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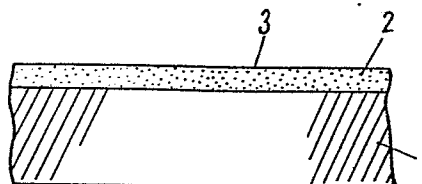
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54 **IMAGE-RECEIVING MATERIAL.**

57 An image-receiving material for use in an image-forming process using as an inking material a dye capable of forming color when adsorbed on an electron-accepting substance, which comprises a substrate having provided thereon a color-developing layer containing silica as a main agent for developing color of the dye. The use of silica as color-developing agent improves transparency of the color-forming layer and provides a clear image having a high coloration density.



TITLE MODIFIED

SPECIFICATION

0162930

see front page

1 TITLE OF THE INVENTION

IMAGE RECEPTOR

TECHNICAL FIELD

This invention relates to an image receptor
5 used for image recording such as electrophotography or
printer. More specifically, the invention relates to an
image receptor useful for image recording using only a
dye material itself as inking material.

BACKGROUND ART

10 A variety of image recording methods using
only a dye material itself as inking material have been
proposed hitherto. For instance, there are known a
one-shot electrophotographic method using light trans-
mitting particles containing a subliming color former as
15 disclosed in Japanese Patent Publication No. 49307/80;
a sublimation transfer method in which a color sheet
prepared by coating a condenser paper or the like with a
subliming dye is heated by a heating element so that the
sublimed dye develops color on an image receptor; and
20 a gas jet recording method disclosed in Japanese Patent
Publication No. 2020/81 in which gas of a subliming dye
is electrically injected and controlled to obtain a dye
image on an image receptor.

In any of the above-described methods, it is

1 necessary to let the dye develop color in a molecular
state and uniformly on an image receptor for obtaining
a clear dye image. For this purpose, there is usually
used an image receptor carrying a dye developer. In the
5 prior art, bottom paper for pressure-sensitive recording
using activated clay as color developer has been used
for said image receptor.

Such bottom paper, however, had the problem of
reduced color purity of the dye image for such reasons
10 that (1) activated clay is tinted in light brown, and
(2) the color-forming layer becomes opaque because of
poor transparency of activated clay. Therefore, said
bottom paper was not suitable for color recording
especially.

15 DISCLOSURE OF INVENTION

The object of this invention is to provide an
image receptor used for image recording employing only
a dye material itself as inking material, in which the
color-forming layer containing color developer is trans-
20 parent.

The image receptor of this invention is of a
structure in which a color forming layer principally
composed of silica is provided on a substrate, and said
color forming layer has the function to let the dye
25 develop color in a molecular state and uniformly.

1 BRIEF DESCRIPTION OF DRAWING

The drawing is a schematic sectional view showing an embodiment of image receptor in accordance with this invention.

5 BEST MODE FOR CARRYING OUT THE INVENTION

In an embodiment of image receptor in accordance with this invention, a color-forming layer 3 principally composed of silica 2 is carried on a substrate 1 as illustrated in the drawing.

10 Silica 2 is used as color developer and has excellent transparency. It is colorless and suffers from no thermal yellowing because of heat resistance, making it possible to obtain a dye image with high color purity. As silica used in this invention, there
15 can be employed silicates represented by $xM_2^I O \cdot ySiO_2$ such as $xNa_2O \cdot ySiO_2$, $xAl_2O_3 \cdot ySiO_2$ and $xMgO \cdot ySiO_2$, silicic acids represented by $xH_2O \cdot ySiO_2$, and amorphous, glassy or colloidal silicon dioxide. Among them,
20 colloidal silica with a pH of 6 or below is especially excellent as it has the excellent ability to cause color development of dye and that the color forming layer can be easily made transparent.

For substrate 1, various types of substrate material can be applied according to the purpose of
25 use. For instance, fine-quality paper or art paper with high whiteness is suited for reflective pictures such as documents. Plastic sheet with excellent transparency

1 and heat resistance such as vinylon, cellophane,
acetyl-cellulose or the like is suited for transmitting
pictures such as slides.

Color forming layer 3 can be made transparent
5 by coating silica finely dispersed in a binder on sub-
strate 1 by a usual means such as bar coater. In this
case, the particle size of silica is preferably not
greater than 0.1 micron.

The binder is preferably one which is strong in
10 binding force, transparent and also excellent in silica
dispersability. For instance, styrene-butadiene copolymer,
ethyl cellulose, acrylic resin or the like is preferred.
A combination of styrene-butadiene copolymer and colloidal
silica is especially suited for the applications where
15 the image receptor is heated since such combination is
hardened and improved in heat resistance when heated.

For attaining better color developing efficiency
of the dye, it is preferred to make the color forming
layer porous so that the dye becomes more easily absorbed
20 by silica. For this purpose, it is desirable that the
amount of the binder used is not greater than 30% by
weight based on silica. The coating weight of the color
forming layer for effecting sufficient color development
of the dye is preferably 1 - 10 g/m² although it is variable
25 depending on the type of the dye used.

It is of course possible, where necessary, to
add a dispersant when dispersing silica in binder or to
add an anti-oxidant or a quencher to the color forming

1 layer for the purpose of preventing color fading of the
dye. Further, an electron acceptant material such as
a known organic or inorganic acid may be used jointly with
silica as a color developing assistant.

5 Example 1

The following materials were well stirred and
mixed by a mixer to form a color forming layer solution.

Color developer:

Silica (colloidal silica "Snowtex O"
10 produced by Nissan Kagaku KK
(pH: 2-4, solids: 20 wt%)) ... 100 parts
by weight

Binder:

Styrene-butadiene copolymer
("Danbond" produced by Nippon
15 Zeon KK (solids: 40 wt%)) 5 parts by
weight

This color forming layer solution was coated on
a sheet of art paper to a coating weight (after drying)
of 6 g/m² to obtain an image receptor A for reflective
picture.

20 Example 2

The color forming layer solution of Example 1
was coated on a vinylon sheet to a coating weight of
6 g/m² to obtain an image receptor B for transmitting

1 picture. Transmittance of the image receptor was 90%.

Example 3

A mixture of the following formulation was
sufficiently dispersed by an attritor to prepare a color
5 forming layer solution.

Color developer:

Silica ("Finesil T-32" (pH 6)

produced by Tokuyama Soda KK) .. 100 parts by
weight

Binder:

10 Ethyl cellulose 10 parts by weight

Solvent:

Methylene chloride 100 parts by weight

This color forming layer solution was coated
on a fine-quality paper to a coating weight (after
15 drying) of 8 g/m^2 to obtain an image receptor C for
reflective picture.

Experiment 1

A yellow disperse dye ("PT-52Y" produced by
Mitsubishi Kasei Kogyo KK), a magenta basic dye (C.I.
20 Basic Red 9) and a magenta subliming color former (7'-
diethylamino-1,3,3,5-tetramethyl-indolinobenzospiropyran)
were coated on a 15 micron thick condenser paper by using
ethyl cellulose as binder to prepare three types of color
sheets D, E and F. The image receptor obtained in the

- 1 Examples and said color sheets were placed one upon the other and heated under the conditions of 180°C, 5 seconds and 1 kg/cm², whereby the distinct yellow and magenta color images such as shown in Table 1 were obtained on
- 5 the image receptor. The numerical figures in the table indicate color density.

Table 1

		Color sheet		
		D (Db)	E (Dg)	F (Dg)
Image receptor	A	1.3	1.3	1.6
	B	1.3*	1.4*	1.7*
	C	1.1	1.2	1.5

*: transmission density

Experiment 2

- Color sheet F was superposed on the yellow color images obtained by using color sheet D in
- 10 Experiment 1, and heated under the same conditions as Experiment 1, whereby the distinct red color images such as shown in Table 2 were obtained.

Table 2

		Color sheet D + F		
		Db	Dg	D _R
Image receptor	A	1.6	1.7	0.2
	B	1.6*	1.8*	0.2*
	C	1.3	1.4	0.2

*: transmission density

1 INDUSTRIAL APPLICABILITY

The image receptor of this invention can make the color forming layer transparent as silica with excellent transparency is used as color developer.

5 Therefore, there is no possibility that the dye which developed color below the color forming layer be concealed by the color developer thereabove to reduce the developed color density, and the whole color forming layer becomes a colored transparent body, so that a dye
10 image with high developed color density can be obtained, enabling realization of high-quality pictures by electrophotography or printers.

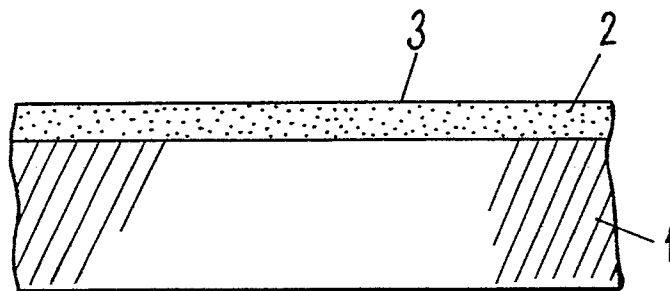
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WHAT IS CLAIMED IS:

1. An image receptor having a structure in which a color forming layer causing color development of a dye which develops color when adsorbed by an electron-acceptant material is provided on a substrate, characterized in that said color forming layer contains silica as main color developer of said dye.
2. An image receptor according to Claim 1, wherein the color forming layer contains silica and a transparent resin binder.
3. An image receptor according to Claim 2, wherein the amount of the resin binder is 30% by weight or less based on silica.
4. An image receptor according to Claim 2, wherein the resin binder is a styrene-butadiene copolymer.
5. An image receptor according to Claim 1, wherein silica is a solidified material of colloidal silica having a pH of 6 or below.
6. An image receptor according to Claim 1, wherein the substrate is paper.
7. An image receptor according to Claim 1, wherein the substrate is a transparent plastic film.

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List of reference numerals in the drawing:

- 1 ... substrate
- 2 ... silica
- 3 ... color forming layer

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/JP84/00559 **0162930**

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ¹		
According to International Patent Classification (IPC) or to both National Classification and IPC <div style="text-align: center; font-size: 1.2em;">Int.Cl⁴ B41M 5/12, 5/18, 5/22</div>		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁴		
Classification System	Classification Symbols	
IPC	B41M 5/12, 5/18, 5/22	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁴		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴		
Category ¹⁵	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸
X	JP, A, 53-48751 (Kanzaki Paper Mfg. Co., Ltd.) 2 May 1978 (02. 05. 78), Page 4 & DE, A, 2746129 & FR, A, 2367618 & GB, A, 1560086 & US, A, 4236732	1 - 7
X	JP, A, 49-111711 (Kanzaki Paper Mfg. Co., Ltd.) 24 October 1974 (24. 10. 74), Page 1 (Family nashi)	1 - 7
X	JP, A, 58-16885 (Mizusawa Kagaku Kogyo Kabushiki Kaisha) 31 January 1983 (31. 01. 83) (Family nashi)	1 - 7
X	JP, A, 52-32716 (Mizusawa Kagaku Kogyo Kabushiki Kaisha) 12 March 1977 (12. 03. 77) (Family nashi)	1 - 7
<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>[*] Special categories of cited documents: ¹⁵</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 48%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"Δ" document member of the same patent family</p> </div> </div>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search ²		Date of Mailing of this International Search Report ²
January 28, 1985 (28. 01. 85)		February 4, 1985 (04. 02. 85)
International Searching Authority ¹		Signature of Authorized Officer ²⁰
Japanese Patent Office		