ｕ．）	Intensity/quantum efficiency (a.u.)
波長（ｎｍ）	Wavelength (nm)
【図１４】	[FIG. 14]
強度／量子効率（ａ．ｕ．）	Intensity/quantum efficiency (a.u.)
波長（ｎｍ）	Wavelength (nm)

(2) According to the allegations of both parties, the description corresponding to the corrected invention of the case in the detailed description of the invention is understood to be Embodiment 2 (page 16 in the request, page 5 in the oral proceedings statement brief (demandant)) (page 6 in the written reply for the trial case dated April 7, 2014). Thus, whether or not constituent components (H) and (J) are described in the part relating to Embodiment 2 in the detailed description of the invention will now be discussed below.

According to the above descriptions (1) B to (1) C, a light-emitting device is described as Embodiment 2 in the corrected description of the case, the light-emitting device including a phosphor layer including a nitride phosphor represented by a composition formula $(M_{1-x}Eu_x)AlSiN_3$ that emits red colored light, and a green phosphor, where a nitride phosphor or an oxynitride phosphor is made selectable as the green phosphor.

It is obvious that the phosphor layer including a nitride phosphor or an oxynitride phosphor, which is selected as the green phosphor, in Embodiment 2, is understood as "substantially does not include an inorganic phosphor other than a nitride phosphor or an oxynitride phosphor." In addition, it is recognized that based on the description "it is preferable to have a configuration where the phosphor layer substantially does not include an inorganic phosphor other than a nitride phosphor or an oxynitride phosphor" in the above description (1) D, as a preferable phosphor, an invention that substantially does not include an inorganic phosphor other than a nitride phosphor or an oxynitride phosphor is described in the corrected description of the case or the drawing.

In addition, based on the above description (1) D "in order to obtain a light-emitting device that emits high luminous flux, the phosphor having the lowest internal quantum efficiency under the excitation of the light that the light-emitting element emits among the phosphors substantially included in the phosphor layer has internal quantum efficiency (absolute value) of 80% or more, preferably 85% or more, and more preferably 90% or more" "in embodiments 1 to 4," it is recognized that an invention including a nitride phosphor represented by a composition formula $(M_{1-x}Eu_x)AlSiN_3$ that emits red colored light and having internal quantum efficiency of 80% or more in order to obtain a light-emitting device that emits high luminous flux is described as Embodiment 2 in the corrected description of the case or drawing such that a person skilled in the art can technically understand.

By using the red phosphor having high internal quantum efficiency of "80% or more," the invention can solve the problem so as to "provide a light-emitting device having both high luminous flux and high color rendering property, and more specifically a light-emitting device for emitting warm white light" described in [0009] in the above description (1) A.

Thus, Embodiment 2 describes, as an invention to solve the problem of the case, the invention that includes a red phosphor "that is a nitride aluminosilicate-based nitride phosphor (provided that $Sr_2Si_4AlON_7:Eu^{2+}$ shall be excluded.)" "having internal quantum efficiency of 80% or more," where the phosphor layer "substantially does not include an inorganic phosphor other than a nitride phosphor or an oxynitride phosphor."

(3) The demandant alleges that described in the corrected description of the case is merely a possibility that "a red phosphor can be made to have internal quantum efficiency of 80% or more by optimizing a manufacturing condition," and there is no disclosure about the technical matters of "making the red phosphor have internal quantum efficiency of 80% or more," which will now be discussed below.

There is a description, "the red phosphor has internal quantum efficiency of 80% or more" as described above in (2). In addition,
A. according to Evidence B No. 11 and Evidence B No. 12, a plurality of experts do not deny the possibility of manufacturing "a nitride phosphor or an oxynitride phosphor that is activated by Eu^{2+}, and has a light emission peak in the wavelength range from at least 600 nm to less than 660 nm" so as to have internal quantum efficiency of 80% or more based on the disclosure in the description in light of the common general technical knowledge of a person skilled in the art at the time of filing of the original application (April 27, June 21, and June 30, 2004), and
B. a $Ca_{1.97}Si_5N_8:Eu_{0.03}$ phosphor having internal quantum efficiency of 84.6% and an $Sr_{1.4}Ca_{0.6}Si_5N_8:Eu$ phosphor having internal quantum efficiency of 86.7%, which are not "nitride aluminosilicate-based" are described in Example 4 ([0046] to [0047]) and Example 9 ([0061] to [0062]) in Evidence A No. 5, and a phosphor in the form of a "nitride silicate phosphor" having internal quantum efficiency of 80% or more is achieved, so that
in view of A and B, it cannot be said that "a nitride phosphor or an oxynitride phosphor that is activated by Eu^{2+}, has a light emission peak in the wavelength range from at least 600 nm to less than 660 nm," and "has internal quantum efficiency of 80% or more" cannot be achieved (theoretically or empirically), so that the allegation is unreasonable. Considering the above-described common general technical knowledge at the time of filing of the original application, it cannot be said that the technical matters are not described technically.
C. Further, Evidence B No. 16, a publication distributed on March 22, 2006 after filing of the original application, describes that "NIMS developed phosphors in which oxynitride crystal is used as a host such as a $CaAlSiN_3:Eu$ red phosphor[2] ... as a phosphor for a white LED. In this research, measurement results of the internal quantum efficiency of these phosphors are reported," and the table titled "Table Quantum efficiency of phosphors" indicates that the measured values are 0.87 at 450 nm and 0.88 at 405 nm as the internal quantum efficiency of $CaAlSiN_3:Eu$. It is to

be noted that reference document (2) is "Hirosaki, et al., the 65th Japan Society of Applied Physics Proceedings: No. 3, Page 1238, 2p-ZL-12 (2004)."

According to the above-described description in Evidence B No. 16 (it is unclear whether the phosphor is the same as the one reported in Japan Society of Applied Physics in 2004, or the phosphor is a phosphor having improved efficiency by optimizing a manufacturing condition), a $CaAlSiN_3$:Eu red phosphor can be understood to actually obtain internal quantum efficiency of 80% or more. While the phosphor is different in composition from the "$SrAlSiN_3$:Eu^{2+} red phosphor" that "can improve internal quantum efficiency of 1.5 times or more by optimizing a manufacturing condition" in the corrected description of the case, the phosphor is a nitride aluminosilicate-based nitride phosphor (provided that $Sr_2Si_4AlON_7$:Eu^{2+} shall be excluded.)" in the corrected invention of the case, which is not contradictory to the judgement made in the above (2) that the invention is described such that a person skilled in the art can technically understand.

(4) Therefore, the corrected description of the case or the drawing can be understood to describe the invention that includes a red phosphor that is a "nitride aluminosilicate-based nitride phosphor (provided that $Sr_2Si_4AlON_7$:Eu^{2+} shall be excluded.)" "having internal quantum efficiency of 80% or more" and having a configuration where a phosphor layer "substantially does not include an inorganic phosphor other than a nitride phosphor or an oxynitride phosphor" in order to solve the problem of the corrected description of the case, and thus the above-described violation of requirements for support No. 1 and No. 2 that demandant alleges is groundless.

(5) Summary

From the foregoing, the Patent cannot be said to have been granted on a patent application that does not meet the requirement stipulated in Article 36(6)(i) of the Patent Act based on the above-described violation of requirements for support No. 1 and No. 2.

2 Reason for invalidation 2 (lack of inventive step due to illegal division)

The above-described "No. 5 Outline of the demandant's allegation and Means of proof 1, (2) Reason for invalidation 2 (lack of inventive step due to illegal division)" will now be examined below.

(1) An examination in terms of the requirements for Division of Application (the requirements stipulated in the main paragraph of Article 44(1) of the Patent Act) will be made as to whether the corrected invention of the case is an invention that is covered by the description, the scope of claims, and the drawing that were first attached to the originally filed application.

As discussed in 1 (1) and (2) above, the corrected invention of the case is the invention described in the corrected description of the case or the drawing. The descriptions in [0001] to [0008], [0013] to [0161], and the drawing that were first attached to the originally filed application are substantially the same as the descriptions in [0001] to [0009], [0012] to [0160], and the drawing of the corrected description of the case. Thus, in view of these descriptions, it is obvious that the corrected invention of the case is the invention described in the description or the drawing that were first attached to the originally filed application.

Therefore, the corrected invention of the case is a part of the invention covered by the original application, and the application of the case is admitted as a newly-filed application that is a part of the original application in accordance with the provisions of Article 44(1) of the Patent Act.

Therefore, the application of the case is admitted as a legitimate divisional application of the original application.

(2) In terms of lack of inventive step due to illegal division

Since the application of the case is admitted as a legitimate divisional application of the original application as described above in (1), the application of the case is regarded to have been filed at the time of filing of the original application (December 15, 2004). Thus, the publication of the unexamined original application distributed on February 16, 2006 does not correspond to a publication distributed in Japan or a foreign country prior to the filing date of the Patent under the provisions of Article 29(1)(iii) of the Patent Act. Therefore, it cannot be said that the corrected invention of the case would have been provided easily by a person ordinarily skilled in the art based on the invention described in Evidence A No. 1, which is a publication of the unexamined original application.

3 Reason for invalidation 3 (lack of inventive step)

The above-described "No. 5 Outline of the demandant's allegation and Means of proof 1, (3) Reason for invalidation 3 (lack of inventive step)" will now be examined below.

(1) The described matters of Evidence A No. 3

There are descriptions below in Evidence A No. 3, which is a publication distributed prior to the date of the priority claim (hereinafter referred to as the "priority date").

A "[Claim 1] An illumination unit comprising at least one LED as a light source, wherein the LED is arranged to emit primary radiation within the range of 300 to 570 nm, wherein the radiation is converted partially or completely to radiation with a longer wavelength by a phosphor exposed to the primary radiation of the LED, wherein the structure of the phosphor is in a form based on nitride or a derivative thereof, wherein the conversion is performed using at least one kind of phosphor, wherein the phosphor is derived from a derivative of a cation M, silicon nitride, or nitride, wherein the phosphor is arranged to emit light with a peak emission wavelength from 430 to 670 nm, wherein the cation is partially replaced by a dopant D, i.e., Eu^{2+} or Ce^{3+}, wherein at least one kind of bivalent metal such as Ba, Ca, and Sr, and/or at least one kind of a tervalent metal such as Lu, La, Gd, and Y is used as the cation M, and wherein the phosphor is derived from the following kinds: nitrides having structures of MSi_3N_5, $M_2Si_4N_7$, $M_4Si_6N_{11}$, and $M_9Si_{11}N_{23}$, oxynitrides having a structure of $M_{16}Si_{15}O_6N_{32}$, and sialon having structures of $MSiAl_2O_3N_2$, $M_{13}Si_{18}Al_{12}O_{18}N_{36}$, $MSi_5Al_2ON_9$, and $M_3Si_5AlON_{10}$.

[Claim 2] The illumination unit according to Claim 1, wherein the ratio of the dopant is 0.5 to 15 mol% of the cation.

[Claim 3] The illumination unit according to Claim 1, wherein when doping is done by Ce^{3+}, an additional dopant, i.e., Pr^{3+} and/or Tb^{3+}, is used, and a ratio thereof is at most 30 mol% of the ratio of Ce^{3+}.

[Claim 4] The illumination unit according to Claim 1, wherein when doping is done by Eu^{2+}, an additional dopant, i.e., Mn^{2+}, is used, and a ratio thereof is at most four times of the ratio of Eu^{2+}.

[Claim 5] The illumination unit according to Claim 1, wherein each Eu^{2+} ion in the phosphor is coordinated by at least two nitride ligands.

[Claim 6] The illumination unit according to Claim 1, wherein a plurality of nitride-containing phosphors are used together, in particular, a plurality of nitride-containing phosphors are used alone to achieve, in particular, an illumination unit that emits

white light.
[Claim 7] The illumination unit according to Claim 1, wherein the phosphor according to the present invention is dispersed in a silicone resin, or is directly applied to the LED.
[Claim 8] The illumination unit according to Claim 1, wherein the LED is a nitride-based semiconductor device.
[Claim 9] The illumination unit according to Claim 6, wherein the primarily emitted radiation emitted in order to generate white light is in a wavelength range of 360 to 420 nm, the primarily emitted radiation being exposed to at least three kinds of phosphors that indicate maximum emission to blue (430 to 470 nm), green (495 to 540 nm), and red (in particular, 540 to 620 nm) for conversion.
[Claim 10] The illumination unit according to Claim 6, wherein the primarily emitted radiation emitted in order to generate white light is in a wavelength range of 420 to 480 nm, the primarily emitted radiation being exposed to at least two kinds of phosphors that indicate maximum emission to green (495 to 540 nm) and red (in particular, 540 to 620 nm) for conversion."

B "[0001]
[Field of the Invention] The present invention relates to an illumination unit including at least one LED that is described in the dominant conception of Claim 1, as a light source. In particular, the LED defines an LED that emits visible light or white light and is based on an LED that primarily emits UV/blue.
[0002]
[Description of the Prior Art] For example, an illumination unit that emits white light is achieved by the combination of a Ga(In)N-LED that mainly emits light in blue at about 460 nm, and a YAG:Ce^{3+} phosphor that emits light in yellow, at present (US 5,998,925 and EP 862794). In this case, two kinds of different yellow phosphors as described in WO-A 01/08453 are used in order to reproduce good color. In this case, there arises a problem in which different temperature properties are often exhibited even if the two phosphors are similar in structure. Well-known examples include a Ce-doped Y-garnet (YAG:Ce) that emits light in yellow, and a (Y, Gd)-garnet that emits light with a longer wavelength than the Y-garnet (YAG:Ce). This causes change of color coordinates, and change of color reproduction, when operating temperatures differ."

C "[0005]

[Problem to be Solved by the Invention] An object of the present invention is to provide the illumination unit described in the dominant conception of Claim 1 as a light source, which is characterized by high permanence even when an operating temperature changes. A further object is to provide an illumination unit that emits light in white and has especially high color reproduction and high efficiency.
[0006]
[Means for Solving Problem] The aforementioned objects are achieved by the feature section of Claim 1. The especially advantageous embodiment is described in a dependent form claim.
[0007] In the case of the present invention, a phosphor that consists of a plurality of nitride-based phosphor kinds is used as a phosphor for LED.
[0008] These are a specific kind of nitride, oxy nitride of the derivative, and sialon. The phosphor derived from a derivative of a cation M and silicon nitride, or nitride is arranged to emit light with a peak emission wavelength of 430 to 670 nm, and the cation is partially replaced by a dopant D; i.e., Eu^{2+} or Ce^{3+} in this case. M is at least one kind of bivalent metal such as Ba, Ca, and Sr and/or at least one kind of a tervalent metal such as Lu, La, Gd, or Y is used as the cation. In this case, the phosphor is derived from the following kinds: nitrides having structures of MSi_3N_5, $M_2Si_4N_7$, $M_4Si_6N_{11}$, and $M_9Si_{11}N_{23}$, oxynitrides having a structure of $M_{16}Si_{15}O_6N_{32}$, and sialon having structures of $MSiAl_2O_3N_2$, $M_{13}Si_{18}Al_{12}O_{18}N_{36}$, $MSi_5Al_2ON_9$, and $M_3Si_5AlON_{10}$.
[0009] The following special phosphor is especially advantageous: 1. $M'M''Si_4N_7$:D, where M' is Sr or Ba, each of which is used alone or in combination, and in particular, M' is partially (up to 20 mol%) replaced by Ca; and M' is a bivalent ion.
[0010] M" is Lu alone or combined with Gd and/or La; and M" is a tervalent ion.
[0011] A specific example thereof is $SrLuSi_4N_7:Eu^{2+}$.
[0012] 2. $M'M''Si_6N_{11}$:D, where M' is Ba_xSr_{3-x}, where x = 1.5 advantageously; where M' is bivalent; where M" is Lu alone or Gd and/or is combined with La and/or Y; and M" is tervalent.
[0013] In addition, the amount of Ba^{2+} and Sr^{2+} can further be changed to a specific portion (the value of x is changed between 1.3 and 1.7), and partially replaced by Ca^{2+} (up to 20 mol% of the entire volume M').
[0014] A specific example thereof is $BaLuSi_6N_{11}$:Eu.
[0015] 3. $M''_3Si_6N_{11}$:D, where M" is La alone or is combined with Gd and/or Y and/or Lu; and M" is a tervalent ion.
[0016] D is Ce^{3+} advantageously.

[0017] A specific example thereof is $La_3Si_6N_{11}$: Ce.
[0018] 4. $M'_2M''_7Si_{11}N_{23}$:D, where M' is Ba alone or is combined with Sr (up to 50 mol%), and M " is La alone or is combined with Gd and/or Lu.
[0019] A specific example thereof is $Ba_2La_7Si_{11}N_{23}$:Eu.
[0020] 5. $M''Si_3N_5$:DM" is La alone or is combined with Gd and/or Lu.
[0021] Where D is Ce.
[0022] A specific example thereof is $LaSi_3N_5$:Ce.
[0023] This is a specific kind of oxy nitride; i.e., a kind of type $M''_{16}Si_{15}O_6N_{32}$:D. They use at least one kind of metal La, Gd, Lu, or Y as a tervalent cation M". This cation is partially replaced by the dopant D, i.e., Eu^{2+} or Ce^{3+}. The following special phosphor is especially advantageous:
6. $M''_{16}Si_{15}O_6N_{32}$: Ce, where M" is La alone or is combined with Gd and/or Lu; and a specific example thereof is $La_{16}Si_{15}O_6N_{32}$: Ce.
[0024] This is a specific kind of sialon; i.e., a kind of type MSiAlON:D. They use at least one kind of metal Ba, Sr, Ca, La, Gd, Lu, or Y as a bivalent or tervalent cation M". This cation is partially replaced by the dopant D; i.e., Eu^{2+} or Ce^{3+}. The following special phosphor is especially advantageous:
7. $M'SiAl_2O_3N_2$:D, where M' is Sr alone or is combined with Ba and/or Ca^{2+}; and the ratio of Ba is up to 50 mol% in this case, and the ratio of Ca is up to 20 mol%.
[0025] A specific example thereof is $SrSiAl_2O_3N_2$:Eu.
[0026] 8. $M'_3M''_{10}Si_{18}Al_{12}O_{18}N_{36}$:D, where M' is Sr alone or is combined with Ba and/or Ca; and the ratio of Ba is up to 50 mol% in this case, and the ratio of Ca is up to 20 mol%.
[0027] M" is La alone or is combined with Gd and/or Lu; M' is Sr^{2+} or M" is La^{3+} advantageously; and a specific example thereof is $Sr_3La_{10}Si_{18}Al_{12}O_{18}N_{36}$:Eu.
[0028] 9. $M''Si_5Al_2ON_9:Ce^{3+}$M" is La alone or is combined with Gd and/or Lu; and a specific example thereof is $LaAl_2Si_5ON_9$:Ce.
[0029] 10. $M''_3Si_5AlON_{10}:Ce^{3+}$M" is La alone or is combined with Gd and/or Lu; where M" is La^{3+} advantageously.
[0030] A specific example thereof is $La_3Si_5AlON_{10}$:Ce."

D "[0048] Such a compound is thermally and chemically stable. In an application (for example, inside of casting resin of an LED) in which this optical activity material has to be scattered, another advantage of this material is to have shock resistance and that it is only slightly or not at all damaged in the case of the grinding process within a mill. In the case of other phosphors, such damage of these particles

by a grinding process reduces efficiency.
[0049] This material design can manufacture an Si/Al-N-based specific phosphor that emits special light within a wide range of blue to deep red.
[0050] In a special advantage of the nitride-based system, a plurality of Si/Al-N-based phosphors that have physically similar properties can be used together, for example, in order to achieve a white LED. The same considerations can be applied also to nitride-based primary light sources that are used very frequently in a similar manner. This is because the primary light sources are generally InN, GaN, and AlN-based semiconductor devices in this case. The Si/Al-N-based phosphor according to the present invention is especially preferably applied directly in this case.

E "[0053] It is advantageous that white light is generated especially using these phosphors in addition to generating a colored light source by excitation using a UV ray of an LED. This is attained by using at least three kinds of phosphors in the case of using a UV-emitting LED as a primary light source, and attained by using at least two kinds of phosphors in the case of using a blue-emitting LED as a primary light source.
[0054] White light that exhibits good color reproduction is attained by combining a UV-LED (that primarily emits light, for example, at 300 to 470 nm) with two kinds to three kinds of phosphors, and at least one of the above-described phosphors is a nitride-containing phosphor according to the present invention.
[0055] The remarkable advantage of a nitride-containing phosphor is its outstanding stability, and thermal and mechanical stability against hot acid and alkali.
[0056]
[Examples] Next, the present invention is described in detail using a plurality of examples.
[0057] The same structure as the one having been described, for example, in the description of U.S. Patent No. 5,998,925 is used as a white LED provided with an InGaN-chip. The structure of the light source for this kind for white light is exemplarily illustrated in FIG. 1a. This light source is a semiconductor device (chip 1) of an InGaN type having a peak emission wavelength of 400 nm and provided with first and the second electrical connection portions 2 and 3, and this is embedded in the range of a recess 9 in a light transmissive base container 8. One side of the connection portion 3 is connected with the chip 1 via a bonding wire 14. The recess includes a wall portion 7, and the wall portion 7 is used as a reflector for blue primary radiation of the chip 1. The recess 9 is filled up with an injection material 5,

and the main component of the injection material 5 contains a silicone casting resin (or an epoxy casting resin) (80 to 90 mass%), and a phosphor pigment 6 (less than 15 mass%). The other components, of small amount, are particularly methyl ether or Aerosil. The phosphor pigment is a mixture that consists of two kinds (or two or more kinds) of nitride-containing pigments that emit light in red and green."

F "[0060] The phosphor according to the present invention is listed in Table 3. This is sialon and nitride of the various coordination numbers.
[0061] FIG. 4 illustrates the typical fluorescent region (nm) of the various nitride-containing phosphors that are described in detail. These phosphors cover the wide spectrum of blue to red.
[0062] FIGS. 3 and 4 illustrate the emitting properties and the reflection properties of various nitride-containing phosphors as a function of wavelength. (note by the body: "FIG. 4" is recognized as an error of "Table 4").

G [0063] In detail, FIG. 3a illustrates the emission spectrum of sialon $SrSiAl_2O_3N_2:Ce^{3+}$ in the case of excitation at 390 nm (4%) (that is, the ratio of Ce to the cation Sr is 4 mol%) (test number TF23A/01). This maximum value is 466 nm in blue, and the mean wavelength is 493 nm. The reflectance (FIG. 3b) is 400 nm, which is about R400 = 60%, and is 370 nm, which is about R370 = 37%.
[0064] An example synthesis of sialon TF23A/01 is described in detail below.
[0065] Phosphor powder is manufactured by an elevated temperature-solid reaction. In order to manufacture the phosphor power, high-purity starting materials, $SrCO_3$, AlN, and Si_3N_4 are mixed at the mole ratio of 1:2:1. The particle sizes of Si_3N_4 are d_{50} = 1.6 micrometer, d_{10} = 0.4 micrometer, and d_{90} = 3.9 micrometer. A small amount of CeO_2 was added as the object of doping, and the corresponding molar quantity of $SrCO_3$ is added in this case.
[0066] After mixing components favorably, the resulting powder is heated to react for about 15 h in a reducing atmosphere (N_2/H_2) at about 1400 degrees C to obtain the above-described compound.
[0067] FIG. 4 illustrates the emission spectrum of sialon $SrSiAl_2O_3N_2:Eu^{2+}$ in the case of excitation at 400 nm (4%) (test number TF31A/01). This maximum value is 534 nm in green, and the mean wavelength is 553 nm. The quantum efficiency QE is 43%. The reflectance (FIG. 4b) is 400 nm, which is about R400 = 31%, and is 370 nm, which is about R370 = 22%.
[0068] FIG. 5 illustrates the emission spectrum of the white LED based on the

primary excitation using the InGaN-chip that indicates peak emission of 360 nm according to the example of FIG. 1a, which uses the sialons as illustrated in FIGS. 3 and 4 and a publicly known red light α-sialon $Sr_2Si_5N_8$:Eu (see WO 01/39574) that emits light in blue or green. During appropriate mixing, the color coordinates of x = 0.331 and y = 0.330 are indicated very close to the white point.

[0069] This indicates that the nitride-based sialon is particularly suitable for a luminescence conversion LED for use in a phosphor-mixture in which another temperature-stable phosphor is used in this case."

H Table 3, Table 4, FIG. 1, and FIG. 4 are as follows.

【表３】

化合物		QE	R360	R400		Max. Em.	x	y
SrSiAl2O3N2:Ce3+		29	30	60		466	0.182	0.232
SrSiAl2O3N2:Eu2+		51	25	42		497	0.304	0.432
La3Si6N11:Ce3+		30	13	39		451	0.157	0.145

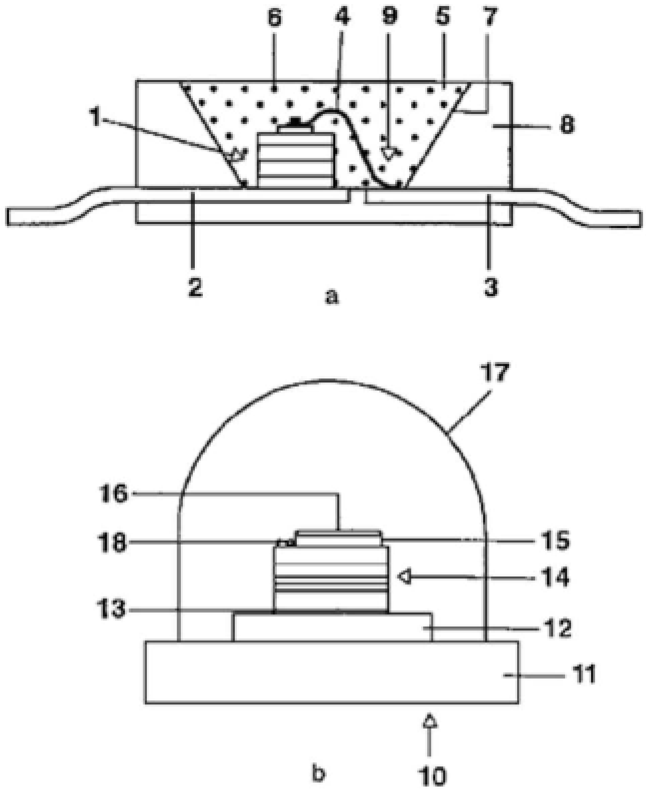
【表３】	[Table 3]
化合物	Compounds

【表４】

蛍光体	ドット（カチオンのmol%）	発光領域		
$SrSiAl_2O_3N_2$: Eu^{2+}	2 ～ 10	495 ～ 515 nm		
$CaSiAl_2O_3N_2$: Eu^{2+}	2 ～ 6	550 ～ 570 nm		
SrSIAl2O3N2: Ca3+	2 ～ 6	455 ～ 480 nm		
$SrSiAl_2O_3N_2$: Eu^{2+}	1 ～ 5	490 ～ 510 nm		
CaSi6AlON9:Eu^{2+}	3 ～ 6	570 ～ 595 nm		
$La_3Si_6N_{11}$:Ce3+	2 ～ 5	435 ～ 452 nm		
$Sr_2Si_4AlON_7$:Eu^{4+}	2 ～ 4	625 ～ 640 nm		

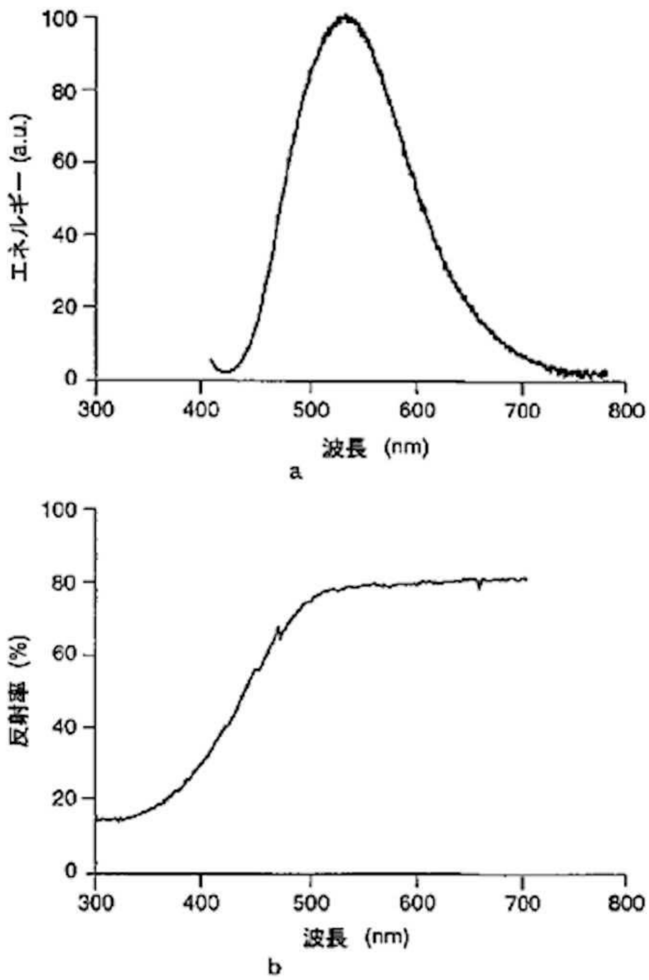
【表４】	[Table 4]
蛍光体	Phosphors
ドット（カチオンのｍｏｌ％）	Dot (mol% of cation)
蛍光領域	Fluorescent region

【図１】



【図１】　　[FIG. 1]

【図４】



【図４】	[FIG. 4]
エネルギー（ａ．ｕ．）	Energy (a.u.)
反射率（％）	Reflectance (%)
波長（ｎｍ）	Wavelength (nm)

(2) Identification of the evidence A3 invention

A According to the description in Claim 1 of (1) A described above, Evidence A No. 3 describes

"an illumination unit comprising at least one LED as a light source, wherein the LED is arranged to emit primary radiation within the range from 300 to 570 nm, wherein the radiation is converted partially or completely to radiation with a longer wavelength by a phosphor exposed to the primary radiation of the LED, wherein the structure of the phosphor is in a form based on nitride or a derivative thereof, wherein the conversion is performed using at least one kind of phosphor, wherein the phosphor is derived from a derivative of a cation M, silicon nitride, or nitride, wherein the phosphor is arranged to emit light with a peak emission wavelength from 430 to 670 nm, wherein the cation is partially replaced by a dopant D; i.e., Eu^{2+} or Ce^{3+}, wherein at least one kind of bivalent metal such as Ba, Ca, or Sr and/or at least one kind of a tervalent metal such as Lu, La, Gd, or Y is used as the cation M, and wherein the phosphor is derived from the following kinds: nitrides having structures of MSi_3N_5, $M_2Si_4N_7$, $M_4Si_6N_{11}$, and $M_9Si_{11}N_{23}$, oxynitrides having a structure of $M_{16}Si_{15}O_6N_{32}$, and sialon having structures of $MSiAl_2O_3N_2$, $M_{13}Si_{18}Al_{12}O_{18}N_{36}$, $MSi_5Al_2ON_9$, and $M_3Si_5AlON_{10}$."

B According to (1) E described above, the LED includes, "for use as a white LED," "an injection material 5" that "contains" a silicone casting resin (or an epoxy casting resin) as the main component," "two kinds of nitride-containing pigments that emit light in red and green," and "the other components of small amount that are particularly methyl ether or Aerosil," and "the recess 9 is filled up with the injection material 5."

C In view of the entire descriptions of evidence A No. 3 including the description of (1) D described above, "[0048] such a compound is thermally and chemically stable ... [0049] This material DESAIN can manufacture an Si/Al-N-based specific phosphor that emits special light within a wide range of blue to deep red. [0050] In a special advantage of the nitride-based system, a plurality of Si/Al-N-based phosphors that have physically similar properties can be used together, for example, in order to achieve a white LED.", the description of (1) E described above, "[0053] It is advantageous that white light is generated especially using these phosphors in addition to generating a colored light source by excitation using a UV ray of an LED. This is attained by using at least three kinds of phosphors in the case of using a UV-emitting LED as a primary light source, and attained by using at least two kinds of phosphors in the case of using a blue-emitting LED as a primary light source. [0054] The white light that exhibits good color reproduction can be attained by combining a UV-LED (that primarily emits light, for example, at 300 to 470 nm) with two kinds to three kinds of phosphors, and at least one of the above-described phosphors is a nitride-containing phosphor according to the present invention. [0055] The remarkable advantage of a nitride-containing phosphor is its outstanding stability, and thermal and mechanical stability against hot acid and alkali.", and from the description of (1) E about using "The phosphor pigment that consists of two kinds (or more kinds) of nitride-containing pigments that emit light in red and green," it is understood that an Si/Al-N-based phosphor can be used as a phosphor that contains two kinds of nitride-containing pigments that emit light in red and green in order to attain white light, and at least one of them is a nitride-containing phosphor according to the present invention (as means for solving problem) (that is, the phosphor "that is derived from a derivative of a cation M, silicon nitride, or nitride, wherein the phosphor is arranged to emit light with a peak emission wavelength from 430 to 670 nm, wherein the cation is partially replaced by a dopant D, i.e., Eu^{2+} or Ce^{3+}, wherein at least one kind of bivalent metal such as Ba, Ca, or Sr and/or at least one kind of a tervalent metal such as Lu, La, Gd, or Y is used as the cation M, and wherein the phosphor is derived from the following kinds: nitrides having structures of MSi_3N_5, $M_2Si_4N_7$, $M_4Si_6N_{11}$, and $M_9Si_{11}N_{23}$, oxynitrides having a structure of $M_{16}Si_{15}O_6N_{32}$, and sialon having structures of $MSiAl_2O_3N_2$, $M_{13}Si_{18}Al_{12}O_{18}N_{36}$, $MSi_5Al_2ON_9$, and $M_3Si_5AlON_{10}$.", which is described in Claim 1 at (1) A described above (hereinafter the phosphor is referred to as the "evidence A3 phosphor")) (for example, according to (1) G described above, there is a description about an example using the "evidence A3 phosphor" as blue and green phosphors and a "publicly known red light α-sialon $Sr_2Si_5N_8$:Eu (see WO 01/39574)" (that is an Si/Al-N-based nitride-containing phosphor not included in the "evidence A3 phosphor") as an example of a white LED in Evidence A No. 3.).

D According to the description, "This is attained by using at least three kinds of phosphors in the case of using a UV-emitting LED as a primary light source, and attained by using at least two kinds of phosphors in the case of using a blue-emitting LED as a primary light source," described above in (1) E, the primary light source that is used in the case of using two kinds of phosphors is a "blue-emitting LED."

E According to (1) F and (1) H described above, a phosphor having a composition of "$Sr_2Si_4AlON_7:Eu^{2+}$ and having an emission region of 625 to 640 nm" is described as an example of an Si/Al-N-based nitride-containing phosphor that emits red light, and a phosphor having a composition of "$Sr_2SiAl_2O_3N_2:Eu^{2+}$" and having Max. Em. of 497, a phosphor having a composition of "$SrSiAl_2O_3N_2:Eu^{2+}$" and having an emission region of 495 to 515 nm, and a phosphor having a composition of

"$SrSiAl_2O_3N_2:Eu^{2+}$" and having an emission region of 490 to 510 nm are described as examples of an Si/Al-N-based nitride-containing phosphor that emits green light in Table 3 and Table 4 described in [Examples].

F According A to E described above, it is recognized that Evidence A No. 3 describes the following invention (hereinafter referred to the "evidence A3 invention").

"An illumination unit comprising at least one LED as a light source, wherein the LED is arranged to emit primary radiation within the range from 300 to 570 nm, wherein the radiation is converted partially or completely to radiation with a longer wavelength by a phosphor exposed to the primary radiation of the LED, wherein the structure of the phosphor is in a form based on nitride or a derivative thereof, wherein the conversion is performed using at least one kind of phosphor, wherein the phosphor is derived from a derivative of a cation M, silicon nitride, or nitride, wherein the phosphor is arranged to emit light with a peak emission wavelength from 430 to 670 nm, wherein the cation is partially replaced by a dopant D; i.e., Eu^{2+} or Ce^{3+}, wherein at least one kind of bivalent metal such as Ba, Ca, or Sr and/or at least one kind of a tervalent metal such as Lu, La, Gd, or Y is used as the cation M, and wherein the phosphor is derived from the following kinds: nitrides having structures of MSi_3N_5, $M_2Si_4N_7$, $M_4Si_6N_{11}$, and $M_9Si_{11}N_{23}$, oxynitrides having a structure of $M_{16}Si_{15}O_6N_{32}$, and sialon having structures of $MSiAl_2O_3N_2$, $M_{13}Si_{18}Al_{12}O_{18}N_{36}$, $MSi_5Al_2ON_9$, and $M_3Si_5AlON_{10}$, wherein the LED includes, for use as a white LED, an injection material that contains a silicone casting resin (or an epoxy casting resin) as the main component, two kinds of nitride-containing pigments that emit light in red and green, and other components of small amount that are particularly methyl ether or Aerosil, and the recess is filled up with the injection material, wherein an Si/Al-N-based phosphor can be used as two kinds of nitride-containing pigments that emit light in red and green in order to attain white light, and at least one of them is the at least one kind of phosphor, and a phosphor having a composition of $Sr_2Si_4AlON_7:Eu^{2+}$ and having an emission region of 625 to 640 nm is selected as an example of an Si/Al-N-based nitride-containing phosphor that emits red light, and a phosphor having a composition of $Sr_2SiAl_2O_3N_2:Eu^{2+}$ and having Max. Em. of 497, a phosphor having a composition of $SrSiAl_2O_3N_2:Eu^{2+}$ and having an emission region of 495 to 515 nm, and a phosphor having a composition of $SrSiAl_2O_3N_2:Eu^{2+}$ and having an emission region of 490 to 510 nm are selected as examples of an Si/Al-N-based nitride-containing phosphor that emits green light, and wherein the light source is a blue-emitting LED."

(3) Comparison

The corrected invention of the case and the evidence A3 invention are compared.

A "A light-emitting device, the device comprising: a phosphor layer comprising a red phosphor and a green phosphor; and a light-emitting element, wherein the light emitting device is arranged to emit output light that comprises a red colored light emission component that the red phosphor emits, a green colored light emission component that the green phosphor emits, and a light emission component that the light-emitting element emits, wherein the output light comprises white light" in the corrected invention of the case is compared with "the light source including an injection material that contains a silicone casting resin (or an epoxy casting resin) as the main component, two kinds of nitride-containing pigments that emit light in red and green, and other components of small amount that are particularly methyl ether or Aerosil, and the recess is filled up with the injection material" and "the light source is a blue-emitting LED" in the evidence A3 invention.

"An injection material that contains a silicone casting resin (or an epoxy casting resin) as the main component, two kinds of nitride-containing pigments that emit light in red and green, and other components of small amount that are particularly methyl ether or Aerosil, and the recess is filled up with the injection material," "a blue-emitting LED," "an illumination unit," and "for use as a white LED" in the evidence A3 invention correspond respectively to "a phosphor layer comprising a red phosphor and a green phosphor," "a light-emitting element," "a light-emitting device," and "the output light comprises white light" in the corrected invention of the case, respectively.

In addition, the evidence A3 invention includes "two kinds of nitride-containing pigments that emit light in red and green" and "a blue-emitting LED" in order to obtain white light. It is obvious that in order to obtain white output light from light in the three colors of red, green, and blue, the output light needs to include light in all of the three colors, so that it is understood that the output light in the evidence A3 invention includes "red and green" light emission components obtained from the "two kinds of nitride-containing pigments that emit light in red and green," and a blue light emission component that the "blue-emitting LED" emits.

In view of the above, the two have a relation corresponding to each other.

B "The phosphor layer substantially comprises no inorganic phosphor other than a nitride phosphor or an oxynitride phosphor" in the corrected invention of the case is compared with "including an injection material that contains a silicone casting resin (or an epoxy casting resin) as the main component, two kinds of nitride-containing pigments that emit light in red and green, and other components of small amount that are particularly methyl ether or Aerosil, and the recess is filled up with the injection material, for use as a white LED" in the evidence A3 invention.

As is examined in A described above, "an injection material that contains a silicone casting resin (or an epoxy casting resin) as the main component, two kinds of nitride-containing pigments that emit light in red and green, and other components of small amount that are particularly methyl ether or Aerosil, and the recess is filled up with the injection material" in the evidence A3 invention corresponds to the phosphor layer in the corrected invention of the case.

The matter in the evidence A3 invention that "an injection material" contains "a silicone casting resin (or an epoxy casting resin) as the main component, two kinds of nitride-containing pigments that emit light in red and green, and other components of small amount that are particularly methyl ether or Aerosil" corresponds to the matter in the corrected invention of the case that "the phosphor layer substantially comprises no inorganic phosphor other than a nitride phosphor or an oxynitride phosphor."

In view of the above, the two have a relation corresponding to each other.

C According to A and B described above, the corrected invention of the case and the evidence A3 invention are in correspondence in the following points:
"A light-emitting device, the device comprising: a phosphor layer comprising a red phosphor and a green phosphor; and a light-emitting element, wherein the light emitting device is arranged to emit output light that comprises a red colored light emission component that the red phosphor emits, a green colored light emission component that the green phosphor emits, and a light emission component that the light-emitting element emits, wherein the output light comprises white light, and

wherein the phosphor layer substantially comprises no inorganic phosphor other than a nitride phosphor or an oxynitride phosphor" while they differ in the following points:

The different feature 1: While the "red phosphor" in the corrected invention of the case is a "nitride aluminosilicate-based nitride phosphor that is excited by light that the light-emitting element emits, activated by Eu^{2+}, and has a light emission peak in the wavelength range from at least 600 nm to less than 660 nm (provided that $Sr_2Si_4AlON_7$: Eu^{2+} shall be excluded.)", it is not clear whether the "nitride-containing pigment" that emits light in "red" in the evidence A3 invention is one like the "red phosphor" in the corrected invention of the case.

The different feature 2: While the "green phosphor" in the corrected invention of the case is "excited by light that the light-emitting element emits, activated by Eu^{2+} or Ce^{3}, and has a light emission peak in the wavelength range from at least 500 nm to less than 560 nm," it is not clear whether the "nitride-containing pigment" that emits light in "green" in the evidence A3 invention is one like the "green phosphor" in the corrected invention of the case.

The different feature 3: While the "blue-light-emitting element" in the corrected invention of the case is a "blue-light-emitting element arranged to emit light having a light emission peak in the wavelength range from at least 440 nm to less than 500 nm," it is not clear whether the "blue-emitting LED" in the evidence A3 invention is one like the "blue-light-emitting element" in the corrected invention of the case.

The different feature 4: While the "phosphors included in the phosphor layer" in the corrected invention of the case "only include phosphors activated by Eu^{2+} or Ce^{3}", it is not clear whether the nitride-containing pigment contained in the "injection material with which the recess is filled up" in the evidence A3 invention is one like the "phosphors included in the phosphor layer" in the corrected invention of the case.

The different feature 5: While the "red phosphor" in the corrected invention of the case "under the excitation of the light that the blue-light-emitting element emits" "has internal quantum efficiency of 80% or more", it is not clear whether the "nitride-containing pigment" that emits light in "red" in the evidence A3 invention is one like the "red phosphor" in the corrected invention of the case.

The different feature 6: While "excitation spectrums of the phosphors that the phosphor layer comprises have an excitation peak in a shorter wavelength range than a wavelength of the light that the blue-light-emitting element emits" in the corrected invention, it is not clear whether the evidence A3 invention is as described in the corrected invention of the case.

(4) Judgment

The above different features 1 to 6 will now be discussed below.

A The different features 1, 2, 4, and 6

In view of the matters, the different feature 2 will be judged first.

(A) Regarding the different feature 2

The evidence A3 invention includes a phosphor having a composition of $Sr_2SiAl_2O_3N_2:Eu^{2+}$ and having Max. Em. of 497, a phosphor having a composition of $SrSiAl_2O_3N_2:Eu^{2+}$ and having an emission region of 495 to 515 nm, and a phosphor having a composition of $SrSiAl_2O_3N_2:Eu^{2+}$ and having an emission region of 490 to 510 nm are selected as example of an Si/Al-N-based nitride-containing phosphor that emits green light. These phosphors correspond to phosphors "derived from sialon" having "structures of $MSiAl_2O_3N_2$" that is one of the "evidence A3 phosphor" that the evidence A3 invention uses as "at least one kind of phosphor," so that it is not significantly difficult to adopt a "phosphor having a composition of $SrSiAl_2O_3N_2:Eu^{2+}$ and having an emission region of 495 to 515 nm," which is one selected as a nitride-containing phosphor that emits green light in the evidence A3 invention. The light emission peak of the phosphor is not clear; however, the emission region of the phosphor ("495 to 515 nm") overlaps to the extent almost the same as the "wavelength range from at least 500 nm to less than 560 nm (that is, the wavelength range in which the green phosphor in the corrected invention of the case has a light emission peak). In addition, Evidence A No. 3 describes, in [0067], a "phosphor having the same composition of "$SrSiAl_2O_3N_2:Eu^{2+}$" and having a light emission peak of "534 nm" (which falls within the "wavelength range from at least 500 nm to less than 560 nm"). Since the "wavelength range from at least 500 nm to less than 560 nm" is a general wavelength range for the green range, it is not significantly difficult to make the light emission peak of the phosphor that emits green light fall within the "wavelength range from at least 500 nm to less than 560 nm" to arrive at the matter specifying the invention pertaining to the different feature

2 in the evidence A3 invention.

(B) Regarding the different feature 1

a First, the technical meaning of the "nitride aluminosilicate-based nitride phosphor" in the corrected invention of the case will be discussed.

The corrected description of the case describes "[0012] ... (1) alkaline-earth-metal orthosilicate-based, thiogallate-based, aluminate-based, and nitride-based (such as nitride silicate-based or sialon-based) green phosphors activated by Eu^{2+} and having a light emission peak in the wavelength range from at least 500 nm to less than 560 nm such as phosphors of $(Ba, Sr)_2SiO_4:Eu^{2+}$, $SrGa_2S_4:Eu^{2+}$, $SrAl_2O_4:Eu^{2+}$, $BaSiN_2:Eu^{2+}$, and $Sr_{1.5}Al_3Si_9N_{16}:Eu^{2+}$.

(2) alkaline-earth-metal orthosilicate-based, thiogallate-based, and nitride-based (such as nitride silicate-based or sialon-based) yellow phosphors activated by Eu^{2+} and having a light emission peak in the wavelength range from at least 560 nm to less than 600 nm such as phosphors of $(Sr, Ba)_2SiO_4:Eu^{2+}$, $CaGa_2S_4:Eu^{2+}$, $0.75(Ca_{0.9}Eu_{0.1})O•2.25AlN•3.25Si_3N_4:Eu^{2+}$, $Ca_{1.5}Al_3Si_9N_{16}:Eu^{2+}$, $(Sr, Ca)_2SiO_4:Eu^{2+}$, $CaSiAl_2O_3N_2:Eu^{2+}$, and $CaSi_6AlON_9:Eu^{2+}$.

(3) nitride-based (such as nitride silicate-based and nitride aluminosilicate-based) red phosphors that are activated by Eu^{2+} and have a light emission peak in the wavelength range from at least 600 nm to less than 660 nm such as phosphors of $Sr_2Si_5N_8:Eu^{2+}$, $SrSiN_2:Eu^{2+}$, $SrAlSiN_3:Eu^{2+}$, $CaAlSiN_3:Eu^{2+}$, and $Sr_2Si_4AlON_7:Eu^{2+}$."

According to the above descriptions, the "nitride-based" phosphors are understood to mean phosphors containing nitrogen such as nitride silicate-based nitrogen, sialon-based nitrogen, and nitride aluminosilicate-based nitrogen. Thus, the "nitride aluminosilicate-based nitride phosphor" is understood to mean a nitride phosphor containing N (nitride), Al (aluminum), and Si (silicate). It is to be noted that this understanding matches the demandant's allegation (pages 14 to 18 in the Oral proceedings statement brief (demandant)) and the demandee's allegation (pages 4 to 5 in the Oral proceedings statement brief (demandee)).

b Next, phosphors that the evidence A3 invention can adopt will be discussed.

The evidence A3 invention includes an "Si/Al-N-based phosphor that can be used as a phosphor that contains two kinds of nitride-containing pigments that emit light in red and green in order to attain white light, and at least one of them is the at least one kind of phosphor", that is, an "Si/Al-N-based phosphor that can be used as two kinds of nitride-containing pigments that emit light in red and green in order to attain white light, at least one of them" is the "evidence A3 phosphor." Thus, a person skilled in the art can understand that an Si/Al-N-based nitride-containing phosphor that is not the "evidence A3 phosphor" can be adopted as an Si/Al-N-based nitride-containing phosphor that emits red light if the "evidence A3 phosphor" is selected as an Si/Al-N-based nitride-containing phosphor that emits green light, as described in (A) above.

c As an Si/Al-N-based nitride-containing phosphor that emits red light, Evidence A No. 13 describes, in [0011] to [0012], a "phosphor having a composition of "$M_{p/2}Si_{12-p-q}Al_{p+q}O_qN_{16-q}:Eu^{2+}$" (where M is Ca alone or combined with Sr and/or Mg) that "emits yellow-orange (GO) light (light emission: 540 to 620 nm)" as a red phosphor having excellent thermal stability and emission properties at high temperatures and used together with a blue LED. The phosphor corresponds to the "nitride aluminosilicate-based nitride phosphor (provided that $Sr_2Si_4AlON_7:Eu^{2+}$ shall be excluded.)".

d In addition, as an Si/Al-N-based nitride-containing phosphor that emits red light, Evidence A No. 3 in (Table 4) indicates a "phosphor having a composition of $Sr_2Si_4AlON_7:Eu^{2+}$ and having an emission region of 625 to 640 nm.

In a nitride silicate-based nitride phosphor, it is understood as a well-known technical matter that at least a portion of "Sr" that is a cation can be replaced by "Ba" or "Ca," and a phosphor in which at least a portion of "Sr" is replaced by "Ba" or "Ca" is also known as a nitride silicate-based nitride phosphor (for example, see the description in Evidence A No. 3, "[Claim 1]..., wherein at least one kind of bivalent metal such as Ba, Ca, or Sr and/or at least one kind of a tervalent metal such as Lu, La, Gd, or Y is used as the cation M, and wherein the phosphor is derived from the following kinds: nitrides having structures of MSi_3N_5, $M_2Si_4N_7$, $M_4Si_6N_{11}$, and $M_9Si_{11}N_{23}$, oxynitrides having a structure of $M_{16}Si_{15}O_6N_{32}$, and sialon having structures of $MSiAl_2O_3N_2$, $M_{13}Si_{18}Al_{12}O_{18}N_{36}$, $MSi_5Al_2ON_9$, and $M_3Si_5AlON_{10}$," and the description in Evidence A No. 3, " [0033] another promising representative of the sialon activated by Eu is α-sialon, which is in accordance with a formula, $M_{p/2}Si_{12-p-q}Al_qN_{16-q}:Eu^{2+}$, where M is Ca alone or combined with at least one kind of metal Sr and Mg, and q is 0 to 2.5, and p is 0.5 to 3, and which is hereinafter represented as GO-sialon", the description in Evidence A No. 4, "the red phosphor is selected from the group consisting of ... and $(Sr_{1-x-y}Ba_xCa_y)_2Si_5N_8:Eu$ wherein $0 \leq x < l$ and $0 \leq y < l$") (page 7, l. 15 to 18), the description in Evidence A No. 5, "[0003] ... this phosphor is a phosphor having the composition represented by $M_XSi_YN_Z:Eu$ (M contains at least one or more alkaline-earth metals selected from the group consisting of Ca, Sr, Ba, and Zn, Z is represented by Z = 2/3X + 4/3Y," and the description in

Evidence A No. 5, "[0063] Example 9 is an $\underline{Sr_{1.4}Ca_{0.6}}Si_5N_8$:Eu phosphor." In addition, in terms of this, there is a description in the corrected description of the case, "... an oxo-nitride aluminosilicate phosphor represented by a composition formula $(M_{1-x}Eu_x)_2Si_4AlON_7$ such as an $Sr_2Si_4AlON_7:Eu^{2+}$ red phosphor may be used. However, M in the above composition formulae is at least one element chosen from Mg, Ca, Sr, Ba, and Zn, and x is a numerical value that satisfies the formula $0.005 \leq x \leq 0.3$," from which it is understood that "Sr" can be replaced by "Ca" or "Ba.")

Thus, a person skilled in the art would also understand a nitride aluminosilicate-based nitride phosphor that is obtained by replacing at least a portion of "Sr" by "Ba" or "Ca" in a nitride aluminosilicate-based nitride phosphor having a composition represented by "$Sr_2Si_4AlON_7:Eu^{2+}$ in Evidence A No. 3 (corresponding to a "nitride aluminosilicate-based nitride phosphor (provided that $Sr_2Si_4AlON_7:Eu^{2+}$ shall be excluded.)").

e As is examined above in b, since the evidence A3 invention can adopt, after selecting the "evidence A3 phosphor" as an Si/Al-N-based nitride-containing phosphor that emits green light, an Si/Al-N-based nitride-containing phosphor that is not an "evidence A3 phosphor" as an Si/Al-N-based nitride-containing phosphor that emits red light, it is not recognized to be significantly difficult to adopt, as an Si/Al-N-based nitride-containing phosphor that emits red light, a "phosphor having a composition of "$M_{p/2}Si_{12-p-q}Al_{p+q}O_qN_{16-q}:Eu^{2+}$" (where M is Ca alone or combined with Sr and/or Mg) that "emits yellow-orange (GO) light (light emission: 540 to 620 nm)," which is described in Evidence A No. 13, or a nitride aluminosilicate-based nitride phosphor that is obtained by replacing at least a portion of "Sr" by "Ba" or "Ca" in a nitride aluminosilicate-based nitride phosphor having a composition represented by "$Sr_2Si_4AlON_7:Eu^{2+}$ in Evidence A No. 3, which is described above in d; that is, to adopt a nitride aluminosilicate-based phosphor having a composition excluding "$Sr_2Si_4AlON_7: Eu^{2+}$."

In this regard, it is not recognized to be significantly difficult to bring the light emission peak of the Si/Al-N-based nitride-containing phosphor that emits red light to "the wavelength range from at least 600 nm to less than 660 nm" considering that making a nitride aluminosilicate-based phosphor emit red light approximately "in the wavelength range from at least 600 nm to less than 660 nm" is described in Evidence A No. 3 (a phosphor having a composition of $Sr_2Si_4AlON_7:Eu^{2+}$ and having an emission region of 625 to 640 nm is described in Table 4) and Evidence A No. 13 (a phosphor having a composition of "$M_{p/2}Si_{12-p-q}Al_{p+q}O_qN_{16-q}:Eu^{2+}$" (where M is Ca alone or combined with Sr and/or Mg) that emits "yellow-orange (GO) light (light emission: 540 to 620 nm)" is described in [0011] and [0012]).

Therefore, it is not significantly difficult to arrive at the matter specifying the invention pertaining to the different feature 1.

(C) Regarding the different feature 4

As described above in (A) and (B), it is obvious that the matters specifying the invention pertaining to the different feature 4 are satisfied by adopting a phosphor having a composition represented by "$SrSiAl_2O_3N_2:Eu^{2+}$" as a phosphor that emits green light, and a nitride aluminosilicate-based nitride phosphor that is obtained by replacing at least a portion of "Sr" by "Ba" or "Ca" in a nitride aluminosilicate-based nitride phosphor having a composition represented by "$Sr_2Si_4AlON_7:Eu^{2+}$" or a phosphor having a composition of "$M_{p/2}Si_{12-p-q}Al_{p+q}O_qN_{16-q}:Eu^{2+}$" (where M is Ca alone or combined with Sr and/or Mg) as a phosphor that emits red light, in Evidence A No. 3.

(D) Regarding the different feature 6

First of all, the technical significance of "excitation spectrums of the phosphors that the phosphor layer comprises have an excitation peak in a shorter wavelength range than a wavelength of the light that the blue-light-emitting element emits" will be discussed below.

In the detailed description of the invention, there are descriptions, "[0013] Since the excitation spectrums of these phosphors have <u>an excitation peak</u> in a shorter wavelength range than a wavelength of the light that the blue-light-emitting element emits while many of them have <u>an excitation peak</u> to a near-ultraviolet region to a violet region with a wavelength from at least 360 nm to less than 420 nm, the phosphors do not necessarily have high external quantum efficiency under the excitation of the blue-light-emitting element. However, it was found that the internal quantum efficiency of the phosphors are 70% or more, which is higher than expected based on the excitation spectrums, and are 90% to 100% in an especially preferable case.", and "[0040] For example, when using a blue-light-emitting element, the green phosphor <u>may be used</u>, which has <u>an excitation peak</u> on the longest wavelength side of the excitation spectrum that is not in the wavelength range from at least 420 nm to less than 500 nm; that is, <u>an excitation peak</u> on the longest wavelength side of the excitation spectrum is in the wavelength of less than 420 nm."; that is, while there are descriptions of phosphors that have an excitation peak in a shorter wavelength range than a wavelength of the light that the blue-light-emitting element emits, there is no description about the technical significance of what operation/working-effect is produced by achieving the configuration of having "an excitation peak" "in a shorter wavelength range than a wavelength of the light that the blue-light-emitting element emits."

In general, it is preferable that the excitation efficiency in the wavelength of excitation light should be high to some extent in order to excite a phosphor, and that a peak in the excitation spectrums of a phosphor should be in agreement with the wavelength of excitation light; however, they do not have to be in agreement with each other. This is obvious, for example, from making an attempt to achieve such a configuration that "excitation spectrums of the phosphors that the phosphor layer comprises have an excitation peak in a shorter wavelength range than a wavelength of the light that the blue-light-emitting element emits" in Evidence A No. 4 (see page 5, ll. 16 to 17, page 6, ll. 6 to 13, and FIGS. 1 to 2, where it is described that phosphors having an excitation peak in the vicinity of 400 nm are excited by a blue LED) and Evidence A No. 5 (see [0045], [0058], [0067], FIGS. 3 to 4, 7, 9, and the like, where it is described that nitride phosphors of Examples 6 and 7 having an excitation peak in the vicinity of 375 nm can be excited by a wavelength of 460 nm, and be combined with a known blue-light-emitting diode.).

In addition, the corrected description of the case describes in [0006] that conventionally "the $Sr_2Si_5N_8:Eu^{2+}$ phosphor that emits red light" (note by the body: in [0012], the phosphor is described as a red phosphor having a light emission peak in the wavelength range from at least 600 nm to less than 660 nm) is used together with a "blue-light-emitting element." According to FIG. 14 of the present case, the "$Sr_2Si_5N_8:Eu^{2+}$ phosphor" has an excitation peak to a near-ultraviolet region to a violet region, so that phosphors that have a configuration that "excitation spectrums of the phosphors that the phosphor layer comprises have an excitation peak in a shorter wavelength range than a wavelength of the light that the blue-light-emitting element emits" are understood to be described as a prior art in the corrected description of the case. Further, the demandee admits that using an $Sr_2Si_5N_8:Eu^{2+}$ phosphor having an excitation peak in a near-ultraviolet region in combination with a blue-light-emitting element having a wavelength that does not coincide with the excitation peak of the $Sr_2Si_5N_8:Eu^{2+}$ phosphor has conventionally been known (page 17, ll. 10 to 17 in the written statement dated November 28, 2014).

Thus, the technical significance of "excitation spectrums of the phosphors that the phosphor layer comprises have an excitation peak in a shorter wavelength range than a wavelength of the light that the blue-light-emitting element emits" is understood to simply describe the properties of the used phosphors.

In view of the above, the above different feature 6 will be discussed below.

a Evidence A No. 3 describes, in FIG. 4, that the reflectance of a green phosphor having a composition of "$SrSiAl_2O_3N_2:Eu^{2+}$" is smaller especially in an ultraviolet region of less than 400 nm, and in view of a reflectance spectrum correlated with an excitation spectrum, a green phosphor having a composition of "$SrSiAl_2O_3N_2:Eu^{2+}$" is assumed to have an excitation peak in an ultraviolet region of less than 400 nm.

b The corrected description of the case describes (in [0012] and [0013]) that nitride-based green phosphors and red phosphors activated by Eu^{2+} have an excitation peak "in a shorter wavelength range than a wavelength of the light that the blue-light-emitting element emits while many of them have an excitation peak to a near-ultraviolet region to a violet region with a wavelength from at least 360 nm to less than 420 nm"; however, considering that nitride-based red phosphors activated by Eu^{2+} generally have an excitation peak in a shorter wavelength range than a wavelength of the light that the blue-light-emitting element emits, it is understood that phosphors adopting a phosphor having a composition represented by "$SrSiAl_2O_3N_2$: u^{2+}" as a phosphor that emits green light, and a nitride aluminosilicate-based nitride phosphor that is obtained by replacing at least a portion of "Sr" by "Ba" or "Ca" in a nitride aluminosilicate-based nitride phosphor having a composition represented by "$Sr_2Si_4AlON_7:Eu^{2+}$ or a phosphor having a composition of "$M_{p/2}Si_{12-p-q}Al_{p+q}O_qN_{16-q}:Eu^{2+}$" (where M is Ca alone or combined with Sr and/or Mg) as a phosphor that emits red light, in Evidence A No. 3, which is described above in (A) and (B), have an excitation peak in a shorter wavelength range than a wavelength of the light that the blue-light-emitting element emits.

In addition, even if the phosphors do not necessarily have an excitation peak in a shorter wavelength range than a wavelength of the light that the blue-light-emitting element emits, no significant operation/working-effect is admitted to be produced by "excitation spectrums of the phosphors that the phosphor layer comprises have an excitation peak in a shorter wavelength range than a wavelength of the light that the blue-light-emitting element emits" as described. In addition, as stated by the demandee in the written statement (page 6) dated August 1, 2014, the peak of the excitation spectrum can be adjusted, so that it does not go beyond design matters to change the relation between the peak of the excitation spectrum and the wavelength of the light that the blue-light-emitting element emits.

Therefore, it is not significantly difficult to arrive at the matter specifying the invention pertaining to the different feature 6.

B Regarding the different feature 3

While a "blue-emitting LED" is used as a light source in the evidence A3 invention, a "wavelength range from at least 440 nm to less than 500 nm" is a general wavelength range for a blue wavelength range, and considering that a blue-emitting LED that emits light with the wavelength "about 460 nm" is generally used as described in Evidence A No. 3, "[0002] ... an illumination unit that emits white light is achieved by the combination of a Ga(In)N-LED that mainly emits light in blue at about 460 nm, and a $YAG:Ce^{3+}$ phosphor that emits light in yellow," it is not significantly difficult for a person skilled in the art to adopt a blue-emitting LED that has a light emission peak in a "wavelength range from at least 440 nm to less than 500 nm" as a "blue-emitting LED" in the evidence A3 invention.

C Regarding the different feature 5

As seen in the description, "[0005] ... A further object is to provide an illumination unit that emits light in white and has especially high color reproduction and high efficiency." in Evidence A No. 3, it is a general object to increase the efficiency in an illumination unit, and using a phosphor having internal quantum efficiency that is enhanced as much as possible by optimization of a manufacturing condition in order to increase the efficiency comes within the scope of an exercise of ordinary creativity of a person skilled in the art. Choosing a phosphor considering the degree of the internal quantum efficiency thereof is merely a design matter that a person skilled in the art should set up as appropriately while taking into account the targeted efficiency or easiness of acquisition/manufacturing of a phosphor.

(5) The demandee's allegation

A The demandee alleges that "It cannot be said that the light emission peak of the red phosphor of constituent component (D), the light emission peak of the green phosphor of constituent component (E), and constituent component (F), "the light-emitting element comprises a blue-light-emitting element arranged to emit light having a light emission peak in the wavelength range from at least 440 nm to less than 500 nm" are described as the configuration of the invention described in Evidence A No. 3 that the demandant identified" (No. 6, 1 (3), C(a) described above), "There is no reason to associate the phosphor described in Table 4 with a white LED including a blue LED" (No. 6, 1 (3), C(b) described above), "The $Sr_2Si_4AlON_7:Eu^{2+}$ cannot be identified as the red phosphor in the invention described in Evidence A No.

3. In addition, there is no description about quantum efficiency QE of the red phosphor" (No. 6, 1 (3), C(c) described above), "The invention described in Evidence A No. 3 is describing the matters described in various portions in Evidence A No. 3, so that the invention is wrongly identified in terms of identification of an invention that can be understood based on the matters described in Evidence A No. 3" (No. 6, 1 (3), D(b) described above), "The illumination unit in Claim 1 in Evidence A No. 3 is not written so as to be implementable in the description of Evidence A No. 3, and thus the illumination unit cannot be identified as a "cited invention" (No. 6, 1 (3), D(c) described above), "The description at the paragraph [0057] in Evidence A No. 3 is not clear, and thus it is unreasonable to identify some technical matters based on this description" (No. 6, 1 (3), D(d) described above), "Disclosed about the phosphor indicated in Table 3 and Table 4 in Evidence A No. 3 is only being combined with a light source having a peak emission wavelength of less than 400 nm, so that the phosphor cannot be combined with a blue LED" (No. 6, 1 (3), D(e) described above), and "Even if a nitride aluminosilicate-based red phosphor is described in Evidence A No. 3, this description does not mean that the technical significance of the corrected invention of the case, "the nitride aluminosilicate-based red phosphor activated by Eu^{2+} and the nitride-based green phosphor activated by Eu^{2+} or Ce^{3+}, which have high internal quantum efficiency, are combined with a blue-light-emitting element to obtain white light that have both high luminous flux and high color rendering property", is disclosed in Evidence A No. 3" (No. 6, 1 (3), E(b) described above).

However, as seen in the description in Claim 1, "the LED is arranged to emit primary radiation within the range from at least 300 to 570 nm" and the description in [0053] and [0054], "is attained by using at least two kinds of phosphors in the case of using a blue-emitting LED as a primary light source. ... The white light that exhibits good color reproduction is attained by combining a UV-LED (that primarily emits light, for example, at 300 to 470 nm) with two kinds to three kinds of phosphors, and at least one of the above-described phosphors is a nitride-containing phosphor according to the present invention", the primary light of the LED is described as including a blue wavelength range, and using a blue-emitting LED is referred to in in Evidence A No. 3, so that in view of the entire description of Evidence A No. 3, a person skilled in the art can understand that a technical idea of combining a blue-emitting LED with the phosphor indicated in Table 3 and Table 4 such as an Si/Al-N-based nitride-containing phosphor is disclosed in Evidence A No. 3.

In addition, the invention identified as a cited invention only has to be understood by a person skilled in the art based on descriptions of the publication and common general technical knowledge upon filing the application, and even if there is a fact that a notice of reasons for refusal to the effect that the application does not satisfy the enabling requirements that are requirements for patentability is notified (Evidence B No. 4), the fact does not mean that the invention of Claim 1 in Evidence A No. 3 cannot be identified as a cited invention. It is to be noted that according to Evidence B No. 4 (a notice of reasons for refusal), while a composition of the evidence A3 phosphor that is adopted in judgment above in (4) is "$SrSiAl_2O_3N_2:Eu^{2+}$," this phosphor is a phosphor represented by a composition of $M'SiAl_2O_3N_2$, which is alleged to be disclosed in Examples in the detailed description of the invention of the description of the application (note by the body: the patent application of Evidence A No. 3).

Therefore, the allegation of the demandee cannot be accepted.

As described above in (4) B, it is not significantly difficult for a person skilled in the art to adopt a blue-emitting LED that has a light emission peak in a "wavelength range from at least 440 nm to less than 500 nm" as a blue-emitting LED, and as described above in (4) C, it does not go beyond design matters that a person skilled in the art should set up as appropriately to choose a phosphor considering the degree of the internal quantum efficiency thereof.

B The demandee alleges that "As for constituent component (I), upon filing the application of the Patent, it was common general technical knowledge to increase luminous flux by conforming the excitation peak of the phosphor to the wavelength of the light that the blue-light-emitting element emits. In contrast, in the corrected invention of the case, it was found that even if the excitation peak of the phosphor is shifted to a shorter wavelength range than the wavelength of the light that the blue-light-emitting element emits, the phosphor can be used as a phosphor having high luminous flux if the phosphor has high internal quantum efficiency. Thus, in the well-known art having no finding of the corrected invention of the case, a phosphor having an excitation peak in the shorter wavelength range than the wavelength of the light that the blue-light-emitting element emits had never used as a phosphor in a white light-emitting device including a blue-light-emitting element. In addition, as for a nitride silicate, it is also known that a blue LED has good luminance efficiency or quantum efficiency and are used based on Evidence A No. 4 and Evidence A No. 5; however, nitride aluminosilicate was recognized to have very low quantum efficiency, as described in Evidence A No. 3 that nitride aluminosilicate has 43%

quantum efficiency in paragraph [0067], and quantum efficiencies of 29% and 51% in Table 3, so that excitation light in an ultraviolet region is usually used, and using excitation light in a blue region was never thought of" (No. 6, 1 (3), C(d) described above), "The corrected invention of the case exerts a working-effect of making it possible to combine the phosphor that was considered to be used only in a light source having a light emission peak in a near-ultraviolet or violet region with a blue-light-emitting element having a light emission peak with a wavelength from at least 440 nm to less than 500 nm, and opening up the selection of a phosphor to be combined with a blue-light-emitting element" (No. 6, 1 (3), D(g) described above), "The technical significance of the corrected invention of the case is having found that the internal quantum efficiency in the blue region is high and that a phosphor is made selectable, the "phosphor having an excitation peak in the shorter wavelength range than the wavelength of the light that the blue-light-emitting element emits" as a phosphor to be combined with a blue-light-emitting element in order to obtain white light that have both high luminous flux and high color rendering property, and thus, the corrected invention of the case, including its working-effects, cannot easily be conceived even by a person skilled in the art judging comprehensively from different features 1 to 6" (No. 6, 1 (3), D(i) described above), and "The finding of the corrected invention of the case that attention is focused on the internal quantum efficiency to make it possible to select "a group of specific phosphors that have an excitation peak in the shorter wavelength range than the wavelength of the light that the blue-light-emitting element emits" as a phosphor to be combined with a blue-light-emitting element is novel, and the corrected invention of the case is accordingly inventive" (No. 6, 1 (3), E(c) described above).

However, it is obvious that an excitation peak does not have to be in agreement with the wavelength of excitation light as described above in (4), A(D), and there is no reason that whether or not the "phosphor has an excitation peak in the shorter wavelength range than the wavelength of the light that the blue-light-emitting element emits" becomes a particular requirement as to whether or not the phosphor can be adopted as a phosphor in a white light-emitting device including a blue-light-emitting element. In addition, as described above in (4), A(D), it is conventionally made to have a configuration that "excitation spectrums of the phosphors that the phosphor layer comprises have an excitation peak in a shorter wavelength range than a wavelength of the light that the blue-light-emitting element emits," which the demandee admits, too. Further, as described above in B, it is recognized that a technical idea of combining a blue-emitting LED with a nitride-containing phosphor such as a phosphor indicated in Table 3 and Table 4 is disclosed in Evidence A No. 3, so that the corrected invention of the case is not admitted to especially "exert a working-effect of opening up the selection of a phosphor to be combined with a blue-light-emitting element." It is not significantly difficult to incorporate a configuration relating to the different features 1 to 6 into the evidence A3 invention as judged above in (4).

C The demandee alleges that "Because even if a "phosphor having a composition of $Sr_2Si_4AlON_7:Eu^{2+}$ and having an emission region of 625 to 640 nm" is used as a nitride-containing phosphor that emits red light that is described in Evidence A No. 3, the matters specifying the invention in the corrected invention of the case cannot be obtained, so that it cannot be said that the matters specifying the invention are easily made" (No. 6, 1 (3), D(a) described above), and "Since Evidence A No. 3 discloses only "$Sr_2Si_4AlON_7:Eu^{2+}$" as a nitride aluminosilicate-based red phosphor, Reason for invalidation 3 can be cancelled only with the fact that "$Sr_2Si_4AlON_7:Eu^{2+}$" was deleted by the request for correction" (No. 6, 1 (3), E(a) described above).

However, as described above in (4), A(B), it is not significantly difficult to adopt a nitride aluminosilicate-based phosphor having a composition other than a composition of "$Sr_2Si_4AlON_7:Eu^{2+}$" as an Si/Al-N-based nitride-containing phosphor that emits red light in the evidence A3 invention.

D The demandee alleges that "In the identification of a claimed invention described in Evidence A No. 3, the limitation is made by a specific matter while it is specified that another phosphor may be used, so that the configurations are contradictory" (No. 6, 1 (3), D(f) described above).

However, as described above in (4), A(B), the evidence A3 invention specifies using an "Si/Al-N-based phosphor that can be used as a phosphor that contains two kinds of nitride-containing pigments that emit light in red and green in order to attain white light, and at least one of them is the at least one kind of phosphor"; that is, an "Si/Al-N-based phosphor that can be used as a phosphor that contains two kinds of nitride-containing pigments that emit light in red and green in order to attain white light, at least one of them" is the "evidence A3 phosphor," while the evidence A3 invention does not exclude use of other phosphors. Thus, using a phosphor that is not included in the "evidence A3 phosphor" in addition to selecting "at least one" "evidence A3 phosphor" is not contradictory.

E The demandee alleges that "Evidence A No. 3 does not disclose an illumination unit that is a combination of a blue-light-emitting element and the phosphor indicated in Claim 1 or Table 3 and Table 4, so even if attention is focused on the internal quantum efficiency, only increasing the internal quantum efficiency in a region of 360 nm to 400 nm, and increasing the internal quantum efficiency of a blue-light-emission region cannot be conceived" (No. 6, 1 (3), D(h) described above).

However, as described above in B, it is recognized that a technical idea of combining a blue-emitting LED with a nitride-containing phosphor such as a phosphor indicated in Table 3 and Table 4 is disclosed in Evidence A No. 3. Because the external quantum efficiency is limited by the internal quantum efficiency, increasing the internal quantum efficiency when an attempt is made to increase the efficiency (external quantum efficiency) could surely occur to a person skilled in the art.

(6) Summary

As described above, the corrected invention of the case could have been easily made by a person skilled in the art based on the evidence A3 invention, the matters described in Evidence A No. 3, the matters described in Evidence A No. 13, and the well-known technical matters, and thus, the demandee should not be granted a patent for the Invention in accordance with the provisions of Article 29(2) of the Patent Act.

No. 8 Closing

As described above, the Patent for the corrected invention of the case is granted for the invention contrary to the provisions of Article 29(2) of the Patent Act, and falls under Article 123(1)(ii) of the Patent Act and should be invalidated.

The costs in connection with the trial shall be borne by the demandee under the provisions of Article 61 of the Code of Civil Procedure which is applied mutatis mutandis in the provisions of Article 169(2) of the Patent Act.

Therefore, the trial decision shall be made as described in the conclusion.

April 6, 2015

Chief administrative judge: KOMATSU, Tetsuzo

Administrative judge: SUZUKI, Hajime
Administrative judge: KONDO, Yukihiro