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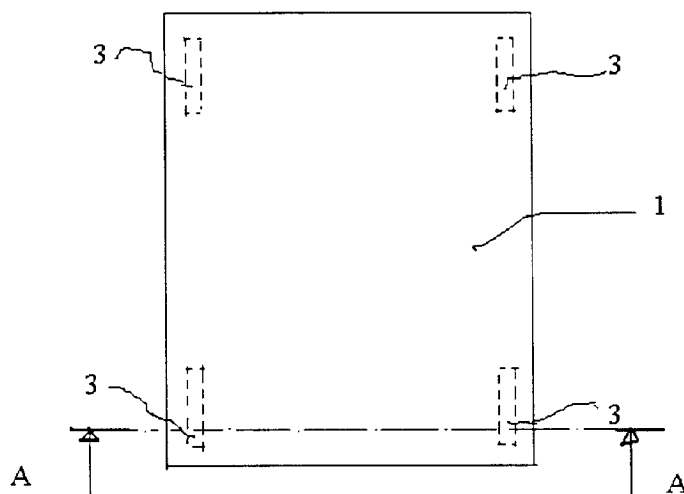
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(54) **Disposable moisture vapour permeable, liquid impermeable covering sheet for bedding articles containing active agents**

(57) The present invention relates to a disposable covering sheet which is moisture vapour permeable and liquid impermeable and contains active agent or agents. The disposable covering sheet comprises at least a moisture vapour permeable layer and a liquid impermeable but moisture vapour permeable film layer of thermoplastic compositions. The disposable covering sheet

such as, for example, a mattress cover or a pillow cover gives a better comfort to the user by providing active agent releasing properties. The disposable covering sheet of the present invention can find a variety of applications wherein moisture vapour permeability and liquid imperviousness combined with long lasting active agent releasing properties are desirable.

Figure 1



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DescriptionField of the Invention

[0001] The present invention relates to a disposable covering sheet preferably for bedding items such as mattresses, pillows, etc. which is moisture vapour permeable, liquid impermeable, and has active agents releasing properties. The covering sheet comprises liquid impermeable formed structures having a moisture vapour permeability comprising thermoplastic compositions preferably applied onto a moisture vapour permeable substrate. The covering sheet of the present invention can find a variety of applications wherein moisture vapour permeability, liquid imperviousness, disposability, comfort, specific active agents releasing properties are desirable. Preferably the covering sheet of the instant invention is a mattress cover or a pillow cover.

Background of the Invention

[0002] Covering sheets, particularly covering sheets for bedding articles, such as bed mattress covers, are known in the art. A primary use of these articles is to protect mattresses, particularly bed mattresses, but also pillows, cushions, duvets, upholstery, from contaminants, e.g. from dust, liquids, or bodily fluids, for example in environments where a mattress is intended to be used by different users, such as in hospitals, hotels, or rental houses. Furthermore, mattress covers are used in house for providing a mattress with a protective covering.

[0003] More recently mattress covers have been also proposed to act as an allergen barrier to control house mites that live in the dust, typically on and within mattresses where they can find favourable environmental conditions in terms of temperature and nourishment.

[0004] It has long been established that house mites, also known as dust mites, are a source of house dust allergens that not only cause allergies, but also adversely contribute to other pathologies, such as asthma. It has also been established that use of allergen control measures is effective in controlling these conditions. Allergen-proof encasing to contain mites to prevent allergen egress has long been used in mattresses, such as bed mattresses, pillows, cushions, duvets, upholstery.

[0005] Mattress covers come in direct or indirect (i.e. through further intermediate layers, e.g. bed sheets, or pillow-cases) contact with the human body, therefore it is important that such covers are moisture vapour permeable for comfort reasons, in addition to being liquid impermeable in order to provide the mattress with the desired protection against external agents. When used as a barrier against dust mites they should also have an allergen barrier capability.

[0006] Various examples of disposable mattress covers which are at the same time liquid impermeable and breathable, i.e. moisture vapour permeable, are known in the art.

[0007] Known disposable mattress covers comprise different materials or structures which are capable of providing a liquid barrier, in addition to providing moisture vapour permeability, preferably air permeability. Such structures or materials can comprise a single layer, or multiple layers laminated together. An example are structures comprising thermoplastic microporous films, e.g. laminated to fibrous layers such as nonwoven layers.

[0008] Particularly preferred materials which are suitable for disposable mattress covers are hydrophilic continuous films, also known as "monolithic films", that do not allow the flow of moisture vapour through open pores or apertures in the material, but do transfer substantial amounts of moisture vapour through the film by absorbing water on one side of the film where the moisture vapour concentration is higher, and desorbing or evaporating it on the opposite side of the film where the moisture vapour concentration is lower.

[0009] In our patent applications EP 0963760 and EP 0964026 thermoplastic compositions are disclosed for making hydrophilic continuous moisture vapour permeable, liquid impermeable layers having preferred characteristics of moisture vapour permeability and liquid imperviousness. The disclosed preferred thermoplastic compositions are also readily processable so as to provide a coating having the desired thickness onto a substrate, so avoiding the need of complex traditional extrusion apparatuses. This is achieved by modifying the viscosity of the thermoplastic polymers by means of the inclusion in the composition of a suitable plasticiser or blend of plasticisers that lowers such viscosity. This allows to utilise with these preferred compositions typical process conditions known in the art for the direct coating of low viscosity hot melt compositions onto a substrate in order to form a moisture vapour permeable, liquid impervious film or layer.

[0010] Disposable, moisture vapour permeable, liquid impermeable mattress covers comprising a moisture vapour permeable, liquid impermeable structure, which in turn comprises a layer of the thermoplastic compositions according to either EP 0963760 or EP 0964026, preferably applied onto a moisture vapour permeable substrate, e.g. a fibrous layer such as a nonwoven layer in order to form a composite structure, are particularly preferred since they provide better moisture vapour permeability combined with liquid imperviousness, and also take advantage of the increased ease of manufacture associated to the above mentioned compositions.

[0011] Another improvement to disposable mattress covers is described in our European patent application No.

99124535.8, filed on 9 December 1999, where an increased friction is established between the disposable mattress cover and the mattress surface during the use, when i.e. the mattress cover is typically subjected to a certain compression against the mattress itself, in order to minimise possible misplacements of the cover during its use, for example when the mattress is a bed mattress or a pillow, and the mattress cover can be moved or misplaced by the user's movement, e.g. during the sleep. This is particularly important when the mattress cover is intended for partial covering of the external surface of a mattress, for example of the upper surface of a bed mattress, e.g., in combination with traditional means for connecting the cover to the mattress, such as for example elastic bands or strands applied at the corners of a rectangular bed mattress cover.

[0012] Provision of an increased friction between the mattress cover and the mattress is however also useful in the context of a mattress cover intended for total encasing of a mattress. In both cases in fact this increased friction prevents or at least reduces relative movements between the mattress cover and the mattress during the use, therefore helping in keeping the mattress cover in its right position provided initially, e.g. by the user when applying the cover to the mattress.

[0013] Even if the covering sheets disclosed in our above mentioned patent applications function well, particularly in terms of protection, they can be improved in terms of further benefits for the user by adding active agents releasing properties to them. While systems for releasing active agents such as perfumes, volatile therapeutic materials, etc. are known in the art and also in the field of covering sheet for bedding articles, see for example WO 99/17643, it is not known a disposable covering sheet particularly for bedding items such as mattresses, pillows, etc. which is moisture vapour permeable, liquid impermeable and has specific active agents releasing properties.

Summary of the Invention

[0014] A disposable, moisture vapour permeable, liquid impermeable, covering sheet comprising at least a moisture vapour permeable layer and a liquid impermeable but moisture vapour permeable film layer preferably applied onto said moisture vapour permeable layer, the covering sheet has specific active agent releasing properties.

[0015] In particular, said covering sheet comprises an active agent releasing system which is able to provide a long lasting release of active agents and, more specifically, an active agent odour intensity positive difference of at least 5, preferably of at least 10, more preferably of at least 15, after 7 and preferably after 14 days compared to the active agent odour intensity of the active agent itself after the same periods of time, the value determined according to the Active Agent Intensity Test described herein, in order to provide a prolonged release of the active agent after the initial use of the covering sheet.

Brief Description of the Drawings

[0016] The drawings herein are intended to illustrate preferred embodiments of the present invention, but are not meant to limit in any way its scope.

Figure 1 is a schematic plan view of a disposable mattress cover according to the present invention.

Figure 2 is a cross-sectional view of the disposable mattress cover of figure 1 taken along the line A-A.

Figure 3 illustrates the mattress cover applied to a mattress.

Detailed Description of the Invention

[0017] According to the present invention, a disposable, moisture vapour permeable, liquid impermeable covering sheet is provided which comprises at least a moisture vapour permeable layer and a liquid impermeable but moisture vapour permeable film layer comprising a highly processable thermoplastic composition having moisture vapour permeability. Said covering sheet offers a further benefit to the user, particularly when used as a covering sheet for bedding articles such as a mattress cover, by providing active agents releasing properties.

[0018] Covering sheets according to the present invention can be used to cover and protect different articles in a variety of fields for both domestic, industrial or institutional usage; such usages include, but are not limited to, covering sheets for headrests and seats, both for domestic use or institutional use, and for use in the transportation industry, table covers of dining sets, covering sheets for medical examination tables, covering sheets for furniture, etc.

[0019] The preferred utilization of the covering sheets herein is in bedding articles, both for domestic and institutional usage. The covering sheets of the present invention are particularly useful for use in disposable bed mattress covers and pillow cases or covers.

[0020] The term "mattress", as used therein, refers to a fabric case filled with resilient material, such as for example

cotton, hair, feathers, foam rubber, or an arrangement of coil springs, and therefore comprises particularly bed mattresses, but also pillows, cushions, comforters, duvets, upholstered portions of beds (such as headboards), or of sofas or armchairs. Consequently, even if the present invention will be described with particular reference to a disposable covering sheet for bedding items in the form of a mattress cover, it is not meant to limit in any way its scope to mattress covers.

[0021] Referring particularly to mattresses it is generally known that each mattress every year "absorbs" from about 45 kilos to about 80 kilos of sweat and about 150 grams of skin scales. In addition to this, millions of mites generally live in the mattress. Another problem is that accidental staining is practically unavoidable. Usually consumers are aware of the above problems and, in fact, most of them use reusable mattress covers which usually are made from cotton. But these covers do not solve the above problems and, in particular, they are not capable of providing an effective action of releasing active agents which means to be able to emit active agents, particularly perfumes, volatile therapeutic materials, etc., in a controlled manner with a long lasting release of said active agents.

[0022] The disposable covering sheet of the present invention consists in a laminate of different layers comprising at least a first moisture vapour permeable layer and a second liquid impermeable but moisture vapour permeable film layer of thermoplastic composition bonded onto said first layer, i.e. the laminate preferably consists of at least two bonded layers giving rise to a composite structure.

[0023] If more film layers of thermoplastic compositions are utilised in a composite structure in combination with one or more other moisture vapour permeable layers to create a layered moisture vapour permeable, liquid impermeable composite structure, each film layer can be made of a same specific thermoplastic composition or of different specific thermoplastic compositions.

[0024] The above composite structure can involve at least one component, typically the film layer, of the thermoplastic composition in combination with one or more other moisture vapour permeable layers. Such moisture vapour permeable materials include, but are not limited to: fibres, fibrous batts, non-wovens, wovens, papers, micro-porous or porous membranes, films such as polymeric films, perforated or apertured films and papers, macroscopically expanded films, cloth, etc.

[0025] Said other components may be non-absorbent, absorbent, liquid-containing, etc.

[0026] The composite structures of the covering sheets described above have a moisture vapour transfer rate (WVTR) of at least 400 g/m²·24h, more preferably at least 500 g/m²·24h, and most preferably at least 600 g/m²·24h, but they are impermeable to liquids.

[0027] According to a particularly preferred embodiment of the present invention the disposable, moisture vapour permeable, liquid impermeable mattress cover comprises a composite structure comprising a film layer of the thermoplastic composition applied onto a moisture vapour permeable substrate, wherein said film layer is intended, in use, to directly contact the mattress. The moisture vapour permeable substrate preferably comprises a fibrous layer, e.g. a nonwoven layer onto which the thermoplastic composition is applied in a continuous layer or film by means of known means, e.g. preferably by hot melt coating.

[0028] A disposable, moisture vapour permeable, liquid impermeable mattress cover comprising a moisture vapour permeable, liquid impermeable structure in turn comprising a layer of the thermoplastic composition which is intended, in use, to directly contact a mattress, can have any shape and arrangement which is known in the art, and which is suitable for its intended use.

[0029] For example, if the mattress consists of a standard bed mattress, the mattress cover can be a substantially rectangular flat sheet with elastic strings at the corners, or alternatively with integrally elasticised corners, as described in FR 2747899. The rectangular sheet typically has suitable dimensions in order to completely cover at least the upper surface of the bed mattress, and preferably, as in the latter embodiment referred to above, also the side surfaces thereof, wherein the elastic strings or the elasticised corners provide for a suitable releasable connection, in a way known in the art, to the mattress. Alternative configurations where the mattress cover has a suitable shape and size in order to completely encase a mattress are also possible. This latter configuration could be preferred when the mattress cover, in addition to liquid imperviousness and moisture vapour permeability, should also provide a total barrier against dust mites and related allergens.

[0030] Preferably, as shown in the herein drawings, a disposable mattress cover comprises a rectangular blanket made according to the present invention. In particular, the disposable, moisture vapour permeable, liquid impermeable blanket is formed by a topsheet 1, which is preferably a moisture vapour permeable fibrous layer, and a backsheets 2, which is a liquid impermeable but moisture vapour permeable film layer of a thermoplastic composition laminated onto said topsheet 1 in order to form a two-layer composite structure. The backsheets 2 is intended to face and to be in direct contact with the top of a mattress 4, while the topsheet 1 is intended to face the user.

[0031] The thermoplastic compositions can provide a certain degree of residual tackiness to the backsheets 2. In turn, this tackiness prevents or at least reduces relative movements between the mattress cover and the mattress 4 during use, therefore helping in keeping the mattress cover in its right position provided by the user initially. In any case and if preferred, the mattress cover can have no residual tackiness by suitably selecting the thermoplastic compositions or

by neutralising any residual tackiness with known means, e.g. talcum powder. This tackiness can be also useful for incorporating the active agents in the mattress cover according to the present invention.

[0032] For assisting the user to put the mattress cover on the mattress in the right position but also for fixing the mattress cover to the mattress in a stable manner adhesive means 3 are provided, as shown in the drawings. The adhesive means 3 can be one or more stripes of a conventional pressure sensitive adhesive covered by a release liner for protecting the adhesive before use, as utilised, for example, in the manufacture of the panty fastening adhesive patch of commercial sanitary napkins, or pieces of double sided adhesive tapes, etc.

[0033] As shown in figure 3, the mattress cover has suitable dimensions to completely cover at least the top surface and partially the longitudinal sides 6 of the mattress 4, while the adhesive means 3 are preferably attached to the longitudinal sides 6 of the mattress 4.

[0034] Any other suitable shape or arrangement for a mattress cover according to the present invention is also possible, depending on the particular mattress type, shape and dimensions, and on the intended use of the mattress cover.

[0035] Preferably the disposable, moisture vapour permeable, liquid impermeable covering sheet of the present invention, when used as a mattress cover or a pillow cover, has a surface area ranging from 15.0 m² to 0.3 m², preferably from 8.0 m² to 0.5 m². Most preferably, particularly in the case of a mattress cover, said surface area is from 5.0 m² to 1.0 m².

[0036] Suitable thermoplastic compositions for the backsheet 2 can be those disclosed in the European patent applications EP 963760 and EP 964026, already mentioned in the background of the invention, but other compositions which form monolithic breathable films can be utilised.

[0037] Residual tackiness of the thermoplastic composition can be advantageously provided by the selection of the tackifying resin; indeed the thermoplastic compositions described in the above applications typically include resins or blends of tackifying resins. Preferred resins, which may be present by up to 50% by weight of the thermoplastic composition, may be selected from rosins and rosin esters, hydrocarbon resins, aliphatic resins, terpene and terpene-phenolic resins, aromatic resins, synthetic C5 resins, mixtures of synthetic C5-C9 resins, and mixtures thereof.

[0038] By suitably selecting the tackifier resin or blend of tackifier resins, it is possible to adjust the residual tackiness at room temperature of the thermoplastic composition, and therefore of the layer formed from said thermoplastic composition, to the extent that it has the typical characteristics of a pressure sensitive adhesive.

[0039] Preferred tackifier resins, or blend of tackifier resins still have a softening point of 125°C or less, and are selected from the group consisting of rosin and rosin esters, terpene-phenolic resins, aromatic resins, and mixtures thereof.

[0040] More preferably, the thermoplastic compositions according to the above mentioned applications comprise a blend of tackifier resins, selected as described above, wherein moreover from 0% to 20%, preferably from 2% to 15%, by weight of said blend of tackifier resins comprises a resin or blend of resins having a softening point of less than 25°C, and from 80% to 100%, preferably from 85% to 98%, by weight of said blend of tackifier resins comprises a resin or blend of resins having a softening point of at least 70°C.

[0041] Other thermoplastic compositions for the backsheet 2 are those described in our European patent application No. 00116284.1, filed on 10 August 2000 with title: "Thermoplastic hydrophilic polymeric compositions with improved adhesive properties for moisture vapour permeable structures" (P&G Case CM2406F).

[0042] Monolithic films are preferred materials because they do not allow the flow of moisture vapour through open pores or apertures in the material, but do transfer substantial amounts of moisture vapour through the film by absorbing water on one side of the film where the moisture vapour concentration is higher, and desorbing or evaporating it on the opposite side of the film where the moisture vapour concentration is lower. Consequently, while they allow the passage of moisture vapour, they are truly impermeable to liquids, dust, etc..

Active agent releasing system

[0043] According to the present invention the disposable covering sheet comprises as an essential component an active agent releasing system which is able to release one or more active agents in a controlled manner.

[0044] Active materials such as, for example, perfume, which will release a fragrance during their utilisation, can be utilised.

[0045] As used herein the term perfume means any odoriferous material. In general, such materials are characterised by a vapour pressure less than atmospheric pressure at ambient temperatures. The perfume employed herein will most often be liquid at ambient temperatures, but also can be solids such as the various camphoraceous perfumes known in the art. A wide variety of chemicals are known for perfumery uses, including materials such as aldehydes, ketones, esters and the like. More commonly, naturally occurring plant and animal oils and exudates comprising complex mixtures of various chemical components are known for use as perfumes, and such materials can be used herein. The perfumes herein can be relatively simple in their composition or can comprise highly sophisticated, complex mix-

tures of natural and synthetic chemical components, all chosen to provide any desired odour.

[0046] Typical perfumes herein can comprise, for example, woody/ earthy bases containing exotic materials such as sandalwood oil, civet, patchouli oil and the like.

[0047] The perfumes herein can be of a light, floral fragrance, e.g., rose extract, violet extract and the like. The perfumes herein can be formulated to provide desirable fruity odours, e.g., lime, lemon, orange and the like.

[0048] Perfume materials are described more fully in S. Arctander, Perfume Flavors and Chemicals. Vols. I and II. Aurthor, Montclair, N.J., and the Merck Index, 8th Edition, Merck & Co., Inc. Rahway, N.J..

[0049] In short, any chemically compatible material which exudes a pleasant or otherwise desirable odour can be used in the perfumed particles herein to provide a desirable odour when applied to articles according to the present invention.

[0050] Perfumes which are normally solid can also be employed in the present invention. These may be admixed with a liquefying agent such as a solvent prior to incorporation into the articles of the present invention by spraying, or may be simply melted and incorporated in the film layer, as long as the perfume does not sublime or decompose upon heating.

[0051] Preferably, starch encapsulated perfumes, as described for example in GB 1464616, can be utilised as the active agent releasing system in the covering sheet according to the present invention. Encapsulation allows a long lasting release of perfumes.

[0052] More preferably, useful active agent releasing systems can be selected among those disclosed in WO 00/02987, EP 0971021, EP 0971024, and EP 0971025 which describe, inter alias, a product of reaction between an amino functional polymer comprising at least one primary and/or secondary amine group and an active component selected from ketone, aldehyde, or mixture thereof. Preferably, the active agent releasing system can be the product of reaction between a primary amine and a ketone or aldehyde perfume component. By utilising the product of reaction described by the above patent applications, the release of the active agent (for example, a perfume component) lasts for a longer period of time than by the use of the active alone itself.

[0053] It should be noted that active agents are not limited to perfumes but other know active agents selected from insecticides, deodorants, volatile therapeutic materials, aromatic oils and mixtures thereof can be utilised for providing a benefit to the user.

[0054] Volatile therapeutic materials include materials which assist in keeping nasal passages clear of congestion in cold or allergy sufferers, for example menthol, camphor, eucalyptus oil and similar oil, as well as other materials which can benefit a patient by absorption through the nasal passages and the lungs as a result of prolonged exposure. The therapeutic materials may include extracts of herbs and the like which help the user to relax or to sleep. Aromatic oils, such as those referred to as 'aromatherapy oils' may also be used into the substrate.

[0055] The active agent to be used in the active agent releasing system of the present invention is preferably selected from any of the above agents or combinations thereof.

[0056] The active agent or agents can be incorporated in the article of the present invention by any of the methods disclosed in the art.

Other characteristics

[0057] A moisture vapour permeable, liquid impervious layer can be formed from a suitable thermoplastic composition by coating said thermoplastic composition onto a substrate.

[0058] A process for making a film layer from a thermoplastic composition according to the present invention typically comprises the steps of providing said composition, heating it to make it flowable, and coating said composition in the molten state onto a substrate in a layer having the desired thickness. It should be noted that active agents can be included in the thermoplastic composition. Alternatively, they can be applied onto the surface of the film or layer made of the thermoplastic composition, e.g. directly adhered thereto by taking advantage of the tackiness of the composition immediately or shortly after formation of the layer or film as mentioned above.

[0059] In accordance with the present invention, a moisture vapour permeable, water impervious composite is formed which comprises the thermoplastic composition and a substrate onto which said thermoplastic composition is coated, wherein the substrate is also moisture vapour permeable.

[0060] Such embodiment provides a moisture vapour permeable, liquid impervious composite structure wherein the film layer formed from the thermoplastic composition is firmly bonded to the substrate while providing the required performance for liquid barrier and hence could be advantageously provided as thinly as possible. In this manner such embodiment provides a moisture vapour permeable, liquid impervious composite structure wherein the contribution of the film layer formed from the thermoplastic composition to the performance of the composite material resides mainly in the provision of a liquid barrier. The remaining performance physical criterion being preferably provided by the provided substrate, that therefore preferably acts also as a support layer. However it should be noted that the film layer does not need to be as thin as possible in any application because the thermoplastic compositions, according to our

before mentioned patent applications, provide high breathability (high WVTR) also in the case of thicker film layers. Typical thickness of the film layer of the thermoplastic composition applied onto a suitable substrate to form a composite structure according to the present invention range from 2 μm to 200 μm .

[0061] The substrate, or support layer may be any useful layer which is also moisture vapour permeable, preferably having a moisture vapour permeability of at least 400 $\text{g/m}^2 \cdot 24\text{h}$, more preferably at least 500 $\text{g/m}^2 \cdot 24\text{h}$, and most preferably at least 600 $\text{g/m}^2 \cdot 24\text{h}$.

[0062] Preferred support layers for use herein include woven and nonwoven layers, most preferably hydrophobic fibrous layers such as hydrophobic nonwoven. As for non limiting examples, a SMS (Spunbonded-Meltblown-Spunbonded) hydrophobic 100% polypropylene nonwoven of 17 g/m^2 or of 25 g/m^2 both commercialised under the code G17A10, MD3000, respectively, by Corovin - BBA Nonwovens Group (Germany), or a spunlaced nonwoven of 50 g/m^2 commercialised under the code TJET C500 by Tecnofibra (Italy) function well.

[0063] Suitable substrates for use herein as further layers in the structure according to the present invention could also include two dimensional, planar micro and macro-porous films; macroscopically expanded films; formed apertured films; nonwoven and woven layers. Suitable macroscopically expanded films for use herein include films as described in for example in US 4,637,819 and US 4,591,523.

[0064] The structures of the preferred embodiment according to the present invention are particularly advantageous as they allow the possibility of providing a composite wherein the thermoplastic composition may be applied onto the support substrate as a film layer with the desired thickness. Typical coating conditions and apparatuses known in the art for the direct coating of low viscosities hot melts can be readily utilised in order to provide the thermoplastic composition at the desired thickness.

[0065] A possible method for forming a composite laminate by coating the thermoplastic composition onto a substrate acting as a support layer is described in PCT application WO 96/25902.

[0066] At least at the coating temperature, the thermoplastic composition in form of a layer preferably exhibits adhesive properties on the supportive substrate in order to form the preferred composite such that no additional adhesive is required to achieve a permanent attachment between the thermoplastic composition and the substrate.

[0067] A moisture vapour permeable, liquid impervious composite structure formed by coating a thermoplastic hydrophilic composition onto a suitable substrate finds particular utility as a structure constituting a disposable, moisture vapour permeable, liquid impermeable mattress cover according to the present invention.

Example

[0068] A polyether-amide block copolymer available from Atofina (France) commercialised under the trade name Pebax 2533 SN is compounded with Tri Butyl Citrate (plasticiser) available from Aldrich Co., Res A-2691 (tackifier resin) available from Hercules Inc., Res A-2690 (tackifier resin) available from Hercules Inc., both resins described in our already mentioned European application No. 00116284.1, and Irganox 1010 (anti oxidant agent) available from Ciba-Geigy.

[0069] The final formulation in percent by weight has the following composition:

44%	Pebax 2533 SN
25%	Tri Butyl Citrate
15%	Res A-2691
15%	Res A-2690
1%	Irganox 1010

[0070] The blend is melt extruded to obtain a film having a basis weight of 20 g/m^2 . The film is laminated directly onto a substrate constituted by a SMS (Spunbonded-Meltblown-Spunbonded structure) hydrophobic 100% polypropylene nonwoven 25 g/m^2 (support layer) commercialised under the trade name MD3000, available from Corovin - BBA Nonwovens Group (Germany). The composite has a WVTR of 846 $\text{g/m}^2 \cdot 24\text{h}$.

[0071] The composite structure is used to produce a mattress cover, e.g. a bed mattress cover as illustrated in the herein drawings. It has a flat rectangular shape with suitable dimensions to completely cover at least the upper surface of a bed mattress, wherein the film layer 2 of thermoplastic composition is intended to face, in use, the mattress 4, and to directly contact it. In particular, the dimension are: 1.75 m (width) and 2.10 m (length) to completely cover the upper surface of a bed mattress 4 and partially its longitudinal sides 6 as indicated in figure 3. The corners of the mattress cover are fixed to the corners of the bed mattress by adhesive tapes 3, after detaching the release liners 5 which protect the adhesive surface of adhesive tapes before use. The adhesive tapes 3 are pieces of double sided adhesive tape, each having a width of 50mm and a length of 300 mm, available from Avery Dennison Co. under FT310 code.

[0072] It should be noted that other adhesive tapes could be provided along the longitudinal edges of the mattress

cover for better fixing it to the longitudinal sides 6 of a bed mattress 4.

[0073] Different samples of the above material for mattress cover having 10 cm x 10 cm dimensions were sprayed with different amounts of a suspension in ethanol of a "perfume" (the active agent releasing system) which is a product of reaction between an amino functional polymer and a ketone perfume such as Delta-Damascone. In particular, the "perfume" is produced in accordance with the teachings of WO 00/02987. It consists of 60% by weight of Delta-Damascone and 40% by weight of Lupasol WF available from Basf AG (Germany). The above "perfume" can be generally defined as an amine reaction product of a compound containing a primary amine functional group and an active ketone or aldehyde containing components. Such preferred compounds and other useful active agents are described in WO 00/02987, EP 0971021, EP 0971024, and EP 0971025.

[0074] The Delta-Damascone perfume was selected because it is described by trained perfumers as being fresh and having the odour of roses and apples, but other fragrances, as it is known in the art and also in above references, can be utilised.

[0075] The "perfume" was applied onto the samples by spraying. In particular, the "perfume" was first liquefied by suspending it in dimethicone (50% "perfume" and 50% dimethicone), then this suspension is mixed at different levels with ethanol and sprayed onto the sample to obtain different amounts of Delta-Damascone (i.e. the active agent), as indicated in the following table which also reports the value of Odour Intensity (perfume intensity) assessed by expert panellists in accordance with the Active Agent Intensity Test hereinafter described.

% of "perfume" in ethanol (by weight)	corresponding weight of Delta- Damascone/ m ²	Odour Intensity after 7 days	Odour Intensity after 14 days
2.5	0.060 g	30	15
0.5	0.012 g	15	10
0.1	0.003	0	0

[0076] The reference was the same sample above described which had a 0.02% of Delta-Damascone suspension in ethanol sprayed onto it giving a basis weight of 0.012 g/m² of Delta-Damascone. The reference had no detected intensity after 7 and 14 days according to the Active Agent Intensity Test.

[0077] As it is evident from the above table, a basis weight of 0.012 g/m² of Delta-Damascone applied on the samples in accordance with the present invention, gives a level of odour intensity of 10 after 14 days, showing a corresponding positive difference when compared to the reference which had no detected intensity after the same period of time notwithstanding the fact that the reference had the same initial quantity of Delta-Damascone perfume sprayed on it as a pure perfume, rather than combined in an active agent releasing system.

[0078] It should be noted that, as also indicated in the Active Agent Intensity Test described below, a positive difference of Odour Intensity of 5 grades after 7 days and preferably after 14 days is consumer meaningful and a positive difference of 10 grades after 7 days and preferably after 14 days is substantial. This means that the mattress cover according to the present invention, since initially used and applied to the mattress by the consumer (i.e. since the initial use for its intended purpose), is able to release the active agent for a period of time of 7 days and preferably for a period of time of 14 days in an effective manner.

[0079] By the term "initial use" it is meant herein the time when the covering is taken out of its packaging and applied to the article, e.g. to the bed mattress.

Tests.

[0080] Moisture vapour permeability is measured as Water Vapour Transmission Rate (WVTR) at 23°C and 50% relative humidity according to the modified ASTM E-96 "Upright Cup" method. The only modification to the standard ASTM E-96 "Upright Cup" method consists in a change in the height of the air gap between the sample and the water surface in the cup, which height is 3 mm ± 0.5 mm, instead of 19 mm ± 2.5 mm, as specified in the standard test method.

Active Agent Intensity Test

[0081] Odour intensity (i.e. perfume intensity in the case of an active agent such as a perfume) is assessed by a panel of expert graders smelling carefully the samples after 7 and 14 days from the sample preparation, which can be considered to correspond to the initial use of the product in real use situation. Samples can be directly prepared as explained above, or taken from an existing covering sheet. In the latter case, the samples are cut from a covering sheet immediately after the covering sheet is taken out of its packaging. The samples have 10 cm x 10 cm dimensions. After preparation the samples are left to rest at room conditions for the desired time. A 0-100 scale is used for odour gradings.

The grading scale is as follows:

100 =	extremely strong odour
75 =	very strong odour
50 =	strong odour
40 =	moderate odour
30 =	slight odour
20 =	weak odour

10 =	very weak odour
0 =	no odour

[0082] A mean positive difference (i.e. a residual amount of odour intensity) of more than 5 grades after 7 days and preferably after 14 days between the active agent releasing system according to the invention and the active raw material alone is consumer meaningful. A positive difference of 10 grades or more after 7 days and preferably after 14 days is substantial. In other words, when a positive difference of intensity grade of more than 5, preferably of at least 10, more preferably of at least 15, is observed between an active releasing system and the active raw material alone, after 7 days and preferably after 14 days, it can be concluded that the active agent releasing system is suitable for use in the present invention because the release of the chosen active component is longer, i.e. it acts for a longer period of time. In this manner an effective benefit is provided for the consumer.

Claims

1. A disposable, moisture vapour permeable, liquid impermeable, covering sheet comprising at least a moisture vapour permeable layer and a liquid impermeable but moisture vapour permeable film layer of thermoplastic composition applied onto said moisture vapour permeable layer **characterised in that** said covering sheet comprises an active agent releasing system which is able to provide an active agent odour intensity positive difference of at least 5, preferably of at least 10, more preferably of at least 15, after 7 days and preferably after 14 days compared to the active agent odour intensity of the active agent itself after the same periods of time, said value determined according to the Active Agent Intensity Test described herein, in order to provide a prolonged release of said active agent after the initial use of said covering sheet.
2. A disposable, moisture vapour permeable, liquid impermeable covering sheet according to claim 1 wherein said active agent releasing system comprises a perfume as an active agent.
3. A disposable, moisture vapour permeable, liquid impermeable covering sheet according to claim 1 wherein said active agent releasing system is a product of reaction between an amino functional polymer comprising at least one primary and/or secondary amine group and an active component selected from ketone, aldehyde, and mixture thereof.
4. A disposable, moisture vapour permeable, liquid impermeable covering sheet according to claim 1 wherein said active agent releasing system is a starch encapsulated perfume.
5. A disposable, moisture vapour permeable, liquid impermeable, covering sheet according to any preceding claims **characterised in that** its Water Vapour Transmission Rate (WVTR) is at least 400 g/m²•24h, preferably at least 500 g/m²•24h, and more preferably at least 600 g/m²•24h.
6. A disposable, moisture vapour permeable, liquid impermeable, covering sheet according to any preceding claim wherein said covering sheet is a disposable covering sheet for bedding articles.
7. A disposable covering sheet for bedding articles according to claim 6 wherein said covering sheet is a disposable mattress cover or a disposable pillow cover.
8. A disposable mattress cover according to claim 7 **characterised in that** said mattress cover comprises adhesive

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means 3 for fixing it to the longitudinal sides 6 of a bed mattress 4.

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Figure 1

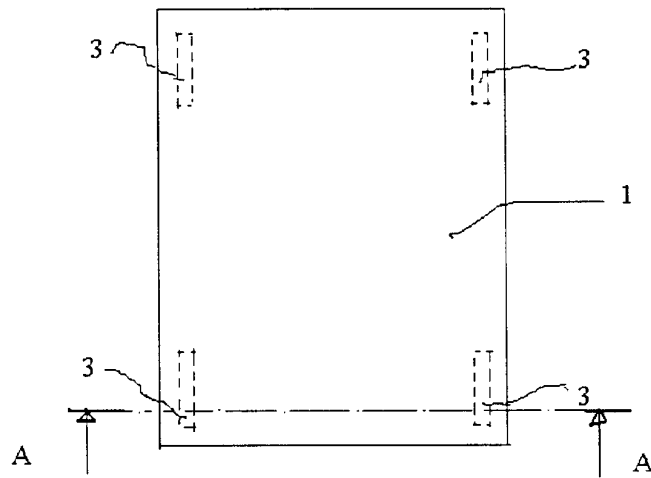


Figure 2

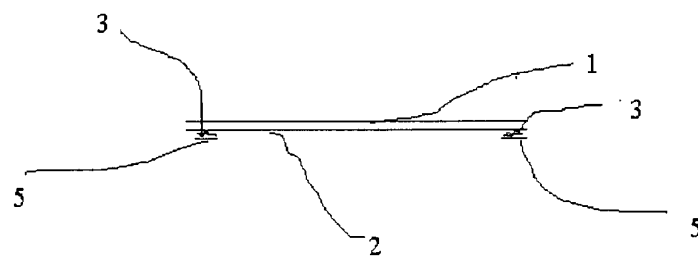
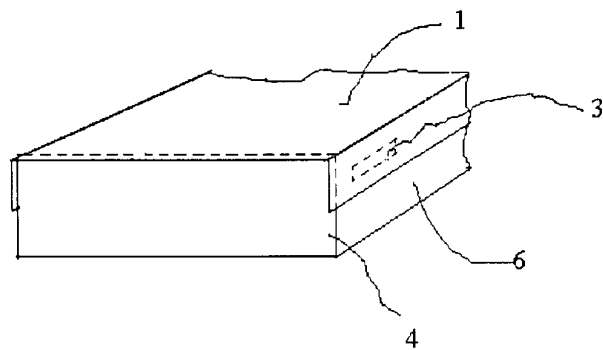


Figure 3





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