

## Appeal decision

Appeal No. 2016-7618

USA

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The case of appeal against the examiner's decision of refusal of Japanese Patent Application No. 2013-272330, entitled "Printing Plates Comprising Modified Pigment Products" (published on April 24, 2014, Japanese Unexamined Patent Application Publication No. 2014-74928) has resulted in the following appeal decision:

## Conclusion

The appeal of the case was groundless.

## Reason

### No. 1 Outline of the case

#### 1 History of the procedures before application

History of the procedures before filling Japanese Patent Application 2013-272330 (hereinafter referred to as "Application") is as follows:

(1) Japanese Patent Application 2002-508897 was filed on June 29, 2001 in accordance with the provisions of Article 184ter(1) of the Patent Act (claiming priority based on an application received by the foreign receiving office (US) on July 6, 2000 and September 20, 2000).

(2) A part of the application described in the above section (1) was filed as a new foreign language written application (Japanese Patent Application 2011-259127) on November 28, 2011 under the provisions of Article 44(1) and Article 36bis(1) of the Patent Act.

(3) In addition, part of the application described in the above section (2) was filed as a foreign language written application on December 27, 2013 under the provisions of Article 44(1) and Article 36bis(1) of the Patent Act. This application is the "Application" of the case.

#### 2 History of the procedures after application

The brief history of the procedures after filing the Application is as follows:

January 27, 2014	Written amendment
October 8, 2014	Notification of reasons for refusal
January 14, 2015	Statement of correction
January 14, 2015	Written opinion
January 14, 2015	Written amendment
May 1, 2015	Notification of reasons for refusal
August 5, 2015	Written opinion
January 21, 2016	Examiner's decision of refusal
May 25, 2016	Request for appeal
May 25, 2016	Written amendment

August 26, 2016                      Notification of reasons for refusal  
(Hereinafter reasons for refusal noticed by this notification of reasons for refusal are referred to as "the reasons for refusal noticed by the body.")  
February 28, 2017                      Written opinion  
February 28, 2017                      Written amendment  
(Hereinafter this written amendment is referred to as "the Amendment.")

### 3 The Invention

The inventions according to Claims 1 to 6 of the Application are specified by the matters described in Claims 1 to 6 described in the scope of claims amended with the Amendment, and the invention according to Claim 1 is as follows (hereinafter referred to as "the Invention").

"A method for forming a black matrix, comprising:

    applying a photosensitive coating on a clear substrate;  
    exposing the said coating imagewise; and  
    developing and drying the said coating,

    wherein the said photosensitive coating comprises at least one modified carbon black product comprising a carbon black having at least one attached organic ionic group and at least one amphiphilic counterion to the said organic ionic group, wherein the said amphiphilic counterion has a charge opposite to that of the said organic ionic group, and

    wherein the said modified carbon black product is prepared by reaction of the said carbon black, at least one amine compound, and a nitrite, thereby attaching the said organic ionic group to the said carbon black."

### 4 Reasons for refusal noticed by the body

The reasons for refusal noticed by the body include the following reasons.

#### (1) Regarding Reason 1(4)

[Example 1] to [Example 21] are disclosed in the detailed description of the invention of the Application. However, among these examples, only [Example 21] is an example regarding a black matrix. Since each of [Example 1] to [Example 20] is not an example regarding a black matrix, a person skilled in the art cannot understand whether these modified carbon black products can be used for a black matrix.

It is not clear whether the Invention is described in the detailed description of the invention.

Thus, regarding the Application, the description of the scope of claims does not meet the requirement stipulated in Article 36(6)(i) of the Patent Act.

(2) Regarding Reason 3

It is only a development of new use for a person skilled in the art to adopt the invention described in International Publication No. 97/47691 (herein after referred to as "Cited Document), which was distributed before the date of priority claim of the Application (hereinafter referred to as "priority date") as a carbon black in a well-known manufacturing method of a black matrix. Alternatively, using a carbon black described in the Cited Document as a carbon black in manufacturing a black matrix is only a matter within normal creative ability of a person skilled in the art.

Thus, since the Invention could be easily made by a person skilled in the art before the priority date based on the invention described in the Cited Document and well-known arts, the appellant should not be granted a patent for the Invention in accordance with the provisions of Article 29(2) of the Patent Act.

No. 2 Judgment by the body

1 Regarding Reason 1(4) (Article 36(6)(i) of the Patent Act)

(1) Description of the detailed description of the invention

The following matters are described in the detailed description of the invention of the application as follows.

A "[Title of the invention] Printing Plates Comprising Modified Pigment Products"

B "[Technical field]

[0001]

The present invention relates to printing plates comprising a substrate and a radiation absorptive layer, wherein the radiation absorptive layer comprises at least one modified pigment product."

C "[Background Art]

[0002]

Printing plates are used in several areas of image reproduction, including lithographic printing (also known as offset or planographic printing), flexographic printing, and gravure printing (also called intaglio or rotogravure).

In general, the printing process involves the development of an image on the plate followed by exposure to an ink.

[0003]

Lithographic printing plates are among the most widely used for making printed copies. Generally, an infrared or near-infrared laser-imageable lithographic printing plate includes at least the following layers: a grained-metal, or polyester plate or sheetlike substrate and a radiation absorptive layer coated thereon.

... (Omitted) ...

[0004]

In general, the radiation absorptive layer comprises a photothermal conversion material capable of interacting with the imaging radiation and a polymeric resin or binder.

... (Omitted) ...

[0006]

The photothermal conversion material can be either a pigment or a dye. For example, UV-and IR-active dyes have been disclosed in phenolic printing plate applications (see DBP879025 and WO97/39894). IR-absorptive pigments such as carbon black have also been shown to be useful in a lithographic printing plate (see, for example, WO99/08157, WO96/20429, WO99/11458, and US6,060,218 in which carbon black is present in a phenolic polymer).

... (Omitted) ...

[0009]

PCT Publication WO00/16987 discloses an imaging member comprising at least one heat-sensitive polymer and a photothermal conversion material, such as a dye or pigment. Such polymers are capable of undergoing a transformation from a hydrophilic to a hydrophobic state, or vice versa. No modified pigment product, particularly those that can undergo a chemical transformation, is disclosed."

D "[Problem to be solved by the invention]

[0012]

Pigments such as carbon black are broad band radiation absorbers and, as such, offer an improvement in performance over dyes. However, the effectiveness of pigments such as carbon black as a photothermal conversion material in a printing plate is dependent on the dispersibility of the pigment in the polymer. Thus, there is

a need for printing plates comprising pigments such as carbon black with improved dispersibility in polymers used to produce printing plates."

E "[Means for solving the problem]

[0013]

The present invention relates to printing plates comprising a substrate and a radiation absorptive layer, wherein the radiation absorptive layer comprises at least one modified pigment product comprising a pigment having attached thereto at least one organic ionic group and at least one amphiphilic counterion.

... (Omitted) ...

[0018]

The present invention further relates to printing plates comprising a substrate and a radiation absorptive layer, wherein the radiation absorptive layer comprises at least one modified pigment product comprising a pigment that is at least partially coated with one or more polymeric coatings.

The present invention further relates to a method of imaging the printing plates of this invention.

[0019]

It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory only and are intended to provide further explanation of the present invention, as claimed."

F "[Description of Embodiments]

[0020]

The present invention relates to printing plates comprising a substrate and a radiation absorptive layer comprising at least one modified pigment product.

... (Omitted) ...

[0021]

Several types of substrates are useful for the present invention and are known to those skilled in the art. Preferred substrates include paper, hydrophilic metals such as aluminum, particularly anodized or grained anodized aluminum, as well as polymers such as polyesters, and, in particular, polyethylene terephthalate. However, other types of substrates can also be used.

[0022]

In general, a radiation absorptive layer comprises a photothermal conversion material and a polymer or resin. The radiation absorptive layer of the present invention comprises a modified pigment and an optional polymer, such as a phenol or polymer.

[0023]

Several pigment types are useful in the present invention. The pigments to be modified can be, but are not limited to, pigments traditionally used in ink compositions (including inkjet ink compositions), coating compositions (including paint formulations), liquid and solid toners, films, plastics, rubbers, and the like. Examples include, but are not limited to, black pigments (e.g., carbon products such as carbon black) and other colored pigments (e.g., polymeric and organic pigments).

... (Omitted) ...

[0028]

The modified pigment product used in the printing plates of the present invention preferably comprises a pigment having attached thereto at least one organic group.

... (Omitted) ...

[0034]

In another embodiment, the printing plates of the present invention comprise a substrate and a radiation absorptive layer which comprises a modified pigment product comprising a pigment having attached thereto at least one organic ionic group and at least one amphiphilic counterion. The amphiphilic counterion is a molecule having a hydrophilic polar "head" and a hydrophobic organic "tail."

... (Omitted) ...

[0035]

The amphiphilic counterion of the present invention has a charge opposite that of the organic ionic group. Thus, if the modified pigment product is anionic, then the amphiphilic counterion will be cationic or positive charging. Similarly, if the modified pigment product is cationic, then the amphiphilic counterion will be anionic or negative charging.

... (Omitted) ...

[0072]

The present invention also relates to a method of imaging a printing plate comprising a radiation absorptive layer which comprises an optional polymer and at

least one modified pigment product which involves selectively exposing the plate to a laser output in a pattern representing an image.

... (Omitted) ...

[0073]

The present invention relates to lithographic printing plates, such as infrared or near-infrared laser-imageable printing plates.

... (Omitted) ...

[0074]

Also, the present invention relates to flexographic printing plates, such as infrared or near-infrared laser-imageable printing plates.

... (Omitted) ...

[0075]

The present invention further relates to thermal transfer recording materials.

... (Omitted) ...

[0076]

The present invention further relates to other types of proofing materials.

... (Omitted) ...

[0077]

The present invention further relates to a black matrix for color filters. A black matrix is an integral component of an image display, in particular, a liquid crystal display (LCD). Examples of liquid crystal displays include, for example, super twisted nematic (STN) displays and thin film transistor (TFT) displays. Each of these types of liquid crystal displays contains a black matrix element. A black matrix is generally formed by applying a photosensitive coating on a clear substrate, exposing the coating imagewise, and developing and drying the coating. In the present invention, the photosensitive coating comprises at least one modified pigment product and a solvent. This may further contain a resin such as a photosensitive resin. The color filter further comprises colored layers. The color layers may be, for example, red, green, and yellow, or cyan, magenta, and yellow. The details of the various conventional components and techniques for such black matrices are described in Japanese patents JP11-62119; JP10-300921; JP11-6914; JP11-14822, and JP11-142639 which are incorporated in their entireties by reference herein.

[0078]

The present invention will be further clarified by the following examples,



which are intended to be purely exemplary of the present invention."

G "[Examples]

[0079]

[Example 1]

An aqueous dispersion of a modified carbon black product was prepared. A pin pelletizer was charged with 1 part of a carbon black with a surface area of 110 m<sup>2</sup>/g and a DBPA of 114 mL/100 g. A solution of 0.06 parts of N-(4-aminophenyl)pyridinium nitrite in 0.18 parts of water was added while a pelletizer was operating at 600 rpm. An aqueous solution of nitric acid in water (0.8 parts, 22% HNO<sub>3</sub>) was added and mixing was continued for a few minutes, to give a product with 0.21 mmol/g of attached p-C<sub>6</sub>H<sub>4</sub>(N<sup>+</sup>C<sub>5</sub>H<sub>5</sub>)NO<sub>3</sub><sup>-</sup> groups. After standing for several days, the product was dispersed in water. Impurities were removed by centrifugation and with diafiltration using water. The resulting dispersion had 12% solids.

... (Omitted) ...

[0080]

... (Omitted) ...

The resulting product was an aqueous dispersion of a carbon black product with an attached ionic group and a polymeric counterion.

[0081]

[Example 2]

... (Omitted) ...

[0083]

... (Omitted) ...

The resulting product was an aqueous dispersion of a carbon black product with an attached ionic group and a polymeric counterion.

[0084]

[Example 3]

... (Omitted) ...

[0085]

... (Omitted) ...

The resulting product was an aqueous dispersion of a carbon black product with an attached ionic group and a polymeric counterion. The product had a zeta

potential of -20 mV.

[0086]

[Example 4]

... (Omitted) ...

The resulting product is an aqueous dispersion of a modified carbon black with a polymeric coating.

[0087]

[Example 5]

... (Omitted) ...

The resulting dispersion was coated onto a grained anodized aluminum plate to give a uniform wet coating with a thickness of 25  $\mu\text{m}$ . The coated plate was air dried. The resulting composite could be imaged by selective exposure to infrared radiation (e.g. with a diode laser emitting at 830 or 1064 nm) and could be developed with a sodium silicate developer.

[0088]

[Example 6]

... (Omitted) ...

The resulting dispersion was coated onto a grained anodized aluminum plate to give a uniform wet coating with a thickness of 25  $\mu\text{m}$ . The coated plate was air dried. The resulting composite could be imaged by selective exposure to infrared radiation (e.g. with a diode laser emitting at 830 or 1064 nm) and could be developed with a sodium silicate developer.

[0089]

[Example 7]

... (Omitted) ...

The resulting dispersion was coated onto a grained anodized aluminum plate to give a uniform wet coating with a thickness of 25  $\mu\text{m}$ . The coated plate was air dried. The resulting composite could be imaged by selective exposure to infrared radiation (e.g. with a diode laser emitting at 830 or 1064 nm) and could be developed with a sodium silicate developer.

[0090]

[Example 8]

... (Omitted) ...

The resulting dispersion was coated onto a grained anodized aluminum plate

to give a uniform wet coating with a thickness of 25  $\mu\text{m}$ . The coated plate was air dried. The resulting composite could be imaged by selective exposure to infrared radiation (e.g. with a diode laser emitting at 830 or 1064 nm) and could be developed with a sodium silicate developer.

[0091]

[Example 9]

... (Omitted) ...

[0093]

... (Omitted) ...

The resulting dispersion was coated onto a grained anodized aluminum plate to give a uniform wet coating with a thickness of 25  $\mu\text{m}$ . The coated plate was air dried. The resulting composite could be imaged by selective exposure to infrared radiation (e.g. with a diode laser emitting at 830 or 1064 nm) and could be developed with a sodium silicate developer.

[0094]

[Example 10]

... (Omitted) ...

[0096]

... (Omitted) ...

The final product was a dispersion having a solids content of 10%. On a dry basis, each gram of carbon black product contained 0.10 meq/g of attached polyacrylic acid (Mw of about 2000).

[0097]

[Example 11]

... (Omitted) ...

[0098]

... (Omitted) ...

Aqueous ammonium hydroxide (39 g of a 28% solution) was added and the product was purified with water in a diafiltration device to give a dispersion of a carbon black product with attached polymer.

[0099]

[Example 12]

The procedure of Example 11 was repeated, except that a carbon black with a surface area of 110  $\text{m}^2/\text{g}$  and a DBPA of 114 mL/100 g was used.

[0100]

[Example 13]

... (Omitted) ...

[0101]

... (Omitted) ...

Aqueous ammonium hydroxide (13 g of a 28% solution further diluted with 200 g of water) was added and the product was purified with water in a diafiltration device to give a dispersion of a carbon black product with attached polymer.

[0102]

[Example 14]

... (Omitted) ...

The resulting dispersion was coated onto a grained anodized aluminum plate to give a uniform wet coating with a thickness of 25  $\mu\text{m}$ . The coated plate was air dried. The resulting composite could be imaged by selective exposure to infrared radiation (e.g. with a diode laser emitting at 830 or 1064 nm) and could be developed with a sodium silicate developer.

[0103]

[Example 15]

... (Omitted) ...

The resulting dispersion was coated onto a grained anodized aluminum plate to give a uniform wet coating with a thickness of 25  $\mu\text{m}$ . The coated plate was air dried. The resulting composite could be imaged by selective exposure to infrared radiation (e.g. with a diode laser emitting at 830 or 1064 nm) and could be developed with a sodium silicate developer.

[Example 16]

The aqueous carbon black product prepared in Example 1 was mixed with the materials in Table 1 using the ratio specified to make an infrared absorbing coating composition. The composition was coated onto grained anodized aluminum to give a uniform wet coating with a thickness of 25  $\mu\text{m}$ .

[0104]

[Table 1]

表 1

	供給者	部
ポリビニルアルコール (Mw=77,000-79,000) (水に5%)	J. T. Baker	15.0
ポリウレタン分散体 Neorez XR-9624 (水に12.8%)	Zeneca	11.7
Cymel 303	Cytec	0.63
Byk 451 触媒 (水に26%)	Byk Chemie	0.38
Triton X-100	Rohm and Haas	0.12
2-ブトキシエタノール	Aldrich Chemical	1.25
カーボンブラック分散体 (水に10%)		16.5
水		3.1

供給者          Supplier

ポリビニルアルコール (Mw = 77,000-79,000) (水に5%)

Polyvinyl alcohol (Mw = 77,000 to 79,000) (5% in water)

ポリウレタン分散体 Neorez XR-9624 (水に12.8%)

Polyurethane dispersion Neorez XR-9624 (12.8% in water)

Byk 451 触媒 (水に26%) Byk 451 catalyst (26% in water)

2-ブトキシエタノール 2-butoxyethanol

カーボンブラック分散体 (水に10%) Carbon black dispersion (10% in water)

水 Water

[0105]

Coating compositions were prepared similarly with dispersions of the modified carbon black products prepared in Examples 2 to 4 and 10. Each was coated onto grained anodized aluminum to give a uniform wet coating with a thickness of 25  $\mu\text{m}$ .

[0106]

[Example 17]

This example describes the application of the infrared absorbing coating compositions of Example 16 to the preparation of lithographic printing plates.

... (Omitted) ...

[0109]

[Example 18]

... (Omitted) ...

[0110]

The carbon black products of Examples 1 to 4 and 10 to 13 were diluted with water to form dispersions with 9.9% solids. Coatings compositions were prepared from 1 part of the polymer latex, 0.84 parts of the carbon black product dispersions, and 0.79 parts of isopropanol. The coating was applied to a grained anodized aluminum plate using a knife coater to give a wet film thickness of 20  $\mu\text{m}$  and was subsequently dried. The resulting composite could be imaged by selective exposure to infrared radiation (e.g. with a diode laser emitting at 830 or 1064 nm) and could be developed with a sodium silicate developer.

[0111]

[Example 19]

... (Omitted) ...

[0112]

The carbon black products of Examples 1 to 4 and 10 to 13 were diluted with water to form dispersions with 9.9% solids. Coatings compositions were prepared from 1 part of the microgel, 0.75 parts of the carbon black product dispersions, and 1.7 parts of isopropanol. The coating could be applied to a Polychrome Vector P95 positive working UV sensitive lithographic printing plate. After drying, the plate could be imaged by selective exposure to infrared radiation (e.g. with a diode laser emitting at 830 or 1064 nm) and could be developed with a Polychrome PC955 developer diluted to 10% in water. The plate could be exposed to UV radiation in a conventional contact exposure frame and could be subsequently developed with a Polychrome PC4000 positive developer.

[0113]

[Example 20]

... (Omitted) ...

[0114]

The carbon black products of Examples 1 to 4 and 10 to 13 were diluted with water to form dispersions with 9.9% solids. Coatings compositions were prepared from 1 part of the microgel, 0.75 parts of the carbon black product dispersions, and 1.79 parts of isopropanol. The coating was applied to a grained anodized aluminum plate using a knife coater to give a wet film thickness of 20  $\mu\text{m}$  and was subsequently dried. The resulting composite could be imaged by selective exposure to infrared radiation (e.g. with a diode laser emitting at 830 or 1064 nm) and could be developed with a sodium silicate developer.

[0115]

[Example 21]

A solution of Joncryl (registered trademark) 611 acrylic resin in tetrahydrofuran (THF) having 31% solids was dried using 3A molecular sieves. Joncryl (registered trademark) 611 acrylic resin is available from S. C. Johnson, Sturtevant, WI, and has a MW of 8100 and an acid number of 53. Paraphenylenediamine (4.7 g) and then 8.9 g of 1,3-dicyclohexylcarbodiimide were added to 1126 g of the Joncryl (registered trademark) 611 acrylic resin solution, and the mixture was heated at reflux for 30 minutes. The mixture was filtered to give a solution of an aminophenyl derivative of the polymer with a solids content of 36 wt%.

[0116]

A rotor stator was used to mix 853 g of the aminophenyl polymer solution, 300 g of carbon black, and 400 mL of THF. The carbon black had a surface area of 50 m<sup>2</sup>/g and a DBPA of 46 mL/100 g. Methanesulfonic acid (3.54 g) was added. A solution of 2.55 g of NaNO<sub>2</sub> in 150 g of water was added dropwise, and mixing was continued for an additional 2 hours. The resulting dispersion was purified with a 20%/80% water/THF solution, THF and finally propylene glycol methyl ether acetate using a diafiltration device. The dispersion was diluted with THF, filtered through 20 µm, 10 µm, 5 µm, 3 µm, 1 µm, and then 0.5 µm filters, and concentrated under vacuum to a solids content of 14.5%. The resulting material was a dispersion of a carbon black product with attached polymer. A thermogravimetric analysis indicated that the solids contained 93% carbon black and 7% polymer.

[0117]

The carbon black product could be used in coating formulations for black matrix applications. An estimate of the volume resistivity of such a coating was made by measuring the resistivity of a coating prepared from 1 part of the carbon black product dispersion, 0.191 parts of Joncryl 611 resin, and 1.6 parts of propylene glycol methyl ether acetate. The resulting solids are 40% carbon black and 60% polymer. The resistivity of the film was 10<sup>12</sup> ohm-cm.

[0118]

As described above, the modified pigment products comprising the groups described above are useful in a wide variety of imaging applications.

[0119]

The above description of preferred embodiments of the present invention has been presented for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed. Modifications

and variations are possible in light of the above teachings, or may be acquired from practice of the invention. The embodiments were chosen and described in order to explain the principles of the invention and its practical application to enable a person skilled in the art to utilize the invention in various embodiments and with various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the claims appended hereto, and their equivalents.

... (Omitted) ..."

## (2) Regarding problem to be solved by the invention

The problem to be solved by the invention, which is described in paragraph [0012] of the description of the Application, is that "There is a need for printing plates comprising pigments such as carbon black with improved dispersibility in polymers used to produce printing plates."

However, the Invention is related to a method for forming a black matrix, not a printing plates (the Application is a division of application).

Regarding a method for forming a black matrix, it is described in paragraphs [0073] to [0076] that "The present invention relates to printing plates," "The present invention relates to flexographic printing plates," and it is described in paragraph [0077] that "The present invention further relates to a black matrix for color filters."

Thus, it is reasonable to understand that Problem to be solved by the Invention is as follows, which is applied to a method for forming a black matrix of the Invention, instead of the description of printing plates in paragraph [0012] of the description (hereinafter referred to as "problem of the Invention").

"There is a need for methods for forming black matrices comprising carbon blacks with improved dispersibility in polymers used to form black matrices."

Whether or not the Invention exceeds the extent of disclosure in the description to which a person skilled in the art would recognize that a problem to be solved by the invention would be actually solved will be examined below.

## (3) Judgment

A First, "Printing Plates Comprising Modified Pigment Products" is described in [Title of the invention]. As to technical field, it is described in paragraph [0001] that "The present invention relates to printing plates comprising a substrate and a



radiation absorptive layer, wherein the radiation absorptive layer comprises at least one modified pigment product." As to background art, a photothermal conversion material included in a radiation absorptive layer of a printing plate is described in paragraphs [0002] to [0009]. As to problem to be solved by the Invention, it is described in paragraph [0012] that "Pigments such as carbon black are broad band radiation absorbers and, as such, offer an improvement in performance over dyes. However, the effectiveness of pigments such as carbon black as a photothermal conversion material in a printing plate is dependent on the dispersibility of the pigment in the polymer. Thus, there is a need for printing plates comprising pigments such as carbon black with improved dispersibility in polymers used to produce printing plates." As to means for solving the problem, a printing plate comprising a modified pigment product and a method for imaging a printing plate are described in paragraphs [0013] to [0018].

None of these descriptions relates to a method for forming a black matrix. In addition, there is no reference regarding a black matrix. Thus, a person skilled in the art can understand only that there are descriptions in paragraphs [0001] to [0018] not directly relating to the Invention. At least it cannot be said that a person skilled in the art coming into contact with the description would recognize that the problem of the Invention would be actually solved.

Taking into account the description of paragraph [0001], "a person skilled in the art" (a person having ordinary skill in the art) in the detailed description of the invention of the Application, is "a person having ordinary skill in the technical field of printing plates." On the other hand, the Invention is "a method for forming a black matrix." Printing plates and black matrices are not the same in technical field.

However, a person having ordinary skill in the technical field of carbon blacks can recognize both printing plates and black matrices as use of carbon blacks. Alternatively, a person having ordinary skill in the technical field of carbon matrices can recognize carbon blacks as pigments included in black matrices. Thus, taking into account the case, hereinafter "a person having ordinary skill in the technical field of carbon blacks" or "a person having ordinary skill in the technical field of carbon matrices" is collectively referred to as "a person skilled in the art."

B Second, in [Description of Embodiments], referring to paragraphs [0020] to [0078], the descriptions in paragraphs [0020] to [0071] do not relate to a method for forming

a black matrix. In addition, there is no reference regarding a black matrix. Thus, a person skilled in the art can only understand that there are descriptions in paragraphs [0020] to [0071] not directly relating to the Invention. At least it cannot be said that a person skilled in the art coming into contact with the description would recognize that the problem of the Invention would be actually solved.

It is described in paragraphs [0072] to [0076] that "The present invention also relates to a method of imaging a printing plate comprising a radiation-absorptive layer which comprises an optional polymer and at least one modified pigment product which involves selectively exposing the plate to a laser output in a pattern representing an image," "The present invention relates to lithographic printing plates, such as infrared or near-infrared laser-imageable printing plates," "Also, the present invention relates to flexographic printing plates, such as infrared or near-infrared laser-imageable printing plates," "The present invention further relates to thermal transfer recording materials," and "The present invention further relates to other types of proofing materials." In addition, it is described in paragraph [0077] that "The present invention further relates to a black matrix for color filters. ... A black matrix is generally formed by applying a photosensitive coating on a clear substrate, exposing the coating imagewise, and developing and drying the coating. In the present invention, the photosensitive coating comprises at least one modified pigment product and a solvent. This may further contain a resin such as a photosensitive resin."

A person skilled in the art coming into contact with these descriptions would recognize that a modified pigment product described in the detailed description of the invention of the Application relates to not only various printing plates but also thermal transfer recording materials and black matrices.

However, the description in paragraph [0077] is an abstract description following the descriptions for the application in paragraphs [0072] to [0076]. A person skilled in the art can understand that these descriptions are common general technical knowledge that black matrices are used for carbon blacks. Further, it cannot be said that a person skilled in the art coming into contact with the description in paragraph [0077] would recognize that the problem of the Invention would be actually solved in use of black matrices.

C Regarding Examples, taking into account the descriptions of paragraphs [0079] to [0119], the descriptions of paragraphs [0079] to [0114] ([Example 1] to [Example

20)) are not related to a method for forming black matrices. That is, the descriptions are as follows.

- (a) Each of [Example 1] to [Example 3] relates to an aqueous dispersion of a carbon black, and is not an example of a method for forming a black matrix.
- (b) [Example 4] relates to a carbon black with a polymeric coating, and is not an example of a method for forming a black matrix.
- (c) Each of [Example 5] to [Example 9] relates to a printing plates, different from a method for forming a black matrix of the Invention.
- (d) Each of [Example 10] to [Example 13] relates to a carbon black product with attached polymer, and is not an example of a method for forming a black matrix.
- (e) Each of [Example 14] to [Example 15] relates to a printing plate, different from a method for forming a black matrix of the Invention.
- (f) Each of [Example 16] to [Example 17] is an example in which [Example 1] to [Example 4] and [Example 10] are respectively applied to a printing plate, different from a method for forming a black matrix of the Invention.
- (g) [Example 18] is an example in which [Example 1] to [Example 4] and [Example 10] to [Example 13] are respectively applied to a printing plate, different from a method for forming a black matrix of the Invention.
- (h) [Example 19] and [Example 20] are similar with [Example 18], different from a method for forming a black matrix of the Invention.

It cannot be said that a person skilled in the art coming into contact with these descriptions would recognize that the problem of the Invention would be actually solved in use of black matrices.

It is described in paragraphs [0115] to [0117] that, as [Example 21], "The carbon black product could be used in coating formulations for black matrix applications." However, a carbon black product of [Example 21] is a carbon black with attached polymer, not a carbon black having at least one attached organic ionic group and at least one amphiphilic counterion. In addition, [Example 21] is not an example for forming a black matrix by applying a photosensitive coating on a clear substrate, exposing the coating imagewise, and developing and drying the coating.

Since [Example 21] is not a modified carbon black product of the Invention and a method for forming a black matrix using a manufacturing process of the Invention, it cannot be said that a person skilled in the art would recognize that the

problem of the Invention would be actually solved with [Example 21].

[Example 21] is that with a composition of [a] 1 part of a carbon black product containing 93% carbon black and 7% polymer, [b] 0.191 parts of Joncryl 611 resin and [c] 1.6 parts of propylene glycol methyl ether acetate, solid of 40% carbon black and 60% polymer are obtained (There is not sufficient description that a composition ratio of material and solid is not correct. The component [c] is a solvent.) In [Example 21], measurement of the optical density is not carried out. Thus, a person skilled in the art cannot confirm that a carbon black of [Example 21] can be used in a black matrix. In addition, even though the resistivity is measured, since the Invention does not limit kinds of organic ionic group and amphiphilic counterion, similar resistivity may not be obtained in the Invention. It cannot be always said that a person skilled in the art coming into contact with [Example 21] would recognize that the problem of the Invention would be actually solved.

D Incidentally, the term "amphiphilic counterion" is not the common term for a person skilled in the art. Taking into account description of the detailed description of the invention, it is described in paragraphs [0034] and [0035] that "The amphiphilic counterion is a molecule having a hydrophilic polar 'head' and a hydrophobic organic 'tail' and 'The amphiphilic counterion has a charge opposite that of the organic ionic group.'" In addition, in a modified carbon black product of the Invention, a carbon black has an attached organic ionic group.

Further, it is common general technical knowledge for a person skilled in the art, which is not described in the detailed description of the invention of the Application, that a carbon black with high dispersibility is required for use in a black matrix. It is thought that a person skilled in the art acquiring this common general technical knowledge obtains a finding that [a] by conceiving that when a carbon black product comprising an organic ionic group having an attached carbon black and an amphiphilic counterion having a charge opposite that of the organic ionic group is mixed with a binder resin material, [b] a hydrophilic polar head is attached to an organic ionic group of the carbon black and [c] a hydrophobic organic tail elongates to a binder resin material, and as a result, [d] by conceiving that a modified carbon black of the Invention may have high dispersibility to the binder resin material, [e] the carbon black product comprising an organic ionic group having an attached carbon black and an amphiphilic counterion having a charge opposite that of the organic ionic group has possibility to be used in a method for forming a black matrix.

(Note by the body: The above matters [a] to [e] can be recognized from Fig. 1 and the descriptions (paragraphs [0056] and [0057], the below section 2(3)B) of Example showing well-known art 2 (Japanese Unexamined Patent Application Publication No. H10-324819, Cited Document 4 of examiner's decision of refusal), which is listed in reasons for refusal noticed by the body.

However, the finding described in the above matter [e] is not directly derived from the components of a modified carbon black product and common general technical knowledge, but is derived from various examinations such as the above matters [a] to [d]. In addition, the finding described in the above matter [e] is only indication for a person skilled in the art that it may be used in a method for forming a black matrix, and is not strong finding that a person skilled in the art would recognize that the problem of the Invention would be actually solved without disclosing specific and sufficient examples.

#### (4) Summary

As described above, a method for forming a black matrix comprising a modified carbon black product of the Invention does not exceed the extent of disclosure in the description to which a person skilled in the art would recognize that a problem to be solved by the invention would be actually solved.

Thus, it cannot be said that the Invention is described in the detailed description of the invention.

Regarding the Application, since the description of the scope of claims does not meet the requirement stipulated in Article 36(6)(i) of the Patent Act, the Application should be rejected.

## 2 Regarding Reason 3 (Article 29(2))

### (1) Description of the Cited Document

The Cited Document, which was distributed before the priority date of the Application and is cited in reasons for refusal noticed by the body, has the following descriptions. Lines are indicated based on the number described in the left on each page. Underlines were applied by the body in order to indicate descriptions used for identifying cited inventions.

A Page 1, lines 5 to 7

#### "Field of the Invention

This invention relates to modified carbon products, compositions prepared from modified carbon products and to methods using the same."

#### B Page 1, lines 8 to 23

##### "Discussion of the Related Art

The concept of using the acid or base properties of a surface to improve wetting or dispersion stability is not new. The use of ionic surfactants to improve wetting or dispersion stability of ionic or polar materials in a non-polar environment/solvent has been used in many instances. A major limitation of this approach is that many solids do not have a sufficient number of polar groups available on the surface to allow the use of relatively simple compounds to impart stabilization or improve wetting.

... (Omitted) ...

Carbon black typically has only very low levels of ionic functionality on its surface. If the level of ionic groups on the surface is increased, the number of potential binding sites on the surface should also increase. In this way, the efficiency of a suitably charged adsorbent interaction with a carbon surface may be enhanced."

#### C Page 2, lines 8 to 11

##### "DESCRIPTION OF THE PREFERRED EMBODIMENTS

The compositions of the present invention comprise an amphiphilic ion and a modified carbon product. The modified carbon product comprises carbon having attached at least one organic group. The modified carbon product has a charge opposite that of the amphiphilic ion."

#### D Page 2, lines 12 to 14

"In further detail, the amphiphilic ion is a molecule having a hydrophilic polar 'head' and a hydrophobic organic 'tail.' The amphiphilic ion of the present invention can be a cationic or anionic amphiphilic ion."

#### E Page 3, lines 13 to Page 4

"Table 1 provides a listing of preferred compounds useful as sources of amphiphilic ions which may be used in the compositions of the present invention.

TABLE 1 COMPOUND LISTING	
CATIONIC AMPHIPHILES	
Simple Amines	Guanidines
Stearylamine Dodecylamine Dimethyldodecylamine Dioctylamine	Stearyl guanidine Oleyl guanidine Ditolylguanidine Aerosol C-61
Fatty Amines and Derivatives	
Soyaalkylamine Oleylamine Ricinolamine Dimethyloleylamine N-Oleyldiaminopropane N-Tallow dipropylene triamine	Cocaalkylamine Dimethylcocaalkylamine Ethomeen7 S/12 Norfox IM-38
Malcated Triamines (Polyamines)	
N-(dioleysuccinyl) dipropylene triamine N,N',N''-tris-(dioleysuccinyl) dipropylene triamine N,N'-bis'(dioleysuccinyl)-N''-(di-(methyl tripropylene glycol) succinyl) dipropylene triamine	
Amino Acid Derived	Anilines
Dimyristyl glutamate Dioleoyl glutamate Di-(PEG350 monomethyl ether) glutamate Di-(PEG750 monomethyl ether) glutamate Dimyristyl aspartate Di-(bis(2'-methoxyethyl)capramid-6-yl) glutamate Di(2'-ethylhexylcapramid-6-yl) glutamate Di-(2'-methoxyethylcapramid-6-yl) glutamate	Aniline 4-Dodecylaniline
Pyridine Derived	
4-(1'-Butyl)pentyl pyridine Butyl Nicotinate	4-t-Butyl Pyridine
Quaternary Derivatives	
Trimethylsoyaalkylammonium Chloride Trimethylcetylammmonium Chloride Trimethyldodecylammmonium Chloride 1-Dodecylpyridinium Chloride Tetraphenylphosphonium Chloride Incrosoft CFI-75 Incrosoft O-90 Ethoquad O/12	
Aminoalcohol Esters	
Diethanolamine Dioleate Diethanolamine Dimyristate N-Methyldiethanolamine Dioleate N-Methyldiethanolamine Dimyristate 2-Amino-2-methyl-1,3-propanediol dioleate 2-Amino-2-methyl-1,3-propanediol dimyristate Tris-(hydroxymethyl)-aminomethane trioleate Tris-(hydroxymethyl)-aminomethane trimyristate	
Polymeric	
Copolymers of Dimethylaminoethyl methacrylate and methyl methacrylate  Poly(propyleneglycol)bis(2-aminopropylether)	Polyethyleneimine Polyvinylpyridine  Polyvinylimidazole
ANIONIC AMPHIPHILES	
Dodecylbenzene sulfonic acid, Na salt  Dodecylsulfate, Na Salt  Ricinoleic Acid, Na Salt  Aerosol OT	Marlowet 4540  Sodium laureth sulfate  Myristic Acid Na salt  Sodium Oleate  Oleyl sarcosine  Avel S-150  Adinol OT16

\*\* Ethomeen and Ethoquad are from Akzo Chemicals, Inc., Chicago, IL; Norfox is from Norman Fax & Co., Vernon, CA; Aerosol is from Cytec Industries, Inc., West Patterson, NJ; Incrosoft is from Croda, Inc., Parsippany, NJ; Texapon N25 is from Henkel KGaA/Cospha, Dusseldorf, Germany; Avel is from PPG Industries/Specialty Chemicals, Gurnee, IL; Adinol is from Croda Chemical, Ltd., North Humberside, UK; and Marlowet is from Hhls AG, Mar l, Germany."

F Page 6, lines 5 to 13

" Regarding the second component of the compositions of the present invention, the carbon may be of the crystalline or amorphous type. Examples include, but are not limited to, graphite, carbon black, carbon fibers, vitreous carbon, activated charcoal, activated carbon, and mixtures thereof. Finely divided forms of the above are preferred; also, it is possible to utilize mixtures of different carbons. The modified carbon products may be preferably prepared by reacting carbon with a diazonium salt in a liquid reaction medium to attach at least one organic group to the surface of the carbon. The diazonium salt may contain the organic group to be attached to the carbon. A diazonium salt is an organic compound having one or more diazonium groups."

G Page 7, lines 8 to 10

"The diazonium salts may be prepared in situ. It is preferred that the modified carbon products contain no by-products or unattached salts."

H Page 7, lines 19 to 23

"Regarding the organic group attached to the carbon, the organic group preferably comprises at least one aromatic group or at least one C<sub>1</sub>-C<sub>12</sub> alkyl group and further contains at least one ionic group, at least one ionizable group, or a mixture of an ionic group and an ionizable group. Preferably, the aromatic group or the C<sub>1</sub>-C<sub>12</sub> alkyl group is directly attached to the carbon."

I Page 10, line 22 to Page 11, line 3

" If the composition of the present invention is sufficiently hydrophobic, the addition of the amphiphilic ion to an aqueous dispersion of the carbon having ionic groups results in flocculation of the carbon. This material can then easily be isolated by such means as filtration. It has been found that some of these types of compositions



may then be easily dispersed into organic solvents such as xylene, heptane, methylamyl ketone, butyl acetate, benzyl alcohol, butanol, methane chloride, acetone, and the like. In some cases, the carbon product of the present invention may be extracted into organic solvents."

J Page 12, line 3 to Page 13, line 15

" As stated earlier, the compositions of the present invention are useful in non-aqueous ink formulations. Thus, the invention provides an improved ink composition containing a solvent and a composition of the present invention. Other known ink additives may be incorporated into the ink formulation. It is also within the bounds of the present invention to use an ink formulation containing a mixture of unmodified carbon with the compositions of the present invention.

... (Omitted) ...

The compositions of the present invention may also be used in non-aqueous coating compositions such as paints or finishes. Thus, an embodiment of the present invention is a coating composition containing a suitable solvent and the composition of the present invention. Other conventional coating additives may be incorporated into the non-aqueous coating compositions such as resins.

Non-aqueous coating formulations vary widely depending on the conditions and requirements of final use. In general, coating systems contain up to 30% by weight carbon. The resin content can vary widely up to nearly 100%. Examples include acrylic, alkyd, urethane, epoxy, cellulotics, and the like. Solvent content may vary between 0 and 80%. Examples include aromatic hydrocarbons, aliphatic hydrocarbons, alcohols, polyalcohols, ketones, esters, and the like.

... (Omitted) ...

Examples of non-aqueous media for the incorporation of compositions containing the modified carbon products of the present invention include, but are not limited to, melamine-acrylic resins, melamine-alkyd resins, urethane-hardened alkyd resins, urethane- hardened acrylic resins, and the like."

K Page 19, line 1 to Page 20, line 19

"Example 7: Preparation of a Carbon Black Product Using a Pin Pelletizer

An eight inch diameter pin pelletizer was charged with 400 g of a carbon black with a nitrogen surface area of 58 m<sup>2</sup>/g and a DBPA of 46 ml/100 g, and 32 g sulfanilic acid. The pelletizer was run at 150 rpm for 1 minute. Deionized water (132 mL) and

sodium nitrite (12.75 g) were added and the pelletizer was run for 2 minutes at 250 rpm. The pelletizer was stopped and the shaft and pins were scraped off, and then the pelletizer was run at 1100 rpm for an additional 2 minutes. The 4-sulfobenzenediazonium hydroxide inner salt was generated in situ, and it reacted with the carbon black. The product was discharged from the pelletizer and dried in an oven at 70-100°C. The product had attached p-C<sub>6</sub>H<sub>4</sub>SO<sub>3</sub>Na groups.

... (Omitted) ...

#### Example 8: Preparation of a Carbon Black Product

This procedure describes the preparation of a carbon black product under continuous operating conditions. 100 parts per hour of a carbon black having a CTAB surface area of 350 m<sup>2</sup>/g and a DBPA of 120 mL/100 g was charged to a continuously operating pin mixer with 25 parts per hour of sulfanilic acid and 10 parts per hour of sodium nitrite as an aqueous solution. The resultant material was dried to give a carbon black product having attached p-C<sub>6</sub>H<sub>4</sub>SO<sub>3</sub>Na groups.

... (Omitted) ...

#### Example 9: Preparation of N-(4-aminophenyl)pyridinium nitrite

Silver nitrite (25.4 g) was added to a solution of 34.1 g of N-(4-aminophenyl)pyridinium chloride in 150 mL of methanol and the mixture was heated at reflux for one hour and allowed to cool to room temperature. The mixture was filtered and the methanol was removed under vacuum to give N-(4-aminophenyl)pyridinium nitrite.

#### Example 10: Preparation of a Carbon Black Product

In pin mixer, 35.8 g of N-(4-aminophenyl)pyridinium nitrite and 300 g of a carbon black with a CTAB surface area of 108 m<sup>2</sup>/g and a DBPA of 116 mL/100 g were mixed. While mixing, 200 g of water, a solution of 14.7 g of concentrated nitric acid in 50 g of water, and 50 g of water were added sequentially. Mixing was continued for an additional 3.5 minutes. The resultant material was a mixture of a carbon black product having attached p-C<sub>6</sub>H<sub>4</sub>N(C<sub>5</sub>H<sub>5</sub>)<sup>+</sup> groups and water containing 53.3% solids.

... (Omitted) ...

A dispersion (50 g) having 5 g solids was prepared by mixing 9.38 g of the undried material with water. Sodium bis(2-ethylhexyl) sulfosuccinate (1.22 g) was added. 2-Heptanone (450 mL) and water (400 g) were added, and the mixture was

shaken. Sodium chloride was added to break the emulsion, and the aqueous layer was removed in a separatory funnel. The aqueous layer was substantially free of carbon black. The carbon black product in the heptanone layer had a UPA mean particle diameter of 0.15. The heptanone layer was filtered through a 325 mesh screen, and the material on the screen was washed with additional heptanone until the washings were colorless. The screen was dried and the residue on it corresponded to 1.5% of the total carbon black product used."

L Page 22, line 19 to Page 23, line 15

"Example 13: Preparation of an Amphiphilic Salt of a Carbon Black Product

A dispersion of the carbon black product of Example 7 (250 g) was made in deionized water (2250 mL). To this well-stirred dispersion was added a solution of oleylamine (18.7 g) in acetic acid (250 mL). The mixture immediately became thick and frothy.

... (Omitted) ...

Example 14: Preparation of Other Amphiphilic Salts of Carbon Black Products

The procedure of Example 13 was followed using the amounts of reagents shown in the table below:

Example #	Amount of Carbon Black (g) Product/ Example #	mmol SO <sub>3</sub> /g	Amount of Amine (g)/Example #	Amount of Acetic Acid (mL)	Amount of Water (mL)
14a	100/7	0.26	20.0/1	100	900
14b	100/7	0.26	16.43/2	100	1,000
14c	40/7	0.26	2.51/ (hexadecylamine)	40	360
14d	50/7	0.17	2.06/4	50	500
14e	12.7/8	0.95	12.7/6	15	135
14f	50/7	0.26	3.7/ArmeenSD*	50	450
14g	200/8	0.26	58.3/ oleylamine	200	1,700

\* Armeen SD is a soyalkylamine from Akzo Chemicals Inc., Chicago, IL."

M Page 23, line 17 to Page 29, line 32

"Example 15: Use of Carbon Products with Amphiphilic Cations in Gloss Ink

The carbon black products of Examples 13 and 14 were evaluated in a standard heat set gloss ink formulation prepared on a three roll mill.

... (Omitted) ...

**Example 16: Use of a Carbon Product with Amphiphilic Cations in Gloss Ink**

The procedure of Example 15 was repeated using the carbon product produced in Example 14c.

... (Omitted) ...

Carbon Product From Example #	Standard	14c
<u>Grind Gauge</u>		
1 mill pass	10/7/47	0/0/26
2 mill passes	6/4/34	0/0/20
3 mill passes	0/0/25	0/0/18
4 mill passes	0/0/21	0/0/18
<u>Laray Viscosity Data</u>		
Viscosity (poise at 2500 s <sup>-1</sup> )	44.1	38.8
Yield Value (dyne/cm at 2.5 s <sup>-1</sup> )	460	371

The amphiphile treated carbon black of Example 14c demonstrates significantly enhanced dispersion rates and lower Laray viscosity than that of an unmodified standard.

Optical properties for inks made from the carbon black products 14c and the standard carbon black were determined as in Example 15 and are shown in the tables below.

Data for a 1 micron film thickness

Carbon from Example #	Optical Density	L*	a*	b*	Gloss (60°)
Standard	1.34	24.84	1.52	4.57	44.7
14c	1.36	23.54	1.78	4.92	47.0

Data for a 2 micron film thickness

Carbon from Example #	Optical Density	L*	a*	b*	Gloss (60°)
Standard	2.04	6.71	0.99	1.46	50.7
14c	2.15	4.85	0.64	0.26	51.8

These results indicate that optical properties of the ink films produced from the

amphiphile treated carbon black product of Example 14c are somewhat denser, jetter, and glossier than that of the standard."

N Page 31, line 13 to Page 32, line 21

"Examples 18a-18n: Treatment of Carbon Black Product with a Polymeric Cationic Amphiphile

The carbon black products in these examples were prepared using the following procedure.

An amine-containing polymer was prepared by emulsion polymerization. To a 1-liter round-bottom flask equipped with a reflux condenser, an addition funnel, a gas inlet tube, a stirrer, and a hot water bath with thermometer were added 264.34 g of water and 0.089 g of sodium carbonate. The flask was heated to approximately 70°C and was sparged with nitrogen for 1 hour. The nitrogen sparge was changed to a sweep, and 15.0 g of a 10% aqueous solution of sodium dodecylbenzene sulfonate was added. The flask was then heated to 85°C. Once at this temperature, 10% (6.0 mL) of an initiator solution (prepared by dissolving 0.20 g of ammonium persulfate in 57.3 g of water) was added, followed by 10% (35.0 g) of an emulsified monomer mixture (prepared by adding 196.6 g methyl methacrylate (MMA), 3.4 g 2-(dimethylamino)ethyl methacrylate (DMAEMA), 1.0 g n-dodecylmercaptan, and 5.0 g of a 10% aqueous solution of sodium dodecylbenzene sulfonate to 118.0 g of water with vigorous stirring. Once emulsified, this mixture was stirred continuously to maintain a good emulsion. A rinse of 4.7 mL of water was used for each addition. The reaction was stirred for 1 hour at 85°C, during which a color change was observed, indicating the formation of polymer. After this time, the remainder of the emulsified monomer mixture was gradually added to the reaction flask dropwise over the next 3 hours. Also during this time, the remainder of the initiator solution was added to the reaction flask in 4 mL portions every 15 minutes. At the completion of the monomer and initiator additions, each flask was rinsed with 4.7 mL of water, and these rinses were added to the reaction flask. The temperature was maintained at 85°C for an additional hour. Then the reaction was allowed to cool to room temperature and stirred overnight.

A dispersion of the carbon black product of Example 8 was prepared by adding 3.70 g of the dry carbon black to 400 mL of water in a 1 liter beaker equipped with an overhead stirrer. This was stirred at room temperature for 10 minutes. To this dispersion was added 0.214 g of glacial acetic acid, followed by 131.2 g of a latex

containing 33.3 g of a 98.3/1.7 copolymer of methylmethacrylate (MMA) and 2-(dimethylamino)ethyl methacrylate (DMAEMA) prepared as described above. The mixture was stirred for 2 hours at room temperature. A solution of 11.4 g of magnesium acetate tetrahydrate in 400 mL of water in a 2 liter beaker equipped with an overhead stirrer and hot plate was heated to 70°C, and to this was added the carbon black polymer mixture. This was stirred for 20 minutes at this temperature and filtered, and the resulting carbon black product was dried in a vacuum oven at 75°C to constant weight."

#### O Scope of Claims

" 1. A composition comprising a) an amphiphilic ion and b) a modified carbon product comprising carbon having attached at least one organic group, wherein said at least one organic group has a charge opposite that of said amphiphilic ion.

... (Omitted) ...

6. The composition of claim 1, wherein said amphiphilic ion is an ammonium ion formed by adding an acid to a copolymer of dimethylaminoethyl methacrylate and methyl methacrylate.

... (Omitted) ...

12. The composition of claim 1, wherein said carbon is carbon black, graphite, vitreous carbon, carbon fiber, finely-divided carbon, activated charcoal, or a mixture thereof.

13. The composition of claim 12, wherein said carbon is carbon black."

#### (2) Cited Invention

In Claim 1 in the scope of claim of the Cited Document, terms "amphiphilic ion" and "modified carbon product" are described. Regarding "amphiphilic ion," it is described in lines 12 to 13 on page 2 of the Cited Document (underlined part in the above section (1)D) that "The amphiphilic ion is a molecule having a hydrophilic polar 'head' and a hydrophobic organic 'tail.'" Further, regarding "modified carbon product," it is described in lines 9 to 11 on page 6 of the Cited Document (underlined part in the above section (1)F) that "The modified carbon products may be preferably prepared by reacting carbon with a diazonium salt in a liquid reaction medium to attach at least one organic group to the surface of the carbon." In addition, it is described in Claim 13 that the carbon is a carbon black.

Given the description above, the following invention is described in the Cited Document (hereinafter referred to as "Cited Invention").

"A composition comprising an amphiphilic ion and a modified carbon product comprising a carbon having attached thereto at least one organic group,  
wherein the said at least one organic group has a charge opposite that of the said amphiphilic ion,  
wherein the said carbon is a carbon black,  
wherein the said amphiphilic ion is a molecule having a hydrophilic polar head and a hydrophobic organic tail, and  
wherein the said modified carbon product is prepared by reacting carbon with a diazonium salt in a liquid reaction medium to attach at least one organic group to the surface of the carbon."

(3) Common general technical knowledge

It is a matter of common general technical knowledge for a person skilled in the art in the technical field of black matrices that "a carbon black with high dispersibility is required for use in a black matrix." This point can be recognized from the following Examples 1 to 6 of well-known art which are listed in reasons for refusal noticed by the body. (The underlines are applied by the body.)

A Example showing well-known art 1: Japanese Unexamined Patent Application Publication No. 2000-29206

"[0010]

[Problem to be solved by the invention] Therefore, the objective of the present invention is to provide a black photosensitive resin composition used for UV coatings, UV inks, color filters, and the like. Other objectives of the present invention are to provide a novel black photosensitive resin composition avoiding problems of radical scavenging activity of carbon blacks and using an acid catalyst reaction, and to provide a novel black photosensitive resin composition excellent in dispersibility and storage stability."

B Example showing well-known art 2: Japanese Unexamined Patent Application Publication No. H10-324819

"[0002]

[Conventional Art] ... (Omitted) ... Conventional carbon blacks have weaker compatibility to other materials, such as organic polymer, water and organic solvents,

than cohesion force between particles, and thus it has been difficult to uniformly mix or disperse carbon blacks under normal mixed or dispersed conditions. To solve this problem, many examinations have been conducted to improve the dispersibility of carbon black by coating the surface of carbon black with various kinds of surfactant or resin to increase compatibility to a solid or liquid substrate.

... (Omitted) ...

[0005] However, even though this carbon black-graft polymer has a functional group having reactivity to a carbon black, the polymer chain has an only property of lipophilicity or hydrophilicity, and thus it has been difficult to meet both opposing requirements of increasing graft efficiency to carbon blacks and of improving dispersibility to various kinds of media with the grafted polymer chain.

[0006] Thus, there has been problems that a) the higher content of carbon in the carbon black-graft polymer cannot be achieved, b) sufficient dispersibility cannot be achieved in a medium with high polarity, such as an alcohol and cellosolve solvent, or in a medium with low polarity, such as a hydrocarbon solvent or silicone solvent, and c) grafting can hardly achieved in an organic solvent. For these reasons, this carbon black-graft polymer has restrictions in use that i) the carbon black-graft polymer cannot be used in producing a black matrix for liquid color filters, since the black matrix with higher content of carbon black is desired, and ii) the carbon black-graft polymer cannot be used in producing an electro-rheological fluid or a sealant for semiconductor devices, since the electro-rheological fluid or sealant with larger electrical insulation is desired.

[0007] Further, conventional carbon black dispersions, for example, carbon black master batches, are dispersed in a binder with only compatibility, and thus there are problems that the final product is not thermally stable and has weak strength with the carbon black highly filled.

... (Omitted) ...

[0014] In addition, the following attempt has been made: blending a black pigment such as a carbon black in a photocurable resin composition, applying the photocurable resin composition on a substrate, drying the substrate to adhere a mask with a predetermined pattern to the substrate, and exposing and developing the substrate, thereby forming a black matrix with a predetermined pattern.

... (Omitted) ...

[0025] Further, in a case of forming a film of black matrix with the photocurable resin composition, the film is completely cured after exposing, curing, and



development, after which heating (afterbaking) at about 100 to 300°C is performed to increase adhesion between a substrate and a film; however it is thought that this heat process causes a change in dispersibility of the carbon black or carbon black-graft polymer in the film, and a large reduction in resistivity of the film after afterbaking is observed. Thus, this carbon black cannot be used as a black matrix for liquid color filters.

[0026]

[Problem to be solved by the invention] Therefore, the objective of the present invention is to provide a novel carbon black composite polymer, a method for producing the same, and use of the same.

[0027] Another objective of the present invention is to provide a novel carbon black composite polymer excellent in dispersibility to various kinds of media such as a binder, while containing the higher content of carbon black, which, in a case where various kinds of photocurable or thermosetting media are added, does not inhibit curing of the medium, can easily form a coating with high strength even adding the higher content, and is also excellent in properties such as electrical insulation, as well as a production method thereof.

... (Omitted) ...

[0030] A further objective of the present invention is to provide a photocurable resin composition useful for forming a black matrix for color filters.

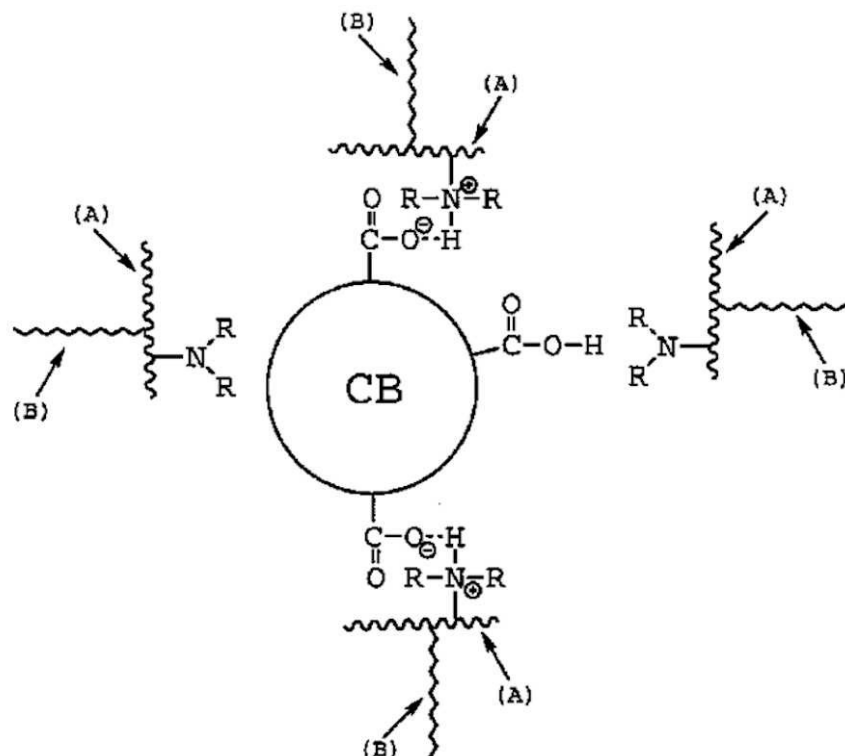
... (Omitted) ...

[0056] FIG. 1 schematically shows a state in a vicinity of the surface of a carbon black, in a case where a block or grafted polymer in which a carbon black has the amino group, amide group, and/or nitrile group is mixed and dispersed in a dispersed medium composed of a desired medium or a medium with properties similar to that of the desired medium. The polymer consists of a segment (A) having the amino group, amide group, and/or nitrile group, and a segment (B) having compatibility with the desired medium, and as illustrated below, in a reaction system, the segment (B) is oriented so as to elongate to the dispersed medium, the segment (A) inevitably surrounds the surfaces of carbon black particles, a suitable condition to make a complex of a carbon black and this polymer with ion bond is provided, and thus formation of the complex is effectively achieved.

[0057] In the resulting carbon black composite polymer, a graft chain attached on the surface of carbon black particle is oriented so that the segment (B) with higher compatibility to the desired medium is exposed outside, and thus higher compatibility

to the desired medium is achieved and a carbon black composite polymer can be dispersed in the medium on submicron scale."

(Note by the body: FIG. 1 is the following figure.)



C Example showing well-known art 3: Japanese Unexamined Patent Application Publication No. H10-160927

"[0006] On the other hand, various kinds of processes for improving the problem of black matrices using the above metal film have been examined. For example, a process for dispersing a carbon black and an organic pigment, if necessary, in a photosensitive resin composition, and using the dispersion for forming a black matrix, has been suggested.

... (Omitted) ...

[0011] In addition, a material for black matrices comprising a photo acid generator, a crosslinker, a binder polymer having a crosslinking point, and a black pigment, is disclosed in Japanese Unexamined Patent Application Publication No. H4-177202. However, a process for exposing from a transparent substrate is not described in this Japanese Unexamined Patent Application Publication. In addition, when an ungrafted black pigment is simply applied to back exposure, in a case where optical density (O. D.) at thickness of formed film of 1  $\mu$ m is 2.0 or less, film strength, dispersion stability, and storage stability can be obtained. However, in achieving

optical density (O. D.) with thickness of formed film being 1  $\mu\text{m}$  is 2.0 or more, since a resin component is low in the vicinity of the surface of the formed black matrix, there are problems that the film strength is very low and thermal adhesion is insufficient, and thus a carbon black with low sensitivity, resist dispersion stability, and storage stability cannot be obtained."

D Example showing well-known art 4: Japanese Unexamined Patent Application Publication No. 2000-154327

"[0001]

[Field of the Invention] The present invention relates to carbon black-graft polymer. More specifically, the present invention relates to carbon black-graft polymer having higher content of carbon and having improved dispersibility to various materials such as water, water solvent, or organic polymer.

... (Omitted) ...

[0007] Indeed, using this carbon black-graft polymer, dispersibility of carbon black in a resin or matrix is increased, and the properties are improved. However, even using this carbon black-graft polymer, in a case of higher content of carbon black in a matrix, for example, in a case of 10 wt% or more of carbon black with respect to the total weight of a carbon black composition, sufficient dispersibility of carbon black in a final product made from the carbon black composition can be obtained, and thus properties such as colorability, electrical insulation, dielectric property, and charge are varied.

[0008]

[Problem to be solved by the invention] Therefore, the objective of the present invention is to provide novel carbon black-graft polymer.

[0009] The further objective of the present invention is to provide carbon black-graft polymer having higher content of carbon and excellent dispersibility.

E Example showing well-known art 5: Japanese Unexamined Patent Application Publication No. H9-22653

"[0001]

[Field of the Invention] The present invention relates to a black matrix for optical color filters used for color televisions, liquid display elements, imaging devices, and the like, and a resist composition for black matrices used for manufacturing color televisions, liquid display elements, imaging devices, and the like.

... (Omitted) ...

[0004] Conventionally, as a method for producing a black matrix, a process comprising providing a chromium film on a substrate and etching it, thereby obtaining a predetermined black matrix pattern, has been used; however, this process is expensive, and has a disadvantage of high surface reflectivity of the obtained film. Thus, a method for producing a black matrix using a resist pattern with a black pigment such as a carbon black has been suggested.

[0005]

[Problem to be solved by the invention] However, a black matrix formed by a conventional resist technique has insufficient light shield, and the thickness of the film needs to be made 1.5  $\mu\text{m}$  or more to obtain a concentration of transmitted light of 2.5 or more.

[0006] To solve the problem, when a blended amount of black pigment is simply increased in a photopolymerizable composition, there are problems that unique dispersion is difficult, film strength and adhesion of the obtained black matrix are poor, and thus the production of practical black matrix with a resist pattern has not been conventionally achieved.

[0007] Recently, there has been suggested a liftoff process in which graphite is applied on a substrate with a resist pattern formed, and then the resist pattern is removed (Japanese Unexamined Patent Application Publication No. H7-34031); however, this process has a lot of steps and disadvantages in manufacture.

[0008] To solve the above conventional problems, the objective of the present invention is to provide a black matrix for color filters with inexpensive manufacture cost and excellent in light shield, solvent resistance, and adhesion to substrate, and a resist composition for producing the black matrix."

F Example showing well-known art 6: Japanese Unexamined Patent Application Publication No. 2000-89005

"[0001]

[Field of the Invention] The invention relates to a photosensitive black resin composition, a method for producing the same, and a method for forming a black matrix. More specifically, the present invention relates to a material used for producing color filters, especially a photosensitive black resin composition forming black matrices, a method for producing the photosensitive black resin composition, and a method for producing a black matrix using the photosensitive black resin

composition.

... (Omitted) ...

[0004] There is a need to add a large amount of carbon black to the black matrix formed with a thin film containing the above carbon black, to obtain suitable optical density (OD). However, increasing an additive amount of carbon black, an additive amount of pigment derivative or polymer dispersing agent also increases to improve dispersibility and dispersion stability. Thus, there are problems that the higher content of carbon black and suitable OD value cannot be obtained, and the sensitivity is lowered. When placing importance on sensitivity, suitable OD value cannot be obtained. Generally, to obtain a suitable OD value, it is thought that the thickness of a coating of black matrix which is a light shield film is made thicker."

#### (4) Well-known arts

The body considers that "A method for forming a black matrix comprising: applying a photosensitive coating on a clear substrate; exposing the coating imagewise; and developing and drying the coating" is well-known art to the extent needless to present example as one of the methods for forming a black matrix. Furthermore, descriptions of the above Example 2 shows the well-known art as follows (underlines are applied by the body. It is necessary for a wet pattern to be dried after development).

"[0220] In addition, when forming a black matrix for color filters by using a black photocurable resin composition of the present invention, for example, the following steps may be conducted.

[0221] The black photocurable resin composition is applied on a substrate such as a glass plate with a spincoater. Then, the coating is dried (prebaked) by a hot air dryer or hot plate at 150°C or less, preferably 80 to 120°C for 1 to 60 minutes. The coating of the resulting black photocurable resin composition preferably has a thickness of about 1.0 to 3.0  $\mu\text{m}$ . Then, to the coating of the black photocurable resin composition, a mask having a predetermined shape such as a dot pattern or a strip pattern is adhered, and after pattern exposing the mask with a parallel beam at 50 to 1000 mJ from an ultraviolet source such as a high pressure mercury lamp, development is carried out and a pattern such as a black matrix is formed.

[0222] Development of the pattern exposed coating is carried out by immersing the coating in a suitable developer at about 0 to 100°C, and eluting and removing uncured part of the coating. After development, the formed color pixel is rinsed with

a suitable washing liquid, and then the color pixel is preferably completely cured by heating (afterbaking) at about 100 to 300 °C for around 1 to 120 minutes with a hot air dryer or hot plate."

#### (5) Comparison

Comparing the Invention with the Cited Invention, the following matters can be acknowledged.

##### A Organic ionic group, carbon black

"Carbon" in the Cited Invention is "carbon having an attached organic group." In addition, in the Cited Invention, "the carbon is a carbon black." Further, "an organic group" in the Cited Invention has "a charge opposite that of an amphiphilic ion," and it can be said that the organic group is an organic ionic group.

Thus, "carbon" and "an organic group" in the Cited Invention respectively correspond to "carbon black" and "an organic ionic group" in the Invention. In addition, "carbon" in the Cited Invention meets requirements of "a carbon black having attached at least one kind of organic ionic group" in the Invention.

##### B Amphiphilic counterion

First, in the Cited Invention, "'the amphiphilic ion" and the "organic group" has the relationship such that "said at least one organic group has a charge opposite to said amphiphilic ion."

Thus, it can be said that "the amphiphilic ion" in the Cited Invention is "at least one of the amphiphilic counterions to the organic ionic group" in the Invention. In addition, "the amphiphilic ion" in the Cited Invention meets the requirement that "the amphiphilic counterion has a charge opposite that of the "organic group" in the Invention.

Second, taking into account the relationship of electric charge between "the organic group" and "the amphiphilic ion, it is thought that "the amphiphilic ion" in the Cited Invention is attached to "the organic group." In addition, "the organic group" and "carbon" in the Cited Invention have the relationship described in the above section A.

Thus, "carbon" in the Cited Invention meets the requirement that "a carbon black having at least one of the amphiphilic counterions to the organic group" in the Invention.

### C Modified carbon black product

Taking into account the matters described in the above sections A and B, "a modified carbon product" in the Cited Invention corresponds to "a modified carbon black product" in the Invention. In addition, "the modified carbon product" in the Cited Invention meets the requirement that "at least one modified carbon black product comprising a carbon black having at least one attached organic ionic group and at least one amphiphilic counterion to the organic ionic group" in the Invention.

### (6) Corresponding features and different features

#### A Corresponding features

Since the Invention is directed to a process and the Cited Invention is directed to a product, these inventions do not correspond as a whole. However, the Invention and the Cited Invention correspond in terms of the following "modified carbon black product."

"At least one modified carbon black product comprising a carbon black having at least one attached organic ionic group and at least one amphiphilic counterion to the said organic ionic group, wherein the said amphiphilic counterion has a charge opposite to that of the said organic ionic group."

#### B The different features

The Invention and the Cited invention are different in the following features.  
(The different feature 1)

Regarding "the modified carbon black product," the Invention comprises the matter that "the modified carbon black product is prepared by reaction of the carbon black, at least one amine compound and a nitrite, thereby attaching the organic ionic group to the carbon black." On the other hand, in the Cited Invention, a process for preparing the modified carbon black product is not clear.

(The different feature 2)

The Invention is "a method for forming a black matrix," "comprising:" "applying a photosensitive coating on a clear substrate"; "exposing the coating imagewise; and" "developing and drying the coating"; on the other hand, the Cited Invention is an invention of a product (composition).

In addition, "the modified carbon black product" in the Invention comprises "a

photosensitive coating"; on the other hand "the modified carbon product" in the Cited Invention is included in "a composition" (whether the modified carbon black product is included in the photosensitive coating is not specified).

#### (7) Judgment

##### A Regarding the different feature 1

"The modified carbon product" in the Cited Invention is "prepared by reacting carbon with a diazonium salt in a liquid reaction medium to attach at least one organic group to the surface of the carbon."

Thus, "the modified carbon black product" in the Invention and "the modified carbon product" in the Cited Invention are not different products, and the different feature 1 is not a different feature between the Invention and the Cited Invention.

Further examining the different feature 1, it is described in lines 8 to 10 on page 7 of the Cited Document that the diazonium salts may be prepared in situ; namely, in a reaction system. According to common general technical knowledge, a process for preparing diazonium in a reaction system generally involves a reaction between an amine compound and nitrite (namely Griess reaction), and this reaction is also described in Example 8 of the Cited Document (the above section (1)K).

That is, the different feature 1 is not a different feature between the Invention and the Cited Invention.

The matter of the Invention regarding the different feature 1 is an only matter that a person skilled in the art preparing "the carbon product" in the Cited Invention can use as appropriate, taking into account the description of the Cited Document.

##### B Regarding the different feature 2

Taking into account the description in the above section (1)B, the objective of the Cited Invention is to improve the dispersion stability of carbon black. In addition, the modified carbon product of the Cited Invention has an organic group and an amphiphilic ion. Thus, it can be said that the modified carbon product in the Cited Invention has high dispersibility (Increase in dispersion rate is confirmed in Example 16 (the above section (A)M)).

Incidentally, a person skilled in the art acquires as common general technical knowledge that "a carbon black with high dispersibility is required for use in a black matrix." Thus, using the modified carbon product in the Cited Invention as a carbon



black dispersed in a photosensitive coating used in well-known arts described in the above section (4), is [A] only development of use for a person skilled in the art (a person having ordinary skill in the technical field of carbon blacks) carrying out the Cited Invention, or [B] merely a matter within normal inventiveness with a person skilled in the art, for a person skilled in the art (a person having ordinary skill in the technical field of black matrices) finding possibility of the Cited Invention.

In addition, a method for forming a black matrix described above includes the matter of the Invention regarding the different feature 2.

Easy conception of the above point [B] is derived not only from the Cited Invention, but also from well-known arts described in the above section (4) (hereinafter simply referred to as "well-known arts"). That is, it is assumed that a person skilled in the art (a person having ordinary skill in the technical field of carbon blacks) coming into contact with the Cited Invention finds that the modified carbon product in the Cited Invention can be used in a black matrix, and it can be thought that the easy conception is derived from the Cited Invention. On the other hand, it is assumed that a person skilled in the art (a person having ordinary skill in the technical field of black matrices) who tries to improve the dispersibility of carbon black used in a black matrix, can contact the Cited Invention, and the easy conception is derived from well-known arts.

Just in case, the easy conception derived from well-known arts will be examined.

That is, taking into account that it is clear that a photosensitive coating in well-known arts comprises a carbon black for pigments, the corresponding features and different features between the Invention and well-known arts are as follows. (Corresponding features)

"A method for forming a black matrix, comprising:

applying a photosensitive coating on a clear substrate;

exposing the said coating imagewise; and

developing and drying the said coating,

wherein the said photosensitive coating comprises a carbon black for pigments."

(The different features)

In the Invention, a carbon black for pigments is "at least one modified carbon black product comprising a carbon black having at least one attached organic ionic

group and at least one amphiphilic counterion to the organic ionic group," "wherein the amphiphilic counterion has a charge opposite that of the organic ionic group," and "wherein the modified carbon black product is prepared by reaction of the carbon black, at least one amine compound, and a nitrite"; on the other hand, a carbon black for pigments in the Cited Invention is not specified.

Examining the different features, a person skilled in the art acquires as common general technical knowledge that a carbon black with high dispersibility is required for use in a black matrix. Thus, utilizing the modified carbon product in the Cited Invention to improve the dispersibility of carbon black for pigments dispersed in a photosensitive coating is merely a matter within normal inventiveness with a person skilled in the art.

(8) Regarding effect of the invention

There is no description of the effect of the invention in the detailed description of the invention of the Application.

The problem of the Invention listed in the above section 1(2) is solved by a person skilled in the art as described in the above section (7).

(9) Appellant's allegation

A The appellant alleges that the dispersibility of particles depends on a system used, and even though the dispersibility in a suitable solvent system is established, a carbon black with different optical density and electrical resistance is needed (lines 31 to 49 on page 4 of the written opinion).

However, it is thought that a person skilled in the art obtains a finding that [a] by conceiving that the modified carbon product in the Cited Invention and a binder resin material are mixed, [b] the hydrophilic polar head of amphiphilic ion is attached to an organic group of the carbon black, and [c] the hydrophobic organic tail is elongated to the binder resin material, and [d] by conceiving that the modified carbon product in the Cited Invention to the binder resin material has high dispersibility, [e] the modified carbon product in the Cited Invention has possibility to be used in a method for forming a black matrix. (In the Application, it is not actually demonstrated that the modified carbon product in the Invention to a photosensitive coating (binder resin) material has high dispersibility.)

In addition, sources of amphiphilic ions are listed in Table 1 of the Cited

Document (the above section (1)E). Thus, taking into account Table 1, a person skilled in the art can select an amphiphilic ion excellent in compatibility with a binder resin material and optical density, with trial and error and discussion. Increasing the dispersibility of modified carbon product, the content of the modified carbon product included in a binder resin material can be increased. In addition, by increasing the dispersibility of modified carbon product, reduction in electrical resistance due to aggregation can be prevented. Thus, a person skilled in the art can also predict the optical density and electrical resistance from the Cited Invention.

By the way, as a binder resin material of black matrix, an acrylate monomer is well-known. For example, it is described in paragraph [0236] of Example showing well-known art 2 that "To 50 parts of the carbon black dispersion (1) obtained from Synthesis Example 1, as polymer, 21.25 parts of Joncryl 68 (manufactured by Johnson Polymer Ltd.) and 62.5 parts of di-pentaerythritol hexacrylate, and as a photoinitiator, 9.38 parts of Irgacure 907 (manufactured by Ciba-Beigy Ltd.) are added and uniformly dispersed, thereby obtaining a black photocurable composition (1)."

On the other hand, it is disclosed in Claim 6 described in the scope of claims of the Cited Document that "said amphiphilic ion is an ammonium ion formed by adding an acid to a copolymer of dimethylaminoethyl methacrylate and methyl methacrylate." (the above section (1)O, also illustrated in Examples 18a to 18n (the above section (1)N)) Taking into account the disclosed content of the Cited Document, a person skilled in the art can predict a suitable modified carbon product.

B In short, the appellant alleges that if it is clear to use a carbon black of the invention described in the Cited Document in a black matrix, a black matrix has to be described in examples of various uses in the Cited Document (lines 20 to 28 on page 5 of written opinion).

However, a black matrix is not described as use of carbon black in the Cited Document simply because the inventors of the Cited Invention were not interested in black matrices at the time. A person skilled in the art acquires as common general technical knowledge that a carbon black can be used for black matrices.

C In short, the appellant alleges that a modified carbon black product in the Invention interacts so as to strengthen a hydrogen bonding network in the polymer of

photosensitive coating.

However, the appellant's allegation is not based on the description of claims.  
(This opinion does not suggest that the invention according to Claim 6 after the Amendment meets the enablement requirement, the support requirement, and the requirement for inventive step.)

(10) Summary

The Invention could have been invented easily by a person skilled in the art on the basis of the Cited Invention and well-known arts.

No. 3 Summary

Regarding the Application, the description of the scope of claims does not meet the requirement stipulated in Article 36(6)(i) of the Patent Act. In addition, the appellant should not be granted a patent for the Invention in accordance with the provisions of Article 29(2) of the Patent Act.

Therefore, the Application should be rejected without examining other claims.

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

July 11, 2017

Chief administrative judge: NAKADA, Makoto

Administrative judge: HIGUCHI, Nobuhiro

Administrative judge: SHIMIZU, Yasushi