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(54) Title: A NONWOVEN WEB DESIGNED FOR USE IN A BEAUTY FACE MASK

(57) Abstract: The invention describes a nonwoven material for use in a beauty face mask, that comprises 100% cellulosic nonwoven web produced as essentially continuous filaments, which material can be loaded with various skin care and beauty lotions or liquids, has high wet strength and is absorbent and is able to dispense absorbed lotions and liquids uniformly, characterized in that it is (a) bonded by merged or fused fibers, hydrogen bonding and physical intermingling of filaments, (b) is soft, conformable and adherent to skin and (c) is compostable and based on renewable resources. Further it describes the use of the inventive nonwoven material to manufacture a beauty face mask that includes the addition of a skin care or beauty lotion or liquid to the nonwoven material as well as a beauty face mask manufactured accordingly.



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A nonwoven web designed for use in a beauty face mask

This invention relates to a nonwoven web suitable to be used as the base sheet for a beauty face mask, and, more particularly, to an essentially pure
5 cellulose nonwoven web formed from essentially continuous filaments and multibonded by merged filaments, hydrogen bonding and/or physical intermingling of filaments. This multibonded web provides the dimensional stability, wet strength, designed lotion holding capacity and liquid take-up rate, and ability to release said lotions during use (liquid release), distribution of
10 lotion rapidly throughout the mask, softness, desired adhesion to skin, and designed transparency to the face mask.

A beauty face mask is a consumer product applied to the face to improve skin and/or facial care, wellness and beauty.

The term "essentially pure cellulose" shall address the fact that cellulosic
15 moulded bodies, e.g. made according to the lyocell process, always contain a small amount of polymers other than cellulose, namely hemicellulose. This does not influence in any way the suitability for the use according to this invention.

Prior Art

20 The use of nonwovens in beauty face masks is well known. EP 2,453,047 discloses the use of spunlace and other nonwoven substrates based on cellulosic fibres for beauty face masks. JP 3,944,526 describes the use of hydroentangled nonwovens with a surface of ultrafine fibres. WO
2011/004834 describes the use of a two-nonwoven-layer face mask, with one
25 layer to absorb liquid and the other to adhere to the user's skin. It is known that there are key properties needed for a beauty face mask, these being wet strength, the ability to hold or retain a liquid lotion, the ability to release that lotion uniformly over a user's skin, and conformity to the user's face. Further, users desire softness and a comfortable fit to the face, and some
30 transparency aids in determining this fit. EP 2,860,307 describes a two layer nonwoven; one layer a liquid retaining layer composed of carded or spunlace

hydrophilic fibres, while the other layer can be a lightweight meltblown polyolefin to provide strength and transparency.

5 The nonwoven substrate for a beauty face mask has been the subject of research but all materials available today are not optimal products for this purpose. A beauty face mask must comfortably conform to the user's face, must be soft on the skin, must be able to hold and release sufficient liquid lotions to perform needed actions on the user's face, whether it is moisturizing, or providing a skin care treatment; it must have sufficient wet
10 strength to remain intact during use and application; it must have the ability to rapidly transfer liquids to all regions of the mask; it must have sufficient stretch to allow application and fitting; finally, transparency when wet does allow the consumer to fit the mask better.

15 Previous technology has addressed one or more of these issues, but not all. US 20150125499 A attempts to address all of these issues, but requires three separate layers to do so; one to retain and dispense the lotion, one to provide transparent liquid retention, and one to enhance adhesion to the skin. The use of three separate layers adds cost and complexity to the face mask.

20 Additionally, many of the disclosed fibres and materials are not biodegradable or sustainably sourced. JP 2015070968 A describes a cellulose non-woven fabric formed of a cellulose fiber having a fiber diameter of 5 [μ]m or more and 12 [μ]m or less has a basis weight of 20 g/mor more and 60 g/mor less, and a thickness of 0.20 mm or more and 0.50 mm or less. The whiteness in a
25 dried state is 30% or more and 70% or less. The transparency in a wet state is 60% or more and 100% or less. The amount of distillation water extract is 1000 mg/kg or less, and the morphological stability represented by the following formula is 88% or more and 98% or less. Morphological stability=[1-
30 {[G-200]+[H-200]}/400]100]. It further discloses the use of spun cellulose nonwoven webs which can be hydroentangled, but suggests multiple layers are required and does not disclose any means to control bonding and bonding types of this nonwoven, making independent control of liquid absorbency and retention, wet strength, softness, adhesion to skin and transparency impossible.

The present invention relates to the use of specially designed nonwoven substrates produced using novel variants of the solution blown nonwoven process, comprising 100% cellulose polymers. There are known methods and products using spunlaid cellulose webs. U.S. 6,358,461, U.S. 7,067,444, U.S. 8,012,565, U.S. 8,191,214, U.S. 8,263,506 and U.S. 8,318,318 all teach methods for producing and using spunlaid cellulose webs. None of these teach either production methods for or products addressing the specific substrate requirements for beauty face masks.

Problem

Traditionally, beauty face masks have consisted of a substrate (either film, textile or nonwoven) or combinations of substrates. These face masks are used in combination with an externally applied liquid, solution, or lotion. The beauty face mask must be able to absorb high levels of these liquids and retain them throughout the application process; but then the beauty face mask must release the liquid to the face and skin uniformly over a reasonable amount of time. These liquids are expensive; liquid retained by the mask after use is wasted and not useful in affecting the face and skin. Additionally, a beauty face mask should adhere to the face and skin during use, but be removable after use with no remaining fibres or mask materials left on the face and skin. The mask must have sufficient strength when wet to be applied by the user without damage. The mask must be soft enough for comfort and conformable enough to fit varying faces and facial structures. Transparency when wet is desirable in optimizing contact of the mask at all points of the face.

The problem with current beauty face mask technology is that there are several key values needed which require opposing properties. For example, more absorbent materials are typically lower strength; higher liquid holding capacity materials are usually inefficient at dispensing liquids evenly; strong materials are usually stiff; strong materials are usually not conformable nor adherent to skin.

Several nonwoven types are used as substrate for beauty face masks, including spunlace, carded, needlepunch and spunlaid, as well as combinations of these nonwovens and in combination with films and coatings. The best technology today and the most widely used substrate commercially appears to be spunlace or spunlace in combination with films or coatings or other nonwovens. Most beauty face mask nonwovens use a cellulosic fibre as at least one component, including cotton, lyocell, and wood pulp.

Spunlace cellulosic fibre based nonwovens have strength and softness, but liquid absorbency and retention can be insufficient. Additionally, adhesion to skin and uniform liquid dispensing can be problematic.

There is a distinct need for a sustainable product at a reasonable cost with high wet strength, high liquid absorption, and liquid retention during application, but complete liquid dispensing during use. All of these properties are needed in a soft, adherent to skin material.

Description

It is the object of the present invention to provide a nonwoven material for use in a beauty face mask, that comprises essentially pure cellulosic nonwoven web produced as essentially continuous filaments, which material can be loaded with various skin care and beauty lotions or liquids, has high wet strength and is absorbent and is able to dispense absorbed lotions and liquids uniformly, which it is (a) bonded by merged filaments, hydrogen bonding and physical intermingling of filaments, (b) is soft, conformable and adherent to skin and (c) is compostable and based on renewable resources.

Preferably the cellulosic nonwoven web is made according to a lyocell process.

30

Cellulosic fibres can be produced by various processes. In one embodiment a lyocell fibre is spun from cellulose dissolved in N-methyl morpholine N-oxide (NMMO) by a meltblown process, in principle known from e.g. EP 1093536

B1, EP 2013390 B1 and EP 2212456 B1. Where the term meltblown is used it will be understood that it refers to a process that is similar or analogous to the process used for the production of synthetic thermoplastic fibres (filaments are extruded under pressure through nozzles and stretched to required degree by high velocity/high temperature extension air flowing substantially parallel to the filament direction), even though the cellulose is dissolved in solution (i.e. not a molten thermoplastic) and the spinning & air temperatures are only moderately elevated. Therefore the term "solution blown" may be even more appropriate here instead of the term "meltblown" which has already become somewhat common for these kinds of technologies. For the purposes of the present invention both terms can be used synonymously. In another embodiment the web is formed by a spun bonding process, where filaments are stretched via lower temperature air. In general, spunbonded synthetic fibres are longer than meltblown synthetic fibres which usually come in discrete shorter lengths. Fibres formed by the solution blown lyocell process can be continuous or discontinuous depending on process conditions such as extension air velocity, air pressure, air temperature, viscosity of the solution, cellulose molecular weight and distribution and combinations thereof.

In one embodiment for making a nonwoven web the fibres are contacted with a non-solvent such as water (or water/NMMO mixture) by spraying, after extrusion but before web formation. The fibres are subsequently taken up on a moving foraminous support to form a nonwoven web, washed and dried.

Freshly-extruded lyocell solution ('solvent spun', which will contain only, for example, 5-15% cellulose) behaves in a similar way to 'sticky' and deformable thermoplastic filaments. Causing the freshly-spun filaments to contact each other while still swollen with solvent and with a 'sticky' surface under even low pressure will cause merged filament bonding, where molecules from one filament mix irreversibly with molecules from a different filament. Once the solvent is removed and coagulation of filaments completed, this type of bonding is impossible.

It is another object of the present invention to provide a process for the manufacture of a nonwoven material consisting of essentially continuous cellulosic filaments by:

- a. Preparation of a cellulose-containing spinning solution
- 5 b. Extrusion of the spinning solution through at least one spinneret containing closely-spaced meltblown jet nozzles
- c. Attenuation of the extruded spinning solution using high velocity air streams,
- d. Forming of the web onto a moving surface [e.g. a perforated belt or drum],
- 10 e. Washing of the formed web
- f. Drying of the washed web

wherein in step c. and/or d. coagulation liquor, i.e. a liquid which is able to cause coagulation of the dissolved cellulose; in a lyocell process this preferably is water or a diluted solution of NMMO in water, is applied to control
15 the merged filament bonding. The amount of merged filament bonding is directly dependent on the stage of coagulation of the filaments when the filaments come into contact. The earlier in the coagulation process that the filaments come into contact, the greater the degree of filament merging that is possible. Both placement of the coagulation liquor application and the speed
20 at which the application liquor is applied can either increase, or decrease, the rate of coagulation. Which results in control of the degree (or amount) of merged filament bonding that occurs in the material.

Preferably the merged filament bonding is further controlled by filament
25 spinning nozzle design and arrangement and the configuration and temperature of filament extension air. The degree of molecular alignment that is present as the solution exits the spinning nozzle has an impact on the coagulation rate. The more aligned the molecules are, the faster the coagulation rate, and conversely, the less aligned the molecules are, the
30 slower the coagulation rate. The spinning nozzle design and arrangement, along with the molecular weight of the cellulosic raw material used will determine the starting coagulation rate at the exit of the spinning nozzle. Additionally, the rate of cooling (temperature decrease) of the solution upon spinning nozzle exit will impact the coagulation rate as well. The slower the

cooling rate, the slower the coagulation rate, and conversely, the faster the cooling rate, the faster the coagulation rate. Therefore, configuration of the filament extension air can directing impact the cooling rate and therefore, impact the coagulation rate, which impacts the achievable amount of merged
5 filament bonding that is possible.

In a preferred embodiment of the process according to the invention at least two spinnerets (also known as jets), preferably between two and ten, and further preferred between 2 and 6, each one arranged to form a layer of nonwoven web, are used to obtain a multilayer nonwoven material. By
10 applying different process conditions at the individual spinnerets it is even possible to obtain a multilayer nonwoven material wherein the individual layers have different properties. This may be useful to optimize the nonwoven material according to the invention for different applications. In one embodiment this could provide a gradient of filament diameters from one side
15 of the material to the other side by having each individual web having a standard filament diameter that is less than the web on top, it is possible to create a material suitable for use as an air filter media that will provide a gradient of pore size (particle size capture). This will provide an efficient filtration process and result in a lower pressure drop across the filter media
20 compared to a single web with similar characteristics at the same basis weight and pore size distribution.

Preferably the filaments are spun using a solution of cellulose in an aqueous amine oxide and the coagulation liquor is water, preferably with a content of amine oxide not being able to dissolve cellulose, also referred to as a lyocell
25 process; the manufacture of such a solution is in principle known, e.g. from U.S. 6,358,461, U.S. 7,067,444, U.S. 8,012,565, U.S. 8,191,214, U.S. 8,263,506 and U.S. 8,318,318; preferably the amine oxide is NMMO.

The present invention describes a cellulosic nonwoven web produced via a meltblown or spunbond-type process. The filaments produced are subjected
30 to touching and/or compaction and/or intermingling at various points in the process, particularly before and during initial web formation. Contact between filaments where a high proportion of solvent is still present and the filaments

are still swollen with said solvent causes merged filament bonding to occur. The amount of solvent present as well as temperature and contact pressure (for example resulting from extension air) controls the amount of this bonding.

In particular the amount of filament intermingling and hydrogen bonding can
5 be limited by the degree of merged filament bonding. This is the result of a decrease in filament surface area and a decrease in the degree of flexibility of the filaments. For instance, as the degree of merged filament bonding increase, the amount of overall surface area is decreased, and the ability of cellulose to form hydrogen bonds is directly dependent on the amount of
10 hydroxyl groups present on the cellulosic surface. Additionally, filament intermingling happens as the filaments contact the forming belt. The filaments are traveling at a faster rate of speed than the forming belt. Therefore, as the filament contacts the belt, it will buckle and sway side to side, and back and forth, just above the forming belt. During this buckling and swaying, the
15 filaments will intermingle with neighboring filaments. If the filaments touch and merge prior to the forming belt, this limits the number of neighboring filaments by which it can intermingle with. Additionally, filaments that merge prior to contacting the forming belt with not have the same degree of flexibility as a single filament and this will limit the total area over which the filament will
20 buckle and sway.

Surprisingly, it has been found that high levels of control of filament merging can be achieved by modifying key process variables. In addition, physical intermingling of at least partially coagulated cellulose filaments can occur after initial contact with non-solvent, particularly at initial filament laydown to form
25 the web. It arises from the potential of the essentially continuous filaments to move laterally during initial filament formation and initial laydown. Degree of physical intermingling is influenced by process conditions such as residual extension air velocity at the foraminous support (forming belt). It is completely different from the intermingling used in production of webs derived from
30 cellulose staple fibers. For staple fibers, an additional process step such as calendaring is applied after the web has been formed. Filaments which still contain some residual solvent are weak, tender and prone to damage.

Therefore, in combination with controlling degree and type of bonding at this stage, it is essential that process conditions are not of a type which could cause filament and web damage. Initial drying of the washed but never-dried nonwoven, together with optionally compacting, will cause additional hydrogen bonding between filaments to develop. Modifying temperature, compacting pressure or moisture levels can control the degree of this hydrogen bonding. Such treatment has no effect on intermingling or the merged filament bonding.

In a preferred embodiment of the invention the nonwoven material is dried prior to subsequent bonding/treatment.

10

In a preferred embodiment of the invention the percentage of each type of bonding is controlled using a process with up to two compaction steps, where one of these compaction steps is done after step d. of the inventive process where the spun filaments are still swollen with a solvent, and one of these compaction steps is done before or in step e. of the inventive process where all or most of the solvent has been removed and the web has been wet with water. As previously discussed, control of the coagulation of the spun solution is a factor in controlling the degree of merged filament bonding. This preferred embodiment concerns decreasing the coagulation rate to a state where additional compaction steps can be used after filament laydown to further increase the actual amount of merged filament bonding that is achievable. It might be helpful to view the maximum achievable filament bonding as the state where we have merged all filaments into an essentially film-like structure.

15

20

The present invention describes a process and product where merged filament bonding, physical intermingling and hydrogen bonding can be controlled independently. However, the degree of merged filament bonding can limit the degree of physical intermingling and hydrogen bonding that can occur. In addition, for the production of multi-layer web products, process conditions can be adjusted to optimise these bonding mechanisms between layers. This can include modifying ease of delamination of layers, if required.

25

30

In addition to merged filament, intermingling and hydrogen bonding being independently set as described above, additional bonding/treatment steps may optionally be added. These bonding/treatment steps may occur while the web is still wet with water, or dried (either fully or partially). These
5 bonding/treatment steps may add additional bonding and/or other web property modification. These other bonding/treatment steps include hydroentangling or spunlacing, needling or needlepunching, adhesive or chemically bonding. As will be familiar to those skilled in the art, various post-treatments to the web may also be applied to achieve specific product
10 performance. By contrast, when post-treatments are not required, it is possible to apply finishes and other chemical treatments directly to the web of this invention during production which will not then be removed, as occurs with, for example, a post-treatment hydroentanglement step.

Varying the degree of merged filament bonding provides unique property
15 characteristics for nonwoven cellulose webs with regards to softness, stiffness, dimensional stability and various other properties. Properties may also be modified by altering the degree of physical intermingling before and during initial web formation. It is also possible to influence hydrogen bonding, but the desired effect of this on web properties is minor. Additionally,
20 properties can be adjusted further by including an additional bonding/treatment step such as hydroentangling, needlepunching, adhesive bonding and/or chemical bonding. Each type of bonding/treatment provides benefits to the nonwoven web. For example, hydroentangling can add some strength and soften the web as well as potentially modifying bulk density;
25 needling is typically employed for higher basis weights and used to provide additional strength; adhesive and chemical bonding can add both strength and surface treatments, like abrasive material, tackifiers, or even surface lubricants.

The present invention allows independent control of the key web bonding
30 features: merged filaments, intermingling at web formation, hydrogen bonding and optional additional downstream processing. Manipulation of merged

filament bonding can be varied to predominantly dictate the properties of the nonwoven web.

In a preferred embodiment of the invention the nonwoven web is hydroentangled. Undergoing this additional process enables a greater range of material functionality design. Such attributes as thickness, drape, softness, strength and aesthetic appearance can be tailored to meet specific consumer requirements.

This material is designed to be a sustainable and cost effective nonwoven with high wet strength, high absorbency, uniform and complete liquid dispensing, consumer pleasing softness, adherent and conformable to face and skin and transparent when wet. This nonwoven web which is a 100% essentially continuous filament cellulose nonwoven will provide both high strength and high absorbency and liquid handling properties, and is a sustainable product.

In a preferred embodiment of the invention the basis weight of the nonwoven web is between 25 and 80 grams per square meter. This range of basis weights defines the preferred area where material opacity, strength, fluid management and conformability can be optimized to meet the consumer expectations for a beauty face mask.

Another object of the present invention is the use of a nonwoven material as described above for the manufacture of a beauty face mask. Preferably such manufacture of a beauty face mask includes the addition of a skin care or beauty lotion or liquid to the nonwoven material. Suitable lotions and liquids are in principle well known to the expert. In this example, the beauty face mask can be packaged wet and ready for use by the consumer

Another object of the present invention is the use of a nonwoven material as described above for the manufacture of a beauty face mask. Preferably such manufacture of a beauty face mask includes the addition of a skin care or beauty lotion or liquid to the nonwoven material in a low moisture content

formulation. Suitable lotions and liquids are in principle well known to the expert. In this example, the beauty face mask can be packaged dry and water-activated at the point of use by the consumer. This gives remarkable economic and handling advantages to the retailers as well as to the users of the face mask.

Some commercial examples of lotions and liquids for beauty facemasks are described in the following to give an idea of possible compositions to be used with the product of the invention:

Composition A: Water, Butylene Glycol, Glycerin, Peg/Ppg/Polybutylene Glycol-8/5/3 Glycerin, Phenoxyethanol, 1,2-Hexanediol, Sodium Polyacrylate, Fragrance, Sodium Hyaluronate, Xanthan Gum, Maltodextrin, Brassica Oleracea Italica (Broccoli) Sprout Extract, Orchis Masculina Extract, Hydrolyzed Rice Bran Extract, Citric Acid, Plantago Major Seed Extract

Composition B: Water, Glycerin, Sodium Polyacrylate, Pentylene Glycol, Glycosyl Trehalose, Sorbitan Stearate, Hydrogenated Starch Hydrolysate, Phenoxyethanol, Tartaric Acid, Aluminum Glycinate, Butylene Glycol, Tocopheryl Acetate, Scutellaria Baicalensis Root Extract, Sodium Hyaluronate, Cassia Angustifolia Seed Polysaccharide, Hydroxyethylcellulose.

Composition C: Water; methyl gluceth-20; peg-75; bis-peg-18 methyl ether dimethyl silane; butylene glycol; propanediol; glycereth-26; cladosiphon okamuranus extract; silybum marianum (lady's thistle) extract; echinacea purpurea (coneflower) extract; garcinia mangostana peel extract; anthemis nobilis (chamomile) flower extract; caffeine; coffea arabica (coffee) seed extract; artemia extract; betula alba (birch) extract; poria cocos sclerotium extract; hydrolyzed rice extract; camelina sativa seed oil; algae extract; lactobacillus ferment; hydrolyzed algin; squalane; c12-15 alkyl benzoate; yeast extract\faex\extrait de levure; caprylyl glycol; tocopheryl acetate; peg-8 glyceryl isostearate; polysorbate 20; glycine; carbomer; sodium hyaluronate; dextrin; xanthan gum; sodium hydroxide; lecithin; triethoxycaprylylsilane; polyhydroxystearic acid; trisodium edta; phenoxyethanol; iron oxides

Composition D: Water, Butylene Glycol, Bifida Ferment Lysate, Glycerin, Bis-Peg-18 Methyl Ether Dimethyl Silane, Hydroxyethylpiperazine Ethane Sulfonic Acid, Alcohol Denat., Peg-20, Sodium Benzoate, Sodium Hydroxide, Phenoxyethanol, Adenosine, Ppg-3 Myristyl Ether, Chlorphenesin, Salicyloyl
5 Phytosphingosine, Ammonium Polyacryldimethyltauramide/Ammonium Polyacryloyldimethyl Taurate, Limonene, Carbomer, Citronellol, Fragrance.

Still another object of the present invention is a beauty face mask which contains a nonwoven material as described above as a base sheet and a skin care or beauty lotion or liquid contained in the nonwoven material. The current
10 invention provides all of the most desired properties for a beauty face mask, i.e. dimensional stability, wet strength, designed lotion holding capacity and liquid take-up rate, and ability to release said lotions during use (liquid release), distribution of lotion rapidly throughout the mask, softness, desired adhesion to skin, and designed transparency while being 100% biodegradable
15 and compostable, based on renewable and sustainable raw materials and produced using an environmentally sound process.

In a preferred embodiment of the present invention is the use of a nonwoven material as described above for the manufacture of a beauty face mask. Preferably such manufacture of a beauty face mask includes the addition of a
20 skin care or beauty lotion or liquid to the nonwoven material. Suitable lotions and liquids are in principle well known to the expert. In this example, the beauty face mask can be packaged wet and ready for use by the consumer

In another preferred embodiment of the present invention is the use of a
25 nonwoven material as described above for the manufacture of a beauty face mask. Preferably such manufacture of a beauty face mask includes the addition of a skin care or beauty lotion or liquid to the nonwoven material in a low moisture content formulation. Suitable lotions and liquids are in principle well known to the expert. In this example, the beauty face mask can be
30 packaged dry and water-activated at the point of use by the consumer. This gives remarkable economic and handling advantages to the retailers as well as to the users of the face mask.

The invention will now be illustrated by examples. These examples are not limiting the scope of the invention in any way. The invention includes also any other embodiments which are based on the same inventive concept.

Examples

- 5 All samples discussed below were conditioned at 23°C ($\pm 2^\circ\text{C}$) and 50% ($\pm 5\%$) relative humidity for 24 hours.

Example 1

- 10 A face mask with a 38 gsm basis weight base sheet according to the invention was compared to the performance of a commercially available face mask of same basis weight also being comprised of essentially continuous cellulosic filaments.

- 15 The face masks were tested for water uptake and water release by the following methods. The test for water uptake was conducted according to DIN 53923.

- 20 Water release was tested using an in-house method as follows. The conditioned samples (10x10 cm size) were loaded 3 times with water and allowed to equilibrate for 2 hours. The wet samples were then put between two collagen foils (10x10 cm) and loaded with a weight of 200 g using a crystallizing dish for 10 seconds. The water released to the collagen foil, was not absorbed by the foil but rather remained on the surface, was quantified gravimetrically. For each sample a threefold determination was performed and
25 average values were used for comparison (coefficient of variation below 14%).

The results were as shown in Table 1:

Table 1:

	Relative water uptake	Relative water release
Commercial face mask	1.0x	1.0x
Face mask of invention	1.1x	1.6x

30

The results clearly show that the face mask of this invention offers higher liquid take-up and, particularly higher liquid release than the comparative

commercial product. These attributes are particularly beneficial for face masks.

Example 2

5 Three different face masks, all made with materials of 38 gsm basis weight were compared for their wet transparency.

The samples evaluated were:

- 10 a) Cellulose continuous filament commercial face mask, same material as evaluated in example 1
- b) 50% rayon staple/30% PET/20% modal commercial face mask
- c) The face mask of the invention

The test method was as follows. The wetted samples (10 fold loaded with
15 water, equilibrium time 10 min) were put on a plastic foil and on a defined light source with light shining through the samples. With software analysis the gray value of each pixel was measured. The instruments and conditions used were:

Camera: Olympus Color View 2 BW 1040x772= (802880 Pixel)

20 Light source: Volpi Intralux 6000-1

Lens: Pentax 12mm

Cold light board: Fostec

Software: Olympus Analysis auto

Shutter speed: 20ms

25 aperture: 4

picture width: 90.5mm

The results are shown in figure 1. Figure 1 shows the transparency evaluation of example 2; x-axis: gray values; y-axis: number of pixel per gray value

30 The results show that the gray value distribution for sample c, the inventive product, is shifted towards a higher gray value versus the commercial samples, meaning higher wet transparency.

35 Example 3

Further the face mask of the invention was evaluated for wicking (or spread ability) of liquids, versus commercial samples (all samples around 38 gsm).

The test method was as follows.

0.5 ml of test liquid (water with 2g/L dye Sulfacide brilliant green) was pipetted
5 onto a conditioned face mask sample ($23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ rel. humidity $50\% \pm 5\%$)
using an Eppendorf pipette. After 5 min a picture of the liquid spread was
taken and software (ImageJ1.49v, National Institute of Health, USA) used to
evaluate the area of the liquid spread.

10 Table 2:

Sample	Comparative area spread of liquid after 5 minutes under test conditions (relative to commercial sample a)
a) Commercial sample	1.0x
b) Commercial sample	1.1x
c) Product of invention	1.3x

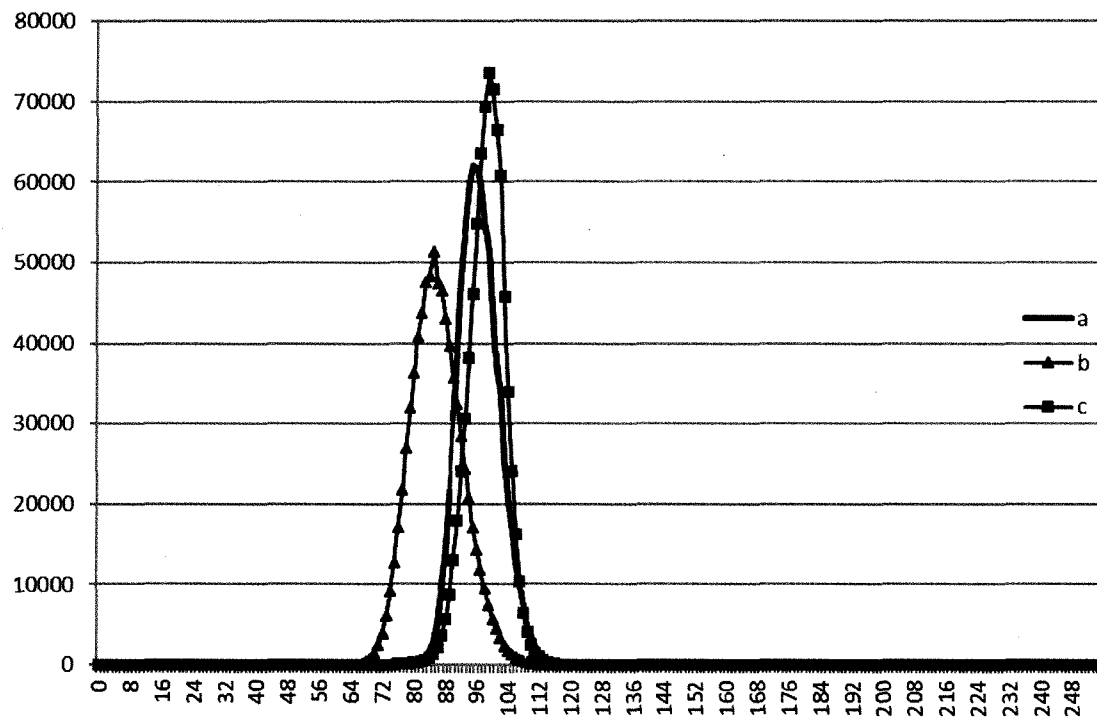
The results (Table 2) show a higher spread ability of liquid for the product of the invention compared to tested commercially available face mask products.

15 This benefit may also lead to fast fabric equilibrium with water based lotions, thus being able to supply dry skin spots by 'pulling' lotion from adjacent areas of the face mask rapidly.

Claims

1. A nonwoven material for use in a beauty face mask, that comprises essentially pure cellulosic nonwoven web produced as essentially continuous filaments, characterized in that it is bonded by merged or fused fibers, hydrogen bonding and physical intermingling of filaments,.
2. The nonwoven material of claim 1 where the cellulosic nonwoven web is made according to a lyocell process.
3. The nonwoven material of Claim 1 where the nonwoven web is hydroentangled.
4. The nonwoven material of claim 1 where the basis weight is between 25 and 80 grams per square meter.
5. Use of a nonwoven material according to claim 1 for the manufacture of a beauty face mask.
6. Use of a nonwoven material according to claim 5 wherein the manufacture of a beauty face mask includes the addition of a skin care or beauty lotion or liquid to the nonwoven material.
7. Beauty face mask characterized in that it contains a nonwoven material according to claim 1 as a base sheet and a skin care or beauty lotion or liquid.
8. Beauty face mask according to claim 7, wherein the skin care or beauty lotion or liquid is in a low moisture content format.

Fig. 1:



INTERNATIONAL SEARCH REPORT

International application No
PCT/AT2017/000022

A. CLASSIFICATION OF SUBJECT MATTER

INV. D04H1/4258 A45D44/00 A61Q19/00 A61K8/02 D04H3/013
D04H3/11 D01D5/098

ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

D04H A45D A61Q A61K D01D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/056956 A1 (ZHAO RONGGUO [US] ET AL) 17 March 2005 (2005-03-17)	1-3
Y	paragraph [0012] - paragraph [0016] paragraph [0027] - paragraph [0028]; claims 1, 12; figures 3-6; example 1	4-8
X	WO 98/26122 A1 (COURTAULDS FIBRES HOLDINGS LTD [GB]; LAW STEPHEN JOHN [GB]; STREET HEA) 18 June 1998 (1998-06-18)	1-4
Y	page 3, line 6 - line 11 page 7, line 13 - page 8, line 29; figure 1; table 3	5-8
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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

6 October 2017

Date of mailing of the international search report

19/10/2017

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Demay, Stéphane

INTERNATIONAL SEARCH REPORT

International application No
PCT/AT2017/000022

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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Y	column 5, line 48 - line 53 column 6, line 33 - line 57 column 9, line 30 - line 65; figures 13, 14 -----	4-8
X	HAYHURST M J: "SPUNBOND CELLULOSE", CHEMICAL FIBERS INTERNATIONAL,, vol. 56, no. 6, 1 June 2006 (2006-06-01), pages 386, 388-390, 393, XP001503726, ISSN: 0340-3343	1-4
Y	the whole document -----	5-8
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Y	page 1, paragraph 6 page 2, paragraph 4 - page 3, paragraph 1 page 7, paragraph 7; claims 1, 14, 15, 22 -----	6-8
X	WO 2009/059342 A1 (CHEMIEFASER LENZING AG [AT]; WHITE PAT [GB]; HARMS HAI0 [AT]; HAYHURST) 14 May 2009 (2009-05-14)	1-5
Y	page 2, paragraph 2 - paragraph 3 page 4, paragraph 3 - page 5, paragraph 1 page 9, paragraph 3 page 10, paragraph 3; example 1 -----	6-8
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Information on patent family members

International application No

PCT/AT2017/000022

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