(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 015 244 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
13.03.2002 Bulletin 2002/11

(21) Application number: **98939400.2**

(22) Date of filing: **14.08.1998**

(51) Int Cl.[7]: **B41C 1/10**, B41N 1/00, B41M 5/36

(86) International application number:
PCT/US98/16885

(87) International publication number:
WO 99/11457 (11.03.1999 Gazette 1999/10)

(54) **PROCESSLESS, LASER IMAGEABLE LITHOGRAPHIC PRINTING PLATE**

VERARBEITUNGSFREIE FLACHDRUCKPLATTE FÜR LASER BEBILDERUNG

PLANCHE D'IMPRESSION LITHOGRAPHIQUE, SANS TRAITEMENT, IMAGEABLE PAR LASER

(84) Designated Contracting States:
DE FR GB

(30) Priority: **02.09.1997 US 922714**

(43) Date of publication of application:
05.07.2000 Bulletin 2000/27

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Description

Field of the Invention

[0001] This invention relates to lithographic printing plates and their process of use. More particularly, this invention relates to lithographic printing plates which can be digitally imaged by infrared laser light.

Description of Related Art

[0002] Conventional lithographic printing plates typically have a radiation sensitive, oleophilic image layer coated over a hydrophilic underlayer. The plates are imaged by imagewise exposure to actinic radiation to produce imaged areas which are either soluble (positive working) or insoluble (negative working) in a developer liquid. During development of the imaged plate, the soluble areas are removed by the developer liquid from underlying hydrophilic surface areas to produce a finished plate with ink receptive oleophilic image areas separated by complimentary, fountain solution receptive hydrophilic areas. During printing, a fountain solution is applied to the imaged plate to wet the hydrophilic areas, so as to insure that only the oleophilic image areas will pick up ink for deposition on the paper stock as a printed image. Conventional lithographic printing plates typically have been imaged using ultraviolet radiation transmitted imagewise through a suitable litho film in contact with the surface of the printing plate.

[0003] With the advent of digitally controlled imaging systems using infrared lasers, printing plates which can be imaged thermally have been developed to address the emerging industry need. In such thermally imaged systems the radiation sensitive layer typically contains a dye or pigment which absorbs the incident infrared radiation and the absorbed energy initiates the thermal reaction to produce the image. However, each of these thermal imaging systems requires either a pre- or post-baking step to complete image formation , or blanket pre exposure to ultraviolet radiation to activate the layer.

[0004] Examples of radiation sensitive compositions and their use in making lithographic printing plates are disclosed in U.S. Patents 4,708,925; 5,085,972; 5,286,612; 5,372,915; 5,441,850; 5,491,046; 5,340,699; and 5,466,557; and European Patent Application 0 672 954 A2.

[0005] Each of the disclosed radiation sensitive lithographic printing plates requires a development step typically with a highly alkaline developer which is prone to reaction with atmospheric carbon dioxide. after non printing areas are removed the developed plate typically requires rinsing and drying prior to mounting on the printing press. In order to take full advantage of current digitally controlled imaging systems there is a need to reduce or eliminate the time required for plate development so that an imaged plate could be directly used on a printing press.

[0006] From US-A 5 491 046 a lithographic printing plate is known, said lithographic printing plate having an imaging layer that comprises an admixture of (1) a resole resin, (2) a novolac resin, (3) a latent Bronsted acid and (4) an infrared absorber said imaging layer being sensitive to both ultraviolet and infrared radiation and being capable of functioning in either a positive-working or a negative-working manner. The known lithographic printing plate is imagewise exposed with a laser diode laser that emits a high-intensity infrared laser beam which provides enhanced image sharpness.

SUMMARY OF THE INVENTION

[0007] These needs are met by the processless lithographic printing plate of this invention which is a lithographic printing plate comprising:

(a) a sheet substrate;
(b) a porous hydrophilic layer applied to the sheet substrate, wherein the porous hydrophilic layer consists essentially of aluminosilicate; and
(c) an imaging layer applied to the hydrophilic layer, wherein the imaging layer is porous and comprises a thermally reactive composition.

[0008] A further embodiment of this invention is a lithographic printing plate comprising:

(a) a sheet substrate;
(b) a porous hydrophilic layer applied to the sheet substrate, wherein the porous hydrophilic layer consists essentially of aluminosilicate; and
(c) an imaging layer applied to the hydrophilic layer, wherein the imaging layer consists essentially of

(1) an acid catalyzed, crosslinking resin system;
(2) a thermal-activated acid generator;
(3) an infrared absorbing compound: and optionally,
(4) an indicator dye.

[0009] A still further embodiment of this invention is a method for preparing a lithographic printing surface consisting essentially of the steps:

A. providing a lithographic printing plate comprising:

(a) a sheet substrate;
(b) a porous hydrophilic layer applied to the sheet substrate, wherein the porous hydrophilic layer
consists essentially of aluminosilicate; and
(c) an imaging layer applied to the hydrophilic layer, wherein the imaging layer comprises a thermally reactive composition;

B. imagewise exposing the imaging layer to infrared radiation to produce an imaged layer; and
C. treating the imaged layer with a conditioner liquid to produce a planar lithographic printing surface.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The invention can be more fully understood from the following description thereof in connection with the accompanying drawings described as follows:

Figure 1 is an electron micrograph of an aluminosilicate surface of the porous hydrophilic layer of this invention.
Figure 2 is an electron micrograph of an imaging layer coated over the porous hydrophilic layer.
Figure 3 is an electron micrograph of an imaged imaging layer coated over the porous hydrophilic layer.

DETAILED DESCRIPTION OF THE INVENTION

[0011] This invention relates to processless thermal lithographic printing plates which can be digitally imaged by infrared laser light having a wavelength between 700 and 1300 nm. The thermal lithographic printing plates described herein do not require a chemical development to remove areas of the imaged plate. Rather, upon exposure to infrared laser light, the imaged areas become ink receptive and the non-image areas repel ink after simple treatment with a conditioner such as a fountain solution.

[0012] The processless thermal lithographic printing plates of this invention is comprised of a sheet substrate; a porous, aluminosilicate hydrophilic layer applied to the sheet substrate; and a thermally reactive imaging layer applied to the hydrophilic layer.

Sheet Substrate

[0013] Any dimensionally stable sheet material may be used to support the lithographic plate structure of this invention. Thus the substrate may be polymeric films such as polyester films; metal sheets such as aluminum; paper product sheets; and the like. Each of these substrate types may be coated with ancillary layers to improve interlayer adhesion; thermal insulation, particularly for metal substrates; and the like. Preferably, the substrate is a sheet of polyester film such as polyethylene terephthalate, although other polymeric films and composites may also be used such as polycarbonate sheets; and the like. A particularly preferred sheet substrate is Myriad polyester offset substrate which is available from Xante Corporation, Mobile, AL. Myriad polyester offset substrate consists of a polyester substrate which has been treated to provide a hydrophilic surface.

Porous Hydrophilic Layer

[0014] The lithographic plate of this invention contains an aluminosilicate hydrophilic layer which is porous and which strongly adheres to both the underlying substrate as well as the overlying imaging layer. A particular hydrophilic layer which possesses these unique features is the hydrophilic surface of the Myriad polyester offset printing plate identified above. The hydrophilic surface of the Myriad product was analyzed using an FT-IR spectrophotometer and identified as alumino silicate corresponding to $Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$. An electron micrograph of that hydrophilic surface at 5 KV electrons and 2000 magnification as illustrated in Figure 1 revealed that the surface is micro-porous having pores which are a fraction of a micrometer. The Myriad product was determined to have an average surface roughness of about 1.0 to about 1.1 micrometers. using conventional roughness measurement methods.

Thermally Reactive Imaging Layer

[0015] The imaging layer of this invention is thermally reactive and contains a composition which strongly absorbs infrared radiation which induces a thermal reaction in the composition to change its physical properties. The imaging layer is porous although visually the coating appears uniform and continuous. Referring to Figure 2, this figure is an electron micrograph at 5 KV electrons and 2000 magnification which illustrates that the surface of a uniform polymeric coating is micro-porous.

[0016] The composition of the imaging layer contains as its essential ingredients an acid catalyzed, crosslinking resin system; a thermal-activated, acid generator; an infrared absorbing compound; and optionally, an indicator dye. The acid catalyzed, crosslinking resin system comprises an acid catalyzed crosslinkable polymer capable of undergoing an acid-catalyzed polymerization and/or crosslinking reaction, at a temperature in the range of about 60-200°C, to form a crosslinked polymer. In one embodiment of this invention, the crosslinking resin system contains as its sole component an acid catalyzed crosslinkable polymer which contains functional groups which allows crosslinking between polymer chains of the resin system. In another embodiment, the crosslinking resin system contains both the acid catalyzed crosslinkable polymer and a binder resin comprising a polymer containing reactive pendent groups selected from the group consisting of hydroxy, carboxylic acid, sulfonamide, hydroxymethyl amide, and alkoxymethyl amide; wherein the binder resin is capable of undergoing an acid-catalyzed polymerization and/or crosslinking reaction with the acid catalyzed crosslinkable polymer, at a temperature in the range of about 60-200°C, to form the crosslinked polymer. Condensation polymerization compositions of this type are disclosed in Assignee's U.S. Patent Application Serial No. 08/745,534.

[0017] The crosslinking resins used in the imaging layer of this invention preferably are resole resins; C_1-C_5 alkoxymethyl melamine and glycoluril resins; polymers of (hydroxymethyl styrene); of (4-methoxymethyl styrene); of [(N-methoxymethyl)-acrylamide]; and of [(N-n-butoxymethyl)-acrylamide]; and combinations thereof. Crosslinking resins which are particularly preferred are copolymers of N-methoxymethyl methacrylamide, of N-methoxymethyl acrylamide, or of hydroxy-((1-oxo-2-propenyl)-amino) acetic acid methyl ester; with C_1-C_{12} alkylacrylate, with C_1-C_{12}alkylmethacrylate, with glycidylmethacrylate, with 3,4-epoxy cyclohexylmethyl methacrylate, with 3,4-epoxy cyclohexylmethyl acrylate, with acrylic acid, and with methacrylic acid. The crosslinking resin is incorporated into the composition in an amount from about 25 to about 90, and preferably about 40 to about 75, weight percent (based on the weight of the composition).

[0018] The binder resin used in the imaging layer of this invention preferably is one or more polymers capable of undergoing an acid-catalyzed condensation reaction with the crosslinking resin at a temperature in the range of about 60 to 200°C to form a crosslinked polymer. Suitable examples of such polymers include poly (4-hydroxystyrene), poly(4-hydroxystyrene/methylmethacrylate), novolac resin, poly(2-hydroxyethylmethacrylate/cyclohexylmethacrylate), poly(2-hydroxyethylmethacrylate/methylmethacrylate), poly(styrene/butylmethacrylate/methylmethacrylate/methacrylic acid), poly(butylmethacrylate/methacrylic acid), poly(vinylphenol/2-hydroxyethylmethacrylate), poly(styrene/n-butylmethacrylate/(2-hydroxyethyl methacrylate/ methacrylic acid), poly(N-methoxymethylmethylacrylamide/ 2-phenylethylmethacrylate/ methacrylic acid), and poly (styrene/ethylmethacrylate/2-hydroxyethylmethacrylate/methacrylic acid). The binder resin is present in the composition in an amount of 0 to about 65, and preferably up to about 50, weight percent (based on the weight of the composition).

[0019] The thermal-activated acid generator used in the imaging layer of this invention promotes the matrix-forming reaction between the crosslinking resin and the binder resin when the layer is exposed to a suitable radiation source. Thermal-activated acid generators suitable for use in this invention include, for example, straight or branched-chain C_1-C_5 alkyl sulfonates; aryl sulfonates; straight or branched chain N-C_1-C_5 alkyl sulfonyl sulfonamides; salts containing an onium cation and nonnucleophilic anion; and combinations thereof. Particularly useful salts include those in which the onium cation is selected from the group consisting of an iodonium, a sulphonium, a phosphonium, a oxysulphoxonium, a oxysulphonium, a sulphoxonium, an N-alkoxy ammonium, an ammonium, or a diazonium cation and where the non-nucleophilic anion is selected from the group consisting of tetrafluoroborate, hexafluorophosphate, hexafluoroarsenate, hexafluoroantimonate, triflate, tetrakis(pentafluorophenyl)borate, pentafluoroethylsulfonate, p-methylbenzene sulfonate, ethyl sulfonate, trifluoromethyl acetate, and pentafluoroethyl acetate. Preferred thermal-activated acid generators are diaryliodonium salts. A particularly preferred thermal-activated acid generator is a C_3 - C_{20} alkoxyphenyl-phenyliodonium salt, or a C_3 - C_{20} alkoxyphenyl-phenyliodonium salt wherein the alkoxy group is substituted at the 2 position with a hydroxy group such as 2-hydroxytetradecyloxyphenyl-phenyliodonium hexafluoroantimonate, or an ester linkage is present in the alkoxy group chain. The thermal-activated acid generator is incorporated in the imaging layer in an amount from about I to about 25 weight percent and preferably from about 5 to about 20 weight percent, based on the weight of the composition.

[0020] The imaging layer of this invention also requires, as a component, an infrared absorber to render the layer sensitive to infrared radiation and cause the printing plate to be imageable by exposure to a laser source emitting in the infrared region. The infrared absorbing compound may be a dye and/or pigment, typically having a strong absorption band in the region between 700 nm and 1400 nm, and preferably in the region between 780 nm and 1300 nm. A wide range of such compounds is well known in the art and include dyes and/or pigments selected from the group consisting of triarylamine dyes, thiazolium dyes, indolium dyes, oxazolium dyes, cyanine dyes, polyaniline dyes, polypyrrole dyes, polythiophene dyes, thiolene metal complex dyes, carbon black, and polymeric phthalocyanine blue pigments. Examples of the infrared dyes employed in the imaging layer are Cyasorb IR99 (available from Glendale Protective Technology), Cyasorb IR165 (available from Glendale Protective Technology), Epolite III-178 (available from Epoline), Epolite IV-62B (available from Epoline), PINA-780 (available from Allied Signal), SpectraIR830A (available from Spectra Colors Corp.), and SpectraIR840A (available from Spectra Colors Corp.). The infrared absorber is used in the imaging layer in an amount from about 2 to about 30 weight percent, percent and preferably from about 5 to about 20 weight percent, based on the weight of the composition.

[0021] Other components which can optionally be incorporated into the imaging layer include an indicator dye and a secondary acid generator.

[0022] An indicator dye is typically added to the imaging layer to provide a visual image on the exposed plate prior to inking or mounting on the press. Suitable indicator dyes for this purpose include Basic Blue 7, CI Basic Blue 11, CI Basic Blue 26, CI Disperse Red 1, CI Disperse Red 4, CI Disperse Red 13, Victoria Blue R, Victoria Blue BO, Solvent Blue 35, and Solvent Blue 36. preferably the imaging layer contains an indicator dye which is present in an amount of about 0.05 to about 10 weight percent and preferably from about 0.1 to about 5 weight percent, based on the weight of the composition.

[0023] Suitable secondary acid generators are those

capable of undergoing an acid-catalyzed thermal decomposition to form additional acid. Secondary acid generators of this type include acetoacetate, a squaric acid derivative, or an oxalic acid derivative. Particularly useful secondary acid generators include tert-butyl-2-methyl-2-(tosyloxymethyl)-acetoacetate, 2-phenyl-2-(2-tosyloxyethyl)-1,3-dioxolane and 3,4-dialkoxycyclobut-3-ene-1,2-dione.

[0024] To form printing plates of this invention, the compositions typically may be dissolved in an appropriate solvent or solvent mixture, to the extent of about 5 to 15 weight percent based on the weight of the composition. Appropriate solvents or solvent mixtures include methyl ethyl ketone, methanol, methyl lactate, etc. Desirably, the coating solution will also contain a typical silicone-type flow control agent. The porous hydrophilic layer on the sheet substrate may be coated by conventional methods, e.g., roll, gravure, spin, or hopper coating processes, at a rate of about 5 to 15 meters per minute. The coated plate is dried with the aid of an airstream having a temperature from about 60 to about 100°C for about 0.5 to 10 minutes. The resulting plate will have an imaging layer having a coating weight below about 3 grams per square meter and preferably between about 1.5 and about 2.5 grams per square meter.

Preparation of the Lithographic Printing Surface:

[0025] In the method of this invention, a lithographic printing surface is prepared using a lithographic printing plate as described supra which comprises a sheet substrate; a porous hydrophilic layer applied to the sheet substrate, wherein the porous hydrophilic layer consists essentially of aluminosilicate; and an imaging layer applied to the hydrophilic layer, wherein the imaging layer comprises a thermally reactive composition. The imaging layer is imagewise exposed to infrared radiation to produce an imaged layer; and the imaged layer is treated with a conditioner liquid to produce a planar lithographic printing surface.

[0026] The lithographic printing plates of this invention are imagewise exposed by a radiation source that emits in the infrared region, i.e., between about 700 nm and about 1,400 nm. Preferably, the infrared radiation is laser radiation. Such laser radiation may be digitally controlled to imagewise expose the imaging layer. In this context, the lithographic printing plates of this invention are uniquely adapted for "direct-to-plate" imaging. Direct-to-plate systems utilize digitized information, as stored on a computer disk or computer tape, which is intended to be printed. The bits of information in a digitized record correspond to the image elements or pixels of the image to be printed. The pixel record is used to control an exposure device which may, for example, take the form of a modulated laser beam. The position of the exposure beam, in turn, may be controlled by a rotating drum, a leadscrew, or a turning mirror. The exposure beam is then turned off in correspondence with the pixels to be printed. The exposing beam is focused onto the imaging layer of the unexposed plate.

[0027] During the writing operation, the plate to be exposed is placed in the retaining mechanism of the writing device and the write laser beam is scanned across the plate and digitally modulated to generate an image on the surface of the lithographic plate. When an indicator dye is present in the imaging layer a visible image is likewise produced on the surface of the plate. Referring to Figure 3, this figure is an electron micrograph at 5 KV electrons and 2000 magnification which illustrates that the surface of an imaged uniform polymeric coating is micro-porous at least in the non-imaged areas.

[0028] After imaging exposure the imaged layer of the lithographic printing plate of this invention is treated with a conditioner liquid. The conditioner liquid may be a conventional fountain solution which is applied to the lithographic plate the conventional way on a lithographic printing press. Alternatively, the conditioner liquid may be an aqueous surfactant solution which is applied to the imaged surface, for example by wiping with a solution saturated applicator, and wherein the treated plate is then directly placed on the printing press and the printing operation begun. In either instance, the treated lithographic printing surface is truly a planar surface in contrast to the shallow relief image of conventional plates resulting from washout development. A unique feature of the lithographic printing plate of this invention is that it can be used directly on a lithographic printing press without such a washout development step required by conventional litho plates. Such a feature further enhances the efficiency of direct-to-plate imaging systems in that it eliminates plate development processing. The aqueous surfactant solution typically has a pH between about 3 and about 13, and contains about 0.2 to about 15 weight percent of a surfactant based on the weight of the conditioner liquid, and preferably between about 2 to about 12 weight percent. The surfactant used in the conditioner liquid preferably is an amphoteric surfactant such as those disclosed in U.S. Patent 3,891,439 the contents of which are incorporated herein by reference. Column 4, lines 21 et seq. of this patent describe amphoteric surfactants which are substituted imidazolines prepared by reacting long chain imidazolines with halogenated or organic intermediates containing carboxyl, phosphoric, or sulfonic acid groups. Amphoteric surfactants of this type are Monaterics available from Mona Industries, Inc., Patterson, NJ, particularly CYNA-50 surfactant. The aqueous surfactant solution may be a conventional fountain solution to which the surfactant has been added or it may be an alkaline solution such as the developer solutions disclosed in U.S. Patent 3,891,439 cited supra. A suitable alkaline solution of this type is a conventional developer, such as the developer disclosed in example 1 of U.S. Patent 3,891,439, which contains about 11 % of the imidazoline based amphoteric CYNA-50 surfactant (hereinafter identified as Surfactant Solution I).

[0029] The lithographic printing plate of this invention will now be illustrated by the following examples but is not intended to be limited thereby.

Example 1

[0030] The substrate used for making the lithographic printing plate was Myriad film base, a product of Xante Corporation, Mobile, Alabama. Myriad® film base is a hydrophilic surface treated polyester film. The hydrophilic surface was analyzed using a FT-IR spectrophotometer and identified as alumino silicate corresponding to $Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$ and an electron micrograph at 5 KV electrons and 2000 magnification (Figure 1)revealed that the hydrophilic surface is micro-porous.

[0031] The polymeric coating solution was prepared by dissolving 4.0 g poly(N-methoxy methyl methacrylamide-co-3,4-epoxycyclohexylmethyl methacrylate) hereinafter ACR1290 (available from Polychrome Corp.), 2.0 g butylated, thermosetting phenolic resin (GPRI-7550, 75% solid, available from Georgia Pacific), 0.8 g 2-hydroxy-tetradecyloxyphenyl-phenyliodonium hexafluoroantimonate hereinafter CD1012 (available from Sartomer), 0.8 g SpectraIR830A infrared dye (available from Spectra Colors Corp.) and 0.2 g of the indicator dye Solvent Blue 35 (available from Spectra Colors Corp.) into 120 g solvent mixture containing 60% methyl ethyl ketone, 20% methanol, 20% ethyl cellosolve and a trace amount of FC430 surfactant. The solution was spin coated on the hydrophilic surface of the Myriad polyester offset substrate at 85 rpm and dried at 60 ° C for 3 minutes to produce a uniform polymeric coating having a coating weight between 0.4 and 1.0 g/m^2. An electron micrograph at 5 KV electrons and 2000 magnification (Figure 2) revealed that the uniform polymeric coating surface is micro-porous.

[0032] The plate was imaged on a Creo Trendsetter thermal plate setter. which was equipped with solid state diode lasers having a wavelength at around 830 nm, at an energy density between 200 and 500 mJ/cm^2. An electron micrograph at 5 KV electrons and 2000 magnification (Figure 3) revealed that the surface of the imaged uniform polymeric coating is micro-porous at least in the non-imaged areas.

[0033] The imaged plate was mounted on press and wetted with Surfactant Solution I (described supra) as a conditioner solution. The plate produced more than 50,000 copies without any deterioration.

Example 2

[0034] The polymeric coating solution was prepared similar to Example 1, except that SpectraIR1060A infrared dye was used to replace SpectraIR830A dye. The solution was spin coated on the hydrophilic surface of the Myriad polyester offset substrate and 85 rpm and dried at 60° C for 3 minutes to produce a uniform polymeric coating having a coating weight between 0.4 and 1.0 g/m^2.

[0035] The plate was imaged on the Creo Trendsetter thermal plate setter, which was equipped with solid state diode lasers having a wavelength at around 830 nm, at an energy density between 200 and 500 mJ/cm^2. The imaged plate was mounted on press and wetted the conditioner solution of Example 1. The plate produced more than 50,000 copies without any deterioration.

Example 3

[0036] The polymeric coating solution was prepared similar to Example 1, except that poly(vinylphenol-co-2-hydroxyethylmethacrylate) was used to replace the GPR1-7550 phenolic resin. The. solution was spin coated on the hydrophilic surface of the Myriad polyester offset substrate and 85 rpm and dried at 60° C for 3 minutes to produce a uniform polymeric coating having a coating weight between 0.4 and 1.0 g/m^2.

[0037] The plate was imaged on the Creo Trendsetter thermal plate setter, which was equipped with solid state diode lasers having a wavelength at around 830 nm, at an energy density between 200 and 500 mJ/cm^2. The imaged plate was mounted on press and wetted a conditioner solution of Example 1. The plate produced more than 50,000 copies without any deterioration.

Example 4

[0038] The polymeric coating solution was prepared similar to Example I, except that 0.6 g poly(hydroxy((1-oxo-2-propenyl)amino)acetic acid-co-3,4-epoxy cylohexylmethyl methacrylate) was used to replace poly (N-methoxy methyl methacrylamide-co-3,4-epoxy cyclohexyl methyl methacrylate) copolymer. The solution was spin coated on the hydrophilic surface of the Myriad polyester offset substrate and 85 rpm and dried at 60° C for 3 minutes to produce a uniform polymeric coating having a coating weight between 0.5 and 1.0 g/m^2.

[0039] The plate was imaged on the Creo Trendsetter thermal plate setter, which was equipped with solid state diode lasers having a wavelength at around 830 nm, at an energy density between 200 and 500 mJ/cm^2. The imaged plate was mounted on press and wetted a conditioner solution of Example 1. The plate produced more than 50,000 copies without any deterioration.

Example 5

[0040] The polymeric coating solution was prepared by dissolving 4.0 g ACR1290, 0.8g CD1012, 0.8g infrared dye SpectraIR830A and 0.2 g indicator dye Solvent Blue 35, into 120 g solvent mixture containing 60% methyl ethyl ketone, 20% methanol, 20% ethyl cellosolve and a trace amount of FC430 surfactant. The solution was spin coated on the Myriad substrate of Example 1 at 85 rpm and dried at 60° C for 3 minutes to produce a

uniform polymeric coating having a coating weight between 0.5 and 1.0 g/m^2.

[0041] The plate was imaged on the Creo Trendsetter thermal plate setter, which was equipped with solid state diode lasers having a wavelength at around 830 nm, at an energy density between 200 and 500 mJ/cm^2. The imaged plate was mounted on press and wetted a conditioner solution Example 1. The plate produced more than 50,000 copies without any deterioration.

Example 6

[0042] A lithographic printing plate was prepared and imaged as described in Example 1. The imaged plate was mounted on a press supplied with a conventional fountain solution to which 4 weight % of CYNA-50 (an amphoteric surfactant available from Mona Industries, Patterson, N.J.) had been added. After the initial start-up impressions were made, the plate produced more than 50,000 copies without any deterioration.

Claims

1. A lithographic printing plate comprising:

(a) a sheet substrate;
(b) a porous hydrophilic layer applied to the sheet substrate, wherein the porous hydrophilic layer consists essentially of aluminosilicate; and
(c) an imaging layer applied to the hydrophilic layer, wherein the imaging layer is porous and comprises a thermally reactive composition.

2. The lithographic printing plate of claim 1 wherein the sheet substrate is a dimensionally stable, polymeric sheet.

3. The lithographic printing plate of claim 1 or 2 wherein the imaging layer has a coating weight between about 1.5 and about 2.5 grams per square meter.

4. The lithographic printing plate of any preceding claim wherein the thermally reactive composition consists essentially of

(1) an acid catalyzed, crosslinking resin system;
(2) a thermally-activated acid generator;
(3) an infrared absorbing compound; and optionally;
(4) an indicator dye.

5. The lithographic printing plate of claim 4 wherein the acid catalyzed, crosslinking resin system comprises an acid catalyzed crosslinkable polymer capable of undergoing an acid-catalyzed condensation reaction, at a temperature in the range of about 60-200°C, to form a crosslinked polymer.

6. The lithographic printing plate of claim 4 or 5 wherein the thermally-activated acid generator is selected from the group consisting of straight or branched chain C_1-C_5 alkyl sulfonates; aryl sulfonates; straight or branched chain N-C_1-C_5 alkyl sulfonyl sulfonamides; salts containing an onium cation and non-nucleophilic anion; and combinations thereof.

7. The lithographic printing plate of claim 4, 5 or 6 wherein the indicator dye is present in the imaging layer, and wherein the indicator dye is selected from the group consisting of Victoria Blue R, Victoria Blue BO, Solvent Blue 35, and Solvent Blue 36.

8. A method for preparing a lithographic printing surface consisting essentially of the steps:

A. providing a lithographic printing plate comprising:

(a) a sheet substrate;
(b) a porous hydrophilic layer applied to the sheet substrate, wherein the porous hydrophilic layer consists essentially of aluminosilicate; and
(c) an imaging layer applied to the hydrophilic layer, wherein the imaging layer comprises a thermally reactive composition;

B. imagewise exposing the imaging layer to infrared radiation to produce an imaged layer; and
C. treating the imaged layer with a conditioner liquid to produce a planar lithographic printing surface.

9. The method of claim 8 wherein the conditioner liquid is an aqueous surfactant solution.

10. The method of claim 8 wherein the conditioner liquid is a fountain solution.

11. The method of any of claims 8 to 10 wherein the imaging layer is porous.

Patentansprüche

1. Lithographie-Druckplatte umfassend:

(a) einen Träger;
(b) eine auf den Träger aufgebrachte poröse hydrophile Schicht, wobei die poröse hydrophile Schicht im wesentlichen aus Aluminiumsili-

cat besteht; und
(c) eine auf die hydrophile Schicht aufgebrachte bilderzeugende Schicht, wobei die bilderzeugende Schicht porös ist und eine thermisch reaktive Zusammensetzung umfaßt.

2. Lithographie-Druckplatte nach Anspruch 1, wobei der Träger eine formbeständige Polymerfolie ist.

3. Lithographie-Druckplatte nach Anspruch 1 oder 2, wobei die bilderzeugende Schicht ein Schichtgewicht zwischen etwa 1,5 und etwa 2,5 g/m^2 aufweist.

4. Lithographie-Druckplatte nach einem vorhergehenden Anspruch, wobei die thermisch reaktive Zusammensetzung im wesentlichen aus

(1) einem Säure-katalysierten, vernetzenden Harzsystem;
(2) einem thermisch aktivierten Säurebildner;
(3) einer Infrarot-absorbierenden Verbindung; und gegebenenfalls
(4) einem Indikator-Farbstoff
besteht.

5. Lithographie-Druckplatte nach Anspruch 4, wobei das Säure-katalysierte, vernetzende Harzsystem ein Säure-katalysiertes vernetzbares Polymer umfaßt, das in der Lage ist, eine Säure-katalysierte Kondensationsreaktion bei einer Temperatur im Bereich von etwa 60 bis 200°C zu durchlaufen, um ein vernetztes Polymer zu bilden.

6. Lithographie-Druckplatte nach Anspruch 4 oder 5, wobei der thermisch aktivierte Säurebildner aus geradkettigen oder verzweigten C_1-C_5-Alkylsulfonaten; Arylsulfonaten; geradkettigen oder verzweigten N-C_1-C_5-Alkylsulfonylsulfonamiden; Salzen, die ein Onium-Kation und ein nicht-nukleophiles Anion enthalten; und Kombinationen davon ausgewählt ist.

7. Lithographie-Druckplatte nach Anspruch 4, 5 oder 6, wobei der Indikator-Farbstoff in der bilderzeugenden Schicht vorhanden ist und wobei der Indikator-Farbstoff aus Viktoriablau R, Viktoriablau BO, Solvent Blue 35 und Solvent Blue 36 ausgewählt ist.

8. Verfahren zur Herstellung einer Lithographie-Druckoberfläche, welches im wesentlichen aus den folgenden Schritten besteht:

A. Bereitstellen einer Lithographie-Druckplatte umfassend:

(a) einen Träger;
(b) eine auf den Träger aufgebrachte poröse hydrophile Schicht, wobei die poröse hydrophile Schicht im wesentlichen aus Aluminiumsilicat besteht; und
(c) eine auf die hydrophile Schicht aufgebrachte bilderzeugende Schicht, wobei die bilderzeugende Schicht eine thermisch reaktive Zusammensetzung umfaßt;

B. bildweises Belichten der bilderzeugenden Schicht mit Infrarotstrahlung, um eine bebilderte Schicht herzustellen; und
C. Behandeln der bebilderten Schicht mit einer Konditionierflüssigkeit, um eine ebene Lithographie-Druckoberfläche herzustellen.

9. Verfahren nach Anspruch 8, wobei die Konditionierflüssigkeit eine wäßrige Lösung eines oberflächenaktiven Mittels ist.

10. Verfahren nach Anspruch 8, wobei die Konditionierflüssigkeit Feuchtmittel ist.

11. Verfahren nach einem der Ansprüche 8 bis 10, wobei die bilderzeugende Schicht porös ist.

Revendications

1. Plaque d'impression lithographique comprenant:

(a) un substrat en feuille;
(b) une couche hydrophile poreuse appliquée sur le substrat en feuille, dans laquelle la couche hydrophile poreuse se compose essentiellement d'aluminosilicate; et
(c) une couche de formation d'image appliquée sur la couche hydrophile, dans laquelle la couche de formation d'image est poreuse et comprend une composition réagissant à la chaleur.

2. Plaque d'impression lithographique selon la revendication 1 dans laquelle le substrat en feuille est une feuille polymère stable au niveau de ses dimensions.

3. Plaque d'impression lithographique selon la revendication 1 ou 2 dans laquelle la couche de formation d'image possède un poids de couche compris entre environ 1,5 et environ 2,5 grammes par mètre carré.

4. Plaque d'impression lithographique selon l'une quelconque des revendications précédentes dans laquelle la composition réagissant à la chaleur se compose essentiellement

(1) d'un système de résine à réticulation catalysé par un acide;
(2) d'un générateur d'acide activé par la cha-

leur;
(3) d'un composé absorbant les infrarouges; et, le cas échéant,
(4) d'un indicateur coloré.

5. Plaque d'impression lithographique selon la revendication 4 dans laquelle le système de résine à réticulation catalysé par un acide comprend un polymère réticulable catalysé par un acide capable de subir une réaction de condensation catalysée par un acide à une température dans la gamme d'environ 60-200°C, pour former un polymère réticulé.

6. Plaque d'impression lithographique selon la revendication 4 ou 5 dans laquelle le générateur d'acide activé par la chaleur est choisi dans le groupe constitué par les alkylsulfonates en C_1-C_5 à chaîne linéaire ou ramifiée, les arylsulfonates, les N-alkyl(en C_1-C_5)sulfonylsulfonamides à chaîne linéaire ou ramifiée, les sels contenant un cation onium et un anion non nucléophile, et leurs combinaisons.

7. Plaque d'impression lithographique selon la revendication 4, 5 ou 6 dans laquelle l'indicateur coloré est présent dans la couche de formation d'image et dans laquelle l'indicateur coloré est choisi dans le groupe constitué par le bleu Victoria R, le bleu Victoria BO, le bleu Solvant 35 et le bleu Solvant 36.

8. Procédé de préparation d'une surface d'impression lithographique constitué essentiellement des étapes consistant à:

A. se procurer une plaque d'impression lithographique comprenant:

(a) un substrat en feuille;
(b) une couche hydrophile poreuse appliquée sur le substrat en feuille, dans laquelle la couche hydrophile poreuse se compose essentiellement d'aluminosilicate; et
(c) une couche de formation d'image appliquée sur la couche hydrophile, dans laquelle la couche de formation d'image comprend une composition réagissant à la chaleur;

B. exposer selon une image la couche de formation d'image à un rayonnement infrarouge pour produire une couche insolée; et
C. traiter la couche insolée avec un liquide de conditionnement pour produire une surface d'impression lithographique plane.

9. Procédé selon la revendication 8 dans lequel le liquide de conditionnement est une solution aqueuse de tensioactif.

10. Procédé selon la revendication 8 dans lequel le liquide de conditionnement est une solution de mouillage.

11. Procédé selon l'une quelconque des revendications 8 à 10 dans lequel la couche de formation d'image est poreuse.



FIG. 1



FIG. 2



FIG. 3