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(71) Applicant: **3M Innovative Properties Company**
St. Paul, Minnesota 55133-1000 (US)

(72) Inventors:
- **Nguyen, Quoc Hiep**
  47918 Tönisvorst (DE)
- **Nguyen, Trung Kien**
  40591 Düsseldorf (DE)
- **Neumann, Bernd**
  40723 Hilden (DE)
- **Lehmann, Holger**
  41844 Wegberg (DE)
- **Walter, Andreas, Dr.**
  41468 Neuss (DE)

(74) Representative: **Kurz, Arnd et al**
3M ESPE AG
3M Office of Intellectual Property Counsel
ESPE Platz
82229 Seefeld (DE)

(54) Decorative and/or information containing label comprising emblems and method of manufacturing it

(57) The present invention relates to a precursor 2 of a label 1 comprising a release carrier 6 with a release surface 6a bearing a polymer layer 3 and a discontinuous emblem layer 4 comprising at least one emblem 5 at the interface between the release surface 6a and major surface 3a of the polymer layer 3.

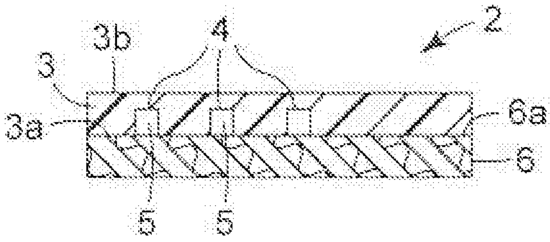

FIG. 1

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Description

Field of the invention

[0001] The present invention relates to a decorative and/or information containing label comprising one or more emblems and a method for manufacturing it. The present invention also relates to a precursor of said label obtained during said method of the present invention.

Background of the invention

[0002] EP 0,911,786 discloses a laser markable label comprising a polymer layer which includes an addition for reversible optical labelling, the additive being made recognizable, and especially visible, by means of electron beams, X-rays, in particular by visible light and, very particularly by IR or UV radiation. The polymer layer may also comprise an additive suitable for reversible magnetic or electrical labelling. Emblems such as logos or bar codes can be introduced into this layer by partially ablating the cover layer with a laser beam. This partially destroys the exposed surface of the layer which tends to make the label less durable and mechanically stable. Also, incorporating the emblems requires an additional laser ablation step which may be less desirable from a manufacturing point of view.

[0003] EP 0,688,678 discloses a single-layer laser label comprising

a) a support layer which
b) contains an additive which changes colour under laser irradiation and which
c) is coated on one side with a self-adhesive composition which
d) is optionally covered with a release paper or a release film.

[0004] This label requires the use of special pigments such as copper hydroxid phosphate pigments or specific pearlescent pigments which when irradiated with a laser show a colour change. The limited versatility of the label of EP ’678 is not acceptable for many applications. The formation of the emblems requires an additional laser irradiation step subsequent to the manufacturing of the label which may not be desirable from a manufacturing point of view. Also, laser irradiation tends to damage the exposed surface of the label which may adversely affect its mechanical properties and durability.

[0005] It was therefore an object of the present invention to provide a decorative and/or information containing label comprising one or more emblems which is highly versatile and may comprise a broad range of pigments and dyes. It was another object of the present invention to provide a decorative and/or information containing label which does not require an additional laser ablation step to provide one or more emblems and/or which has advantageous mechanical properties and/or provide an aesthetically pleasing surface appearance. It was another object of the present invention to provide an advantageous method of manufacturing such label. It was furthermore another object of the present invention to provide a decorative and/or information containing label comprising emblems which does not exhibit the shortcomings of the state of the art or exhibits them to a lesser degree only.

Short description of the invention

[0006] The present invention relates to a precursor of a label comprising a release carrier with a release surface bearing a polymer layer and a discontinuous emblem layer comprising at least one emblem at the interface between the release surface and a major surface of the polymer layer. The release surface of the release carrier and/or the materials of the polymer layer and the emblem layer are selected so that the cohesive force of the polymer layer, the cohesive force of the one or more emblems and the bonding force between the one or more emblems and the polymer layer is higher than the interfacial adhesive force between the polymer layer and the emblems, respectively, and the release surface. A surface portion of such emblem(s) contacts the release surface so that such surface portion of the emblem(s) 5 is coplanar with the adjacent exposed surface of the polymer layer. This results in the label which comprises the polymer layer and the emblem layer, being essentially cleanly separatable from the release surface when peeling off the release carrier.

[0007] The present invention furthermore relates to a label comprising a polymer layer comprising one or more emblems arranged adjacent to one of the major surfaces of said polymer layer, said emblems comprising one or more polymers and one or more colouring agents selected from the group consisting of inorganic pigments including metal flakes, organic pigments, inks and dyes, and/or one or more inorganic microspheres or beads whereby said colouring agents and/or inorganic microspheres or beads and/or their respective concentration are selected so that the one or more emblem(s) are visually discernible from the polymer layer. In a preferred embodiment the label bears on its other major surface an adhesive layer such as, in particular, a pressure-sensitive adhesive layer.

[0008] The present invention further relates to a method of making the precursor of a label comprising the steps of

(i) providing a release carrier,
(ii) applying a discontinuous emblem layer comprising one or more emblems to the release surface of the release carrier, and
(iii) applying the polymer layer onto the release surface and the emblem layer so that the emblem layer is arranged at the interface between the polymer layer and the release surface of the release carrier.

[0009] The present invention furthermore relates to a method of making a label according to the invention comprising the steps of

(i) providing a precursor of the present invention, and
(ii) removing the release carrier.

Short description of the figures

[0010] *Fig. 1* shows a preferred embodiment of a precursor 2 of the present invention comprising a release carrier 6, a polymer layer 3 and a discontinuous emblem layer 4 comprising several emblems 5 at the interface between the release surface 6a and the major surface 3a of the polymer layer 3. The surface of the emblem(s) 5 facing the release surface 6a is coplanar with the surface 3a of the polymer layer 3.

[0011] *Fig. 1a* shows a preferred embodiment of a label 1 of the present invention which is obtainable from the precursor 2 of Fig. 1a by removing the release carrier 6. Optionally a protective layer 10 may be applied onto the major surface 3a of the polymer layer 3 (not shown).

[0012] *Fig. 2* shows another preferred embodiment of a precursor 2 of the present invention which is based on the precursor 2 of Fig. 1 but additionally comprises an adhesive layer 7 attached to the surface 3b of the polymer layer 3. The adhesive layer 7 is covered with release liner 9.

[0013] *Fig. 2a* shows another preferred embodiment of a label 1 of the present invention which is obtainable from the precursors 2 of Fig. 2 by removing the release carrier 6. Optionally a protective layer 10 may be applied to the major surface 3a of the polymer layer 3 (not shown).

Detailed description of the invention

[0014] The term "label" as used above and below denotes a spatially limited section of a one- or multilayer continuous polymeric film optionally including an adhesive layer such as, in particular, a pressure-sensitive adhesive layer. The label can be obtained from such polymeric film. The polymeric film may comprise only one polymeric layer 3 comprising one or more emblems 5 arranged adjacent to major surface 3a of the polymer layer 3 and no further polymeric layers, or it may comprise one or more polymeric layers 8 in addition to polymeric layer 3. The label can be obtained from such continuous polymeric film by converting using conventional techniques such as, for example, die-cutting. The label can have different lengths and includes, for example, products with a relative short length such as identification or price tags or decorative and/or information providing tabs but also tape products with a relative great length sufficient for winding them into a roll.

[0015] The term "emblem" as used above and below denotes a three-dimensional section which is arranged within the polymer layer 3 adjacent to the surface 3a of the polymer layer 3. In the precursor 2 the one or more emblems 5 are arranged so that a surface portion of such emblem(s) 5 contacts the release surface 6a whereby such surface portion of the emblem(s) 5 is coplanar with the exposed adjacent surface 3a of the polymer layer 3. This is also referred to above and below as the emblem layer 4 and/or the emblem(s) 5 being arranged at the interface between the surface 3a of the polymer layer 3 and the release surface 6a of release carrier 6. The one or more emblems are visually discernible against the surrounding polymer layer 3, and are preferably arranged to provide a decorative or aesthetical effect such as figures or symbols and/or to deliver information such as, for example, an instruction, warning or identification information.

[0016] The precursor 2 of a decorative and/or information containing label 1 of the present invention comprises a release carrier 6 which preferably comprises a carrier film or layer such as a paper or polymer film bearing a low-adhesion release layer to provide a release surface 6a allowing for an essentially residue-free removal of the release of the polymer layer 3 embedding emblem(s) 5, from the release surface 6a. Representatives of suitable carrier films or layers comprise, for example, high-density papers such as glassine paper, clay-coated paper, kraft paper, polymer-laminated paper such as polyethylene-laminated paper and polymeric films. Useful polymeric films and layers include, for example, polyolefin polymers, monoaxially oriented polypropylene (MOPP), biaxially oriented polypropylene (BOPP), simultaneously biaxially oriented polypropylene (SBOPP), polyethylene, copolymers of polypropylene and polyethylene, polyester polymers, polycarbonate polymers, polymethacrylate polymers, cellulose acetate, polyester (e. g. biaxially oriented polyethylene terephthalate), vinyl acetates, and combinations thereof.

[0017] The low-adhesion release layer may, for example, be coated onto the carrier film or layer followed by subsequent drying and/or UV or e-beam curing. Examples of suitable low adhesion coatings are cellulose acetate butyrate, vinyl acetate-dibutyl maleate, vinyl alcohol silicone emulsions, or preferably water-based ethylene acrylic acid or water-based acrylic. The carrier films or layers may also be treated with release agents such as fluorine containing resins or silicone resins. Alternatively, it is also possible to apply a printable low-adhesion coating as is described, for example, in US 5,496,635.

[0018] In case the release carrier 6 itself comprises a release material such as, for example, a highly fluorinated polymer it is also possible to omit the low-adhesion release layer and employ the carrier layer alone.

[0019] The precursor 2 of the decorative and/or information providing label 1 furthermore comprises a discontinuous emblem layer 4 comprising one or more emblems 5. The term "discontinuous" means in case only one emblem is present, that such emblem 5 does cover only part (preferably less than 50 %) of the release surface 6a. In case two or more emblems 5 are present the term "discontinuous" means that the two or more emblems are not linked to each other but form discrete, separate sections. The two or more emblems 5 preferably cover less than 75 % and more preferably less than 50 % of the release surface 6a.

[0020] The emblems layer 4 is preferably applied by printing a printable or coatable precursor of the emblems 5 onto the release surface 6a with subsequent drying and/or curing. The printable or coatable precursor of the emblems preferably has a Brookfield viscosity of between 300 cPoise and 8,000 cPoise and more preferably between 300 and 3,000 cPoise at a temperature of 20 °C. The precursor of the emblems may be applied by any printing method such as, for example, by screen printing, ink-jet printing, electrostatic printing or rotogravure printing, flexo printing, letterpress printing, offset printing or thermal transfer or hot stamping printing.

[0021] The printable or coatable precursor of the emblem(s) 5 comprises one or more polymers which are selected to allow for an essentially clean and residue-free removal of the emblems 5 together with the surrounding matrix of polymer layer 3 from the release surface 6a when removing the release carrier 6 to provide the label 1. The polymers of such precursor of the emblem are preferably selected from a group of polymers consisting of (meth)acrylate polymers, polyurethane polymers, polymers comprising polymerized units derived from one or more olefin monomers, from one or more (meth)acrylic monomers, from one or more vinyl monomers, silicone polymers, and mixtures thereof.

[0022] Representative examples include polyolefins such as polyethylenes, polypropylenes and polybutylenes; olefinic copolymers such as ethylene(meth)acrylate copolymers; ethylene/vinyl acetate copolymers; acrylonitrile-butadiene-styrene copolymers; acrylic polymers and copolymers, polyurethanes and copolymers such as acrylic polyurethanes; vinyl polymers and copolymer such as polyvinylchloride, and mixtures thereof. Mixtures or blends of any plastic or plastic and elastomeric materials such as polypropylene/polyethylene, polyurethane/polyolefin, polyurethane/polycarbonate, polyurethane/polyester can also be used.

[0023] An especially preferred acrylic polyurethane which is disclosed in WO 93/12,155 comprises components A, B and C wherein component A comprises a copolymer of

(i) a monoester of acrylic or methacrylic acid and an aliphatic diol having 2 to 8 carbon atoms and
(ii) an ester of acrylic or methacrylic acid and an aliphatic alcohol having 1 to 8 carbon atoms, and optionally a vinyl aromatic monomer as well as N-vinylpyrrolidone or N-vinylcaprolactame,

said component A having a T_G of 30 ° C to 100 °C,
component B comprises an aliphatic polyester diol with an weight-average molecular weight less than 20,000 and
component C comprises a polyfunctional isocyanate or blocked polyfunctional isocyanate.

[0024] This polymer is described in more detail on page 5, line 4 - page 7, line 14 of WO 93/12,155 which passage is enclosed herein by reference.

[0025] The precursor of the emblem(s) 5 furthermore comprises one or more additives which render the emblem(s) 5 visually discernible from the polymer layer 3. Such additives comprise, in particular, colouring agents such as inorganic pigments including metallic pigments or metallic flakes such as aluminium flakes or particles, organic pigments, water-borne or solvent-borne inks or dyes, and/or inorganic microspheres and/or beads such as, for example, glass beads. These additives are preferably selected so that the emblem(s) 5 are visually discernible from the surrounding polymer layer 3 by the unaided eye under normal ambient light conditions but it is also possible that the additives are selected so that the emblem(s) 5 are visibly discernible when viewing them through magnifying glasses or a microscope, respectively, or irradiating the label 1 with UV light or viewing it under retroreflective lighting conditions. It was found that emblem (s) comprising partially metallized glass beads or a combination of glass beads which may or may not be metallized, with metal flakes exhibit retroreflective properties. The term "partially metallized glass beads" refers to glass beads 20 - 60 % of the surface of which are coated with a thin metal film which may be applied, for example, by CVD or PVD techniques. The use of glass beads which may or may not be aluminized in combination with aluminium and/or silver flakes or particles is preferred. Glass beads suitable in the present invention are preferably essentially spherical and typically have a diameter of between 40-60 μm.

[0026] Inorganic pigments which are suitable in the present invention include, for example, titanium dioxide white, carbon and vegetable black, iron oxide pigments, cadmium pigments, lead chromate pigments, chromium oxide pigments including chromium oxide green, ultramarine blue, chrome green, phthalo chrome green, mixed metal oxide pigments and bi-vanadates.

[0027] Organic pigments suitable in the present invention include, for example, azo pigments, polycyclic pigments and metal complex pigments. Suitable azo pigments include, for example, monoazo yellow and orange pigments, disazo pigments, naphthol pigments, benzimidazolone pigments and disazo condensation pigments. Suitable polycyclic pigments include, for example, phthalocyanine pigments, quinacridone pigments, perylene and perinone pigments, thioindigo pigments, anthraquinone pigments, dioxazine pigments, isoindolinone and isoindoline pigments, diketopyrrolo pyrrole pigments, triarylcarbonium pigments and quinophthalone pigments.

[0028] Commercially available inorganic pigments which are suitable for use in the emblem(s) 5 of the present invention include, for example, carbon black available as carbon black paste from Degussa, Germany. As a white coloured pigment, titanium dioxide in silane modified form can be used (Kronos CL 310, Kronos Titan, Leverkusen, Germany). Lead sulfochromate pigments and mixed crystal lead sulfo-chromate-molybdate pigments are available from Heubach as Heucotron T and Heucotron T Orange 8010, respectively. Also aluminium particles of 5 μm length in a solvent (STAPA-Off-Set 3000, Eckhart-Werke, Fürth, Germany) can be used as organic pigments.

[0029] Commercially available organic pigments include isoindolininone yellow commercially available as Cromophtal Yellow 2RLTS from Ciba; perylene red commercially available as Irgazin Red BPTN from Ciba; pthalocyanine green, a halogenated Cu-phtalocyanine commercially available as Chomophtal Green GFN from Ciba; quinacridone violet commercially available as Cinquasia Violet RRT-899D from Ciba; C. I. pigment red 178/71155 (Paliogen rot L3910 HD, BASF, Ludwigshafen, Germany); C. I. pigment yellow 110 (Irgazin gelb 3RLT-N, Ciba-Geigy, Marienberg, Germany); and C. I. pigment blue 1511, Heliogen blau K6911 D, BASF, Ludwigshafen, Germany).

[0030] Pearlescent pigments that subtly change colour as the viewing angle is changed can be obtained, for example, from Merck KGaA, Darmstadt, Germany, under the Iriodin trade designation.

[0031] Liquid crystal polymer additives which change colour when the viewing angle is changed which are also suitable in the present invention, can be obtained from Wacker Chemie of Munich, Germany. An example of an additive which is invisible under ambient light but visible under UV light is Black Light Varnish available from Wernecke of St. Paul, MN, U. S. A. It is also possible to use fluorescent pigments such as neodymium oxide. A suitable fluorescent pigment is available from Honeywell under the trade designation Luminux® Effect Blue SN. It is also possible to use phosphorescent pigments of the Luminux® Phosphorescent pigments series available from Honeywell such as Luminux® green SN-F5 or Luminux® Green N5.

[0032] Inks which are suitable in the present invention include 3M Process Colour Series 880I which is commercially available from 3M Company.

[0033] The average size of the colouring agents can vary widely. Organic pigments typically have an average size of between 0.03 - 1 μm and more preferably of between 0.05 - 0.5 μm. The average size of inorganic pigments can vary between 0.2 μm to 50 μm or even more. Titanium dioxide, for example, has a size of typically between 0.2 - 1 μm whereas red iron oxide has typically has an average size of between 0.3 - 3 μm. The average size of metal particles and flakes typically is between 3 - 25 μm, and glass beads have a typical average size of 40 - 60 μm. The person skilled in the art will easily select the appropriate thickness of the polymer layer 3 and of any additional polymer layers 8, if present, in view of the respective average size of the colouring agents used.

[0034] The colouring agents and/or inorganic microspheres or beads used in the present invention, are preferably selected so that the one or more element(s) 5 are visibly discernible against the polymer layer 3 upon formation of the precursor 2, i.e. without requiring a further treatment step such as laser irradiation. Therefore the use of colouring agents which exhibit a color change upon laser marking such as the Lazerflair® pearlescent pigments from Merck is not preferred in the present invention.

[0035] The one ore more additives included into the precursor of the emblem(s) 5 to render such emblem(s) visually discernible against the polymer layer 3 are preferably present in an amount of from 2 - 70 pph, preferably 2-50 pph (parts per hundred resin) with respect to the mass of such precursor.

[0036] The precursor of emblem(s) 5 may comprise further agents and additives such as, for example, levelling agents, thickeners, wetting agents, polymerization catalysts, crosslinking agents and solvents. Levelling agents support the formation of a uniform and smooth surface without surface defects. Suitable levelling agents are generally organic silicones and fluorochemicals. Thickeners and solvents may be added in order to adjust the viscosity of the precursor of the emblem(s) 5 to impart advantageous printability properties to it. Polymerization catalysts and, optionally, crosslinking agents may be added if the precursor is cured subsequent to its application to the release surface.

[0037] While the structure of that part of the surface of the emblem(s) 5 which is or has been in contact with the release surface 6a is determined by the surface structure of the release surface 6a and preferably is essentially flat, the shape of the other surface portions of the emblem(s) 5 which are in contact with the polymer layer 3, can vary broadly and can be, for example, essentially polygonic or essentially curved. The average height of the emblem(s) which is defined as the average distance between the release surface 6a and the maximum extension of the emblem(s) 5 in a direction normal to such release surface 6a, is preferably less than the thickness of the polymer layer 3, more preferably less than 90 % and especially preferably less than 50 % of the thickness of the polymer layer 3. In case of glass beads or pearlescent pigments, for example, which may have an extension of, for example, 40-80 μm the average height of the emblem(s) may exceed the thickness of the polymer layer 3; in such case one or more further polymer layers 8 are required, and the emblem(s) 5 extend in such additional polymer layers 8.

[0038] The extension and shape of the emblem(s) 5 in the plane of surface 3a of the polymer layer 3 can vary broadly and is determined by the desired decorative effect or the information to be displayed. Emblem(s) 5 which are visible and discernible with the unaided eye typically have an extension in the plane of surface 3a of at least 1 mm. Emblem(s) 5 with an extension in the plane of surface 3a of, for example, 10 - 500 , more preferably 25 -250 μm are typically not readily discernible with the unaided eye but require the use of, for example, magnifying glasses or a microscope. Therefore such emblem(s) having an extension in the μm-range, can be used as a security feature which is referred to below in the Example section as "microscript"-type emblem(s) 5.

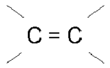
[0039] The precursor 2 of the decorative and/or information providing label 1 of the present invention furthermore comprises a polymeric layer 3 which is attached to the release surface 6a of the release carrier thereby enclosing the one or more emblem(s) 5. A precursor of the polymer layer 3 is preferably laid down onto the release surface 6a by printing or coating or casting methods such as, for example, screen printing, spraying, rotogravure or knife coating. It is also possible to apply the polymer layer 3 by extrusion, lamination, calendaring, or thermal transfer printing or hot film stamping. The printable and/or coatable precursor of the polymer layer 3 preferably has a Brookfield viscosity of between 300 cPoise and 8,000 cPoise and more preferably of between 300 and 3,000 cPoise at 20 °C. Subsequent to its application to the release surface 6a and the emblem(s) 5, the precursor of the polymer layer is preferably dried and/or cured. Drying may be applied, in particular, to waterborne precursors of the polymer layer using a drying temperature of, for example, 20 - 200 °C. Curing may be effected, for example, by irradiating the precursor of the polymer layer 3 with UV light or by increasing its temperature to accelerate curing.

[0040] The printable or coatable precursor of the polymer layer 3 comprises one or more polymers which are selected

- to provide a sufficiently strong bond to the emblem(s) 5, and
- to allow for an essentially clean removal of the polymer 3, together with the emblem(s) 5, from the release surface 6a when removing the release carrier 6

so that the label 1 can be separated essentially intactly and cleanly from the release surface 6a of the release carrier. The precursor of the polymer layer 3, the precursor of the emblem(s) 5 and/or the release surface 6a are therefore selected so that the interfacial adhesive force between the polymer layer 3 enclosing the emblem(s) 5 and the release surface 6a is less than the cohesive strength of the polymer layer 3, the cohesive strength of the emblem(s) 5 and the bonding strength between the polymer layer 3 and the emblem(s) 5.

[0041] The requirement of a sufficient bonding strength between the polymer layer 3 and the emblem(s) 5 can usually be met by selecting the precursor of the polymer layer 3 so that it is compatible with the polymer of the emblem(s) 5 and its precursor. The term "compatible" means that the precursors of the polymer layer 3 and of the emblem(s) are selected so that they are chemically similar to each other and can react to form a chemical bond. If the precursor of the polymer layer 3 comprises, for example, a polymer comprising unsaturated



double bonds or acrylic groups the precursor of the emblem(s) 5 preferably also comprises a polymer comprising such groups. Such a choice can be made easily and does not require any inventive input from the person skilled in the part.

[0042] The precursor of polymer layer 3 comprises one or more polymers which are preferably selected from the group of polymers given above for the polymers suitable to use in the emblems. Especially preferable are acrylic based and polyvinyl based polymers.

[0043] In a preferred embodiment the precursors of the polymer layer 3 and the one or more emblem(s) 5 each comprise at least one polymer which is essentially the same.

[0044] The polymers used on the precursors of the polymer layer 3 and the emblem(s) 5 are preferably selected so that the polymer layer 3 of the label 1 with the emblem(s) 5 enclosed therein, has a tensile strength at break of about 1,000 N/cm^2 to about 5,000 N/cm^2 and especially preferably from about 1,250 N/cm^2 to 4,000 N/cm^2. The elongation at break of the polymer layer 3 preferably is between 2 - 50 %. The polymer layer 3 preferably has a thickness of between

5 - 500 μm and more preferably between 20 - 250 μm.

[0045] The precursor of the polymer layer 3 may comprise further additives such as colouring agents such as inorganic and organic pigments, inks and dyes, inorganic or organic microspheres, glass beads, levelling agents, thixotropic agents, thickeners, wetting agents, polymerization catalysts, crosslinking agents and solvents.

[0046] If colouring agents and/or microspheres are added to the precursor of the polymer layer 3 these additives and/or their concentration are selected to be different from the colouring agents and/or microspheres or their concentration, respectively, used in the emblem(s) 5 so that the emblem(s) 5 are visually discernible against the polymer layer 3 enclosing such emblem(s) 5. For the purposes of the present invention colouring agents such as the Lazerflair® pearlescent pigments from Merck which change their colour upon laser irradiation, are considered to be the same pigment before and after the laser irradiation. The labels 1 of the present invention preferably do not comprise any colouring agent which exhibits a colour change when irradiated with a laser beam under conditions which essentially do not result in damaging the surface 3a of the polymer layer. In the label of the present invention the total concentration of the colouring agents in the emblem(s) 5 preferably is different from the total concentration of the colouring agents in the polymer layer (3).

[0047] In a preferred embodiment the precursor of the polymer layers 3 comprises partially metallized glass beads or optionally non-metallized glass beads in combination with metal flakes or particles to impart retroreflective properties to the polymer layer.

[0048] The variation of the colourants and/or microspheres and/or their concentration, respectively, in and adjacent to the surface 3a of the polymer layer 3 is a unique feature of the precursor 2 of the present invention and the corresponding label 1 obtainable from such precursor. This construction allows for a broad variety of design possibilities without placing restrictions on the nature of the colourants and/or microspheres used which is required, for example, in EP 0,688,678.

[0049] The precursor 2 of the label 1 of the present invention preferably comprises an adhesive layer 7 so that the label 1 can be adhesively attached to substrates. The adhesive layer may be attached to the surface 3b of the polymer layer 3 (i. e. to the major surface of the polymer layer which is opposite to the major surface 3a and to the emblem layer 4) or, if the precursor 2 and the corresponding label 1 comprise further polymer layers 8 which are attached to the surface 3b of the polymer layer, to the exposed surface of such layer or stack of layers.

[0050] The adhesive layer 7 may be applied onto the polymer layer 3 (or the exposed outside layer of the precursor) by casting from an organic solution or an aqueous dispersion or by such techniques as hot melt coating. The adhesive layer 7 may also be obtained by laminating an adhesive film onto the polymer layer 3 or the outside layer of the precursor, respectively. Examples of suitable adhesive films include 3M Transfer Tape 9458 (thickness 25.4 μm, suitable for application to smooth surfaces) and 3M VHB 4918, clear (thickness 2.0 μm, suitable for application to rough surfaces). To promote adhesion between the polymer layer 3 (or the outside layer of the precursor) and the adhesive layer 7, surface 3b of the polymer layer 3 (or the outside layer of the precursor) can be treated before the adhesive is applied. This treatment can comprise the application of a chemical primer or preferably include corona discharge treatment.

[0051] For making the adhesive layer 7 it is preferred to use pressure-sensitive adhesives or heat-activatable adhesives. These may comprise polyacrylates, polyesters, polyimides, polyolefins, polyamides, polyurethanes, silicone polymers, polybutadiene and copolymers, polyisoprenes and copolymers, natural and synthetic rubbers as well as hydrogenated derivates thereof with and without resins, fillers and crosslinking agents.

[0052] Polyacrylates have also proven to be useful, particularly those which have been modified for use on a variety of surfaces exhibiting very different surface energies, such as steel and polyethylene. Useful alkyl acrylates (i. e. acrylic acid alkyl ester monomers) for the preparation of polyacrylates include linear or branched monofunctional unsaturated acrylates or methacrylates of non-tertiary alkyl alcohols, the alkyl groups of which have from 4 to 14 and, in particular, from 4 to 12 carbon atoms. Examples of these lower alkyl acrylates include but are not limited to, n-butyl acrylate, isobutyl acrylate, hexyl acrylate, 2-ethylhexyl acrylate, isooctyl acrylate, n-octyl acrylate, n-octyl methacrylate, 2-methylbutyl acrylate, isononyl acrylate, n-nonyl acrylate, isoamylacrylate, n-decyl acrylate, isodecyl acrylate, isodecyl methacrylate, isobornyl acrylate, 4-methyl-2-pentyl acrylate and dodecyl acrylate.

[0053] Particularly preferred are acrylate-based pressure-sensitive adhesive materials such as copolymers of isooctyl acrylate and acrylic acid like those disclosed in U.S. Patent no. 2,884,126 (U.S. Patent no. Re: 24,906) which is incorporated herein by reference. The adhesive layer 7 can have a thickness of 10 to 2,000 μm, preferably 10 to 1,000 μm.

[0054] The pressure-sensitive adhesives which are particularly preferred are tackified or non-tackified isooctyl acrylate and acrylic acid copolymers. The copolymers are preferably employed in amounts ranging from 50 to 70% and preferably in an amount of about 60 % by weight. As tackifying resin, there may preferably be used, for example, Foral 85 (company Hercules), a hydrogenated rosin or its glycerol or pentaerythritol esters in amounts of preferably 30 to 50 % and particularly preferred of about 40 % by weight. In the mixture of adhesive, typically antioxidants in amounts of about 0.5 - 2 wt. % and cross-linkers such as for example aziridine compounds may be added.

[0055] The adhesive layer 7 can be protected by a release liner 9. The release liner is preferably adhesive-repellant and more specifically comprises paper or film which has been coated or modified with compounds of low surface energy relative to the adhesive applied. Organo silicone compounds, fluoropolymers, polyurethanes, polyethylene naphthalate and polyolefins can serve this purpose. The release liner can also be a polymeric sheet produced from polyethylene, polypropylene, PVC, polyesters with or without the addition of adhesive-repellant compounds. The release liner can have a thickness of 25 to 250 μm, preferably 30 to 200 μm.

[0056] The one or more additional layers 8 which may be attached to the surface 3b of polymer layer 3 are preferably polymer layers each comprising one or more polymers which may be selected from a group of thermoplastic polymers consisting of polyesters, polycarbonates, polyarylates, polyamides, polyimides, polyamide-imides, polyether-amides, polyetherimides, polyaryl ethers, polyarylether ketones, aliphatic polyketones, polyphenylene sulphide, polysulfones, polystyrenes and their derivatives, polyacrylates, polymethacrylates, cellulose derivatives, polyethylenes, polyolefins, copolymers having a predominant olefin monomer, fluorinated polymers and copolymers, chlorinated polymers, polyacrylonitrile, vinyl polymers such as polyvinylacetate or polyvinylalcohol, polyethers, ionomeric resins, elastomers, silicone resins, epoxy resins, and polyurethanes.

[0057] In a preferred embodiment such additional polymer layer(s) 8 comprises one or more polymers selected from the group of polymers identified above for use in polymer layer 3 and in the emblem layer 4.

[0058] The additional layers 8 may be applied to surface 3b of polymer layer 3 by any conventional technique including lamination, coating, printing or the like. The additional polymer layers may comprise further additives such as colouring agents including inorganic and organic pigments, inks and dyes, organic and inorganic microspheres and beads, levelling agents, thixotropic agents, thickeners, wetting agents, polymerization catalysts, crosslinking agents and solvents.

[0059] In a preferred embodiment the precursor 2 of the present invention and the corresponding label 1 comprise one or more additional polymer layers. These one or more additional polymer layers 8 preferably comprise one or more colouring agents (or colorants) which are different from and/or used in a different concentration than the colorants used in the polymer layer 3 and/or the one or more emblem(s) 5. This allows for specific decorative and/or aesthetical effects including laser ablation of the polymer layer 3 to display the one or more polymer layers 8 beneath layer 3. While this broadens the design possibilities made available through the present invention laser ablation may not be preferred for any application because it damages the surface of the label 1 which makes such label less mechanically durable.

[0060] The label 1 of the present invention which is obtainable from the precursor 2 by removing the release carrier 6, offers several advantages and unique properties.

[0061] The exposed surface of the label 1 may be formed by surface 3a of the polymer layer 3. The roughness and structure of surface layer 3a including the exposed surface of the emblem(s) 5 is determined by the roughness and structure of the release surface 6a to which the polymer layer 3 and the emblem(s) 5 had been applied in the precursor 2.

[0062] The release surface 6a preferably is essentially smooth resulting in an essentially smooth surface 3a of the label 1. The term "essentially smooth" means that the release surface 6a exhibits an average roughness R_z of less than 5 μm and more preferably of less than 3 μm. More preferably, the average surface roughness R_z is between 0.5 - 2.5 μm and especially preferably between 0.7 - 1.5 μm. The labels 1 of the present invention do not require a laser after-treatment to render the emblem(s) 5 visually discernible against the polymer layer 3. Consequently, the surface portion of the emblem(s) 5 within such surface 3a is not damaged by any laser treatment, and the surface roughness of the surface 3a and the surface portion of the emblem(s) 5 within such surface 3a is preferably essentially the same.

[0063] For specific applications where the surface of the label should have, e.g. a leatherlike look/surface appearance, the release surface 6a may be modified to have a higher roughness R_Z of, for example, between 5 μm and 1,000 μm.

[0064] If desired, the release layer is structured and exhibits a regular or irregular pattern of indentations and/or elevations as is described, for example, in EP 0,951,518.

[0065] A protective layer 10 may be attached to the surface 3a of the polymer layer 3 of the label to protect the label 1 and to impart, for example, scratch resistance to it. The protective layer 10 is preferably transparent. Examples of suitable materials for the protective layer of the invention include primed or unprimed polyethylene terephthalate (polyester), polyvinylchloride, polyolefins, or cellulose acetate films. While these protective films 10 are intended to protect the label permanently it is also possible to apply, for example, a masking tape to the exposed surface of the polymer layer for temporary protection.

[0066] Label 1 according to the present invention comprises a polymer layer 3 with emblem(s) 5 arranged adjacent to the surface 3a of such polymer layer 3 as is described above. In such label the polymer layer 3 and/or the emblem (s) 5 comprise one or more colourants and/or microspheres so that the colourants and/or microspheres and/or their concentration, respectively, in the polymer layer 3 on the one hand and in the emblem(s) 5 on the other hand are different from each other. In other words, there is a variation of colourants and/or microspheres and/or their respective concentration in the area of surface 3a of the polymer layer 3 and the emblem(s) 5 enclosed therein so that the emblem(s) 5 are visually discernible against the polymer layer 3.

[0067] The labels 1 of the present invention are preferably made by manufacturing the precursor 2 of the invention and removing the release carrier 6. Removal of release carrier 6 is preferably obtained by peeling off the release carrier.

[0068] If desired, a protective layer 10 may additionally be applied to the polymer layer 3 as was described above.

[0069] The precursor of the present invention is preferably made by providing a release carrier 6 in the first step. Then the emblem layer 4 comprising one or more emblems 5 is attached to the release surface 6a, preferably by printing the precursor of emblem(s) 5 onto the release surface 6a. The emblem(s) 5 are preferably dried and/or cured subsequent to such printing step. Then the precursor of the polymer layer 3 is applied onto the release surface 6a and the emblem (s) 5 so that the polymer layer 3 encloses the emblems. The precursor of the polymer layer is preferably applied by coating, casting or printing using any known coating and/or printing method. It is also possible to apply the polymer layer 3 or its precursor, respectively, by extrusion, lamination, hot stamping or thermal transfer printing. Then the precursor of the polymer layer 3 is dried and/or cured. If desired, the precursor may be further modified by attaching one or more further polymer layers and an adhesive layer 7 such as a pressure-sensitive adhesive layer.

[0070] The present invention will be further illustrated in the following examples which are to exemplify the invention without restricting it.

List of materials used in the invention

Component A:

[0071] Acrylate polyol comprising 2-hydroxyethyl methacrylate (2-HEMA), methylmethacrylate (MMA), ethylmethacrylate (EMA) and iso-butylmethacrylate (IBMA), was prepared according to the following procedure:_50 parts toluene and 50 parts butylacetate were charged to a reaction vessel equipped with a nitrogen purge, stirrer, thermometer and addition funnel. 2.5 parts di-t-butyl peroxide was added to the solvents at 60°C. 100 parts monomer mixture, comprising 16 parts 2-HEMA, 55 parts MMA, 17 parts EMA and 12 parts IBMA, was mixed with 2.5 parts azobisisobutyronitrile. The monomer mixture was added to the contents of the vessel with stirring in three equal portions: one portion initially, one portion after 1 hour and one portion after 2 hours. After the exotherm was complete, the reaction mixture was stirred at 60°C for 8 hours. Final solids content was about 50 weight%.

Component B:

[0072] Aliphatic polyesterdiol: Epsilon-carpolactonediol, available under the trade-name TONE® 230 (Union Carbide, US)

Component C:

[0073] Blocked multifunctional isocyanate, adduct of 1,6-hexamethylene diisocyanate and 2-butanone oxime available under the trade name Desmodur BL 3175 (Bayer Leverkussen, Germany)

Coloring agents (Component D):

[0074]

D1: titanium dioxide silane modified, commercially available under the trade name Kronos CL310 (Kronos Titan, Germany)

D2: Aluminum particles in solvent, 5μ available under the trade name STAPA-Off-Set 3000 (Eckhart-Werke, Germany)

D3: Carbon black paste in soya alkyd resin available under the trade name TACK 1 (Degussa, Germany)

Component E (levelling agent):

[0075] 3M Novec™ Fluorosurfactant FC 4434

Acrylic coating mixture-1 (white):

[0076] The solution of acrylate polyol (component A; 59 weight %) as prepared above was mixed with a 50 % by weight solution of aliphatic polyester diol (component B; 15 weight %) in toluene. Component D1 (30 parts per hundred resin pph) was added. The resulting mixture was rendered homogeneous by mixing on a ball mill for eight hours at room temperature.

[0077] Directly preceding the coating in the Examples (see below), blocked isocyanate (component C; 26 weight %) was added as well as dibutyltindilaurate catalyst (0.2 pph) and component E (0.6 pph).

Acrylic coating mixture-2 (silver):

[0078] The solution of acrylate polyol (component A; 56 weight %) as prepared above was mixed with a 50 % by weight solution of aliphatic polyester diol (component B; 17 weight %) in toluene. Component D2 (8 pph) was added. The resulting mixture was rendered homogeneous by mixing on a ball mill for eight hours at room temperature.

[0079] Directly preceding the coating in the Examples (see below), blocked isocyanate (component C; 27 weight %) was added as well as dibutyltindilaurate catalyst (0.2 pph) and component E (0.6 pph).

Acrylic coating mixture-3 (black)

[0080] The solution of acrylate polyol (component A; 56 weight %) as prepared above was mixed with a 50 % by weight solution of aliphatic polyester diol (component B; 17 weight %) in toluene. Component D3 (7.5 pph) was added. The resulting mixture was rendered homogeneous by mixing on a ball mill for eight hours at room temperature.

[0081] Directly preceding the coating in the Examples (see below), blocked isocyanate (component C; 27 weight %) was added as well as dibutyltindilaurate catalyst (0.2 pph) and component E (0.6 pph).

Acrylic coating mixture-4 (clear)

[0082] The solution of acrylate polyol (component A; 59 weight %) as prepared above was mixed with a 50 % by weight solution of aliphatic polyester diol (component B; 15 weight %) in toluene. Glass beads were added (5 weight %). The resulting mixture was rendered homogeneous by mixing on a ball mill for eight hours at room temperature.

[0083] Directly preceding the coating in the Examples (see below), blocked isocyanate (component C; 26 weight %) was added as well as dibutyltindilaurate catalyst (0.2pph) and component E (0.6 pph).

Glass beads:

Glass beads having an average diameter of about 50μm and a refractive index of 2.3

Adhesive

3M Transfer Tape 9458: acrylic pressure sensitive adhesive, having a thickness of 25.4 μm

Examples

Preparation of films or labels

Preparation of release carrier 6

[0084] A casting release carrier comprising a polymer-coated paper was prepared by taking a 108 g HIFI Kraft paper (available from Chem Tenero AG) and coating it with a solution of acrylic release material. The paper was then dried to give a dry coating weight of 30 g/cm^2. The surface was smooth and glossy and exhibited an average roughness R_Z of approximately 1,0 μm. This release carrier is denoted below as release carrier 6/sample 1.

[0085] For screen printed films, a double side siliconized PET-release liner having a thickness of 76μm and quality 1876, commercially available from Huhtamaki, was used. This release carrier is denoted below as release carrier 6/sample 2.

Example 1

[0086] In a first step acrylic coating mixture-1 was printed as an emblem layer onto release carrier 6/sample 1 using rotogravure method. The emblem layer was dried at 180 °C for 1 minute.

[0087] Then acrylic coating mixture-2 was coated as polymer layer 3 onto the release carrier 6/sample 1 and oven dried at 180 °C during 2 min. Dry polymer layer 3, having a smooth surface, was about 10 μm in thickness.

[0088] A polymer layer 8 comprising acrylic coating mixture-3 was coated onto the first layer and dried at 200 °C during 2 min. The coating thickness of this second layer was about 50 μm after drying.

[0089] In a next step, 3M Transfer Tape 9458 was laminated onto the polymer layer 8 to provide pressure-sensitive adhesive layer 7 and the release liner 9. The coating thickness of the adhesive layer 7 was 25.4 μm. Finally, the release carrier 6/sample 1 used in the first step of the production was removed.

Example 2

[0090] In Example 2, a multilayer film was produced essentially according to the method as described in Example 1, except that the emblem layer 4 was printed onto the release carrier 6/sample 1 through screen printing. The emblem layer 4 was screen-printed with the 3M™ Process Colour 889I (red) and oven dried at 80 °C during 3 min.

[0091] A high cohesive bond between the emblem layer 4 and the polymer layer 3 was observed by a cross-cut test with the 3M Scotch Tape 610, according to the test method EN ISO 2409.

Example 3

[0092] In Example 3, a multilayer film from which labels 1 can be cut was produced using screen printing method.

[0093] In a first step, an emblem layer was printed onto Huhtamaki's release liner (release carrier 6/sample 2) using 3M™ Process Colour 889I (red). The emblem layer was dried at 80 °C for 3 minutes.

[0094] In a second step, the polymer layer 3 was screen printed onto the pre-printed release carrier 6/sample 2 using 3M™ Process Colour 844I (yellow) and oven dried at 80 °C during 5 min. The dried polymer layer 3 was about 15 μm in thickness.

[0095] In a third step, a polymer layer 8 was screen printed onto the polymer layer 3 using 3M™ Process Colour 885I (black) and dried at 80 °C during 10 min. The coating thickness of this additional polymer layer 8 was about 50 μm after drying.

[0096] In a next step, 3M Transfer Tape 9458 was laminated onto polymer layer 8 to provide adhesive layer 7 and release liner 9. The coating thickness of the adhesive layer 7 was 25.4 μm. Finally, release carrier 6/sample 2 used in the first step of the production was removed.

Example 4

[0097] In Example 4, a multilayer film from which labels 1 can be cut was made with a retro-reflective emblem layer 4, using a screen-printing method.

[0098] In a first step acrylic coating mixture-4 was screen-printed onto release carrier 6/sample 2 in a pattern or a logo to provide the emblem layer 4, which was then dried at 180°C for 1 minute..

[0099] Then acrylic coating mixture-2 was coated as polymer layer 3 onto the pre-printed release carrier 6/sample 2 bearing the emblem layer 4, and was oven dried at 160 °C during 2 min. The dry polymer layer 3 was about 15 μm in thickness.

[0100] A layer 8 was coated onto polymer layer 3, using acrylic coating mixture-3. The coating was dried at 200 °C during 2 min. The coating thickness of this additional layer 8 was about 50 μm after drying.

[0101] In a next step, 3M Transfer Tape 9458 was laminated onto the additional layer 8 to provide adhesive layer 7 and release liner 9.. The coating thickness of the adhesive layer 7 was 25.4 μm. Finally, the release carrier 6/sample 2 used in the first step of the production was removed.

Example 5

[0102] In Example 5, a multilayer film from which labels 1 can be cut was made.

[0103] In a first step a modified acrylic coating mixture-1 comprising, instead of silane modified titanium dioxide (component D1), 5 wt.% of glass based (average size of 40-60 μm) was printed onto release carrier 6/sample 1 in a pattern or a logo using rotogravure method to provide the emblem layer 4 which was then dried at 180 °C for 1 minute. The composition of acrylic coating mixture-1 was otherwise as indicated above.

[0104] In a second step acrylic coating mixture-4 was coated onto the pre-printed release carrier 6/sample 1, bearing the emblem layer 4, to form polymer layer 3. Layer 3 was oven dried at 180 °C during 2 min. The dried polymer layer 3 was about 15 μm in thickness.

[0105] A polymer layer 8 comprising an acrylic coating mixture as disclosed in Example 1 above was coated onto polymer layer 3 and oven dried at 180 °C during 2 min. The dried additional polymer layer 8 was about 15 μm in thickness.

[0106] A further additional polymer layer 8a was coated onto the first additional polymer layer 8 using acrylic coating mixture-3. The coating was dried at 200 °C for 2 min. The coating thickness of this further additional polymer layer 8a was about 50 μm after drying.

[0107] In a next step, 3M Transfer Tape 9458 was laminated onto the further additional polymer layer 8a to provide adhesive layer 7 and release liner 9.The coating thickness of the adhesive layer 7 was 25.4 μm. Finally, the release carrier 6/sample 1 used in the first step of the production was removed.

Example 6

[0108] In Example 6, a multilayer film from which labels 1 can be cut is made which comprises a clear retro-reflective additional polymer layer 8 next to polymer layer 3. This construction offers the advantage that in case polymer layer 3 is laser-marked this retro-reflective layer will be seen as a retro-reflective background by lighting.

[0109] In a first step emblem layer 4 was made by printing acrylic coating mixture-1 in a pattern or a logo onto release carrier 6/sample 1 using rotogravure method. The printed emblem layer 4 was dried at 180 °C for 2 minutes.

[0110] Then acrylic coating mixture-2 was coated onto the pre-printed release carrier 6/sample 1 bearing emblem layer 4, to make polymer layer 3 which was oven dried at 180 °C during 2 min. The dried polymer layer 3 was about 15 µm in thickness.

[0111] In a next step an additional polymer layer 8 was obtained by coating acrylic coating mixture-4onto the polymer layer 3. The additional polymer layer 8 was oven dried at 180 °C during 2 min. The dried polymer layer 8 was about 15 µm in thickness.

[0112] A further additional polymer layer 8a was coated onto the first additional polymer layer 8 using acrylic coating mixture-3. The coating was dried at 200 °C for 2 min. The coating thickness of this further additional polymer layer 8a was about 50 µm after drying.

[0113] In a next step, 3M Transfer Tape 9458 was laminated onto the further additional polymer layer 8a to provide adhesive layer 7 and release liner 9. The coating thickness of the adhesive layer 7 was 25.4 µm. Finally, the release carrier/sample 1 used in the first step of the production was removed.

Example 7

[0114] In Example 7, a multilayer film was produced essentially according to the method as described in Example 1, except that a micro-script with a height between 100 - 500 µm was printed in addition to the logo to form the emblem layer 4. This adds an added security feature to prove the authenticity of the film. This micro script is legible clearly by use of a magnifying glass.

Test methods

[0115] The labels obtained from the films by cutting were tested according to the following test methods.
The results are given in Tables 1 and 2.

Abrasion resistance

[0116] The abrasion resistance was tested according to the CSA-test method C22.2 No. 0.15-M95, using a Teledyne Taber Abrasion Tester, CS-10 Abrasion wheel, 250 gr. weight. The test was run on 40 x 40 mm test samples (100 cycles).

[0117] The results of abrasion resistance as given in Table 1 are determined by visual inspection of the abraded surface (after the 100th cycle) using following standard:

+ = good
++ = very good (no change)

Chemical and water resistance

[0118] The resistance to chemicals or water was tested by immersing the sample into the respective test liquid for a period of 10 seconds, following by drying for 20 seconds. This procedure was repeated five times. Test liquids used were n-heptane, n-iso-propanol, diesel, drinking water.
The legibility of logo was determined by visual inspection using following standard:

+ = logo good legible
++ = logo very good legible (no change)

The results are recorded in table 1.

Heat resistance

[0119] 100 mm x 25 mm samples, adhered to an aluminium plate were exposed to a temperature of 120 °C and 180 °C for a period of one hour in a forced air oven. Each sample was visually evaluated with respect to shrinkage, adhesion and colour changes.

[0120] The evaluation symbols given in Table 1 have the following meaning:

+ = good
++ = very good (no change)

Smear resistance - Rub test

[0121] The smear resistance of the printed logo, adhesion strength at the edges as well as the adhesive oozing were tested according to the test method DIN 57700 (or VDE 700) and using several test liquids like water, n-heptane, iso-propanol and diesel.

[0122] The samples were adhered to an aluminium plate. The samples were rubbed during 15 seconds using a square of white tissue, soaked with water. This procedure was repeated with each of the test liquids. For all samples a rating ++ was obtained, indicating no visible change was detected.

Cross-cut test

[0123] The bonding of the logo to the top layer was tested accordingly to EN ISO 2409, using 3M Scotch Tape 610. All examples showed a very good bond between logo and top layer. 0 % of printed logo was removed during the test.

Reflection measurement

[0124] The reflection R' was measured according to DIN 67520-2, using an illumination angle of +5° and an observation angle of 0.33°. The results, recorded in cd/(m^2.lux) are given in table 2.

Tensile strength and elongation

[0125] The tensile strength and elongation of the labels was measured according to AFERA 4004 and AFERA 4005 test methods respectively. The tests were done on specimen of 1 inch width. Testing conditions were 22°C and 50% relative humidity. The tensile strength at break (N/cm^2)and the elongation (%) are recorded in table 2.

Roughness measurement Rz

[0126] The roughness of the polymer layer 3 was measured according to Test Method DIN EN ISO 1302 (06/02) using a Perthometer M2 testing equipment, available from Mahr. The results, recorded in µm are given in table 2.

Table 1 : Performance result

Ex.-No.	**Thickness (µm) of label (without adhesive)**	**Resistance rating**				
		Abrasion	**Chemical/water**	**Smear**	**Heat at**	
					120°C / 1hr	180°C /1hr
1	63	++	++	++	++	++
2	66	+	++	++	++	++
3	65	+	++	++	++	++
4	63	+	++	++	++	++
5	65	++	++	++	++	++
6	62	++	++	++	++	++
7	65	++	++	++	++	++

Table 2: Performance (cont)

(continued)

Ex.-No.	Tensile Strength at break (N/cm^2)	Elongation (%)	Reflection R' [cd/(m^2.lux)]	Roughness Rz (μm)
1	4157	5,21	0,0	1,32
2	3481	5,6	0,0	1,47
3	2252	11,0	0,0	1,39
4	3730	4,9	0,1	1,80
5	3458	5,89	0,44	1,87
6	3410	5,87	0,0	1,63
7	3306	6,1	0,0	1,71

List of reference numbers

[0127]

1	Label
2	precursor of label 1
3	polymer layer
3a	major surface of polymer layer 3 facing release surface 6a
3b	major surface of polymer layer 3 opposite to major surface 3a
4	emblem layer
5	emblem(s)
6	release carrier
6a	release surface
7	adhesive layer
8	further polymer layer
9	release liner
10	protective layer

Claims

1. Precursor (2) of a label (1) comprising a release carrier (6) with a release surface (6a) bearing a polymer layer (3) and a discontinuous emblem layer (4) comprising at least one emblem (5) at the interface between the release surface (6a) and major surface (3a) of the polymer layer (3).

2. Precursor (2) according to claim 1 wherein the polymer layer (3) comprises one or more polymers selected from the group consisting of (meth)acrylate polymers, polyurethane polymers, polyester polymers, polymers comprising polymerized units derived from one or more olefin monomers, one or more acrylic monomers and/or or more vinyl monomers, silicone polymers, polyimide polymers and mixtures thereof.

3. Precursor (2) according to claim 2 wherein the polymer layer (3) comprises one or more colouring agents selected from the group consisting of inorganic pigments including metal flakes, organic pigments, inks and dyes, and/or one or more inorganic microspheres or beads.

4. Precursor (2) according to any of the preceding claims wherein the one or more emblems (5) comprise one or more polymers selected from the group consisting of (meth)acrylate polymers, polyurethane polymers, polymers comprising polymerized units derived from one or more olefin monomers, from one or more acrylic monomers, from one or more vinyl monomers, silicone polymers, and mixtures thereof.

5. Precursor (2) according to claim 4 wherein the one or more emblems (5) comprise one or more colouring agents selected from the group consisting of inorganic pigments including metal flakes, organic pigments, inks and dyes, and/or one or more inorganic microspheres or beads.

6. Precursor according to claim 3 and 5 wherein the additives comprised in the polymer layer (3) and in the one or more emblem(s) (5), respectively, and/or their concentration are different from each other so that the emblem(s) (5) are visually discernible from the polymer layer (3).

7. Precursor (2) according to any of the preceding claims wherein the polymer layer (3) has a thickness of between 5 and 500 μm.

8. Precursor (2) according to any of the preceding claims wherein the precursor (2) comprises an adhesive layer (7) which is attached to the major surface (3b) of the polymer layer (3).

9. Precursor (2) according to claim 8 wherein the adhesive layer (7) comprises a pressure-sensitive adhesive.

10. Precursor (2) according to claim 9 wherein the pressure-sensitive adhesive is selected from the group consisting of acrylic, block copolymer, rubber resin, poly(alpha) olefin and silicone pressure-sensitive adhesives.

11. Precursor according to any of claims 8 - 10 wherein the adhesive layer (7) is covered with a release liner (9).

12. Precursor (2) according to any preceding claims comprising one or more further polymer layers (8) between the polymer layer (3) and the adhesive layer (7).

13. Label (1) comprising a polymer layer (3) comprising one or more emblems (5) arranged adjacent to one of the major surfaces of said polymer layer (3), said emblems (5) comprising one or more polymers and one or more colouring agents selected from the group consisting of inorganic pigments including metal flakes, organic pigments, inks and dyes, and/or one or more inorganic microspheres or beads whereby said colouring agents and/or inorganic microspheres or beads and/or their respective concentration are selected so that the one or more emblem(s) (5) are visually discernible from the polymer layer (3).

14. Label according to claim 13 wherein the polymer layer (3) and the one or more emblem(s) (5) do not comprise any colouring agent which exhibits a colour change when subjecting the label to laser irradiation under conditions which essentially do not result in damaging the surface 3a of the polymer layer 3 and/or the surface portion of the emblem (s) 5 within such surface 3a.

15. Label according to any of claims 13-14 wherein the total concentration of the colouring agents in the emblem(s) 5 is different from the total concentration of the colouring agents in the polymer layer (3).

16. Label according to any of claim 13-15 wherein the other major surface (3b) of the polymer layer (3) bears an adhesive layer (7).

17. Label according to any of claims 13 - 16 comprising one or more additional polymer layers on the polymer surface (3b) or between the polymer surface (3b) and adhesive layer (7), respectively.

18. Method of making the precursor (2) of a label (1) according to any of claims 1-12 comprising the steps of

(i) providing a release carrier (6),
(ii) applying a discontinuous emblem layer (4) comprising one or more emblems (5) to the release surface (6a) of the release carrier (6), and
(iii) applying the polymer layer (3) onto the release surface (6a) and the emblem layer (4) so that the emblem layer (4) is arranged at the interface between the polymer layer (3) and the release surface (6a) of the release carrier (6a).

19. Method according to claim 18 wherein the polymer layer (3) is applied by coating, casting, printing, extrusion, calandering or lamination.

20. Method according to any of claims 18-19 wherein the emblem layer (4) is applied by printing, imaging or rotogravure coating, thermo-transfer printing, film printing, flexo printing, offset printing, digital printing and letter press printing, optionally with subsequent drying and/or curing.

21. Method according to claim 20 wherein printing is effected by screen printing, electrostatic printing, ink jet printing and the like.

22. Method of making a label (1) comprising the steps of

(i) providing a precursor (2) of a label (1) according to any of claims 1-12, and
(ii) removing the release carrier (6).

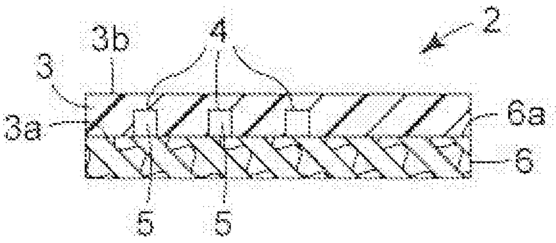


FIG. 1

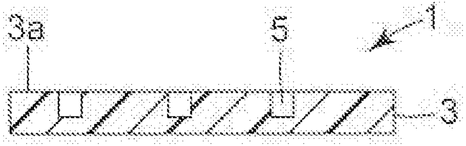


FIG. 1a

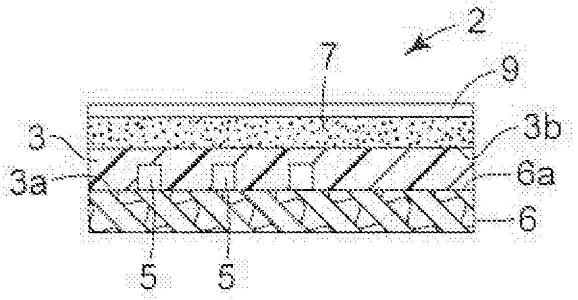


FIG. 2

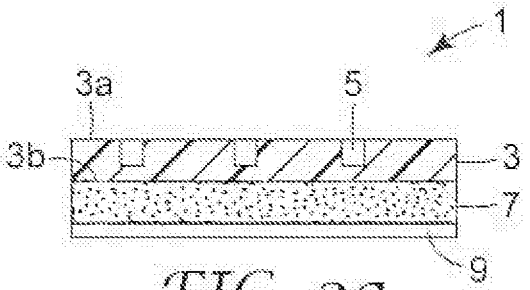


FIG. 2a

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 11 9242

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	30 January 2007	Pavlov, Valeri

CATEGORY OF CITED DOCUMENTS

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