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3,553,009

**PROCESS OF PREPARING AN ELECTRO-
PHOTOGRAPHIC MATERIAL**

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2 Claims

ABSTRACT OF THE DISCLOSURE

A process for preparing a photoconductive material which comprises contacting an organic polymeric resinous film with an impregnation agent comprising a photosensitizing material is disclosed.

This application is a continuation of U.S. application Ser. No. 451,662, filed Apr. 28, 1965, and now abandoned.

This invention relates to photoconductive materials and, more particularly, to their use in electrophotography.

It is known that images may be formed and developed on the surface of certain photoconductive materials by electrostatic means. The basic xerographic process, as taught by Carlson in U.S. Pat. 2,297,691, involves uniformly charging a photoconductive insulating layer and then exposing the layer to a light-and-shadow image which dissipates the charge on the portions of the layer which are exposed to light. The electrostatic latent image formed on the layer corresponds to the configuration of the light-and-shadow image. This image is rendered visible by depositing on the imaged layer a finely divided developing material comprising a colorant called a toner and a toner carrier. The toner will normally be attracted to those portions of the layer which retain a charge, thereby forming a powder image corresponding to the latent electrostatic image. This powder image may be fixed thereon or may be transferred to paper or other receiving surfaces. The paper will then bear the powder image which may subsequently be made permanent by heating or other suitable fixing means. The above general process is also described in U.S. Pats. 2,357,809; 2,891,011; and 3,079,342.

That various photoconductive insulating materials may be used in making electrophotographic plates is known.

Various types of known plates are described in U.S. Patents 3,097,095; 3,113,022; 3,041,165; 3,126,281; 3,073,861; 3,072,479; 2,999,750; Canadian Patent 644,167 and German Patent 1,068,115.

Suitable photoconductive insulating materials such as anthracene sulfur, selenium and mixtures thereof have been disclosed by Carlson in U.S. 2,297,691. These materials generally have sensitivity in the blue or near ultraviolet range, and all but selenium have the further limitation of being only slightly light sensitive. For this reason, selenium has been the most commercially accepted material for use in electrophotographic plates. Vitreous selenium, while desirable in most aspects, suffers from serious limitations in that its spectral response is limited somewhat to the ultra-violet, blue and green regions of the spectrum, and the preparation of vitreous selenium plates requires costly and complex procedures, such as vacuum evaporation. Also, selenium plates require the use of a separate conductive substrate layer, preferably with an additional barrier layer deposited thereon before deposition of the selenium photoconductor. Because of these economic and commercial considerations, there have

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been many recent efforts towards developing photoconductive insulating materials other than selenium for use in electrophotographic plates.

Various two-component mixtures of photoconductive and non-photoconductive materials have been used as photoconductive insulating layers in electrophotographic plates. For example, the use of inorganic photoconductive pigments dispersed in suitable binder materials to form photoconductive insulating layers is known. It has further been demonstrated that organic photoconductive insulating dyes and a wide variety of polycyclic compounds may be dispersed in suitable resin materials from which photoconductive insulating layers may be formed. Inorganic pigment-binder plates are limited in usefulness because they are often opaque and are thus limited to use in systems where light transmission is not required. Inorganic pigment-binder plates have the further disadvantage of being non-reusable due to their rough surfaces which make cleaning difficult and to their high fatigue characteristics.

In a third type of plate, inherently photoconductive organic compounds are used to form photoconductive insulating layers; frequently in combination with sensitizing dyes or Lewis acids. The polymeric and binder-type organic photoconductor plates of the prior art generally have the inherent disadvantages of high cost of manufacture, brittleness, and poor adhesion to supporting substrates. A number of these photoconductive insulating layers have low temperature distortion properties which make them undesirable in an automatic electrophotographic apparatus which often includes powerful lamps and thermal fusing devices which tend to heat the electrophotographic plate.

It is therefore an object of this invention to provide a method of making a photoconductive insulating material suitable for use as an electrophotographic plate devoid of the above-noted disadvantages.

Another object of this invention is to provide a composite photoconductive film in which the photoconductive component may be concentrated near one surface thereof.

Another object of this invention is to provide a method of making a photoconductive insulating sheet in which the concentration of the photoconductive component may be varied through the sheet thickness.

Another object of this invention is to provide a method for improving the photoconductive characteristics of a resinous film.

Another object of this invention is to provide a photoconductive insulating material suitable for use in electrophotographic plates in both single use and reusable systems.

A further object of this invention is to provide an electrophotographic plate having a wide range of useful physical properties.

Still another object of this invention is to provide a transparent photoconductive insulating material suitable for use in systems where light transmission is required.

The foregoing objects and others are accomplished in accordance with this invention, generally speaking, by providing a photoconductive material adapted for use in electrophotographic plates in which is obtained a process which comprises steps of providing a film of a solid organic polymeric resin and impregnating said film with an agent which imparts substantial photoconductivity to said film. The impregnation may be performed, for example, by dissolving the impregnation agent in a solvent which is neutral with respect to the film heating the solution to a temperature lying between 40° C. and the boiling point of the solvent used and applying the solution to the film. The duration of the process depends on the concentration and temperature of the solution.

This process, unlike any previous process, is capable of producing a photoconductive film in which the photoconductive sensitivity varies through the film thickness. It is possible to either substantially uniformly impregnate the film or vary the concentration through the film thickness from maximum concentration at one surface to zero concentration at the other. On the other hand, with this process it is possible to impregnate only the surface, if desired. Thus, especially where one surface of the film is metallized before impregnation, one may easily make a plate having successive layers of conductor, dielectric and photoconductor. Also, it is known that the addition of some photoconductive compositions to molten or dissolved organic materials adversely affects the adhesion of the material when later coated onto a supporting substrate. In the present process, the film may be metallized *before* impregnation, thus substantially eliminating the adhesion problems.

The resinous film need not be itself a photoconductive insulating material. An impregnation agent is selected which provides the desired photoconductive response when diffused into the film. Suitable impregnation agents may include, for example, organic photoconductive insulating materials and electron acceptors. The impregnation step may be aided by a swelling agent for the film if desired. Other advantageous additives, such as sensitizing dyes, may be included, if desired.

A "photoconductive insulator" for the purposes of this invention is defined with reference to the practical application in xerographic imaging. It is generally considered that any insulator may be rendered "photoconductive" through excitation by sufficient intense radiation of sufficiently short wave-length. This statement applies generally to inorganic as well as to organic materials, including the inert binder resins used in binder plates and the resinous films used in the process of this invention. However, the short wave-length radiation sensitivity is not useful in practical imaging systems because sufficiently intense sources of wave-lengths below 3200 angstrom units are not available, because such radiation is damaging to the human eye and because this radiation is absorbed by glass optical systems. Accordingly, for the purposes of this application, the term "photoconductive insulator" includes only those materials which may be characterized as follows:

(1) They may be formed into continuous films which are capable of retaining an electrostatic charge in the absence of actinic radiation, and

(2) These films are sufficiently sensitive to illumination of wave-lengths longer than 3200 angstrom units so as to be discharged by at least one-half by a total flux of at most 10^{14} quanta/cm.² of absorbed radiation.

This definition excludes the films of this disclosure, before impregnation, from the class of "photoconductive insulators."

Any suitable organic binder or resin may be used to prepare the solid polymeric film to be impregnated in the process of this invention. Typical resins are thermoplastics such as polyethylene terephthalate, polyamides, polyimides, polycarbonates, polyacrylates, polymethylmethacrylates, polyvinyl fluorides, polyvinyl chlorides, polyvinyl acetates, polystyrene, styrene-butadiene copolymers, polymethacrylates, polyacrylics, silicone resins, chlorinated rubber, and mixtures and copolymers thereof where applicable; thermosetting resins such as epoxy resins, phenoxy resins, phenolics, epoxy-phenolic copolymers, epoxy urea-formaldehyde copolymers, epoxy melamine-formaldehyde copolymers and mixtures thereof, where applicable. Other typical resins are epoxy esters, vinyl epoxy resins, tall-oil modified epoxies, and mixtures thereof where applicable. In addition to the above-noted materials, any other suitable resin may be used if desired.

The impregnation agent may comprise any suitable photo-sensitive material, which may include organic photoconductors and/or electron acceptor materials.

Organic photoconductors which have been found to be especially useful as impregnation agents include triphenyl amine; 2,4-bis(4,4'-diethyl-aminophenyl)-1,3,4-oxadiazol; N-isopropylcarbazole triphenylpyrrol and mixtures thereof. These compositions are preferred for optimum sensitivity. However, any other suitable organic photoconductor may be used, if desired. Typical organic photoconductors include

4,5-diphenylimidazolidinone;
4,5-diphenylimidazolidinethione;
4,5-bis-(4'-amino-phenyl)-imidazolidinone;
1,5-cyanonaphthalene;
1,4-dicyanonaphthalene;
aminophthalodinitrile;
nitrophthalidinitrile;
1,2,5,6-tetraazacyclooctatetraene-(2,4,6,8);
3,4-di-(4'-methoxy-phenyl)-7,8-diphenyl-1,2,5,6-tetraazacyclooctatetraene-(2,4,6,8);
3,4-di-(4'-phenoxy-phenyl)-7,8-diphenyl-1,2,5,6-tetraazacyclooctatetraene-(2,4,6,8);
3,4,7,8-tetramethoxy-1,2,5,6-tetraaza-cyclooctatetraene-(2,4,6,8);
2-mercapto-benzthiazole;
2-phenyl-4- α -naphthylidene-oxazolone;
2-phenyl-4-diphenylidene-oxazolone;
2-phenyl-4-p-methoxybenzylidene-oxazolone;
6-hydroxy-2-phenyl-3-(p-dimethylamino phenyl)-benzofurane;
6-hydroxy-2,3-di(p-methoxyphenyl)benzofurane;
2,3,5,6-tetra-(p-methoxyphenyl)-furo-(3,2')-benzofurane;
4-dimethylamino-benzylidene-benzhydrazide;
4-dimethylaminobenzylideneisonicotinic acid hydrazide;
furfurylidene-(2)-4'-dimethylamino-benzhydrazide;
5-benzilidene-amino-acenaphthene;
3-benzylidene-amino-carbazole;
(4-N,N-dimethyl amino-benzylidene)-p-N,N-dimethyl-aminoaniline;
(2-nitro-benzylidene)-p-bromo-aniline;
N,N-dimethyl-N'-(2-nitro-4-cyano-benzylidene)-p-phenylene-diamine;
2,4-diphenyl-quanazoline;
2-(4'-amino-phenyl)-4-phenyl-quinazoline;
2-phenyl-4-(4'-di-methyl-amino-phenyl)-7-methoxy-quinazoline;
1,3-diphenyl-tetrahydroimidazole;
1,3-di-(4'-chlorophenyl)-tetrahydroimidazole;
1,3-diphenyl-2,4'-dimethyl amino phenyl)-tetrahydroimidazole;
1,3-di-(p-tolyl)-2-[quinolyl-(2')]-tetrahydroimidazole;
3-(4'-dimethylamino-phenyl)-5-(4''-methoxy-phenyl)-6-phenyl-1,2,4-triazine;
3-pyridyl-(4')-5-(4''-dimethylamino-phenyl)-6-phenyl-1,2,4-triazine;
3-(4'-amino-phenyl)-5,6-di-phenyl-1,2,4-triazine;
2,5-bis[4'-amino-phenyl-(1')]-1,3,4-triazole;
2,5-bis[4'-N-ethyl-N-acetylamino-phenyl-(1')]-1,3,4-triazole;
1,5-diphenyl-3-methyl-pyrazoline;
1,3,4,5-tetraphenyl-pyrazoline;
1-phenyl-3-(p-methoxy styryl)-5-(p-methoxy-phenyl)-pyrazoline;
1-methyl-2-(3',4'-dihydroxy-methylene-phenyl)-benzimidazole;
2-(4'-dimethylamino phenyl)-benzoxazole;
2-(4'-methoxyphenyl)-benzthiazole;
2,5-bis-[p-aminophenyl-(1)]-1,3,4-oxadiazole;
4,5-diphenyl-imidazolone;
3-aminocarbazole;
and mixtures thereof.

Any suitable electron acceptor-type composition may also be used as the impregnation agent in the process of this invention. Best results are obtained when the following electron acceptors are used: 2,4,7-trinitro-9-fluore-

none; 2,4,5-tetranitro-9-fluorenone; picric acid; 1,3,5-trinitro-benzene and chloranil. Other typical electron acceptor compositions include: quinones, such as p-benzoquinone, 2,5-dichlorobenzoquinone, 2,6-dichlorobenzoquinone, chloranil, naphthoquinone - (1,4), 2,3, dichloronaphthoquinone - (1,4), anthraquinone, 2-methylanthraquinone, 1,4-dimethylanthraquinone, 1-chloroanthraquinone, anthraquinone - 2-carboxylic acid, 1,5-dichloroanthraquinone, 1-chloro-4-nitroanthraquinone, phenanthrene - quinone, acenaphthenequinone, pyranthrenequinone, chrysensquinone, thio-naphthene-quinone, anthraquinone - 1,8-disulfonic acid and anthraquinone - 2-aldehyde; triphthaloyl-benzene-aldehydes such as bromal, 4-nitrobenzaldehyde, 2,6-dichlorobenzaldehyde-2, ethoxy-1-naphthaldehyde, anthracene-9-aldehyde, pyrene-3-aldehyde, oxindole-3-aldehyde, pyridine-2,6-dialdehyde, biphenyl-4-aldehyde; organic phosphonic acids such as 4-chloro-3-nitro-benzene-phosphonic acid, nitrophenols, such as 4-nitrophenol, and picric acid, acid anhydrides, for example, acetic-anhydride, succinic anhydride, maleic anhydride, phthalic anhydride, tetrachlorophthalic anhydride, perylene 3,4,9,10-tetracarboxylic acid and chrysene-2,3,8,9-tetracarboxylic anhydride, di-bromo maleic acid anhydride; metal halides of the metals and metalloids of the Groups I-B II through to Group VIII of the periodical system, for example: aluminum chloride, zinc chloride, ferric chloride, tin tetrachloride, (stannic chloride), arsenic trichloride, stannous chloride, antimony pentachloride, magnesium chloride, magnesium bromide, calcium bromide, calcium iodide, strontium bromide, chromic bromide, manganous chloride, cobaltous chloride, cobaltic chloride, cupric bromide, ceric chloride, thorium chloride, arsenic tri-iodide, boron halide compounds, for example: boron trifluoride, and boron trichloride; and ketones, such as acetophenone, benzo phenone, 2-acetyl-naphthalene, benzil, benzoin, 5-benzoyl acenaphthene, biacenedione, 9-acetyl-anthracene, 9-benzoyl-anthracene, 4-(4-dimethylamino-cinnamoyl)-1-acetylbenzene, acetoacetic acid anilide, indandione-(1,3), (1-3 diketo-hydrindene) acenaphthene quinone-dichloride, anisil, 2,2-pyridil and furil.

Additional Lewis acids are mineral acids such as the hydrogen halides, sulphuric acid and phosphoric acid; organic carboxylic acids, such as acetic acid and the substitution products thereof, monochloro-acetic acid, dichloroacetic acid, trichloro-acetic acid, phenylacetic acid, and 6-methyl-coumarinylacetic acid (4); maleic acid, cinnamic acid, benzoic acid, 1-(4-diethyl-amino-benzoyl)-benzene-2-carboxylic acid, phthalic acid, and tetrachlorophthalic acid, alpha-beta-di-bromo-beta-formyl-acrylic acid (muco-bromic acid), dibromo-maleic acid, 2-bromo-benzoic acid, gallic acid, 3-nitro-2-hydroxyl-1-benzoic acid, 2-nitro phenoxyacetic acid, 2-nitro-benzoic acid, 3-nitro-benzoic acid, 4-nitro-benzoic acid, 3-nitro-4-ethoxy-benzoic acid, 2-chloro-4-nitro-1-benzoic acid, 2-chloro-4-nitro-1-benzoic-acid, 3-nitro-4-methoxybenzoic acid, 4-nitro-1-methyl-benzoic acid, 2-chloro-5-nitro-1-benzoic acid, 3-chloro-6-nitro-1-benzoic acid, 4-chloro-3-nitro-1-benzoic acid, 5-chloro-3-nitro-2-hydroxy-benzoic acid, 4-chloro-2-hydroxy-benzoic acid, 2,4-dinitro-1-benzoic acid, 2-bromo-5-nitro-benzoic acid, 4-chlorophenyl-acetic acid, 2-chloro-cinnamic acid, 2-cyano-cinnamic acid, 2,4-dichlorobenzoic acid, 3,5-dinitrobenzoic acid, 3,5-dinitrosalicylic acid, malonic acid, mucic acid, acetosalicylic acid, benzilic acid, butane-tetracarboxylic acid, citric acid, cyano-acetic acid, cyclo-hexane-dicarboxylic acid, cyclohexene-carboxylic acid, 9,10-dichloro-stearic acid, fumaric acid, itaconic acid, levulinic acid (levulic acid), malic acid, succinic acid, alpha-bromo-stearic acid, citraconic acid, dibromo-succinic acid, pyrene-2,3,7,8-tetracarboxylic acid, tartaric acid, organic sulphonic acids, such as 4-toluene sulphonic acid, and benzene sulphonic acid 2,4-dinitro-1-methyl-benzene-6-sulphonic acid, 2,6-dinitro-hydroxy-benzene-4-sulphonic acid, 2-nitro-1-hydroxybenzene-4-sulphonic acid, 4-nitro-1-hydroxy-2-

benzene-sulphonic acid, 3-nitro-2-methyl-1-hydroxybenzene-5-sulphonic acid, 6-nitro-4-methyl-1-hydroxybenzene-2-sulphonic acid, 4-chloro-1-hydroxybenzene-3-sulphonic acid, 2-chloro-3-nitro-1-methylbenzene-5-sulphonic acid and 2-chloro-1-methyl-benzene-4-sulphonic acid.

The solvent used must be chosen so as to dissolve the impregnation agent used but be neutral with respect to the film used. Any suitable solvent which meets these two requirements may be used. Typical solvents include aromatic hydrocarbons, such as benzene and toluene, both substituted and unsubstituted; ketones, such as acetone and methyl-ethyl ketone; methylene chloride; carbon tetrachloride; alcohols, and mixtures thereof.

To facilitate impregnation a suitable swelling agent for the resin film used may be added to the solution of solvent and impregnation agent. Any suitable composition which is capable of temporarily swelling the particular resin film may be used. For example, best results with polyethylene terephthalate are obtained with diphenyl and ortho and para phenylphenol. Typical swelling agents include diphenyl; orthophenylphenol; paraphenylphenol; mono and di-chloro benzene, mixtures of tetrahydronaphthalene with cyclohexanol; benzoic acid; salicylic acid; methyl salicylate; and mixtures of methyl phenylcarbinol with acetophenone. The solvent-impregnation agent solution may include from zero to about 20 percent by weight of swelling agent. However, it is preferred that from about 1 to about 4 percent by weight of swelling agent be used in the solution to give optimum swelling and impregnation.

The film to be impregnated may be metallized on one of its faces, if desired. The metallic layer may be applied either before or after impregnation.

The following examples will further define the specifics of the present invention. Parts and percentages are by weight unless otherwise indicated. The examples below should be considered to illustrate various preferred embodiments of the present invention.

EXAMPLE I

About 5 parts of N-isopropyl carbazole is dissolved in about 50 parts of benzene. A film of "Mylar," a polyethylene-terephthalate resin available from E. I. du Pont de Nemours & Co., about 4 microns thick is introduced into this solution and the solution is boiled, under reflux for about 2 hours while the film is maintained in the solution. The film thus treated is rinsed in benzene and dried in a drying oven at 60° C. During drying the film is stretched over a frame to avoid warping. The film is then carefully stretched on a well-polished metallic surface and charged to about 1000 volts by means of a corona discharge device. The film is exposed for about 20 seconds to a light-and-shadow pattern by means of a high pressure mercury vapor lamp. The plate is then developed by cascading Xerox Corporation 1824 developer over the plate, as described, for example in U.S. Pats. 2,788,288 and 3,079,342. The powder image is fused, thereon producing an image corresponding to the original, which can be viewed directly or by projection.

EXAMPLE II

About 10 parts of 2,5-bis-(4'-diethylaminophenyl)-1,3,4-oxadiazole and about 2 parts of diphenyl are dissolved in about 50 parts of benzene. A sheet of "Mylar" about 4 microns thick is impregnated with this solution under reflux for about 30 minutes. The sheet is washed with benzene, dried, and afterwards carefully stretched on a well-polished metallic surface. The film is negatively charged to about 1000 volts by a corona discharge device and exposed to a light-and-shadow pattern by means of a mercury vapor lamp of 150 watts for about 10 seconds. The resulting electrostatic latent image is developed by cascading Xerox Corporation 1824 developer over

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the sheet. The developed image is then electrostatically transferred to a paper receiving sheet and fused thereon. An image corresponding to the original results.

EXAMPLE III

About 5 parts of 2,4,7-trinitro-9-fluorenone and about 1 part of diphenyl are dissolved in about 50 parts of benzene. A film of "Mylar" about 4 microns thick having one side vacuum metallized is introduced into this solution. The solution is maintained at reflux for about 2 hours. The film, thus treated, is rinsed in benzene and dried in a vacuum while stretched over a frame to avoid warping. The film is charged, exposed and developed as in Example I above. The developed image is then electrostatically transferred to a receiving sheet and fused.

EXAMPLE IV

About 2 parts of triphenylamine and about 2 parts of orthophenylphenol are dissolved in about 50 parts of benzene. A sheet of "Mylar" is impregnated as in Example I. Then one surface of the Mylar sheet is coated with a silver paint solution which is allowed to dry. Thereafter, the sheet is charged, exposed and developed as in Example I. A good image is produced corresponding to the original. This demonstrates that the "Mylar" sheet may be coated with a conductor after impregnation, if desired.

EXAMPLE V

About 5 parts of 1,4-dimethoxybenzene and about 2 parts of orthophenylphenol are dissolved in about 50 parts of benzene. A sheet of non-metallized "Mylar" film is impregnated, charged, exposed and developed as in Example I. An image is obtained which can be transferred to a paper-receiving surface or fixed on the film by a brief exposure to an infrared lamp.

EXAMPLE VI

About 5 parts of 2,4-bis(4,4'-diethyl-aminophenyl)-1,3,4-oxadiazole is dissolved in about 50 parts of benzene. A sheet of nylon 6 film, a polyamide film, available from British Cellophane Limited, about 7 microns thick is introduced into this solution and the solution is boiled under reflux for about 2 hours while maintaining the film in the solution. The film thus treated is rinsed in benzene and dried in a drying oven at 60° C. The film is stretched over a frame to avoid warping during drying. The film is then charged, exposed, and developed as in Example I. A good quality image corresponding to the original is produced.

EXAMPLE VII

About 5 parts of 2,4,7-trinitro fluorenone is dissolved in about 50 parts of benzene. A film of Pyre-ML, R C-675, a polyimide film available from E. I. du Pont de Nemours & Co., having a thickness of about 5 microns and having one face vacuum metallized with aluminum is introduced into the above solution and the solution is refluxed for about 30 minutes. The impregnated film is dried, charged, exposed and developed as in Example III above. A good quality image corresponding to the original is produced.

EXAMPLE VIII

About 10 parts 2,5-bis-(4,4'-diethylaminophenyl)-1,3,4-oxadiazole) and about 2 parts of diphenyl is dissolved in about 50 parts of benzene. A film of "Plestar," polycarbonate resin, available from General Aniline and Film

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Corp., about 4 microns thick is introduced into the above solution and the solution is boiled under reflux for about 2 hours. The film is then dried, charged, exposed, and developed as in Example I above.

Although specific materials and conditions were set forth in the above examples, these were merely illustrative of the present invention. If desired, the film may be impregnated in pattern configuration, resulting in a plate of varying sensitivity. Various other compositions, such as the typical materials listed above and various conditions, where suitable, may be substituted for those given in the examples with similar results. The impregnation agent, impregnating solution, or film to be impregnated, as disclosed above, may have other materials mixed therewith to enhance, sensitize, synergize or otherwise modify the photoconductive properties of the final impregnated film.

Many other modifications of the present invention will occur to those skilled in the art upon a reading of this disclosure. These are intended to be encompassed within the spirit of this invention.

We claim:

1. A process of preparing a photoconductive material which comprises: contacting an organic polymeric resinous film, said film comprising polyethylene terephthalate, with a solution containing an impregnation agent and a solvent being capable of dissolving said impregnation agent, said impregnation agent comprising a photosensitizing material, said material being selected from the group consisting of an organic photoconductive monomer, an electron acceptor material, and mixtures thereof, and a swelling agent for said film, said swelling agent being selected from the group consisting of diphenyl, orthophenylphenol, paraphenylphenol, and mixtures thereof; dispersing said impregnation agent into a part of said film; and continuing impregnation by said contact until a desired degree of photoconductivity is imparted into said film.

2. A process of improving the photoconductivity of an organic polymeric resinous film, which comprises: contacting said resinous film, said film comprising polyethylene terephthalate, with a solution containing an impregnation agent, said impregnation agent comprising a photosensitizing material, said material being selected from the group consisting of an organic photoconductive monomer, an electron acceptor material and mixtures thereof, a solvent in said solution being capable of dissolving said impregnation agent, and a swelling agent for said film, said swelling agent being selected from the group consisting of diphenyl, orthophenylphenol, paraphenylphenol, and mixtures thereof; dispersing said impregnation agent into a part of said film; and continuing impregnation by said contact until a desired degree of photoconductivity is imparted into said film.

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