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Fox

[11] **3,784,376**

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[54] **PHOTOCONDUCTIVE ELEMENT CONTAINING FURANS, INDOLES, OR THIOPHENES**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 73,257, Sept. 16, 1970, abandoned.

[52] **U.S. Cl.** **96/1.5,** 252/501

[51] **Int. Cl.** **G03g 5/00**

[58] **Field of Search** 96/1.5; 252/501

[56] **References Cited**

UNITED STATES PATENTS

3,485,625 12/1969 Fox 96/1.5

3,174,854 3/1965 Stumpt 252/501

OTHER PUBLICATIONS

C.A., Vol. 57, p. 1743 I.

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Assistant Examiner—John L. Goodrow
Attorney—Robert W. Hampton et al.

[57] **ABSTRACT**

Organic photoconductive elements of improved electrophotographic speed are prepared by coating on an electrically conducting support a photoconductive layer containing a 1,3-diarylisobenzofuran or 1,3-diaryl-4,7-dihydroisobenzofuran or the corresponding isoindole or isobenzothiophene derivatives.

10 Claims, No Drawings

PHOTOCONDUCTIVE ELEMENT CONTAINING FURANS, INDOLES, OR THIOPHENES

This invention relates to electrophotography and more particularly to novel organic photoconductive materials.

Electrophotographic processes employ an electrophotographic or photoconductive element comprising a coating of a photoconductive insulating material on a conductive support. The element is given a uniform surface charge in the dark and then is exposed to an image pattern of activating electromagnetic radiation such as light or X-rays. The charge on the photoconductive element is dissipated in the illuminated area to form an electrostatic charge pattern which is then developed by contact with an electroscopic marking material. The marking material or toner, as it is also called, whether carried in an insulating liquid or in the form of a dry powder, deposits on the exposed surface in accordance with either the charge pattern or the discharge pattern, as desired. Then, if the photoconductive element is of the non-reusable type, the developed image is fixed by fusion or otherwise to the surface of the photoconductive element. If the element is of the reusable type, e.g., a selenium-coated drum, the image is transferred to another surface such as paper and then fixed to provide a copy of the original.

All of this is well known and has been described in many patents and other literature, for example, in the patent of Carlson, U. S. Pat. No. 2,297,691, and in more recent works such as "Electrophotography" by R. M. Scaffert, published by Focal Press Ltd., 1965.

It is also known that many organic materials can be used as photoconductors. The organic photoconductors have a number of advantages over the inorganic photoconductors such as zinc oxide, which are presently more widely used. For instance, the organics are more resistant to abrasion than the inorganics. They can be charged to either high negative or positive potential while the inorganics often saturate at low potential and are less versatile in that characteristically they accept only a positive or a negative charge. Also the organics usually offer greater exposure latitude, can be spectrally sensitized more effectively and have other advantages over zinc oxide and other inorganics.

These useful properties which organic photoconductors possess in greater or lesser degree have lead to a widespread interest in them. However, they also have certain disadvantages which render them less desirable than zinc oxide for some uses. For example, many organic photoconductors have low xerographic speed or sensitivity and those that have adequate speed often have poor light stability and form colored materials by photodegradation.

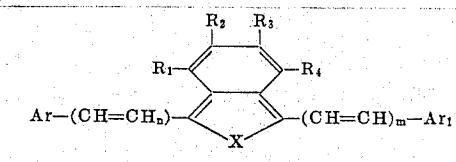
Among the many organic photoconductors that have been proposed are various 2,5-diarylfurans and 2,3-benzofurans, as disclosed, for example, in German Pat. No. 1,105,714 and Belgian Pat. No. 585,450. Although these furan derivaties have a number of advantages as organic photoconductors a problem has been that their sensitivity or electrophotographic speed has not been as high as desired.

In accordance with the present invention I have discovered that certain isobenzofurans and related compounds have unexpectedly higher electrophotographic speed than the furan derivaties which are reported in the prior art as photoconductors and also have better

light stability than high speed organic photoconductors. Based on this discovery, the photoconductive elements of the present invention, in general, comprise (a) an electrically conductive support and (b) a 1,3-diarylisobenzofuran or 1,3-diaryl-4,7-dihydroisobenzofuran or the corresponding isobenzothiophene and isoindole compounds. These compounds are characterized by the presence of a fused 6-membered unsaturated ring in the 4,5-position of the furan, thiophene or pyrrole ring and aryl substituents in the 1 and 3 positions. The aryl groups can be separated from the heterocyclic nucleus by conjugated linear carbon chains of 2,4,6 or 8 carbon atoms, i.e., $+CH=CH+_n$, where $n=0$ to 4. Therefore, in referring broadly to the 1,3-diaryl substituted compounds herein, it is intended to include vinylogs in which one or both of the 1,3-aryl groups is separated from the heterocyclic nucleus by one or more vinylene groups. The term aryl is thus used with respect to the 1,3-substituents to include not only phenyl, naphthyl and the like but also styryl, naphthylvinylene and the like.

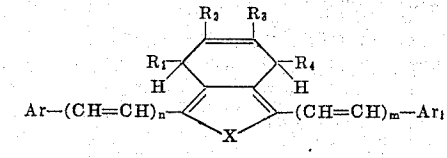
Such compounds can be represented by the formulae:

I



and

II



wherein X is -O-, -S- or -NR; R is H or alkyl of 1 to 18 carbon atoms, preferably lower alkyl; Ar and Ar_1 are aryl groups; R_1, R_2, R_3 and R_4 are hydrogen atoms or substituents, and n and m are integers from 0 to 4. As substituens, R_1, R_2, R_3 and R_4 can be essentially any electropositive or electronegative radicals such as alkyl, aryl, -COOR, $-CONR_2$, -CN, halogen, -OR, -R'-COOR or -R'-$CONR_2$, wherein R is hydrogen or alkyl of 1 to 18 carbon atoms and preferably is lower alkyl and R' is an alkylene radical of 1 to 18 carbon atoms, preferably lower alkyl (i.e., 1 to about 6 carbon atoms). The aryl groups, Ar and Ar_1 include, for example, phenyl, naphthyl, etc, and such radicals having substituents on the aromatic rings.

The photoconductive elements of the invention can employ any of the described isobenzofuran and analogous compounds having the indicated broad range of substituents. Advantageously, however, compounds are employed in which R_1, R_2, R_3 and R_4 and the values of *n* and *m* are such that the compounds are soluble in convenient solvents and are compatible with the most

effective binder resins. Best results in these respects are obtained when *n* and *m* are 0 or 1 and R_1, R_2, R_3 and R_4 are hydrogen atoms or alkyl groups of 1 to 18 carbon atoms, especially lower alkyl groups (i.e., 1 to about 6 carbon atoms).

Examples of the compounds of particular interest include the following: 1,3-diphenylisobenzofuran; 1,3-diphenyl-5,6-dimethylisobenzofuran; 1,3-diphenyl-4,7-dihydroisobenzofuran; 1-mesityl-3-phenylisobenzofuran; 1,3-dimesitylisobenzofuran; 1,3-diphenyl-4,7-diethylisobenzofuran; 1,3-diphenyl-5,6-dimethyl-isobenzothiophene; 1,3-diphenyl-4,7-dimethylisoindole; 1,3-bis(m-bromostyryl)isobenzothiophene; 1,3-bis(p-dimethylaminostyryl)isobenzofuran; 1-(2-naphthyl)-3-styryl-5,6-dimethylisobenzofuran; 1,3-di(m-tolyl)-4-dimethylamino-7-ethylisobenzothiophene; 1,3-bis-(4-phenyl-1,3-butadienyl-1)-2-methylisoindole; 1,3-bis-(2-naphthylvinylene-1)isobenzofuran; 1,3-diphenyl-5-methylisoindole; 1,3-diphenyl-2-methylisoindole; 1,3-diphenyl-5,6-dimethyl-4,7-dihydroisobenzothiophene and 1,3-diphenyl-2-methyl-4,7-dihydroisoindole.

Isobenzofurans and dihydroisobenzofurans of the types suitable in the compositions of the invention and methods of preparing such compounds are described, for example, by M. S. Newman, *J. Org. Chem.*, 26, 2630 (1960) and by Adams et al., *J. Am. Chem. Soc.*, 62, 56 (1940). The isobenzothiophene and isoindole compounds, i.e., where X in the formulae above is -S- or -NH-, can be prepared, for example, by the procedure of Mann et al., Chem. Commun. 1969, 420.

When employed as photoconductors in accordance with the present invention these compounds are mixed in an amount of 1 to 75 parts by weight with 25 to 99 parts by weight of a polymeric binder and are coated from a suitable solvent on a conducting support to provide the photoconductive layer of the electrophotographic element.

Preferred binders for admixture with the photoconductive compounds in preparing the photoconductive layers of the present invention include polymers having fairly high dielectric strength which are good electrically insulating film-forming vehicles. Materials of this type include styrene-butadiene copolymers; silicone resins; styrene-alkyd resins; silicone-alkyd resins; soya-alkyd resins; poly(vinyl chloride); poly(vinylidene chloride); vinyl chloride-vinylidene chloride copolymers; vinylidene chloride-acrylonitrile copolymers; poly(vinyl acetate); vinyl acetate-vinyl chloride copolymers; poly(vinyl acetals), such as poly(vinyl butyral); polyacrylic and methacrylic esters, such as poly(methyl methacrylate), poly(n-butyl methacrylate), poly(isobutyl methacrylate), etc.; polystyrene; nitrated polystyrene; polymethylstyrene; isobutylene polymers; polyesters, such as copoly[ethylene-co-alkylenebis(alkyleneoxyaryl)phenylene-dicarboxylate], e.g., poly[ethylene-co-isopropylidene-2,2-bis-(ethyleneoxyphenyl)terephthalate]; phenol-formaldehyde resins; ketone resins; polyamides; polycarbonates; polythiocarbonates; copolymers of vinyl haloarylates and vinyl acetate such as poly(vinyl-m-bromobenzoate-co vinyl acetate); waxes, chlorinated polyethylene, etc. Especially preferred are thermoplastic resins. Suitable resins are sold under such trademarks as Vitel PE-101, Cymac, Piccopale 100, Saran F-220, Lexan 145 and Geon 222. Also mixtures of these binders can be used.

The photoconductive compositions formed by blending a polymeric binder such as a polyester or polycarbonate with a monomeric organic photoconductor of the type described are preferred embodiments of the invention, because they provide a wide choice of binders and ratios of binder to photoconductor. It is well known, however, to use polymerizable photoconductors that require no separate polymeric binder. It should be understood therefore that it is within the scope of the present invention to use species of the described photoconductors that contain the active nuclei depicted above but that are polymerizable and require no separate polymeric binder, although even in this event a polymer of the polymeric binder type can also be blended with the polymeric photoconductor if desired.

The polymeric photoconductors are prepared by polymerizing monomers which contain the described photoconductive nuclei (i.e., 1,3-diarylisobenzofuran or 1,3-diaryl-4,7-dihydroisobenzofuran or corresponding isobenzothiophene or isoindole) and which are polymerizable to form either addition or condensation polymers. Addition polymers can be formed when the monomeric photoconductor contains one or more vinylene groups as, for example, when *n* or *m* or both in I or II above is a positive integer of 1 to 4. The addition polymerization can be carried out by known catalytic techniques for polymerization of vinyl monomers.

Condensation polymers can be formed when, for example, in formulae I and II, two or more of the substituents R_1 through R_6 are radicals that condense with other radicals to form esters, amides, urethanes, carbonates, etc. These include radicals such as -OH, -COOH. -COOalkyl, $-NH_2$ and the like. Conventional catalytic procedures for forming such condensation polymers can be used. For example, if R_1 and R_2 are carboxyl groups the isobenzofuran compound can be reacted with a glycol such as ethylene glycol in the presence of a catalyst such as an oxide of tin or titanium to form a polyester. The preferred condensation polymers are polycarbonates and polyurethanes and especially preferred are those formed from monomers I or II when R_1 and R_9 are the polymer-forming functional groups such as hydroxyl groups, *n* and *m* are zero, and the monomer is reacted with phosgene or a diisocyanate.

Solvents useful for preparing coating compositions with the photoconductors of the present invention can include a wide variety of organic solvents for the components of the coating composition. For example, benzene; toluene; acetone; 2-butanone; chlorinated hydrocarbons such as methylene chloride; ethylene chloride; and the like; others, such as tetrahydrofuran and the like, or mixtures of such solvents can advantageously be employed in the practice of this invention.

Sensitizing compounds usful with the photoconductive elements of the present invention can be selected from a wide variety of materials, including such materials as pyrylium dye salts including thiapyrylium dye salts and selenapyrylium dye salts disclosed in VanAllen et al. U. S. Pat. No. 3,250,615; fluorenes, such as 7,12-dioxo-13-dibenzo(a,h)fluorene, 5,10-dioxo-4a,11-diazabenzo(b)fluorene, 3,13-dioxo-7-oxadibenzo-(b,g)fluorene, and the like; aggregate-type sensitizers of the type described in Belgian Pat. No. 705,117 dated Apr. 16, 1968; aromatic nitro compounds of the kind described in U. S. Pat. No.

2,610,120; anthrones like those disclosed in U. S. Pat. 2,670,284; quinones, U. S. Pat. No. 2,670,286; benzophenones U. S. Pat. No. 2,670,287; thiazoles U. S. Pat. No. 2,732,301; mineral acids; carboxylic acids, such as maleic acid, di- and tri-chloroacetic acids, and salicyclic acid; sulfonic and phosphoric acids; and other electron acceptor compounds as disclosed by H. Hoegl, *J. Phys. Chem.*, 69, No. 3, 755–766 (March, 1965), and U. S. Pat. No. 3,232,755.

The amount of sensitizer that can be added to a photoconductor layer to give effective increases in speed can vary widely. The optimum concentration will vary with the specific photoconductor and sensitizing compound used. In general, substantial speed gains can be obtained where an appropriate sensitizer is added in a concentration range from about 0.0001 to about 10 weight percent or more based on the weight of the coating composition. Normally, sensitizers are added to the coating composition in an amount of about 0.005 to about 5.0 percent by weight of the total coating composition.

Coating thicknesses of the photoconductive composition on a support can vary widely. Normally, a coating in the range of about 1μ to about 500μ after drying is useful for the practice of this invention. The preferred range of coating thickness is found to be in the range from about 5μ to about 200μ after drying although useful results can be obtained outside of this range.

Suitable supporting materials for the photoconductive layers of the present invention can include any of a wide variety of electrically conducting supports, for example, various conducting papers; aluminum coated paper; aluminum-paper laminates; metal foils such as aluminum foil, zinc foil, etc.; metal plates, such as aluminum, copper, zinc, brass, and galvanized plates; varpor deposited metal layers such as silver, nickel or aluminum on conventional film supports such as cellulose acetate, poly-(ethylene terephthalate), polystyrene and the like conducting supports. An especially useful conducting support can be prepared by coating a support material such as poly(ethylene terephthalate with a layer containing a semiconductor dispersed in a resin as described in U. S. Pat. No. 3,245,833 or vacuum deposited on the support. Likewise, a suitable conducting coating can be prepared from the sodium salt of a carboxyester lactone of a malaic anhydride-vinyl acetate copolymer. Such kinds of conducting layers and methods for their optimum preparation and use are disclosed in U. S. Pat. Nos. 3,007,901; 3,245,833 and 3,267,807.

The electrophotographic elements of the invention are used for making xerographic images in the following manner: The electrophotographic element is held in the dark and given a blanket electrostatic charge by placing it under a corona discharge. This uniform charge is retained by the photoconductive layer because the substantial dark insulating property of the layer, i.e., the low conductivity of the layer in the dark. The electrostatic charge formed on the surface of the photoconductive layer is then selectively dissipated from the surface of the layer by image-wise exposure to light by means of a conventional exposure operation such as, for example, by a contact-printing technique, or by lens projection of an image, and the like, to thereby form a latent electrostatic image in the photoconductive layer. Exposing the surface in this manner forms a pattern of electrostatic charge by virtue of the fact that light energy striking the photoconductor causes the electrostatic charge in the light struck areas to be conducted away from the surface in proportion to the intensity of the illumination in a particular area.

The charge pattern produced by exposure is then developed or transferred to another surface and developed there, i.e., either the charged or uncharged areas rendered visible, by treatment with a medium comprising electrostatically responsive particles having optical density. The developing electrostatically responsive particles can be in the form of a dust, i.e., powder, or a pigment in a resinous carrier, i.e., toner. A preferred method of applying such toner to a latent electrostaic image for solid area development is by the use of a magnetic brush. Methods for forming and using a magnetic brush toner applicator are described in the following U. S. Pat. Nos: 2,786,439; 2,786,440; 2,786,441; 2,811,465; 2,874,063; 2,984,163; 3,040,704; 3,117,884; and Reissue 25,779. Liquid development of the latent electrostatic image may also be used. In liquid development, the developing particles are carried to the image-bearing surface in an electrically insulating liquid carrier. Methods of development of this type are widely known and have been described in the patent literature, for example, U. S. Pat. No. 2,907,674 and in Australian Pat. No. 212,315. In dry developing processes, the most widely used method of obtaining a permanent record is achieved by selecting a developing particle which has as one of its components a low-melting resin. Heating the powder image then causes the resin to melt or fuse into or on the element. The powder is, therefore, caused to adhere permanently to the surface of the photoconductive layer. In other cases, a transfer of the electrostatic charge image formed on the photoconductive layer can be made to a second support such as paper which would then become the final print after development and fusing. Techniques of the type indicated are well known in the art and have been described in a number of U. S. and foreign patents, such as U. S. Pat. Nos. 2,297,691 and 2,551,582 and in "RCA Review" Vol. 15 (1954) pages 469–484.

The following example further illustrates the principles of the invention.

EXAMPLE 1

Electrophotographic elements or plates are prepared in the following manner: To a solution of 0.15 grams of the organic photoconductive compound and 0.002 grams of a sensitizing dye in 5 ml. of methylene chloride is added 0.050 grams of Vitel PE-101* *Vitel PE-101 is a trademark of Goodyear Tire & Rubber Company for a copolyester of terephthalic acid with a glycol mixture having a 9:1 molar ratio of ethylene glycol and 2,2-bis-(4-β-hydroxyethoxyphenyl) propane. polyester. The mixture is agitated to obtain a clear viscous solution or dope which is knife-coated on aluminum foil at about 125° F. and a wet thickness of 0.004 inches. The coated product is dried and dark-conditioned by heating for fifteen hours in a dark oven at 47° C. Samples of the resulting xerographic element are charged in total darkness by means of a negative corona and then exposed through a step tablet to the light of a tungsten lamp at an illumination intensity of about 19 foot-candles for 12 seconds. The step tablet is of the carbon-grain-in-gelatin type with density increments of

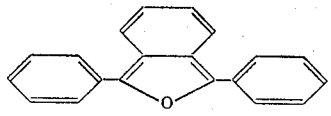
0.15. An inlay of 2.0 density covers one half of the tablet to extend the range of exposure. A photographic film positive carrying printed text and numbers identifying the steps lies between the photoconductive layer and the tablet.

The resulting electrostatic latent image is developed by cascading over the surface of the photoconductive layer a mixture of negatively charged thermoplastic toner particles and plastic beads.

Following the described procedure a series of electrophotographic elements is prepared using the furan compounds I through V and sensitizers (or no sensitizers) as indicated in the following lists of furan compounds and sensitizers and the table hereinafter. Elements are also prepared which contain a furan compound but no sensitizer and a control element is prepared which contains only the polyester binder resin and the sensitizer B.

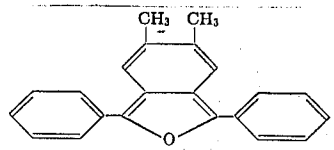
Furan Compounds

I



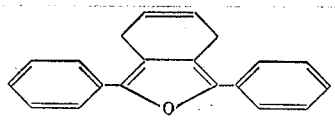
1,3-diphenylisobenzofuran

II



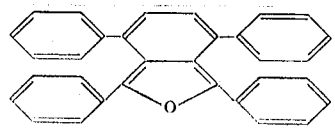
1,3-diphenyl-5,6-dimethylisobenzofuran

III



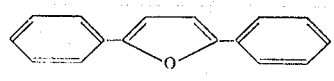
1,3-diphenyl-4,7-dihydroisobenzofuran

IV



1,3,4,7-tetraphenylisobenzofuran

V



2,5-diphenylfuran

SENSITIZERS

A. No sensitizer added.

B. 4-(4-n-amyloxyphenyl)-2,6-bis(4-ethylphenyl)-thiapyrylium perchlorate

C. 2,4,7-trinitrofluorenone

D. Crystal violet

E. Rhodamine B

F. 2,4-bis-(4-ethoxyphenyl)-6-(4-amyloxystyryl) pyrylium fluoroborate

The table below records the results of the described xerographic exposure of plates containing the organic photoconductors and sensitizers indicated in the table. (Except that the data for the element containing compound IV are from a test with positive charging. In a negative charging test, which possibly failed for other reasons, the element containing this compound yielded no image.). The speed designations in the table are relative speeds indicating the multiple by which the particular xerographic element is faster than the control that contains only the polyester binder resin and sensitizer B. With the procedure described the control gives a detectable image to about step 10.

Table

Photoconductor	Sensitizer	Image Formed	Speed Rating
I	A (None)	Yes	24
I	B	Yes	200
I	C	Yes	48
I	D	Yes	98
I	E	Yes	200
II	A (None)	Yes	78
II	E	Yes	120
III	C	Yes	150
IV	B	Yes	57
IV	C	Yes	20
IV	D	No	—
IV	E	Yes	15
V	A (None)	No	—
V	B	Yes	38
V	C	Yes	6
V	D	No	—
V	E	Yes	5
None (Control)	A (None)	No	—
	B	Yes	5
	C	No	—
	D	No	—
	E	No	—

The results recorded in the table show that the described isobenzofuran compounds I, II and III are photoconductors of good sensitivity. They are unexpectedly superior to a simple diaryl substituted furan such as compound V. In these particular comparisons compound IV, (1,3,4,7-tetraphenyl-isobenzofuran, which is also a 1,3-diarylisobenzofuran of the type contemplated herein) is not as markedly superior to photoconductor V and the control element as are compounds I, II and III. An explanation for these results which are not as good as can be obtained with compound IV is that some crystallization of the compound occurred in this particular coating. The following example describes a coating in which substantially better results are obtained with compound IV.

EXAMPLE 2

The crystallization of the 1,3,4,7-tetraphenylisobenzo-furan encountered in Example 1 is eliminated or reduced in a photoconductive element prepared substantially as in Example 1 but using bisphenol-A polycarbonate (Lexan 145 polycarbonate) as the binder instead of polyester and using approximately 15 percent concentration of the compound in the coating instead of approximately 20 percent. Testing of such compositions containing compound IV and either sensitizer B

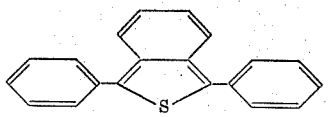
or sensitizer F for positive and negative charging gives the following results:

Photoconductor	Sensitizer	speed Positive	Negative
IV	B	120	71
IV	F	170	160

The next example illustrates the use of the following thiobenzofuran and isoindole compounds in photoconductive elements of the invention:

Thiobenzofuran Compound

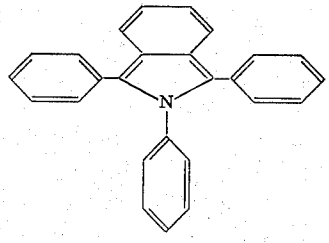
VI



1,3-diphenylisothiobenzofuran

Isoindole Compound

VII



1,2,3-triphenylisoindole

EXAMPLE 3

Photoconductive elements of the invention containing a thiobenzofuran (compound VI) or an isoindole (compound VII) are prepared as in Example 1, using the following basic formulation:

Photoconductor — 0.25 g.
Vitel 101 polyester — 1.00 g.
Sensitizer — 0.01 g.
Methylene chloride — 9.60 g.

Results obtained with these compositions positively charged and tested as in Example 1 are as follows:

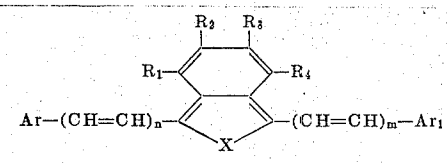
Photoconductor	Sensitizer	Image Formed	Speed Rating
VI	B	Yes	200
	E	Yes	100
VII	B	Yes	50
	E	Yes	50

Compounds of somewhat related structure which appear to have some utility as organic photoconductors, although not having the surprisingly high sensitivity of the 1,3-diarylisobenzofurans, include the following isoindoles: 1-(4-dimethyl-aminophenylisoindole, 1-phenylisoindole and 1-(4-methoxyphenyl) isoindole.

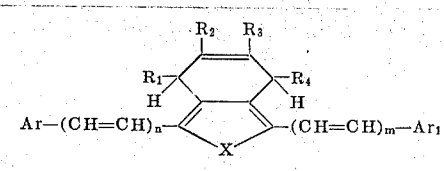
The invention has been described in detail with particular reference to preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention.

I claim:

1. A photoconductive element comprising an electrically conducting support and having thereon a layer comprising a polymeric binder with an organic photoconductive compound of the formula



or



where R_1, R_2, R_3 and R_4 are hydrogen, alkyl, aryl, -COOR, -CON(R)$_2$, CN, halogen, -OR, -R′-COOR, or -R′-CON(R)$_2$ wherein R is hydrogen or alkyl and R′ is an alkylene radical; Ar and Ar_1 are aryl groups; X is O, S, or NR; and *n* and *m* are integers from 0 to 4.

2. An element according to claim **1** in which R_1, R_2, R_3 and R_4 are hydrogen or lower alkyl.

3. An element according to claim **2** in which a sensitizing dye is incorporated with the organic photoconductor compound.

4. An element according to claim **3** in which the organic photoconductor compound is 1,3-diphenylisobenzofuran.

5. An element according to claim **3** in which the organic photoconductor compound is 1,3-diphenyl-5,6-dimethylisobenzofuran.

6. An element according to claim **3** in which the organic photoconductor compound is 1,3-diphenyl-4,7-dihydroisobenzofuran.

7. An element according to claim **1** comprising a photoconductive layer coated on an electrically conducting support, said layer comprising (a) a photoconductive compound selected from the group consisting of 1,3-diphenylisobenzo-furan, 1,3-diphenyl-5,6-dimethylisobenzofuran and 1,3-diphenyl-4,7-dihydroisobenzofuran, (b) a sensitizing dye and (c) a polymeric binder.

8. An element according to claim **7** in which the polymeric binder is a major component of the photoconductive layer and is a terephthalic polyester.

9. An element according to claim **7** in which the polymeric binder is a major component of the photoconductive layer and is a bisphenol-A polycarbonate.

10. An element according to claim **3** in which the organic photoconductor compound is 1,2,3-triphenylisoindole.

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