Patent Literature 2: Japanese Patent Application Laid-open No. 2002-348568

Patent Literature 3: Japanese Patent Application Laid-open No. 2007-273440

Patent Literature 4: Japanese Patent Application Laid-open No. 2002-317175

Patent Literature 5: Japanese Patent Application Laid-open No. 2001-164245

Patent Literature 6: Japanese Patent Application Laid-open No. 2011-241160

Patent Literature 7: Japanese Patent Application Laid-open No. 2014-136771

Patent Literature 8: International Patent Application Laid-open No. 2016/108411

Patent Literature 9: Korean Patent Application Laid-open No. 2017/0049360

Summary

Technical Problem

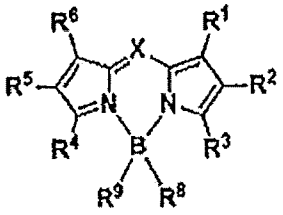
[0006] However, the use of these organic light-emitting materials to manufacture a color conversion composition is still inadequate from the perspective of improving color reproducibility, light emission efficiency and durability. In particular, the technology for providing both high light emission efficiency and high durability and the technology for providing both green emission light with high color-purity and high durability are inadequate.

[0007] The problem to be solved by the present disclosure is to provide an organic light-emitting material suitable as a color conversion material that can be used in a liquid crystal or other such display or an LED or other such illumination apparatus, and to achieve both improved color reproducibility and high durability.

Solution to Problem

[0008] To solve the problem described above and to achieve the object, a pyrromethene-boron complex according to the present disclosure is a compound represented by general formula (1),

[0009]

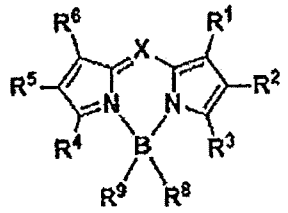


(1)

wherein in general formula (1), X is C-R^7 or N, R^1 to R^7 are each the same or different and are selected from among hydrogen, a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted heterocyclic group, a substituted or unsubstituted alkenyl group, a substituted or unsubstituted cycloalkenyl group, a substituted or unsubstituted alkynyl group, a hydroxy group, a thiol group, a substituted or unsubstituted alkoxy group, a substituted or unsubstituted alkylthio group, a substituted or unsubstituted aryl ether group, a substituted or unsubstituted aryl thioether group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heteroaryl group, a halogen, a cyano group, an aldehyde group, a substituted or unsubstituted carbonyl group, a carboxy group, a substituted or unsubstituted oxycarbonyl group, a substituted or unsubstituted carbamoyl group, a substituted or unsubstituted ester group, a substituted or unsubstituted amide group, a substituted or unsubstituted acyl group, a substituted or unsubstituted sulfonyl group, a substituted or unsubstituted sulfonic acid ester group, a substituted or unsubstituted sulfonamide group, a nitro group, a substituted or unsubstituted silyl group, a

substituted or unsubstituted siloxanyl group, a substituted or unsubstituted boryl group, and a substituted or unsubstituted phosphine oxide group, where R^2 and R^5 are selected from among the groups other than a substituted or unsubstituted aryl group and a substituted or unsubstituted heteroaryl group; R^2 and R^5 are groups not containing a heteroaryl group with at least two condensed rings; R^8 and R^9 are selected from among a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted heterocyclic group, a substituted or unsubstituted alkenyl group, a substituted or unsubstituted cycloalkenyl group, a substituted or unsubstituted alkynyl group, a hydroxy group, a thiol group, a substituted or unsubstituted alkoxy group, a substituted or unsubstituted alkylthio group, a substituted or unsubstituted aryl ether group, a substituted or unsubstituted aryl thioether group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heteroaryl group, a halogen, and a cyano group; and at least one of R^1 to R^6 is a group containing a fluorine atom.

[0009a] In an aspect, there is provided a pyrromethene-boron complex being a compound represented by general formula (1),

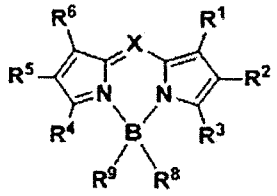


(1)

wherein in general formula (1), X is C-R^7 or N; R^1 to R^7 are each the same or different and are selected from among hydrogen, a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted heterocyclic group, a substituted or unsubstituted alkenyl group, a substituted or unsubstituted cycloalkenyl group, a substituted or unsubstituted alkynyl group, a hydroxy group, a thiol group, a substituted or

unsubstituted alkoxy group, a substituted or unsubstituted alkylthio group, a substituted or unsubstituted aryl ether group, a substituted or unsubstituted aryl thioether group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heteroaryl group, a halogen, a cyano group, an aldehyde group, a carboxy group, a substituted or unsubstituted ester group, a substituted or unsubstituted amide group, a substituted or unsubstituted acyl group, a substituted or unsubstituted sulfonyl group, a substituted or unsubstituted sulfonic acid ester group, a substituted or unsubstituted sulfonamide group, a nitro group, a substituted or unsubstituted silyl group, a substituted or unsubstituted siloxanyl group, a substituted or unsubstituted boryl group, and a substituted or unsubstituted phosphine oxide group, wherein R^2 and R^5 are selected from among these groups other than a substituted or unsubstituted aryl group and a substituted or unsubstituted heteroaryl group; R^2 and R^5 are groups not containing a heteroaryl group with at least two condensed rings; R^8 and R^9 are selected from among a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted heterocyclic group, a substituted or unsubstituted alkenyl group, a substituted or unsubstituted cycloalkenyl group, a substituted or unsubstituted alkynyl group, a hydroxy group, a thiol group, a substituted or unsubstituted alkoxy group, a substituted or unsubstituted alkylthio group, a substituted or unsubstituted aryl ether group, a substituted or unsubstituted aryl thioether group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heteroaryl group, a halogen, and a cyano group; either R^8 or R^9 is a cyano group; and at least one of R^1 to R^6 is a group containing a fluorine atom.

[0009b] In another aspect, there is provided a pyrromethene-boron complex characterized in being a compound represented by general formula (1),

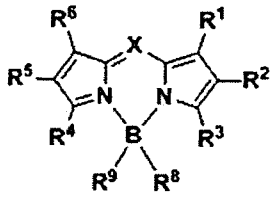


(1)

wherein in general formula (1), X is C-R^7 or N; R^1 to R^7 are the same or different and are selected from among hydrogen, a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted heterocyclic group, a substituted or unsubstituted alkenyl group, a substituted or unsubstituted cycloalkenyl group, a substituted or unsubstituted alkynyl group, a hydroxy group, a thiol group, a substituted or unsubstituted alkoxy group, a substituted or unsubstituted alkylthio group, a substituted or unsubstituted aryl ether group, a substituted or unsubstituted aryl thioether group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heteroaryl group, a halogen, a cyano group, an aldehyde group, a carboxy group, a substituted or unsubstituted ester group, a substituted or unsubstituted amide group, a substituted or unsubstituted acyl group, a substituted or unsubstituted sulfonyl group, a substituted or unsubstituted sulfonic acid ester group, a substituted or unsubstituted sulfonamide group, a nitro group, a substituted or unsubstituted silyl group, a substituted or unsubstituted siloxanyl group, a substituted or unsubstituted boryl group, or a substituted or unsubstituted phosphine oxide group, wherein R^2 and R^5 are selected from among these groups other than a substituted or unsubstituted aryl group and a substituted or unsubstituted heteroaryl group; R^2 and R^5 are groups not containing a heteroaryl group with at least two condensed rings; R^8 and R^9 are selected from among a

substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted heterocyclic group, a substituted or unsubstituted alkenyl group, a substituted or unsubstituted cycloalkenyl group, a substituted or unsubstituted alkynyl group, a hydroxy group, a thiol group, a substituted or unsubstituted alkoxy group, a substituted or unsubstituted alkylthio group, a substituted or unsubstituted aryl ether group, a substituted or unsubstituted aryl thioether group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heteroaryl group, a halogen, or a cyano group; at least one of R^1 to R^6 is a group containing a fluorine atom; and the group containing a fluorine atom is a fluorine-containing acyl group, a fluorine-containing ester group, a fluorine-containing amide group, a fluorine-containing sulfonyl group, a fluorine-containing sulfonic acid ester group, or a fluorine-containing sulfonamide group.

[0009c] In another aspect, there is provided a pyrromethene-boron complex being a compound represented by general formula (1),

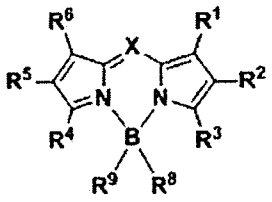


(1)

wherein in general formula (1), X is C-R^7; R^7 is a substituted or unsubstituted aryl group; R^1 to R^6 are the same or different and are selected from among hydrogen, a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted heterocyclic group, a substituted or unsubstituted alkenyl group, a substituted or unsubstituted cycloalkenyl group, a substituted or unsubstituted alkynyl group, a hydroxy group, a thiol group, a substituted or unsubstituted alkoxy group, a

substituted or unsubstituted alkylthio group, a substituted or unsubstituted aryl ether group, a substituted or unsubstituted aryl thioether group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heteroaryl group, a halogen, a cyano group, an aldehyde group, a carboxy group, a substituted or unsubstituted ester group, a substituted or unsubstituted amide group, a substituted or unsubstituted acyl group, a substituted or unsubstituted sulfonyl group, a substituted or unsubstituted sulfonic acid ester group, a substituted or unsubstituted sulfonamide group, a nitro group, a substituted or unsubstituted silyl group, a substituted or unsubstituted siloxanyl group, a substituted or unsubstituted boryl group, and a substituted or unsubstituted phosphine oxide group, wherein R^2 and R^5 are selected from among these groups other than a substituted or unsubstituted aryl group and a substituted or unsubstituted heteroaryl group; R^2 and R^5 are groups not containing a heteroaryl group with at least two condensed rings; R^8 and R^9 are fluorine; at least one of R^1 to R^6 is a group containing a fluorine atom; and neither R^1 nor R^6 is a fluoride-containing aryl group or a fluorine-containing alkyl group.

[0009d] In another aspect, there is provided a pyrromethene-boron complex being a compound represented by general formula (1),



(1)

wherein in general formula (1), X is C-R^7 or N; if X is C-R^7, R^7 is either a substituted or unsubstituted aryl group or a substituted or unsubstituted heteroaryl group; R^1 to R^7 are the same or different and are selected from among hydrogen, a substituted or unsubstituted alkyl group, a substituted or

unsubstituted cycloalkyl group, a substituted or unsubstituted heterocyclic group, a substituted or unsubstituted alkenyl group, a substituted or unsubstituted cycloalkenyl group, a substituted or unsubstituted alkynyl group, a hydroxy group, a thiol group, a substituted or unsubstituted alkoxy group, a substituted or unsubstituted alkylthio group, a substituted or unsubstituted aryl ether group, a substituted or unsubstituted aryl thioether group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heteroaryl group, a halogen, a cyano group, an aldehyde group, a carboxy group, a substituted or unsubstituted ester group, a substituted or unsubstituted amide group, a substituted or unsubstituted acyl group, a substituted or unsubstituted sulfonyl group, a substituted or unsubstituted sulfonic acid ester group, a substituted or unsubstituted sulfonamide group, a nitro group, a substituted or unsubstituted silyl group, a substituted or unsubstituted siloxanyl group, a substituted or unsubstituted boryl group, and a substituted or unsubstituted phosphine oxide group, wherein R^2 and R^5 that are selected from among these groups other than the substituted or unsubstituted aryl group and the substituted or unsubstituted heteroaryl group; R^2 and R^5 are groups not containing a heteroaryl group with at least two condensed rings; at least one of R^1, R^3, R^4, and R^6 is a substituted or unsubstituted alkyl group, a substituted or unsubstituted aryl group, or a substituted or unsubstituted heteroaryl group; R^8 and R^9 are selected from among a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted heterocyclic group, a substituted or unsubstituted alkenyl group, a substituted or unsubstituted cycloalkenyl group, a substituted or unsubstituted alkynyl group, a hydroxyl group, a thiol group, a substituted or unsubstituted alkoxy group, a substituted or unsubstituted alkylthio group, a substituted or unsubstituted aryl ether group, a substituted or unsubstituted

aryl thioether group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heteroaryl group, a halogen, and a cyano group; at least two of R^1 to R^6 are groups containing a fluorine atom; and neither R^1 nor R^6 is a fluorine-containing aryl group or a fluorine-containing alkyl group.

[0010] In the pyrromethene-boron complex according to the present disclosure, at least two of R^1 to R^6 in the general formula (1) are groups containing a fluorine atom.

[0011] In the pyrromethene-boron complex according to the present disclosure, at least one of R^2 and R^5 in the general formula (1) is a group containing a fluorine atom.

[0012] In the pyrromethene-boron complex according to the present disclosure, R^2 and R^5 in the general formula (1) are groups containing a fluorine atom.

[0013] In the pyrromethene-boron complex according to the present disclosure, the group containing the fluorine atom in the general formula (1) is a fluorine-containing acyl group, a fluorine-containing ester group, a fluorine-

containing amide group, a fluorine-containing sulfonyl group, a fluorine-containing sulfonic acid ester group, or a fluorine-containing sulfonamide group.

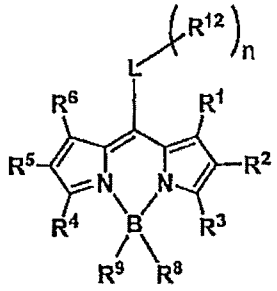
[0014] In the pyrromethene-boron complex according to the present disclosure, the group containing the fluorine atom in the general formula (1) is a fluorine-containing ester group.

[0015] In the pyrromethene-boron complex according to the present disclosure, at least one of R^1, R^3, R^4, and R^6 in the general formula (1) is a substituted or unsubstituted alkyl group.

[0016] In the pyrromethene-boron complex according to the present disclosure, R^7 in the general formula (1) is a substituted or unsubstituted aryl group.

[0017] In the pyrromethene-boron complex according to the present disclosure, the compound represented by the general formula (1) is a compound represented by general formula (2),

[0018]



(2)

in general formula (2), R^1 to R^6, R^8, and R^9 are the same as in the general formula (1), R^{12} is a substituted or unsubstituted aryl group or a substituted or unsubstituted heteroaryl group, L is a substituted or unsubstituted arylene group or a substituted or unsubstituted heteroarylene group, and n is an integer of 1 to 5.

[0019] In the pyrromethene-boron complex according to the present disclosure, either R^8 or R^9 in the general

formula (1) is a cyano group.

[0020] In the pyrromethene-boron complex according to the present disclosure, the compound represented by general formula (1) exhibits a light emission with a peak wavelength observed in a region of 500 to 580 nm inclusive, in response to excitation light.

[0021] In another aspect, there is provided a color conversion composition according to the present disclosure is a color conversion composition that converts incident light to light with a longer wavelength than a wavelength of the incident light. The color conversion composition includes: the pyrromethene-boron complex according to any one of the above-mentioned embodiments; and a binder resin.

[0022] The color conversion composition according to the present disclosure includes: a light-emitting material (a); and a light-emitting material (b), at least one of the light-emitting material (a) and the light-emitting material (b) being the pyrromethene-boron complex, the light-emitting material (a) being a light-emitting material emitting, in response to excitation light, light having a peak wavelength observed in a region of 500 to 580 nm inclusive, and the light-emitting material (b) being a light-emitting material emitting, in response to at least one of excitation by excitation light and light emission from the light-emitting material (a), light having a peak wavelength observed in a region of 580 to 750 nm inclusive.

[0023] In the color conversion composition according to the present disclosure, content w_a of the light-emitting material (a) and content w_b of the light-emitting material (b) have a relation $w_a \geq w_b$.

[0024] The color conversion composition according to the present disclosure further includes a solvent.

[0025] In the color conversion composition according to

the present disclosure, the binder resin is a thermoplastic resin.

[0026] In another aspect, there is provided a color conversion film according to the present disclosure includes a layer containing the color conversion composition according to any one of the above-mentioned embodiments or a cured product thereof.

[0027] The color conversion film according to the disclosure further includes a barrier film.

[0028] In another aspect, there is provided a light source unit according to the present disclosure includes: a light source; and the color conversion film according to the above-mentioned embodiments.

[0029] In the light source unit according to the present disclosure, the light source is a light-emitting diode having a maximum light emission in a wavelength range of 430 to 500 nm inclusive.

[0030] In another aspect, there is provided a display according to the present disclosure includes the color conversion film according to any one of the above-mentioned embodiments.

[0031] In another aspect, there is provided an illumination apparatus according to the present disclosure includes the color conversion film according to any one of the above-mentioned embodiments.

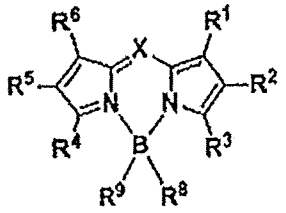
Advantageous Effects

[0032] The color conversion film using the pyrromethene-boron complex and color conversion composition according to the present disclosure achieves both light emission with high color purity and high durability and therefore exhibits the effect of making it possible to both improve color reproducibility and achieve high durability. The light source unit, the display, and the illumination apparatus according to

the present disclosure use such a color conversion film and therefore exhibit the effect of making it possible to both improve color reproducibility and achieve high durability.

CLAIMS

1. A pyrromethene-boron complex being a compound represented by general formula (1),



(1)

wherein in general formula (1), X is C-R^7 or N; R^1 to R^7 are each the same or different and are selected from among hydrogen, a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted heterocyclic group, a substituted or unsubstituted alkenyl group, a substituted or unsubstituted cycloalkenyl group, a substituted or unsubstituted alkynyl group, a hydroxy group, a thiol group, a substituted or unsubstituted alkoxy group, a substituted or unsubstituted alkylthio group, a substituted or unsubstituted aryl ether group, a substituted or unsubstituted aryl thioether group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heteroaryl group, a halogen, a cyano group, an aldehyde group, a carboxy group, a substituted or unsubstituted ester group, a substituted or unsubstituted amide group, a substituted or unsubstituted acyl group, a substituted or unsubstituted sulfonyl group, a substituted or unsubstituted sulfonic acid ester group, a substituted or unsubstituted sulfonamide group, a nitro group, a substituted or unsubstituted silyl group, a substituted or unsubstituted siloxanyl group, a substituted or unsubstituted boryl group, and a substituted or

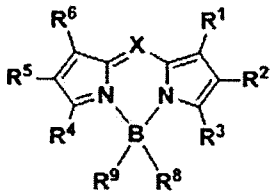
unsubstituted phosphine oxide group, wherein R^2 and R^5 are selected from among these groups other than a substituted or unsubstituted aryl group and a substituted or unsubstituted heteroaryl group; R^2 and R^5 are groups not containing a heteroaryl group with at least two condensed rings; R^8 and R^9 are selected from among a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted heterocyclic group, a substituted or unsubstituted alkenyl group, a substituted or unsubstituted cycloalkenyl group, a substituted or unsubstituted alkynyl group, a hydroxy group, a thiol group, a substituted or unsubstituted alkoxy group, a substituted or unsubstituted alkylthio group, a substituted or unsubstituted aryl ether group, a substituted or unsubstituted aryl thioether group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heteroaryl group, a halogen, and a cyano group; either R^8 or R^9 is a cyano group; and at least one of R^1 to R^6 is a group containing a fluorine atom.

2. The pyrromethene-boron complex according to claim 1, wherein at least two of R^1 to R^6 in the general formula (1) are groups containing a fluorine atom.

3. The pyrromethene-boron complex according to claim 1 or 2, wherein the group containing the fluorine

atom in the general formula (1) is a fluorine-containing acyl group, a fluorine-containing ester group, a fluorine-containing amide group, a fluorine-containing sulfonyl group, a fluorine-containing sulfonic acid ester group, or a fluorine-containing sulfonamide group.

4. A pyrromethene-boron complex characterized in being a compound represented by general formula (1),



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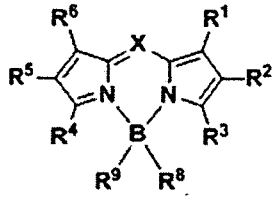
wherein in general formula (1), X is C-R^7 or N; R^1 to R^7 are the same or different and are selected from among hydrogen, a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted heterocyclic group, a substituted or unsubstituted alkenyl group, a substituted or unsubstituted cycloalkenyl group, a substituted or unsubstituted alkynyl group, a hydroxy group, a thiol group, a substituted or unsubstituted alkoxy group, a substituted or unsubstituted alkylthio group, a substituted or unsubstituted aryl ether group, a substituted or unsubstituted aryl thioether group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heteroaryl group, a halogen, a cyano group, an aldehyde group, a carboxy group, a substituted or unsubstituted ester group, a substituted or unsubstituted amide group, a substituted or unsubstituted acyl group, a substituted or unsubstituted sulfonyl group, a substituted or unsubstituted sulfonic acid ester group, a substituted or unsubstituted sulfonamide group, a nitro group, a

substituted or unsubstituted silyl group, a substituted or unsubstituted siloxanyl group, a substituted or unsubstituted boryl group, or a substituted or unsubstituted phosphine oxide group, wherein R^2 and R^5 are selected from among these groups other than a substituted or unsubstituted aryl group and a substituted or unsubstituted heteroaryl group; R^2 and R^5 are groups not containing a heteroaryl group with at least two condensed rings; R^8 and R^9 are selected from among a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted heterocyclic group, a substituted or unsubstituted alkenyl group, a substituted or unsubstituted cycloalkenyl group, a substituted or unsubstituted alkynyl group, a hydroxy group, a thiol group, a substituted or unsubstituted alkoxy group, a substituted or unsubstituted alkylthio group, a substituted or unsubstituted aryl ether group, a substituted or unsubstituted aryl thioether group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heteroaryl group, a halogen, or a cyano group; at least one of R^1 to R^6 is a group containing a fluorine atom; and the group containing a fluorine atom is a fluorine-containing acyl group, a fluorine-containing ester group, a fluorine-containing amide group, a fluorine-containing sulfonyl group, a fluorine-containing sulfonic acid ester group, or a fluorine-containing sulfonamide group.

5. The pyrromethene-boron complex according to claim 4, wherein at least two of R^1 to R^6 in the general formula (1) are groups containing a fluorine atom.

6. The pyrromethene-boron complex according to claim 4 or 5, wherein either R^8 or R^9 in the general formula (1) is a cyano group.

7. A pyrromethene-boron complex being a compound represented by general formula (1),



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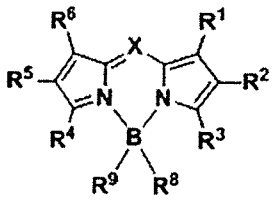
wherein in general formula (1), X is C-R^7; R^7 is a substituted or unsubstituted aryl group; R^1 to R^6 are the same or different and are selected from among hydrogen, a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted heterocyclic group, a substituted or unsubstituted alkenyl group, a substituted or unsubstituted cycloalkenyl group, a substituted or unsubstituted alkynyl group, a hydroxy group, a thiol group, a substituted or unsubstituted alkoxy group, a substituted or unsubstituted alkylthio group, a substituted or unsubstituted aryl ether group, a substituted or unsubstituted aryl thioether group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heteroaryl group, a halogen, a cyano group, an aldehyde group, a carboxy group, a substituted or unsubstituted ester group, a substituted or unsubstituted amide group, a substituted or unsubstituted acyl group, a substituted or unsubstituted sulfonyl group, a substituted or unsubstituted sulfonic acid ester group, a substituted or unsubstituted sulfonamide group, a nitro group, a

substituted or unsubstituted silyl group, a substituted or unsubstituted siloxanyl group, a substituted or unsubstituted boryl group, and a substituted or unsubstituted phosphine oxide group, wherein R^2 and R^5 are selected from among these groups other than a substituted or unsubstituted aryl group and a substituted or unsubstituted heteroaryl group; R^2 and R^5 are groups not containing a heteroaryl group with at least two condensed rings; R^8 and R^9 are fluorine; at least one of R^1 to R^6 is a group containing a fluorine atom; and neither R^1 nor R^6 is a fluoride-containing aryl group or a fluorine-containing alkyl group.

8. The pyrromethene-boron complex according to claim 7, wherein at least two of R^1 to R^6 in the general formula (1) are groups containing a fluorine atom.

9. The pyrromethene-boron complex according to claim 7 or 8, wherein the group containing the fluorine atom in the general formula (1) is a fluorine-containing acyl group, a fluorine-containing ester group, a fluorine-containing amide group, a fluorine-containing sulfonyl group, a fluorine-containing sulfonic acid ester group, or a fluorine-containing sulfonamide group.

10. A pyrromethene-boron complex being a compound represented by general formula (1),



(1)

wherein in general formula (1), X is C-R^7 or N; if X is C-R^7, R^7 is either a substituted or unsubstituted aryl group or a substituted or unsubstituted heteroaryl group; R^1 to R^7 are the same or different and are selected from among hydrogen, a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted heterocyclic group, a substituted or unsubstituted alkenyl group, a substituted or unsubstituted cycloalkenyl group, a substituted or unsubstituted alkynyl group, a hydroxy group, a thiol group, a substituted or unsubstituted alkoxy group, a substituted or unsubstituted alkylthio group, a substituted or unsubstituted aryl ether group, a substituted or unsubstituted aryl thioether group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heteroaryl group, a halogen, a cyano group, an aldehyde group, a carboxy group, a substituted or unsubstituted ester group, a substituted or unsubstituted amide group, a substituted or unsubstituted acyl group, a substituted or unsubstituted sulfonyl group, a substituted or unsubstituted sulfonic acid ester group, a substituted or unsubstituted sulfonamide group, a nitro group, a substituted or unsubstituted silyl group, a substituted or unsubstituted siloxanyl group, a substituted or unsubstituted boryl group, and a substituted or unsubstituted phosphine oxide group, wherein R^2 and R^5 that

are selected from among these groups other than the substituted or unsubstituted aryl group and the substituted or unsubstituted heteroaryl group; R^2 and R^5 are groups not containing a heteroaryl group with at least two condensed rings; at least one of R^1, R^3, R^4, and R^6 is a substituted or unsubstituted alkyl group, a substituted or unsubstituted aryl group, or a substituted or unsubstituted heteroaryl group; R^8 and R^9 are selected from among a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted heterocyclic group, a substituted or unsubstituted alkenyl group, a substituted or unsubstituted cycloalkenyl group, a substituted or unsubstituted alkynyl group, a hydroxyl group, a thiol group, a substituted or unsubstituted alkoxy group, a substituted or unsubstituted alkylthio group, a substituted or unsubstituted aryl ether group, a substituted or unsubstituted aryl thioether group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heteroaryl group, a halogen, and a cyano group; at least two of R^1 to R^6 are groups containing a fluorine atom; and neither R^1 nor R^6 is a fluorine-containing aryl group or a fluorine-containing alkyl group.

11. The pyrromethene-boron complex according to claim 10, wherein the group containing the fluorine atom in the general formula (1) is a fluorine-containing acyl group, a fluorine-containing ester group, a fluorine-containing amide group, a fluorine-containing sulfonyl group, a fluorine-containing sulfonic acid ester group, or a fluorine-containing sulfonamide group.

12. The pyrromethene-boron complex according to claim 10 or 11, wherein either R^8 or R^9 in the general formula (1) is a cyano group.

13. The pyrromethene-boron complex according to any one of claims 1 to 12, wherein at least one of R^2 and R^5 in the general formula (1) is a group containing a fluorine atom.

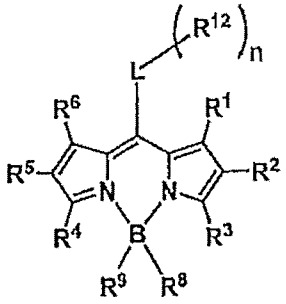
14. The pyrromethene-boron complex according to any one of claims 1 to 13, wherein R^2 and R^5 in the general formula (1) are groups containing a fluorine atom.

15. The pyrromethene-boron complex according to any one of claims 1 to 14, wherein the group containing the fluorine atom in the general formula (1) is a fluorine-containing ester group.

16. The pyrromethene-boron complex according to any one of claims 1 to 15, wherein at least one of R^1, R^3, R^4, and R^6 in the general formula (1) is a substituted or unsubstituted alkyl group.

17. The pyrromethene-boron complex according to any one of claims 1 to 9 and 11 to 16, wherein R^7 in the general formula (1) is a substituted or unsubstituted aryl group.

18. The pyrromethene-boron complex according to any one of claims 1 to 17, wherein the compound represented by the general formula (1) is a compound represented by general formula (2),



(2)

in general formula (2), R^1 to R^6, R^8 and R^9 are the same as in the general formula (1); R^{12} is a substituted or unsubstituted aryl group or a substituted or unsubstituted

heteroaryl group; L is a substituted or unsubstituted arylene group or a substituted or unsubstituted heteroarylene group; and n is an integer of 1 to 5.

19. The pyrromethene-boron complex according to any one of claims 1 to 18, wherein the compound represented by general formula (1) exhibits a light emission with a peak wavelength observed in a region of 500 to 580 nm inclusive, in response to excitation light.

20. A color conversion composition that converts incident light to light with a longer wavelength than a wavelength of the incident light, the color conversion composition comprising:

the pyrromethene-boron complex according to any one of claims 1 to 19; and

a binder resin.

21. The color conversion composition according to claim 20, comprising:

a light-emitting material (a); and

a light-emitting material (b),

at least one of the light-emitting material (a) and the light-emitting material (b) being the pyrromethene-boron complex,

the light-emitting material (a) being a light-emitting material emitting, in response to excitation light, light having a peak wavelength observed in a region of 500 to 580 nm inclusive, and

the light-emitting material (b) being a light-emitting material emitting, in response to at least one of excitation by excitation light and light emission from the light-emitting material (a), light having a peak wavelength observed in a region of 580 to 750 nm inclusive.

22. The color conversion composition according to claim 21, wherein content w_a of the light-emitting material (a) and content w_b of the light-emitting material (b) have a relation $w_a \geq w_b$.

23. The color conversion composition according to any one of claims 20 to 22, further comprising a solvent.

24. The color conversion composition according to any one of claims 20 to 23, wherein the binder resin is a thermoplastic resin.

25. A color conversion film comprising a layer containing the color conversion composition according to any one of claims 20 to 24 or a cured product thereof.

26. The color conversion film according to claim 25, further comprising a barrier film.

27. A light source unit comprising:
a light source; and
the color conversion film according to claim 25 or 26.

28. The light source unit according to claim 27, wherein the light source is a light-emitting diode having a maximum light emission in a wavelength range of 430 to 500 nm inclusive.

29. A display comprising the color conversion film according to claim 25 or 26.

30. An illumination apparatus comprising the color conversion film according to claim 25 or 26.