⑲ Europäisches Patentamt
European Patent Office
Office européen des brevets

⑪ Publication number: 0 140 387
A2

⑫ EUROPEAN PATENT APPLICATION

㉑ Application number: 84113135.2

㉒ Date of filing: 31.10.84

(51) Int. Cl.⁴: G 03 G 5/14
C 08 L 27/08, C 08 L 9/02

㉚ Priority: 02.11.83 JP 206583/83

㊸ Date of publication of application:
08.05.85 Bulletin 85/19

(84) Designated Contracting States:
DE GB

㉑ Applicant: FUJI PHOTO FILM CO., LTD.
210 Nakanuma Minami Ashigara-shi
Kanagawa 250-01(JP)

(72) Inventor: Sawada, Kenichi
c/o Fuji Photo Film Co. Ltd. No. 210, Nakanuma
Minami Ashigara-shi Kanagawa(JP)

(72) Inventor: Kondo, Syunichi
c/o Fuji Photo Film Co. Ltd. No. 210, Nakanuma
Minami Ashigara-shi Kanagawa(JP)

(72) Inventor: Sano, Kenji
c/o Fuji Photo Film Co. Ltd. No. 210, Nakanuma
Minami Ashigara-shi Kanagawa(JP)

(72) Inventor: Sato, Hideo
c/o Fuji Photo Film Co. Ltd. No. 210, Nakanuma
Minami Ashigara-shi Kanagawa(JP)

(74) Representative: Barz, Peter, Dr. et al,
Patentanwälte Dr. V. Schmied-Kowarzik Dipl.-Ing. G.
Dannenberg Dr. P. Weinhold Dr. D. Gudel Dipl.-Ing. S.
Schubert Dr. P. Barz Siegfriedstrasse 8
D-8000 München 40(DE)

(54) Electrophotographic light-sensitive material.

(57) An electrophotographic light-sensitive material is described, comprising an electrically conductive support and an electrophotographic light-sensitive element with an intermediate layer sandwiched therebetween, wherein the intermediate layer contains (a) a vinylidene chloride/acrylonitrile copolymer, and (b) a polymeric substance having a softening point of at least 100°C.

Croydon Printing Company Ltd.

ELECTROPHOTOGRAPHIC LIGHT-SENSITIVE MATERIAL

The present invention relates to an electrophotographic light-sensitive material. More particularly, it is concerned with an electrophotographic light-sensitive material having superior flexibility and improved adhesion between an electrophotographic light-sensitive element and an electrically conductive support.

Commonly used electrophotographic light-sensitive materials comprise an electrically conductive support and an electrophotographic light-sensitive element provided on the support. The following electrophotographic light-sensitive elements are known; a photoconductive layer in which inorganic light semiconductors such as zinc oxide, cadmium sulfide and selenium, or organic photoconductive substances such as electric charge transporting compounds (e.g., polyvinyl carbazoles and hydrazones) are bonded together by the use of a resinous binder; a photoconductive member vacuum deposited on the electrically conductive support; and a laminated member comprising a charge carrier-generating layer and a charge carrier-transporting medium layer.

These electrophotographic light-sensitive materials, however, have the disadvantage that adhesion between the electrically conductive support and the electrophotographic light-sensitive element is insufficient because of poor affinity. In working the electrophotographic light-sensitive materials i.e., cutting or slitting, the electrophotographic light-sensitive element can be stripped off at the site of cutting or slitting. Also, when the electrophotographic light-sensitive materials are bent in handling or conveying in the form of a roll film, the electrophotographic light-sensitive element is stripped off. Such electrophotographic light-sensitive materials are not suitable for practical use. If liquid toners are used and the electrophotographic light-sensitive material is subjected to a stress in the liquid, this undesirable separation can occur to significant extent. This separation can occur over the whole light-sensitive material or in a very fine spot form.

In order to overcome the above problem, provision of an intermediate layer of various compounds between the electrically conductive support and the electrophotographic light-sensitive element has been proposed. These compounds include polyvinyl butyral (see Japanese Patent Application (OPI) No. 28838/75), polyvinyl acetate (see Japanese Patent Publication No. 46263/74), and polyamide (see Japanese Patent Application (OPI) No. 114132/76) (The term "OPI" as used herein means a "published unexamined Japanese patent application"). In electrophotographic light-sensitive materials in which such an intermediate layer is provided, the adhesion between the electrically conductive support and the electrophotographic light-sensitive element is improved. However, there is a residual potential, which gives rise to problems such as formation of fog.

Various compounds for use in the preparation of such intermediate layers are also described in Japanese Patent Publication No. 46263/74. An intermediate layer of polyvinylidene chloride, for example, improves the adhesion between the electrically conductive support and the electrophotographic light-sensitive element. In coating the intermediate layer, however, blocking occurs between the intermediate layer and the reversal roller of a coating machine because the softening point of polyvinylidene chloride is low. Moreover, when the electrophotographic light-sensitive element provided on the intermediate layer is bent, cracks are formed in the light-sensitive element.

An object of the present invention is to provide an electrophotographic light-sensitive material having superior flexibility.

Another object of the present invention is to provide an electrophotographic light-sensitive material which has superior adhesion between the electrophotographic light-sensitive element and the electrically conductive support.

It has been found that these and other objects are attained by providing between the electrically conductive support and the electrophotographic light-sensitive element an intermediate layer containing (a) a vinylidene chloride/acrylonitrile copolymer and (b) a polymeric substance having a softening point of at least 100°C.

The present invention relates to an electrophotographic light-sensitive material comprising an electrically conductive support and an electrophotographic light-sensitive element with an intermediate layer sandwiched therebetween, wherein the intermediate layer contains:

(a) a vinylidene chloride/acrylonitrile copolymer; and

(b) a polymeric substance having a softening point of at least 100°C.

In the vinylidene chloride/acrylonitrile copolymer used in the present invention, the weight ratio of vinylidene chloride to acrylonitrile is from about 1:9 to 9:1 and preferably from about 3:7 to 7:3. The molecular weight of the copolymer is from about 1,000 to 1,000,000 and preferably from about 10,000 to 100,000. Although the copolymer can be dispersed in water or organic solvents and used as a latex, it is preferably used in the form a solutions in an organic solvent for the purpose of increasing the adhesion strength. Typical examples of vinylidene chloride/acrylonitrile copolymers soluble in organic solvents include Saran Resin R200, R202, etc., as produced by Asahi Kasei Co., Ltd. The synthesis of the copolymer is described, for example, in U.S. Patent 3,132,124.

The polymeric substance having a softening point of at least 100°C that is used in the present invention is dispersible or soluble in water or organic solvents.

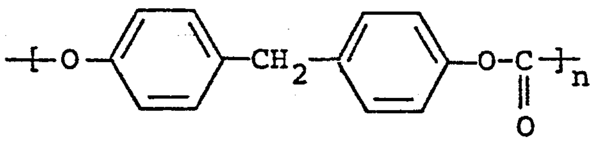
In a preferred embodiment of the present invention, a polymeric substance having a softening point of at least 100°C, preferably at least 130°C, which is soluble in an organic solvent and a vinylidene chloride/acrylonitrile copolymer are dissolved in an organic solvent.

Representative examples of such polymeric substances include polyvinyl carbazole, polycarbonate, polyamide, polystyrene, polyvinyl chloride, polymethyl methacrylate, and triacetyl cellulose. In cases where the binder used in the light-sensitive element is a polymeric substance having a softening point of at least 100°C, it is preferred that the same polymers of the same type be used in the preparation of the intermediate layer in view of their affinity.

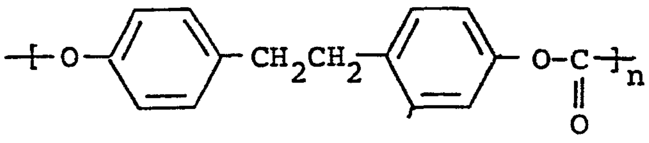
A preferred example of the polymeric substance is polycarbonate, preferably having a molecular weight of 5,000 to 100,000, which exhibits good adhesion and has few adverse influences on electrophotographic characteristics. Preferred polycarbonates are polyesters of carbonic acid and polyvalent alcohols or phenols, and can be produced by various conventional techniques such as the ester exchange process, the phosgene process, and the self-polycondensation process.

Typical examples of useful polycarbonates, include those containing the following repeating units (I) - (IV) either alone in combination, although the present invention is not to be construed as being limited thereto.

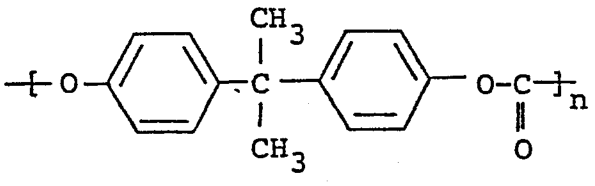
[I]



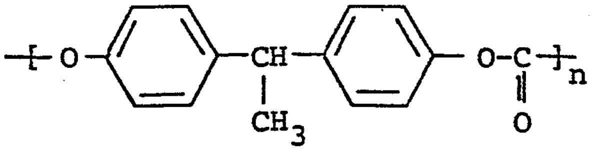
[II]



[III]



[IV]



In order to increase the adhesion between the electrically conductive support and the light-sensitive element and to prevent the blocking of the intermediate layer to a reversal roller of a coating machine, it is preferred that the polymeric substance (b) be used in an amount of from about 60 to 1,800 parts by weight per 100 parts by weight of the vinylidene chloride/acrylonitrile copolymer (a). More preferably the polymeric substance (b) is used in an amount of from about 100 to 900 parts by weight per 100 parts by weight of the vinylidene chloride/acrylonitrile copolymer (a).

Solvents or dispersing media which can be used in the preparation of a coating solution for the intermediate layer of the present invention are not undly limited and include benzene, toluene, xylene, chlorobenzene, dichloromethane, dichloroethane, trichloroethane, cyclohexanone, tetrahydrofuran, dioxane, and mixtures thereof. Of these compounds, solvents capable of dissolving the components contained in the intermediate layer are preferably used.

The thickness of the intermediate layer of the present invention is, as a dry film thickness, from about 0.01 to 5 μ and preferably from about 0.1 to 1 μ.

The electrically conductive support used is not unduly limited, and it is sufficient if at least the surface is electrically conductive. Representative examples are drum or sheet supports made of metals such as aluminum, copper, iron and zinc, and supports of, e.g., paper, plastics, and glass, the surface of which is made electrically conductive by techniques such as vacuum deposition of metals such as aluminum, copper, zinc, and indium vacuum deposition of electrically conductive compounds such as In_2O_3 and SnO_2 lamination of a metallic foil and dispersing carbon black, powdered electrically conductive metallic compounds (e.g., In_2O_3 and SnO_2), powdered metals, and so forth in a binder polymer.

The effect of the intermediate layer of the present invention is particularly remarkable when organic photoconductive substances are used in the light-sensitive element. Light-sensitive elements can be divided into two types: a single-layer element in which an organic photoconductive substance is dispersed in a binder or a charge carrier-transporting medium; and a laminated element in which a charge carrier-transporting medium layer is provided on a layer containing an organic photoconductive substance.

A wide variety of organic photoconductive substances is known in the art, and any of these known substances can be used in the present invention. Representative examples of such organic photoconductive substances are described in Research Disclosure, No. 10938 (May, 1973), page 61, "Electrophotographic Element, Material, and Process".

Polymeric organic photoconductive substances which are particularly effective in the present invention are described below.

It is desirable for polymeric organic photoconductive substances to have a nucleus containing π electrons. Typical examples of such nuclei include polycyclic aromatic hydrocarbon nuclei such as naphthalene, anthracene, pyrene, perillene, acenaphthene, phenylanthracene, and diphenylanthracene; heteroaromatic compound nuclei such as carbazole, indole, acridine, 2-phenylindole, and N-phenylcarbazole; and their halogen or lower alkyl-substituted derivatives.

In the present invention, vinyl polymers containing the above nuclei are preferably used as photoconductive substances. Examples are homo- and copolymers of vinyl monomers such as vinylnaphthalene, vinylanthracene, vinylpyrene, vinylperillene, acenaphthylene, styrylanthracene, vinylcarbazole, vinylindole, and vinylacridine; homo- and copolymers of vinyl ethers such as anthryl methylvinyl ether, pyrenyl methylvinyl ether, carbazolyl ethylvinyl ether, and indolyl ethylvinyl ether; epoxy resins such as polyglycidyl carbazole, polyglycidyl indole, and poly(p-glycidylanthrylbenzene); homo- and copolymers of esters such as acrylates and methacrylates, containing as a substituent the above nucleus having π electrons; and polycondensates of the above π electron-based compounds and formaldehyde.

In the organic photoconductive layer of the present invention, if desired, known additives such as sensitizers, binders, dyes, pigments, and plasticizers can be incorporated.

Known sensitizing dyes used in sensitization of organic photoconductive substances, can be added to the photoconductive layer and can be appropriately chose from conventional dyes capable of increasing the degree of sensitivity of organic photoconductive substances.

Representative examples of such sensitizing dyes are described below, although the present invention is not to be construed as being limited thereto:

Triphenylmethane dyes such as Brilliant Green, Victoria Blue-B, Methyl Violet, Crystal Violet, and Acid Violet 6B;

rhodamines such as Rhodamine B, Rhodamine 6G, Rhodamine G Extra, Sulforhodamine B, and Fast Acid Eosine G;

xanthene dyes such as Eosine S, Eosine A, erythrosine, Phloxine, Rose Bengale, and Fluoresceine;

thiazine dyes such as Methylene Blue;

acridine dyes such as Acridine Yellow, Acridine Orange, and Trypaflavin;

quinoline dyes such as pinacyanol, and cryptocyanine;

quinone dyes and ketone dyes such as Alizarine, Alizarine Red S, and quinizarin;

cyanine dyes;

chlorophyll;

allylmethane dyes such as Violet Fuchsine, Erythrosine 2Na, Rhodamine B500, Fanal Pink B, Rhodamine 6GDN, and Auramine,

polymethine dyes such as 3,3'-diethylthiacarbocyanine iodide;

azo dyes such as Eriochrome Blue Black R;

azomethine dyes such as bis(p-dimethylaminobenzal) azine;

carbonyl dyes such as Solway Ultra Blue B, and Alizarine Cyanin Green GWA;

heterocyclic compounds such as N,N-pentamethylene-bis(benzthiazole) perchlorate;

phthalocyaine dyes such as Segnal, Night and Tarcois; and pyrylium dyes such as a 2,6-di-tert-butyl-4-(2,6-di-tert-butyl-4H-thiopyran-4-indenemethyl)thiapyrylium salt, a 2,6-di-tert-butyl-4-(3,2,6-di-tert-butyl-4H-thiapyran-4-indene propene-1-yl)thiapyrylium salt, a 2,6-diphenyl-4-(4-diethylaminophenyl)thiapyrylium salt, and a 2,6-di-tert-butyl-4-(4-diethylaminostyryl)thiapyrylium salt.

These sensitizing dyes are used in a sufficient amount to sensitize the organic photoconductive substances, and the amount of the sensitizing dye added varies depending on the type of organic photoconductive substance and on the type of sensitizing dye used. In general, the sensitizing dye is used in an amount of from about 0.01 to 100 parts by weight, preferably from about 0.1 to 30 parts by weight per 100 parts by weight of the photoconductive substance.

Binders which can be used include cyanoethyl cellulose, nitrile rubber, polycarbonate of bisphenol A, linear polyester, a styrene/butadiene copolymer, and a vinylidene chloride/acrylonitrile copolymer.

Plasticizers which can be used include biphenyl chloride, an epoxy resin, triphenylmethane compounds, a cumarone resin, and a low molecular weight xylene resin.

Charge carrier-transporting compounds are generally divided into two groups: compounds transporting a charge and compounds transporting a positive hole. Both types of compounds can be used in the electrophotographic light-sensitive element of the present invention.

Compounds transporting a charge include compounds having an electron attractive group, such as 2,4,7-trinitro-9-fluorenone, 2,4,5,7-tetranitro-9-fluorenone, 9-dicyanomethylene-2,4,7-trinitrofluorenone, 9-dicyanomethylene-2,4,5,7-tetranitrofluorenone, tetranitrocarbazole, chloranil, 2,3-dichloro-5,6-dicyanobenzoquinone, 2,4,7-trinitro-9,10-phenanthrenequinone, tetrachlorophthalic anhydride, tetracyanoethylene, and tetracyanoquinodimethane.

The compounds transporting a positive hole include compounds having an electron donative group, such as vinyl polymers (e.g., polyvinyl carbazole and its derivatives, polyvinyl pyrene, polyvinyl anthracene, poly(2-vinyl-4-(4'-dimethylaminophenyl)-5-phenyl) oxazole, and poly(3-vinyl-N-ethyl) carbazole), polymers (e.g., polyacenaphthylene, polyindene, and an acenaphthylene/styrene copolymer), condensation resins (e.g., a pyrene/formaldehyde resin, a bromopyrene/formaldehyde resin, and an ethylcarbazole/formaldehyde resin), triphenylmethane polymers, triazole derivatives, oxadiazole derivatives, imidazole derivatives, polyarylalkane derivatives, pyrazoline derivatives and pyrazolone derivatives, phenylenediamine derivatives, arylamine derivatives, amino-substituted chalcone derivatives, N,N-bicarbazyl derivatives, oxazole derivatives, styrylanthracene derivatives, fluorenone derivatives, and hydrazone derivatives.

In preparing a single layer electrophotographic light-sensitive element, finely divided particles of a photo-conductive substance are dispersed in a binder solution or a solution with a charge carrier-transporting compound and a binder dissolved therein and the resulting dispersion is coated on an electrically conductive support and dried. In this case, the thickness of the electrophotographic light-sensitive element is from above 1 to 30 μ and preferably from about 3 to 15 μ.

A laminated electrophotographic light-sensitive element is prepared by vacuum depositing a photoconductive substance on an electrically conductive support, or coating a solution of the photoconductive substance in a solvent on the electrically conductive support, or coating a dispersion of the photoconductive substance in a suitable solvent or, if desired, a solvent with a binder dissolved therein on the electrically conductive support to form a charge carrier-generating layer and then coating a solution containing a charge carrier-transporting compound and a binder on the charge carrier-generating layer. In this case, the thickness of the charge carrier-generating layer is not more than about 4 μ and preferably not more than about 2 μ, and the thickness of the charge carrier-transporting medium layer is from about 3 to 30 μ and preferably from about 5 to 20 μ.

The photoconductive substance is ground to a particle size of not more than about 5 μ, preferably not more than about 2 μ by means of a dispersing machine such as a ball mill, a sand mill, or a vibration mill.

If the amount of the photoconductive substance to be used in the single layer-type light-sensitive element is too small, the sensitivity of the resulting electrophotographic light sensitive material is poor, and it is too large chargeability is reduced and the strength of the electrophotographic light-sensitive element is decreased.

The amount of the photoconductive substance being added to the electrophotographic light-sensitive element is from about 0.01 to 2 times, preferably from about 0.05 to 1 time the weight of the binder. The amount of the charge carrier-transporting compound to be added, if desired, is from about 0.1 to 2 times, preferably from about 0.3 to 1.3 times the weight of the binder. Charge carrier-transporting compounds are used as binders by themselves, it is preferred that the amount of the diazo compound added be from about 0.01 to 1.0 time the weight of the binder.

If in the laminated electrophotographic light-sensitive element a photoconductive substance-containing layer is coated as a charge carrier-generating layer, the amount of the photoconductive substance used is preferably at least about 0.1 times the weight of the binder. If the amount of the photoconductive substance used is below this amount, the light sensitivity obtained is low. The amount of the charge carrier-transporting compound to be added to the charge carrier-transporting medium is from about 0.2 to 2 times, preferably from about 0.3 to 1.3 times the weight of the binder. If polymeric charge carrier-transporting compounds are used as binders, they can be used without the use of other binders.

Additives used in the present invention and a use thereof are described in, for example, Japanese patent applications (OPI) 30936/73 (corresponding to U.S. Patent 3,745,005), 114132/76, 129237/76 and 143564/80.

In preparing the coating solutions for these layers, the solvents or dispersing media used in the preparation of the coating solution for the intermediate layer of the present invention can be used.

The present invention is described in greater detail with reference to the following Example, although the present invention is not to be construed as being limited thereto. Unless otherwise indicated, all parts, percents and ratios are by weight.

EXAMPLE 1

Coating solutions A to F having the compositions shown in Table 1 were prepared as coating solutions for an intermediate layer, and coating solutions G and H having the compositions as described hereinafter were prepared as coating solutions for an organic photoconductive layer.

These coating solutions were coated on a 100 μ thick polyethylene terephthalate film support with a 60 Å thick In_2O_3 layer vacuum deposited thereon (PET film made electrically conductive with In_2O_3) to form an intermediate layer and an organic photoconductive layer in this sequence and then were dried to produce an electrophotographic light-sensitive material.

The dry thickness of the intermediate layer was 0.2 μ, and the dry thickness of the organic photoconductive layer was 7 μ. The combinations of the intermediate layer and the organic photoconductive layer are shown in Table 2.

Table 1

	Coating Solutions					
	A (g)	B (g)	C (g)	D (g)	E (g)	F (g)
Vinylidene Chloride/ Acrylonitrile Copolymer* (a)	0.14	0.20	0.30	0.20	0.20	0.70
Polycarbonate (b)	0.56	0.50	0.35	-	-	-
Polyvinyl Carbazole (c)	-	-	-	-	0.50	-
Polystyrene (d)	-	-	-	0.50	-	-
Methylene Chloride	55	55	55	55	55	55
Chlorobenzene	14	14	14	14	14	14

Note:

* Salan R202 (produced by Asahi Kasei Co., Ltd.)

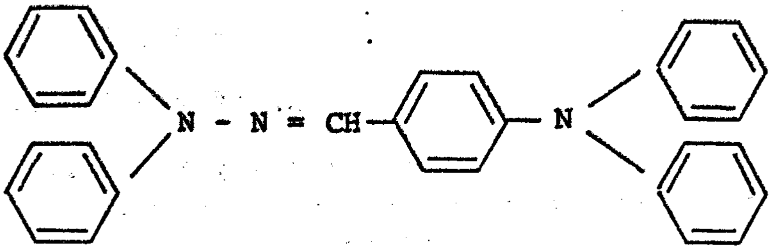
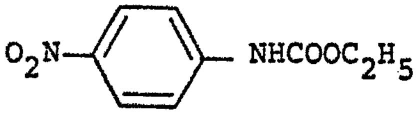
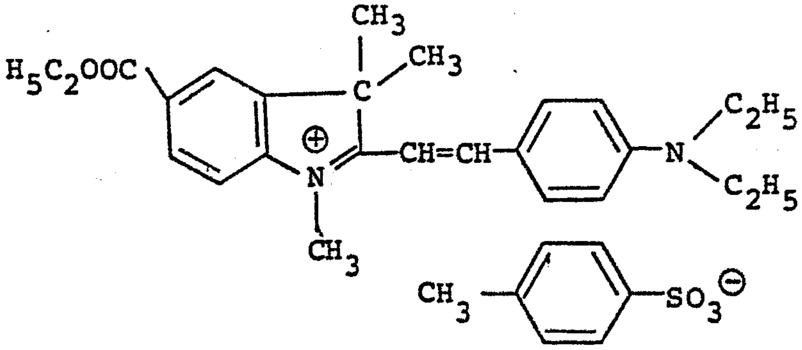
(a) Softening Point: 105°C

(b) Molecular Weight: about 25,000,
Softening Point: 225°C

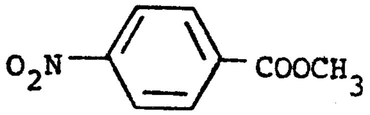
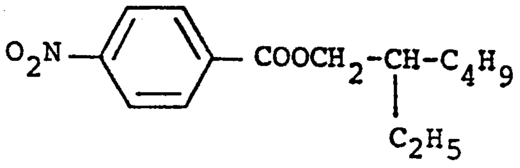
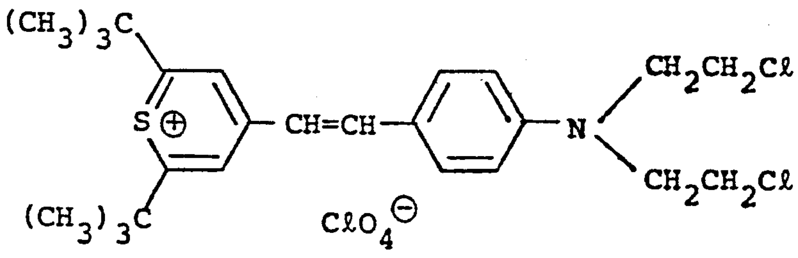
(c) Molecular Weight: about 50,000,
Softening Point: 210°C

(d) Molecular Weight: about 50,000,
Softening Point: 230°C

Coating Solution G

Polycarbonate	10 g
	5 g
	1 g
	0.35 g
Methylene Chloride	42.5 g
Toluene	7.5 g

Coating Solution H

Polyvinyl Carbazole	10 g
	1.5 g
	0.5 g
	0.3 g
Methylene Chloride	80 g
Chlorobenzene	80 g

The thus-produced electrophotographic light-sensitive materials (Nos. 1 to 13) were measured for film strength, adhesion strength, chargeability, and specific sensitivity. The results are shown in Table 2.

Film Strength

The light-sensitive material was wound on cylinders having varying diameters with the photoconductive layer facing outside. The diameter of the cylinder at which cracks were formed in the photoconductive layer was determined. The rating scale was as follows.

< 1	Even if the light-sensitive material is wound on a cylinder having a diameter of 1 mm, no cracks are formed in the photoconductive layer.
4 mm	Cracks are formed in the photoconductive layer when the light-sensitive material is wound on a cylinder having a diameter of 4 mm.
5 mm	Cracks are formed in the photoconductive layer when the light-sensitive material is wound on a cylinder having a diameter of 5 mm.

The smallest figure is most desirable, and at a value of 5 mm or less, the light-sensitive material can be used as a roll film.

Adhesion Strength

Lines were cut in the surface of the photoconductive layer at right angles using a cutter knife to form 100, 5 mm x 5 mm squares. A mylar tape (produced by Nitto Co., Ltd.) was applied on the surface and then stripped off in parallel with the photoconductive layer. The number of squares removed was counted. The figure in Table 2 indicates the number of squares removed.

Chargeability

Chargeability was determined by measuring the surface electric charge (V) when the light-sensitive material was corona charged at an application voltage of + 7.5 kv.

Specific Sensitivity

Specific sensitivity was determined based on the exposure amount required to reduce the potential through light attenuation to 1/2 of the initial valve, with light-sensitive material No. 1 being assigned a value of 100.

Table 2

Electro-Photographic Light-Sensitive Material	Intermediate Layer	Photo-conductive Layer	Characteristics			
			Film Strength	Adhesion Strength	Charge-ability	Specific Sensitivity
No. 1	none	G	< 1	93	480V	100
No. 2	none	H	5 mm	98	500V	130
No. 3	A	G	< 1	2	540V	100
No. 4	B	G	< 1	2	600V	98
No. 5	C	G	< 1	1	630V	100
No. 6	D	G	"	2	680V	96
No. 7	E	G	"	5	580V	88
No. 8*	F	G	-	-	-	-
No. 9	A	H	4 mm	6	720V	120
No. 10	B	H	5 mm	7	680V	115
No. 11	C	H	4 mm	8	730V	100
No. 12	E	H	4 mm	1	700V	95
No. 13*	F	H	-	-	-	-

Note:		
	Nos. 1, 2, 8, 13	Comparative examples
	Nos. 3 to 7, 9 to 12	Examples of the present invention

* Coating was impossible because of the occurrence of blocking.

As is apparent from the results of Table 2, the electorphotographic light-sensitive materials of the present invention (Nos. 3 to 7 and Nos. 9 to 12) are superior especially in adhesivity as compared with those of the comparative examples having no intermediate alyer. Further, the electrophotographic light-sensitive materials of the present invention are used without serious influence on a film strength and a specific sensitivity in spite of no intermediate alyer.

Example 2

The same procedures as Example 1 were repeated except that coating solutions I, J and K shown in the following Table 3 were prepared and used as the coating solutions for intermediate layer to prepare electrophotographic light-sensitive materials. The thus-produced electrophotographic light-sensitiv materials (Nos. 14 to 18) were measured in the same way as Example 1.

The combinations of the intermediate layers and the organic photoconductive layers, and results of the measurements are shown in the following Table 4.

Table 3

	Coating solutions		
	I (g)	J (g)	K (g)
Vinylidene Chloride/ Acrylonitrile Copolymer (a)	0.14	0.35	-
Polymethyl Methacrylate (e)	0.56	0.35	0.70
Methyl Ethyl Ketone	50	50	50
Methylene Chloride	30	30	30

Note: (e) Molecular Weight : about 97,000

Softening Point : 115°C

Table 4

Elect - Photographic Light-Sensitive Material	Inter-mediate Layer	Photo-coductive Layer	Characteristics			
			Film Strength	Adhesion Strength	Charge-ability	Specific Sensitivity
No. 14	I	G	< 1	2	640V	96
No. 15	J	G	< 1	1	620V	94
No. 16	I	H	< 1	4	620V	110
No. 17	J	H	< 1	2	630V	114
No. 18	K	G	6 mm*	78	510V	102

Note: No. 18 : Comparative examples

Nos. 14 to 17: Examples of the present invention

6 mm* : Cracks are formed in the photoconductive layer when the light-sensitive material is wound on a cylinder having a diameter of 6 mm.

CLAIMS:

1. An electrophotographic light-sensitive material comprising an electrically conductive support having thereon an intermediate layer, and an electrophotographic light-sensitive element, in that sequence, wherein the intermediate layer contains:

(a) a vinylidene chloride/acrylonitrile copolymer; and

(b) a polymeric substance having a softening point of at least 100°C.

2. The electrophotographic light-sensitive material as in claim 1, wherein said polymeric substance (b) has a softening point of at least 130°C.

3. The electrophotographic light-sensitive material as in claim 1 or 2, wherein the weight ratio of vinylidene chloride to acrylonitrile in said copolymer (a) is from about 1:9 to 9:1 and the molecular weight of the copolymer is from about 1000 to 1 000 000.

4. The electrophotographic light-sensitive material as in claim 3, wherein the weight ratio of vinylidene chloride to acrylonitrile in said copolymer is from about 3:7 to 7:3 and the molecular weight of the copolymer is from 10 000 to 100 000.

5. The electrophotographic light-sensitive material as in any of claims 1 to 4, wherein said polymeric substance (b) is selected from polyvinyl carbazole, polycarbonate, polyamide, polystyrene, polyvinyl chloride, polymethyl methacrylate, and triacetyl cellulose.

6. The electrophotographic light-sensitive material as in claim 5, wherein said polymeric substance (b) is a polycarbonate having a molecular weight of from about 5 000 to 100 000.

7. The electrophotographic light-sensitive material as in any of claims 1 to 6, wherein said polymeric substance (b) is present in an amount from about 60 to 1800 parts by weight per 100 parts of said copolymer (a) in said intermediate layer.

8. The electrophotographic light-sensitive material as in claim 7, wherein said polymeric substance (b) is present in an amount from about 100 to 900 parts by weight per 100 parts by weight of said copolymer (a).

9. The electrophotographic light-sensitive material as in any of claims 1 to 8, wherein the dry film thickness of said intermediate layer is from about 0.01 to 5 μ.

10. The electrophotographic light-sensitive material as in claim 9, wherein said intermediate layer has a dry film thickness of from about 0.1 to 1 u.

11. The electrophotographic light-sensitive material as in any of claims 1 to 10, wherein said electrophotographic light-sensitive element comprises an organic photoconductive substance.