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(54) A flexible supported lithographic printing plate having improved printing endurance

Flexible lithographische Druckplatte mit verbesserter Druckleistung

Cliché flexible supporté pour l'impression lithographique ayant une endurance améliorée à l'impression

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Description

1. Field of the invention.

The present invention relates to a method for making a lithographic printing plate, in particular to a method wherein a lithographic printing plate precursor having a flexible support, e.g. a polyester film support is used.

2. Background of the invention.

Lithographic printing is the process of printing from specially prepared surfaces, some areas of which are capable of accepting ink (oleophilic areas) whereas other areas will not accept ink (oleophobic areas). The oleophilic areas form the printing areas while the oleophobic areas form the background areas.

Two basic types of lithographic printing plates are known. According to a first type, so called wet printing plates, both water or an aqueous dampening liquid and ink are applied to the plate surface that contains hydrophilic and hydrophobic areas. The hydrophilic areas will be soaked with water or the dampening liquid and are thereby rendered oleophobic while the hydrophobic areas will accept the ink. A second type of lithographic printing plates operates without the use of a dampening liquid and are called driographic printing plates. This type of printing plates comprise highly ink repellant areas and oleophilic areas. Generally the highly ink repellant areas are formed by a silicon layer.

Lithographic printing plates can be prepared using a photosensitive lithographic printing plate precursor, also called imaging element. Such imaging element is exposed in accordance with the image data and is generally developed thereafter so that a differentiation results in ink accepting properties between the exposed and unexposed areas.

Examples of photosensitive lithographic printing plate precursors are for example the silver salt diffusion transfer (hereinafter DTR) materials disclosed in EP-A-410500, EP-A-483415, EP-A-423399, imaging elements having a photosensitive layer containing diazonium salts or a diazo resin as described in e.g. EP-A-450199, imaging elements having a photosensitive layer containing a photopolymerizable composition as described in e.g. EP-A-502562, EP-A-491457, EP-A-503602, EP-A-471483 or DE-A-4102173.

Alternatively a lithographic printing plate may be prepared from a heat mode recording material as a lithographic printing plate precursor. Upon application of a heat pattern in accordance with image data and optional development the surface of such heat mode recording material may be differentiated in ink accepting and ink repellant areas. The heat pattern may be caused by a direct heating source such as a thermal head but may also be caused by a light source as e.g. a laser. In the latter case the heat mode recording material will include a substance capable of converting the light into heat. Heat mode recording materials that can be used for making a lithographic printing plate precursor are described in e.g. EP-A-0 573 091 (prior art according to Art. 54(3) EPC) DE-A-2512038, FR-A-1.473.751, Research Disclosure 19201 of April 1980 or Research Disclosure 33303 of January 1992.

As supports for the above mentioned lithographic printing plates there are known metal support such as e.g. aluminium and flexible supports such as e.g. paper or polyester film supports. Generally the flexible supports are used for short run jobs where they have a cost advantage over metal supports. Furthermore, if a transparent flexible support is used exposure of the lithographic printing place precursor may proceed through the support which allows the use of cameras without special optics.

A disadvantage of the use of flexible supported lithographic printing plates is however the inherently low dimensional stability which is one of the causes limiting the printing endurance of the printing plate especially when two or more images need to be printed over each other in register such as e.g. in color printing. Attempts have therefore been made to increase the dimensional stability of a flexible supported printing plate by e.g. using a thicker flexible support. Although this brings some improvement, there is still a need for further improvement. Furthermore, the use of a thicker support may cause problems in some processing equipment used for processing the printing plate precursor.

In JP 236692/63 (Kokai) it has been proposed to adhere the flexible support of the printing plate to a metallic plate using a hot-melt adhesive. This method is cumbersome and does no longer present a cost advantage over the use of a lithographic printing plate precursor having a metal support.

3. Summary of invention

Accordingly it is an object of the present invention to provide a lithographic printing plate precursor and printing plate having a flexible support and which printing plate has an improved printing endurance especially when used in printing images over each other in register.

Further objects of the present invention will become clear from the description hereinafter.

According to the present invention there is provided a lithographic printing plate precursor comprising on a first side of a flexible support a surface capable of being differentiated in oleophilic and oleophobic areas upon imaging and on a second side opposite to said first side a layer comprising micro-particles of pressure-sensitive adhesive covered with a protective stripping layer.

According to the present invention there is further provided a lithographic printing plate comprising on a first side of a flexible support a surface differentiated in oleophilic and oleophobic areas and on a second side opposite to said first side a layer comprising micro-par-

ticles of pressure-sensitive adhesive.

4. Detailed description of the invention

As a consequence of the presence of micro-particles of pressure sensitive-adhesive on the back side, lithographic printing plates according to the present invention show little or no stretching when mounted under stress on a printing machine. Furthermore, after printing the printing plates can be removed without leaving substantial traces of adhesive and even if some adhesive remains on the printing machine it can be easily removed.

According to the present invention the micro-particles can be present on the back of the lithographic printing plate precursor which means that they will be present during processing of the precursor to the printing plate. In this case a protective layer is used to cover the micro-particles of pressure-sensitive adhesive and is removed after processing before mounting the printing plate. As a cover layer there can be used almost any material because of the low adhesive strength of the micro-particle adhesives. Examples of suitable cover layers are e.g. paper or a thin plastic film. Such cover layer may include matting agents to avoid sticking of one printing plate precursor to another so that in an automatic processor precursors may be drawn from a pack without difficulty.

According to a first embodiment in connection with the present invention the micro-particles of pressure sensitive adhesive can be applied to the back of the printing plate precursor using a coating solution containing the micro-particles and a binder being inert thereto as described in e.g. US-P-3.857.731. The micro-particles are preferably elastomeric and tacky acrylate copolymers. They preferably consist of 90 to 99.5% by weight of at least one alkyl acrylate ester and 10 to 0.5% by weight of a monomer selected from the group consisting of substantially oil-insoluble, water-soluble, ionic monomers and maleic anhydride. The micro-particles may have an average diameter between 1 and 250μm more preferably between 5 and 150μm.

The acrylate ester portion of the micro-particles preferably consists of those monomers that are hydrophobic, water emulsifiable, substantially water insoluble and which as homopolymers generally have a glass transition temperature of 20°C or less. Examples of such monomers are iso-octyl acrylate, 4-methyl-2-pentyl acrylate, 2-methylbutyl acrylate and sec-butyl acrylate.

Examples of ionic monomers for use in the micro-particles are e.g. trimethylamine methacrylamide, trimethylamine p-vinylbenzimide, ammonium acrylate, sodium acrylate, N,N-dimethyl-N-1-(2-hydroxypropyl)amine methacrylamide and maleic anhydride. The micro-particles may be prepared according to the method described in US-P 3,857,731.

Suitable binders for use in combination with the micro-particles are binders that are inert towards the micro-particles i.e. they do not chemically attack the particles or act as a solvent for them. Examples of binders are nitrocellulose, urethanes, gelatin, polyvinyl alcohol etc...

The amount of binder should be chosen such that the micro-particles are effectively anchored to the back of the lithographic printing plate precursor but should not be so much as to cause complete submergence of the micro-particles in the binder so that no micro-particles are available at the surface i.e. the micro-particles should protrude from the layer. Preferably the amount of binder is between 0.15 parts by weight and 2.5 parts by weight with respect to the micro-particles and more preferably between 0.2 and 0.6.

According to a second embodiment the micro-particles may be applied without the aid of a binder by spraying a suspension of the micro-particles in a solvent e.g. water as disclosed in EP-A-278557. This will result in islands of the pressure-sensitive adhesive on the back of the lithographic printing plate precursor. As an advantage of this method, not only the pressure-sensitive adhesives described above can be used but also other conventionally used pressure-sensitive adhesives having a continuous-coat (100% coverage) peel adhesion values, when applied to untreated paper, in the order of 100-1000g/cm width.

When sprayed to the backing of the lithographic printing plate precursor the surface coverage of the pressure-sensitive adhesive is preferably from 10 to 85% and more preferably from 20 to 60%. The individual islands formed are preferably 0.01-0.15mm thick and at least roughly circular having a diameter not larger then 0.02-1.5mm. It may occur that some islands form a chain but this should be limited to the stated dimensions. More details about suitable sprays and pressure-sensitive adhesive for use in this method are disclosed in EP-A-276557.

The above method of spraying the micro-particles is also the preferred method for applying the micro-particles to the backing of a lithographic printing plate obtained from a precursor not having the micro-particles on the back.

The present invention may be used with any type of lithographic printing plate (precursor) having a flexible support. Examples are the printing plate (precursors) mentioned in the introduction. The present invention is however especially suitable for use with a lithographic printing plate precursor that is processed according to the DTR-process to obtain a lithographic printing plate.

Such lithographic printing plate precursor comprises on a flexible support in the order given an optional base coat, a silver halide emulsion layer and an image-receiving surface layer. The back side of the support generally contains one or more backing layers. According to the present invention the outermost backing layer can include micro-particles of pressure-sensitive adhesive or these may be sprayed thereon. The

micro-particles are then covered with a cover layer as described above.

To obtain a lithographic printing plate from such a precursor the precursor is image-wise exposed, e.g. by means of a camera or a laser or LED, and is subsequently developed in alkaline processing liquid containing a silver halide solvent in the presence of developing agents. The plates surface may then be neutralised with a neutralising liquid. After processing the image receiving layer will bare a silver image that is capable of accepting greasy ink in a printing process using a dampening liquid. The advantage of the present invention in this method of making a printing plate according to the DTR-process is the fact that the plate can be processed as usual without loss of the adhesive strength or pollution of the processing liquid by the adhesive. Before mounting the obtained printing plate the cover layer is removed.

The present invention will now be illustrated by the following example without the intention to limit the invention thereto. All parts are by weight unless otherwise specified.

EXAMPLE

Two times four lithographic printing plate precursors having a polyethyleneterephthalate support (0.2mm) where prepared as described in the example of EP-A-532076.

The two pairs of four lithographic printing plate precursors were then imaged with the four color separations (YMCK) of a color test image. The precursors were then processed as described in the example of EP-A-532076.

Four printing plates corresponding to the color separations were then sprayed on the back with 3M Spray Mount (commercially available from 3M) to apply the micro-particles of pressure-sensitive adhesive.

The obtained four printing plates and the other four printing plates not having the micro-particles were then used to print on a Heidelberg GTO 46 printing machine.

It was found that the four printing plates having the micro-particles of pressure-sensitive adhesive showed hardly no stretching of the image whereas the other four plates showed a considerable stretching of around 0.5mm/m during printing. As a consequence the number of copies that could be obtained with the printing plates having the micro-particles of pressure-sensitive adhesive was about twice the printing endurance of the comparitive four plates.

Claims

1. A lithographic printing plate precursor comprising on a first side of a flexible support a surface capable of being differentiated in oleophilic and oleophobic areas upon imaging and on a second side opposite to said first side a layer comprising micro-particles of pressure-sensitive adhesive covered with a protective stripping layer.

2. A lithographic printing plate precursor according to claim 1 wherein said flexible support is paper or a polyester film.

3. A lithographic printing plate precursor according to claim 1 wherein said layer comprising micro-particles is essentially free of binder and said micro-particles are present in the form of islands covering between 10 and 85% of the surface of said second side.

4. A lithographic printing plate precursor according to claim 1 wherein said layer comprising said micro-particles further contains a binder.

5. A lithographic printing plate precursor according to any of the above claims comprising on said first side in the order given a silver halide emulsion layer and an image receiving layer containing physical development nuclei.

6. A lithographic printing plate comprising on a first side of a flexible support a surface differentiated in oleophilic and oleophobic areas and on a second side opposite to said first side a layer comprising micro-particles of pressure-sensitive adhesive.

7. A lithographic printing plate according to claim 6 wherein said flexible support is paper or a polyester film.

8. A lithographic printing plate according to claim 6 wherein said layer comprising micro-particles is essentially free of binder and said micro-particles are present in the form of islands covering between 10 and 85% of the surface of said second side.

9. A lithographic printing plate according to any of claims 6 to 8 comprising on said first side in the order given a developed silver halide emulsion layer and an image receiving layer containing a silver image capable of accepting greasy ink.

Patentansprüche

1. Ein lithografischer Druckplattenvorläufer, der auf einer ersten Seite eines biegsamen Trägers mit einer Oberfläche, auf der bei der Bildaufzeichnung eine Differenzierung zwischen oleophilen und oleophoben Bereichen herbeigeführt werden kann, und auf einer zweiten, der ersten Seite gegenüberliegenden Seite mit einer mit einer Schutzabziehschicht überzogenen Schicht mit Mikroteilchen von selbsthaftendem Klebemittel überzogen ist.

2. Lithografischer Druckplattenvorläufer nach Anspruch 1, dadurch gekennzeichnet, daß der biegsame Träger Papier oder ein Polyesterfilmträger ist.

3. Lithografischer Druckplattenvorläufer nach Anspruch 1, dadurch gekennzeichnet, daß die die Mikroteilchen enthaltende Schicht im wesentlichen kein Bindemittel enthält und die Mikroteilchen in Form von die Oberfläche der zweiten Seite in einem Verhältnis zwischen 10 und 85% bedeckenden Inseln vorliegen.

4. Lithografischer Druckplattenvorläufer nach Anspruch 1, dadurch gekennzeichnet, daß die die Mikroteilchen enthaltende Schicht weiterhin ein Bindemittel enthält.

5. Lithografischer Druckplattenvorläufer nach irgendeinem der vorstehenden Ansprüche, der auf der ersten Seite der angegebenen Reihe nach eine Silberhalogenid-Emulsionsschicht und eine physikalische Entwicklungskeime enthaltende Bildempfangs-Schicht enthält.

6. Lithografische Druckplatte, die auf einer ersten Seite eines biegsamen Trägers mit einer Oberfläche, auf der eine Differenzierung zwischen oleophilen und oleophoben Bereichen herbeigeführt ist, und auf einer zweiten, der ersten Seite gegenüberliegenden Seite mit einer Schicht mit Mikroteilchen von selbsthaftendem Klebemittel überzogen ist.

7. Lithografische Druckplatte nach Anspruch 6, dadurch gekennzeichnet, daß der biegsame Träger Papier oder ein Polyesterfilmträger ist.

8. Lithografische Druckplatte nach Anspruch 6, dadurch gekennzeichnet, daß die die Mikroteilchen enthaltende Schicht im wesentlichen kein Bindemittel enthält und die Mikroteilchen in Form von die Oberfläche der zweiten Seite in einem Verhältnis zwischen 10 und 85% bedeckenden Inseln vorliegen.

9. Lithografische Druckplatte nach irgendeinem der Ansprüche 6 bis 8, die auf der ersten Seite der angegebenen Reihe nach eine entwickelte Silberhalogenid-Emulsionsschicht und eine ein fette Farben anziehendes Silberbild enthaltende Bildempfangsschicht enthält.

Revendications

1. Un précurseur de plaque d'impression lithographique comprenant sur un premier côté d'un support flexible une surface sur laquelle on peut provoquer une différentiation entre zones oléophiles et oléophobes lors de la formation d'image, et sur un second côté opposé au premier côté une couche contenant des microparticules de colle auto-adhésive enrobée d'une couche protectrice pelliculable.

2. Précurseur de plaque d'impression lithographique selon la revendication 1, caractérisé en ce que le support flexible est un support papier ou un support de film en polyester.

3. Précurseur de plaque d'impression lithographique selon la revendication 1, caractérisé en ce que la couche contenant des microparticules ne contient essentiellement pas de liant et que les microparticules sont présentes sous forme d'îles couvrant entre 10 et 85% de la surface du second côté.

4. Précurseur de plaque d'impression lithographique selon la revendication 1, caractérisé en ce que la couche contenant les microparticules contient également un liant.

5. Précurseur de plaque d'impression lithographique selon l'une quelconque des revendications précédentes, contenant dans l'ordre indiqué sur le premier côté une couche d'émulsion à l'halogénure d'argent et une couche réceptrice d'image contenant des germes de développement physique.

6. Une plaque d'impression lithographique contenant sur un premier côté d'un support flexible une surface sur laquelle on a provoqué une différentiation entre zones oléophiles et zones oléophobes, et sur un second côté opposé à ce premier côté une couche contenant des microparticules de colle auto-adhésive.

7. Plaque d'impression lithographique selon la revendication 6, caractérisée en ce que le support flexible est un support papier ou un support de film en polyester.

8. Plaque d'impression lithographique selon la revendication 6, caractérisée en ce que la couche contenant des microparticules ne contient essentiellement pas de liant et que les microparticules sont présentes sous forme d'îles couvrant entre 10 et 85% de la surface du second côté.

9. Plaque d'impression lithographique selon l'une quelconque des revendications 6 à 8, contenant dans l'ordre indiqué sur le premier côté une couche d'émulsion à l'halogénure d'argent développée et une couche réceptrice d'image contenant une image argentique à même de recevoir de l'encre grasse.