NEAR INFRARED RAY ABSORBENT COMPOSITION, NEAR INFRARED RAY CUT FILTER, MANUFACTURING METHOD OF NEAR INFRARED RAY CUT FILTER, SOLID IMAGE PICKUP ELEMENT, CAMERA MODULE

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a near infrared ray absorbent composition, a near infrared ray cut filter, a manufacturing method of a near infrared ray cut filter, a solid image pickup element, and a camera module.

2. Description of the Related Art

[0002] A CCD image sensor or a CMOS image sensor which is a solid image pickup element is used in a video camera, a digital still camera, a mobile phone with a camera function, and the like. In order to use a silicon photodiode having sensitivity with respect to a near infrared ray in a light receiving section of the solid image pickup element, it is necessary to perform visual sensitivity correction, and there are many cases of using a near infrared ray cut filter.

In JP2014-63144A, a near infrared ray absorbent composition is disclosed in which a content of a near infrared ray absorption dye is 0.2 to 10 parts by mass, and contents of a silane coupling agent and/or an oligomer thereof are 0.1 to 30 parts by mass, with respect to 100 parts by mass of a transparent resin.

In JP2013-19991A, a near infrared ray absorbent composition is disclosed in which a near infrared ray absorption dye formed of a diimmonium salt, a silane coupling agent, and a pressure sensitive adhesive are contained.

SUMMARY

[0004] However, in the near infrared ray absorbent composition disclosed JP2014-63144A and

JP2013-19991A, heat resistance was insufficient.

The present disclosure has been made in order to solve such a problem, and an object of present disclosure is to provide a near infrared ray absorbent composition which can form a cured film having excellent heat resistance while maintaining high near infrared ray shielding properties, and a near infrared ray cut filter, a manufacturing method of a near infrared ray cut filter, a solid image pickup element, and a camera module using the near infrared ray absorbent composition.

[0005] As a result of intensive studies of the present inventors, it has been found that a near infrared ray absorbent composition containing a compound having a partial structure represented by M-X and a near infrared ray absorbent compound can form a film having excellent heat resistance and high near infrared ray shielding properties, and thus, the present disclosure has been completed. The present disclosure provides the followings.

<1> A near infrared ray absorbent composition, containing: a compound having a partial structure represented by M-X; and a near infrared ray absorbent compound, in which a content of the compound having a partial structure represented by M-X is greater than or equal to 15 mass% with respect to a total solid content of the near infrared ray absorbent composition, and here, M is an atom selected from Si, Ti, Zr, and Al, X is one type selected from a hydroxy group, an alkoxy group, an acyloxy group, a phosphoryloxy group, a sulfonyloxy group, an amino group, an oxime group, and $O=C(R^a)(R^b)$, R^a and R^b each independently represent a monovalent organic group, and in a case in which X is $O=C(R^a)(R^b)$, X is bonded to M by an unshared electron pair of an oxygen atom of a carbonyl group.

<2> The near infrared ray absorbent composition according to <1>, in which in the compound having a partial structure represented by M-X, M is Si.

<3> The near infrared ray absorbent composition according to <1> or <2>, in which in the compound having a partial structure represented by M-X, X is an alkoxy group.

<4> The near infrared ray absorbent composition according to any one of <1> to <3>,

in which the compound having a partial structure represented by M-X is an acrylic resin, an acrylamide resin, or a styrene resin.

<5> The near infrared ray absorbent composition according to any one of <1> to <4>, in which a weight-average molecular weight of the compound having a partial structure represented by M-X is 500 to 300,000.

<6> The near infrared ray absorbent composition according to any one of <1> to <5>, in which the near infrared ray absorbent compound is a copper compound.

<7> A near infrared ray cut filter obtained by using the near infrared ray absorbent composition according to any one of <1> to <6>.

<8> A manufacturing method of a near infrared ray cut filter, comprising: applying the near infrared ray absorbent composition according to any one of <1> to <6> on a solid image pickup element on a light receiving side.

<9> A solid image pickup element, comprising: a near infrared ray cut filter obtained by using the near infrared ray absorbent composition according to any one of <1> to <6>.

<10> A camera module, comprising: a solid image pickup element; and a near infrared ray cut filter disposed on the solid image pickup element on a light receiving side, in which the near infrared ray cut filter is the near infrared ray cut filter according to <7>.

[0005a] In one aspect of the present disclosure, there is provided a near infrared ray absorbent composition, containing: a compound having a partial structure represented by M-X; and a near infrared ray absorbent compound, wherein a content of the compound having a partial structure represented by M-X is greater than or equal to 15 mass% with respect to a total solid content of the near infrared ray absorbent composition, and M is an atom selected from Si, Ti, Zr, and Al, X is one type selected from a hydroxy group, an alkoxy group, an acyloxy group, a phosphoryloxy group, a sulfonyloxy group, an amino group, an oxime group, and $O=C(R^a)(R^b)$, R^a and R^b each independently represent a monovalent organic group, and in a case in which X is $O=C(R^a)(R^b)$, X is bonded to M by an unshared electron pair of an oxygen atom of a carbonyl group.

[0005b] In another aspect of the present disclosure, there is provided a near infrared ray cut filter obtained by using the near infrared ray absorbent composition as described herein.

[0005c] In yet another aspect of the present disclosure, there is provided a manufacturing method of a near infrared ray cut filter, comprising: applying the near infrared ray absorbent composition as described herein on a solid image pickup element on a light receiving side.

[0005d] In a further aspect of the present disclosure, there is provided a solid image pickup element, comprising: a near infrared ray cut filter obtained by using the near infrared ray absorbent composition as described herein.

[0005e] In another aspect of the present disclosure, there is provided a camera module, comprising: a solid image pickup element; and a near infrared ray cut filter disposed on the solid image pickup element on a light receiving side, wherein the near infrared ray cut filter is the near infrared ray cut filter as described herein.

[0006] According to the present disclosure, it is possible to provide a near infrared ray absorbent composition which can form a cured film having excellent heat resistance while maintaining high near infrared ray shielding properties. Further, it is also possible to improve moisture resistance. In addition, it is possible to provide a near infrared ray cut filter, a manufacturing method of a near infrared ray cut filter, a solid image pickup element, and a camera module using such a near infrared ray absorbent composition.

BRIEF DESCRIPTION OF THE DRAWINGS