(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
25 August 2011 (25.08.2011)

PCT

(10) International Publication Number
WO 2011/103227 A1

(51) International Patent Classification:
A61K 8/02 (2006.01) *A61K 8/73* (2006.01)
A61Q 9/04 (2006.01)

(21) International Application Number:
PCT/US2011/025142

(22) International Filing Date:
17 February 2011 (17.02.2011)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/305,173 17 February 2010 (17.02.2010) US

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

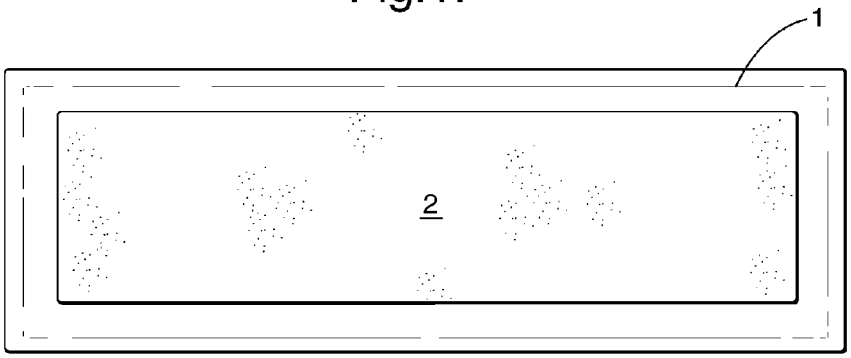
(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

(54) **Title**: DURABLE DEPILATORY ARTICLE

Fig.1.



(57) **Abstract**: A depilatory article comprising a substrate; and a depilatory composition disposed on the substrate, the coating of depilatory composition forming a coated region of the substrate and having a substrate facing side and a non-substrate facing side, wherein said depilatory composition has a yield point from 50 Pa to 2000 Pa, preferably from 65 Pa to 1200 Pa, more preferably from 80 Pa to 750 Pa and even more preferably from 100 Pa to 500 Pa measured via a stress controlled amplitude sweep; at a frequency of 1Hz and a temperature of 25C and wherein the depilatory article comprises a protective release layer, preferably a water impermeable protective release layer placed on the non-substrate facing side of the depilatory composition.

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DURABLE DEPILATORY ARTICLE

FIELD OF THE INVENTION

The present invention relates to depilatory articles comprising a chemically active depilatory composition disposed on a substrate.

BACKGROUND OF THE INVENTION

Depilatory compositions used to remove unwanted hair by chemical activity are known. Such compositions may comprise thioglycolate salts to degrade keratin in the hair and thus weaken the hair strands. These compositions may take the form of creams, lotions and the like which may be applied to the unwanted hair in a variety of ways, such as with a spatula. The spatula or another suitable implement is then used to scrape off the weakened hair strands and complete the depilation process. This can be a messy and awkward procedure for the user of the depilatory cream or lotion. By disposing the depilatory composition on a substrate one may overcome or mitigate such disadvantages to an extent. Substrate-based depilatory products are known from JP63073910A, US2006002878, JP6135826A, JP11012123A and JP62230711A.

While addressing some of the handling problems of creams and lotions by removing the need for an application implement, known substrate-based depilatory compositions, especially oil-in-water emulsions, do not address the problem of ensuring desired dosage after storage and transport or in use, nor the resultant risks of irritation or ineffective depilation that may be associated with uncontrolled dosage. Specifically, applicants have found that inappropriate rheological properties, found particularly in oil-in-water emulsions, allow a depilatory composition to displace across the surface of a substrate, especially during storage and transport but also during use, therefore leading to an undesired quantity of depilatory composition being provided to different areas of the skin. This uneven dosage may lead to irritation in some areas and insufficient depilatory action in others, and is a problem exacerbated by the presence of a protective release layer which must be removed from the depilatory article prior to use, causing mechanical stress upon the depilatory composition and resulting in rupturing, thinning and/or flowing of the composition. Simultaneously, inappropriate rheological properties may prevent conformability of a composition to the surface of the body, thus inhibiting availability of active ingredients to the area for which cosmetic treatment is desired and further undermining the effectiveness of the composition. There exists a need, therefore, for an effective substrate-based

depilatory article that facilitates the desired dosage of active ingredients being maintained throughout use and even after storage or transport.

SUMMARY OF THE INVENTION

According to a first aspect of the invention, the applicants have surprisingly found that a depilatory article comprising a substrate; and a depilatory composition disposed on the substrate, the coating of depilatory composition forming a coated region of the substrate and having a substrate facing side and a non-substrate facing side, wherein said depilatory composition has a yield point from 50 Pa to 2000 Pa, preferably from 65 Pa to 1200 Pa, more preferably from 80 Pa to 750 Pa and even more preferably from 100 Pa to 500 Pa measured via a stress controlled amplitude sweep; at a frequency of 1Hz and a temperature of 25°C and wherein the depilatory article comprises a protective release layer, preferably a water impermeable protective release layer placed on the non-substrate facing side of the depilatory composition meets the aforementioned need by providing a depilatory article that provides a regulated dosage of active ingredients during use, even after storage and transport.

According to a second aspect of the invention, a cosmetic method of removing hair from the skin is provided, comprising the steps of: applying a depilatory article according to the first aspect of the invention to a surface of skin, preferably human skin, leaving said depilatory article in contact with the skin for a period of greater than 1 minute, preferably 2 to 10 minutes, more preferably 2 to 8 minutes, removing said depilatory article from the surface of the skin, and preferably rubbing, scraping, rinsing or wiping the surface of the skin in the area to which the depilatory article was applied.

According to a third aspect of the invention, a depilatory kit is also provided, comprising: a depilatory article according to the first aspect of the invention, optionally at least one of a pre-treatment depilatory composition, a post-treatment depilatory composition and/or a tool to assist removal of hair and/or depilatory composition after use, and packaging for said depilatory kit.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig.1. is a plan view of a depilatory article of the present invention.

Fig.2. is a side view of a depilatory article of the present invention.

Fig.3. is a side view of a depilatory article of the present invention applied to keratinous tissue.

DETAILED DESCRIPTION OF THE INVENTION

As used herein, the term "buffering base" refers to a base capable of opposing pH changes by means of chemical or physical (solubility) processes and thereby limiting the pH to less than or equal to 13.

As used herein, the term "water impermeable" includes materials or objects through which water in its liquid state does not pass.

As used herein the term "colloid-forming" includes chemical species that are able to form stable, aqueous solid-in-liquid colloidal systems, including nano-colloidal systems.

As used herein, the term "sodium silicate" refers to Na_2SiO_3, any other silicate comprising sodium as the only cation besides silicon, and any other silicate comprising sodium. The same definition applies correspondingly to any other silicate, for example "potassium silicate" refers to K_2SiO_3, any other silicate comprising potassium as the only cation besides silicon and any other silicate comprising potassium, "ammonium silicate" to $(NH_4)_2SiO_3$, any other silicate comprising ammonium as the only cation besides silicon and any other silicate comprising ammonium and "manganese silicate" to Mn_2SiO_4, any other silicate comprising manganese as the only cation besides silicon and any other silicate comprising manganese.

The rheological properties of the personal care composition lead to improved performance in use. In particular, the yield point describes the resistance of the personal care composition to deformation under environmental stress. If the yield point is too high, then the personal care composition may not deform sufficiently when applied to the surface of the body. In the case of a depilatory composition, this may lead to hair fibres being unable to enter the personal care composition effectively upon application, resulting in less desirable depilatory effectiveness. If the yield point is too low, however, then the personal care composition may flow readily and is not cleanly removed from the skin upon removal of the personal care article, thus requiring the inconvenience of additional wiping and risking irritation to the user. Accordingly, the depilatory composition has a yield point from 50 Pa to 2000 Pa, preferably from 65 Pa to 1200 Pa, more preferably from 80 Pa to 750 Pa and even more preferably from 100 Pa to 500 Pa when measured via a stress controlled amplitude sweep; at a frequency of 1Hz and a temperature of 25°C. The

yield point described is defined as the 5% decrease in magnitude of the elastic modulus G' plateau value as measured on a TA1000 Rheometer, available from TA Instruments of New Castle, Delaware, USA. Once desired rheological properties have been specified, such as by the present invention, these properties may be altered in the personal care composition by changing the concentration or identity of the thickening system and the water content of the personal care composition.

Advantageously, the depilatory composition displays an elastic modulus G' which exceeds its viscous modulus G" at all frequencies below 60 rad/s, preferably below 20 rad/s, more preferably below 10 rad/s and even more preferably below 1 rad/s; when measured via a strain controlled frequency sweep; at a strain of 1% and a temperature of 25°C. The elastic modulus of the depilatory composition exceeds its viscous modulus at a low frequency of applied stress. This indicates that the depilatory composition is behaving in a solid-like manner at rest and is of particular benefit when the depilatory composition is interposed between two substrates, for example a substrate and a protective release layer.

In another preferred embodiment, the depilatory composition displays a high degree of shear thinning behaviour enabling the effective coating of target hairs during application and improve depilatory efficacy. Accordingly, at a low shear rate of 0.1 s^{-1}, the dynamic viscosity of the depilatory composition is preferably 1000 Pa.s to 10000 Pa.s, whereas at a high shear rate of 1000 s^{-1}, the dynamic viscosity of the depilatory composition is preferably 0.1 Pa.s to 1 Pa.s, measured at a temperature of 25°C.

Even when using a depilatory composition with the rheological specification above, excessive quantity of depilatory composition may still displace during storage or transit, while too little will not provide desirably depilatory efficacy. Accordingly, the depilatory composition is preferably disposed upon said substrate amount per unit area of from 0.300 g/cm^2 to 0.001 g/cm^2, more preferably from 0.015 g/cm^2 to 0.003 g/cm^2, even more preferably from 0.080 g/cm^2 to 0.005 g/cm^2 and even more preferably still from 0.05 g/cm^2 to 0.005 g/cm^2, wherein the unit area refers to the coated region of the substrate and not including any uncoated surface of the substrate. Additionally, the area used to calculate the amount of depilatory composition disposed upon the substrate is calculated ignoring any surface texturing or micro-structuring. Alternatively, the mean thickness of the depilatory composition is preferably from 0.01 mm to 3 mm, more

preferably 0.1 mm to 1.5 mm, even more preferably from 0.05 mm to 0.8 mm, and even more preferably still from 0.05 mm to 0.5 mm.

Depilatory articles of the present invention comprise a protective release layer removably attached to the depilatory composition. The depilatory composition disposed upon the substrate will have a substrate facing side and a non-substrate facing side and may be disposed on one surface of the substrate, that surface being a depilatory surface of the depilatory article. The protective release layer should be placed in contact with the non-substrate facing side of the depilatory composition. Alternatively, the protective release layer may be described as being on a surface of the depilatory composition substantially opposing that which is in contact with the substrate. The protective release layer may comprise materials including polymer resins such as a polyolefins e.g. polypropylene (including stratified biaxially oriented polypropylene (SBOPP)), polyethylene (including LDPE; LLDPE; HDPE; Metallocene) or polyethylene terephthalate. Alternative materials which may be used include polyvinylchloride, polyamide, acetyl, acrylonitrile butadiene styrene, acrylic, acrylonitrile styrene acrylate, ethylene vinyl alcohol, ethylene vinyl acetate, Nylon, Latex, natural or synthetic rubbers, polycarbonate, polystyrene, silicone or thermo plastic elastomer, thermo plastic vulcanate or copolymers of said materials. Where appropriate the protective release layer may comprise one or more laminations, combinations of multiple layers and/or indications (which may include instructions and illustrations) relating to at least one aspect of the usage of the depilatory article. In an advantageous the protective release layer may comprise a coating of a non-stick material. Exemplary non-stick coatings include wax, silicone, fluoropolymers such as TEFLON®, and fluorosilicones. In a preferred embodiment, the protective release layer covers at least the entire aforementioned coated region of the substrate. In another preferred embodiment the protective release layer is water impermeable. In a further preferred embodiment, the protective release layer has a mean thickness of at least 85 microns, more preferably from 85 microns to 130 microns, even more preferably from 90 microns to 120 microns. In yet another preferred embodiment, the protective release layer extends beyond the coated region of the substrate to provide a removal tab.

Depilatory articles of the present invention comprise a depilatory composition. The depilatory composition should be suitable for being placed in contact with a user's skin (and unwanted hair). In a preferred embodiment, the depilatory composition is aqueous. The concentration of

water in the depilatory composition is preferably at least 40%, more preferably from 50% to 98%, even more preferably from 60% to 95% and even more preferably still from 70% to 90%, by weight of the depilatory composition. This high water level helps to improve the overall skin mildness of the depilatory composition by being dilute, and to keep the system more robust to pH changes, which may result in skin irritation.

Depilatory articles of the present invention comprise a substrate to facilitate application of the depilatory composition to keratinous tissue and prevent a messy usage experience. The substrate may be water permeable or water impermeable. The substrate may comprise any suitable material such as fibrous materials, papers, fabrics, non-wovens, plastics, amorphous solids, crystalline solids, foils, rubbers, latex, thermoplastic elastomers, cellular foams (open and closed cell), composites, laminates and mixtures thereof. Preferably, the substrate is water impermeable. Using a substrate prevents water loss from the depilatory composition while the depilatory composition is in contact with the keratinous tissue and thus prevents the depilatory composition from drying out. Water loss from the depilatory composition lowers the water concentration, thus increasing the concentration of active ingredients and bases present. This could result in irritation to the skin, which applicants wish to avoid.

The substrate advantageously possesses a rigidity in the range of from 5.00 g/cm to 0.08 g/cm, preferably from 3.00 g/cm to 0.08 g/cm, more preferably from 1.80 g/cm to 0.10 g/cm, even more preferably from 0.80 g/cm to 0.15 g/cm and even more preferably still from 0.60 g/cm to 0.25 g/cm. This rigidity of the substrate ensures that desirable handleability and conformability attributes of a depilatory article are achieved. In particular, the article collapsing under gravity or folding is avoided, which is especially undesirable if different areas of the depilatory composition are able to readily come into contact with each other, while maintaining the capability for the substrate to conform to the surface to which it is applied without folding or crinkling, in order to further improve depilatory efficiency. Accordingly, the substrate is readily conformable to the skin and unwanted hair without permanently deforming during use, as this may also result in problems for the user during application. In a preferred embodiment, the rigidity is substantially constant and does not change during the lifetime of a product.

Rigidity can be readily measured using the American Standard Test Method (ASTM) D2923-06 on a Handle-O-Meter, model #211-300, available from Thwing-Albert Instrument Co. of

Philadelphia, Pa. The rigidity is read directly from the meter and expressed as grams per centimetre of sample width. Samples were prepared as 10.16 cm (4 inch) by 10.16 cm (4 inch) test specimens with edges parallel to the machine direction and transverse direction for substrates with directionality. Three rigidity measurements were determined on the same side of fresh test specimens orientated in the same substrate direction. A further three rigidity measurements were taken on the same side of fresh test specimens oriented at 90° to the first orientation. These six measurements were repeated on the opposite side to the first six measurements, on fresh test samples. The 12 rigidity measurements were then averaged and reported to 0.01 g/cm.

The rigidity of a substrate is a function of substrate thickness and inherent modulus of elasticity. Different materials have different moduli of elasticity. Based upon the material or materials that the substrate comprises, a substrate thickness should be selected that enables the desired rigidity of the substrate to be achieved.

The substrate may be water permeable or water impermeable. The substrate may comprise any suitable material such as fibrous materials, papers, fabrics, non-wovens, plastics, amorphous solids, crystalline solids, foils, rubbers, latex, thermoplastic elastomers, cellular foams (open and closed cell), composites, laminates and mixtures thereof. Preferably, the substrate is water impermeable. Using a water impermeable substrate prevents water loss from the depilatory composition while the depilatory composition is in contact with the keratinous tissue and thus prevents the depilatory composition from drying out. Water loss from the depilatory composition lowers the water concentration, thus increasing the concentration of active ingredients and bases present. This could result in irritation to the skin, which applicants wish to avoid.

The substrate preferably comprises at least one water impermeable material and is compatible with depilatory compositions. Examples of useful water impermeable materials include but are not limited to polypropylene (PP); polyethylene (PE, including HDPE and LLDPE); polyethylene terephthalate (PET); polyvinylchloride (PVC); polyamide (PA); polycarbonate; polyurethane; cellulose acetate; polychloropene; polysulfone; polytetrafluoroethylene (PTFE); polyvinyl acetate (PVA); polystyrene; polyphenylene oxide (PPO); acrylonitrile butadiene styrene (ABS); acrylic; acrylonitrile styrene acrylate (ASA); ethylene vinyl alcohol (EVA); natural rubber, latex, nylon, nitrile, silicone and thermo plastic elastomers (TPE). The substrate may comprise a single polymer or mixtures of polymers or copolymers. Preferably the substrate comprises a plastic

sheet, more preferably a polyolefin, even more preferably a polyethylene and even more preferably still high density polyethylene.

In an advantageous embodiment, the depilatory composition is disposed upon the water impermeable material, preferably plastic sheet, more preferably polyolefin, even more preferably polyethylene and even more preferably still high density polyethylene. In this advantageous embodiment, there is preferably no layer of water permeable material between the depilatory composition and the water impermeable material. In a preferred embodiment, the water impermeable material forms a water impermeable layer.

The substrate preferably has a thickness of from 80 μm to 12 μm, more preferably from 50 μm to 15 μm, even more preferably from 40 μm to 16 μm and even more preferably still from 30 μm to 17 μm.

Non-limiting examples of substrate material and thickness combinations for the substrate are:

Substrate Material	Thickness [microns]	Rigidity [g/cm]
HDPE	13	0.13
HDPE	18	0.33
HDPE	36	1.05
LLDPE	23	0.23
PP	18	0.46

[HDPE is a mixture of LBI 85% M6030 and Exxon Mobil 15% LD2001 manufactured on a Merritt-Davis casting line]
[LLDPE is Exxon Mobil 15% LD2001 manufactured on a Merritt-Davis casting line]
[PP is Basell PH835 manufactured on a Merritt-Davis casting line]

The substrate may be a laminate comprising at least two materials, including non-wovens; paper; board; metal based substrates (eg aluminium foil); flocking or topical coatings (e.g. surfactants; printing); closed or open cell foams or substrates described herein above. In a preferred embodiment, at least one of the materials is water impermeable.

The substrate may comprise a textured or, alternatively, micro-structured surface on at least a portion of one side. Surface texturing or micro-structuring increases the effective surface area of the substrate and thus improves adherence of the depilatory composition to said substrate, facilitating an easy removal of the depilatory article by peeling it off the skin, or increases the grip of the surface, thus improving handleability. The textured structures may comprise dimples; lines or curvilinear embossments. A textured surface may be formed on the substrate by any appropriate technique, including embossment calendars and casting.

The substrate may be manufactured by any suitable method, including casting, injection moulding, co-injection moulding, over moulding, in-mold assembly, compression moulding, blow moulding, casting thermo or vacuum forming and where appropriate may be laminated by heat welding (which may further include the use of pressure, ultrasonic forces and radio or high frequencies), co-extrusion; adhesives, electro static adhesions (such as flocking by fibres) and topical surface applications.

Achieving a desired dosage of depilatory composition to the surface of the skin is a further advantage of using a substrate-based product. However, if the substrate is able to stretch or tear, the layer of depilatory composition disposed upon it may be thinned, thickened or rupture in places, resulting in uneven and hence less desirable depilatory activity. In particular, low depilatory efficacy may result in areas treated with thinned or ruptured areas of the composition while higher depilatory efficacy and increased irritation may result in areas treated with thickened areas of the composition.

The potential problem of a substrate stretching may be avoided by selecting a substrate that does not permanently deform during use. This problem may also be avoided by selecting a substrate with a sufficiently high secant modulus such that it is less likely to stretch during normal use. Accordingly, in another preferred embodiment, the substrate has a secant modulus at 2% strain of greater than 689.5 bar (10,000 psi), more preferably greater than 1379.0 bar (20,000 psi), even more preferably greater than 2068.4 bar (30,000 psi) and even more preferably still greater than 2757.9 bar (40,000 psi) in order to achieve uniform application of the depilatory composition to the surface of the body during usage. Without wishing to be bound by theory, applicants believe that using a substrate with an excessively low secant modulus at 2% strain can deform and thus break apart the depilatory composition disposed on the substrate, leading to uneven depilatory

action and increased risk of irritation. The secant modulus at 2% strain may be measured readily using the American Standard Test Method (ASTM)) 'Standard Test Method for Tensile Properties of Thin Plastic Sheeting D882-09' conducted on an MTS Insight1 Tensile Tester available from MTS Systems Co., Eden Prairie, MN, USA. This method may also be applied to non-plastic materials and is designed for use on sheets with a thickness of less than 1 mm.

The potential problem of a substrate tearing may be avoided by selecting a substrate that does not fail during usage. This problem may also be avoided by selecting a substrate with a sufficiently high nominal tensile strength such that it is less likely to tear during normal use. Accordingly, in another preferred embodiment, the substrate has a nominal tensile strength of at least 5 MPa more preferably at least 10 MPa even more preferably at least 15 MPa and even more preferably still at least 18 MPa in order to achieve uniform application of the depilatory composition to the surface of the body during usage. Without wishing to be bound by theory, applicants believe that using a substrate with an excessively low nominal tensile strength can fail during usage and thus break apart the depilatory composition disposed on the substrate, leading to uneven depilatory action and increased risk of irritation. The nominal tensile strength may be measured readily using the American Standard Test Method (ASTM) 'Standard Test Method for Tensile Properties of Thin Plastic Sheeting D882-09' conducted on an MTS Insight1 Tensile Tester available from MTS Systems Co, Eden Prairie, MN, USA. This method may also be applied to non-plastic materials and is designed for use on sheets with a thickness of less than 1mm.

A layer of depilatory composition can be applied to the substrate through any known technique of applying viscous fluids to substrates, including, for example, extrusion, casting (e.g., reverse roll, knife-over roll, slot die, Gravure roll), spraying, knife blade coating, and zone coating. Such techniques may be modified to alter the quantity of depilatory composition disposed on the substrate. For example, the speed at which the substrate travels through an extrusion process determines the quantity of depilatory composition disposed upon said substrate. The area of depilatory composition may cover the entire surface of the substrate of a portion thereof. Advantageously, the depilatory composition covers less than the entire surface of the substrate to facilitate handling. The substrate may comprise at least one region with two orthogonal dimensions each of a length greater than 1 cm, preferably greater than 1.5 cm and more preferably greater than 2 cm upon which no depilatory composition is disposed.

In a preferred embodiment, the depilatory composition comprises a keratin reducing agent to weaken and/or break strands of unwanted hair. Non-limiting examples of suitable keratin reducing agents include: sulphide salts such as Li_2S, Na_2S, K_2S, MgS, CaS, SrS or BaS, hydrogen sulphide salts such as NaSH or KSH, thioglycol, thioglycerol, thioglycolamide, thioglycolhydrazide, thioglycolic acid, thioglycolate salts (such as potassium thioglycolate, calcium thioglycolate, ammonium thioglycolate, diammonium dithioglycolate, glyceryl monothioglycolate, or monoethanolamine thioglycolate), thiosalicylic acid, thiomalic acid, ammonium thiolactate, monoethanolamine thiolactate, dithioerythritol, 2-mercaptopropionic acid, 1,3-dithiopropanol, glutathione, dithiothreitol, cysteine, homocysteine, N-acetyl-L-cysteine and cysteamine. Advantageously, the keratin reducing agent is present in an amount of from 0.3% to 20%, preferably from 0.8% to 15%, more preferably from 1% to 10% by weight of the composition.

Advantageously, the depilatory composition may comprise at least one thioglycolate salt or thioglycollic acid acting as a hair removal agent when the depilatory composition is applied to unwanted hair. Preferably, the depilatory composition comprises sodium, potassium, magnesium, calcium, beryllium, strontium, zinc, monoethanolamine, ammonium, tetralkylammonium, imidazolium, pyridinium, phosphonium or glyceryl thioglycolate salts, or mixtures thereof, which may include dianion forms of thioglycolate. More preferably, the depilatory composition comprises at least one of sodium, potassium, magnesium or calcium thioglycolate, or mixtures thereof. Even more preferably the depilatory composition comprises potassium or calcium thioglycolate, or mixtures thereof. In a preferred embodiment, the concentration of the conjugate acid of the thioglycolate salt (which may include all species in the deprotonation equilibrium system) is from 0.5% to 12.0%, more preferably from 0.8% to 8.0% and even more preferably from 1.0% to 6.0% by weight of the depilatory composition.

In a preferred embodiment, the depilatory composition comprises a monovalent cation, preferably a monovalent metal cation. Without wishing to be bound by theory, the applicants believe that the presence of monovalent metal cations increases the dissociation of thioglycolate salts. The monovalent cations such as those derived from monovalent cation containing salts are able to displace the cation of the thioglycolate salt and further enhance dissociation of said thioglycolate salt. This increases the amount of deprotonated thioglycolate formed from the thioglycolate salt and therefore increases the effectiveness of the depilatory composition.

Sources of monovalent cations include potassium, sodium, lithium, ammonium, tetraalkyl ammonium and imidazolium salts, which may be a component of another ingredient, for example a thickening system or skin care active. Preferred sources of monovalent cations include potassium and sodium salts.

In order to further enhance the safety of the resulting product, it is advantageous to limit the amount of monovalent cations, preferably monovalent metal cations, to which the skin is exposed when the depilatory article is used, although a small quantity may improve the efficacy of the depilatory composition. Advantageously, the quantity of monovalent cations (or monovalent metal cations in the preferred embodiment above) per unit area of the aforementioned coated region is less than 5.10×10^{-4} mol/cm^2, preferably less than 3×10^{-4} mol/cm^{-2}, more preferably from 1×10^{-9} mol/cm^2 to 1.5×10^{-4} mol/cm^2, even more preferably from 2.50×10^{-8} mol/cm^2 to 6.65×10^{-5} mol/cm^2 and even more preferably still from 6×10^{-7} mol/cm^2 to 4.5×10^{-5} mol/cm^2. The selection of keratin reducing agent and optional ingredients including the base may be made considering the quantity of monovalent cations or monovalent metal cations achieved.

Limiting the quantity of monovalent ion present in the depilatory composition may prevent skin irritation but also limits the quantity of thioglycolate salt that may be present in a formula if monovalent ion containing thioglycolate salts or bases are used. Accordingly, in an advantageous embodiment, the depilatory composition comprises a divalent cation,, preferably a divalent metal cation, and preferably wherein the thioglycolate salt, the buffering base (if present) or both comprises a divalent cation, or more preferably a divalent metal cation in order to enable the inclusion of additional depilatory active. In another preferred embodiment, the thioglycolate salt comprises a divalent metal cation. Applicants have established that thioglycolate salts comprising monovalent metal cations, such as potassium thioglycolate, are effective at removing hair from the skin, even at low doses, but may expose the skin tissue to harsh chemical conditions, resulting in irritation. On the other hand, thioglycolate salts comprising divalent metal cations, such as calcium thioglycolate, are relatively non-irritating to the skin.

In a depilatory composition comprising a mixture of monovalent and divalent ions, controlling the ratio of divalent ions to monovalent ions may also improve the safety characteristics of the depilatory articles of the present invention. Increasing the concentration of divalent ions relative

to the concentration of monovalent ions increases the likelihood that any particular depilatory active species is associated with a divalent ion, rather than the more irritating monovalent ions. On the other hand, increasing the concentration of monovalent ions increases the effectiveness of the depilatory composition. Accordingly, in an alternative embodiment the ratio of the concentration of divalent ions to the concentration of monovalent ions present in the depilatory composition is advantageously in the range of from 400:1 to 0.02:1, preferably from 200:1 to 0.1:1, more preferably 60:1 to 0.3:1, even more preferably from 20:1 to 0.5:1, and even more preferably still from 15:1 to 1:1.

The pH of the depilatory composition may advantageously be in the range of from 6 to 13.8, preferably from greater than 7 to 13, more preferably from 9 to 12.9, even more preferably from 10 to 12.8, even more preferably still from 12 to 12.7 and yet more preferably from 12.3 to 12.6 to improve the efficacy of the active ingredient. The depilatory composition may, in a preferred embodiment, comprise at least one base to control the pH. Preferably, the depilatory composition comprises potassium hydroxide; sodium hydroxide; lithium hydroxide; calcium hydroxide; barium hydroxide; caesium hydroxide; sodium hydroxide; ammonium hydroxide; strontium hydroxide; rubidium hydroxide; magnesium hydroxide; zinc hydroxide; sodium carbonate; pyridine; ammonia; alkanolamides (including monoethanolamine, diethanolamine, triethanolamine), phosphates (including tetrasodium phosphate), arginine or mixtures thereof. More preferably, the depilatory composition comprises at least one buffering base, even more preferably the depilatory composition comprises calcium hydroxide, magnesium hydroxide; barium hydroxide; strontium hydroxide; zinc hydroxide; arginine or mixtures thereof. Still more preferably the depilatory composition comprises calcium hydroxide; magnesium hydroxide, zinc hydroxide, sodium hydroxide, potassium hydroxide or mixtures thereof. Even more preferably still, the depilatory composition comprises calcium hydroxide.

In a preferred embodiment, the base is present at a concentration of from 0.1% to 10.0%, more preferably from 0.5% to 8.0% and even more preferably from 1.0% to 5.0%, by weight of the depilatory composition.

In another preferred embodiment, the depilatory composition comprises at least one silicate or silica, advantageously at least one water-soluble or colloid-forming silicate or silica.

Preferably, the depilatory composition comprises at least one water-soluble or colloid-forming silicate selected from lithium silicates; sodium silicates (including disodium metasilicate pentahydrate and disodium metasilicate nanohydrate); potassium silicates; calcium silicates, ammonium silicates; manganese silicates; imidazolium silicates, synthetic and natural silicates (clays) or mixtures thereof. More preferably, the depilatory composition comprises at least one water-soluble or colloid-forming silicate selected from synthetic clays; sodium silicates, potassium silicates, or mixtures thereof and even more preferably the depilatory composition comprises a sodium silicate or mixtures of sodium silicates.

Alternatively, the depilatory composition comprises a form of silica that is colloid-forming, (such as amorphous microporous silica), forms sol or gel systems, (such as silica gels and nano-colloidal silicas), or is mesostructured. Surface modification of silica may be advantageous to promote the formation of stable colloid systems.

Suitable synthetic and natural silicates (clays) are available commercially as: Laponite® RDS; XLS and S etc. (available from RockWood Additives Limited); Wyoming Bentonite; Californian Hectorite; Jadeite; Enstaite and Rhodonite; Benonate® EW (available from Rheox Inc.); Bentolite® (available from Southern Clay Products Inc.) Optigel® (available from Süd Chemie Rheologicals)

The silicate or silica is preferably present in the depilatory composition in an amount per unit area of the coated region of from 2.05×10^{-8} mol/cm^2 to 1.23×10^{-4} mol/cm^2, preferably from 1.64×10^{-7} mol/cm^2 to 3.69×10^{-5} mol/cm^2 and more preferably from 4.92×10^{-7} mol/cm^2 to 8.20×10^{-6} mol/cm^2. Within the preferred ranges, the effectiveness of the depilatory composition is further increased while irritation is maintained within an acceptable level. Without wishing to be bound by theory, applicants believe that an amount of silicate or silica is required in order to enhance the dissociation of the thioglycolate salt sufficiently for the increase in efficacy to be clearly apparent to the user, but that excessive dosage of silicate or silica may lead to over-dissociation of the thioglycolate salt resulting in increased skin irritation. Alternatively, the silicate or silica may be present in the depilatory composition in an amount of from 0.01% to 5%, preferably 0.1% to 4%, more preferably 0.2% to 3% and even more preferably from 0.5% to 2% by weight of the depilatory composition.

The depilatory composition may optionally comprise a thickening agent. A representative but not exhaustive list can be found in "The Encyclopaedia of Polymers and Thickeners for Cosmetics" compiled and edited by Robert Y. Lochhead, PhD and William R. Fron, Department of Polymer Science, University of Southern Mississippi. Exemplary classes of thickening agents include gums, carbomers, polymers and copolymers of acrylic acid, associated thickeners, layered silicates/clays and natural polymers (including polysaccharides). One or more thickening agents may be included in the depilatory composition. It may be desirable to utilize gel network structures or oil-in-water emulsions to thicken the depilatory compositions. Suitable materials for preparing the gel network structures or oil-in-water emulsions are well represented in the art and include fatty materials such as fatty alcohols (for example cetyl alcohol and stearyl alcohol) alone or used in conjunction with non-polar oils such as paraffin or mineral oils. An appropriate emulsifier may also be used to form and stabilize the bilayer structure characteristic of gel network structures or to form and stabilize an oil-in-water emulsion. The thickening agent may be present at a level of from about 0.01% to about 20%, preferably from about 0.1% to about 10%, more preferably from about 0.3% to about 5%, and even more preferably from about 0.5% to about 4%, by weight of the aqueous depilatory composition.

Advantageously, the thickening agent comprises carrageenan. The carrageenan is preferably present in an amount of from 0.1% to 10%, more preferably from 0.5% to 8%, even more preferably from 1% to 5% and even more preferably still from 2% to 4% by weight of the depilatory composition. The carrageenan may be iota, kappa or lambda carrageenan, and in a preferred embodiment is iota carrageenan. Without wishing to be bound by theory, the applicants believe that a depilatory composition comprising carrageenan has both an affinity to the surface of the skin, providing an effect analogous to a frictional resistance opposing spreading of the composition and cohesive forces that further prevent spreading and additionally prevent rupturing of the composition.

The depilatory composition may also include other skin care ingredients such as conditioning agents selected from the group consisting of humectants, moisturizers, or skin conditioners (including mineral oil; almond oil; chamomile oil; jojoba oil; avocado oil; shea butter, niacinamide and glycerine); skin rejuvenation compositions (for example targeted for fine lines, wrinkles and uneven skin tone including retinoids), cosmetic compositions; anti-inflammatory agents (including corticosteroids); anti-oxidants (including flavonoids) radical scavengers;

sunscreen agents; skin cooling or warming agents and the like. The depilatory composition may comprise one or more skin care ingredients present in an amount of from about 0.001% to about 10%, more preferably from about 0.01% to about 7%, and even more preferably from about 0.025% to about 5%, by weight of the depilatory composition.

An accelerant may be employed in the depilatory composition. This optional component accelerates the rate of depilatory action of the depilatory agent. Suitable accelerants include, but are not limited to, urea; thiourea; dimethyl isosorbide; arginine salts; ethoxydiglycol; propylene glycol and methylpropyldiol. The accelerant may be present in a concentration range of from 0.5% to 10%, more preferably from 2% to 8% and even more preferably from 2% to 5% by weight of the depilatory composition.

The depilatory composition may further comprise components known, conventionally used, or otherwise effective for use in hair removal compositions particularly dyes; pigments (including ultra marines and talc); anionic, cationic, non-ionic and/or amphoteric or zwitterionic surfactants, polymers (including hydrophobically modified polymers); dispersing agents; solvents; lubricants; fragrances; preservatives; chelants, proteins and derivatives thereof, plant materials (e.g. aloe, chamomile and henna extracts); silicones (volatile or non-volatile, modified or non-modified); film-forming agents; film forming promoters and mixtures thereof.

Depilatory articles of the present invention may take any form suitable for applying to keratinous tissue. The size and shape of the depilatory article may take any form suitable for application to the body area from which hair is to be removed. The depilatory article will preferably relate to the body area or zone from which hair is to be removed, especially the face (including the jaw, chin and upper lip regions of the face), underarm and bikini areas. Preferably, the depilatory article takes the form of a mask (configured for the face) or a strip/patch (configured for general use). In another preferred embodiment, the substrate of the depilatory article is substantially planar.

The coated region preferably comprises an upper-lip portion adapted to be placed above a human mouth, and a first return portion projecting from the upper lip portion and adapted to be placed contiguously with the outer extremity of the vermilion lip in a first corner of the mouth. The return portion has a length along its greatest dimension of at least 0.2 cm, preferably from 0.5 cm

to 5cm, more preferably from 0.75 cm to 4 cm, even more preferably from 1 cm to 3 cm. Applicants have found that this configuration enables the user to remove unwanted hair from the skin immediately surrounding the corner of the mouth while lowering the risk of depilatory composition contacting the vermillion lip, where it may cause irritation. In an alternative embodiment, the coated region further comprises a second return portion projecting from the upper lip portion and adapted to be placed contiguously with the outer extremity of the vermillion lip in a second corner of the mouth.

Advantageously, the upper lip portion has a length along its greatest dimension of at least 0.2 cm, preferably from 0.5 cm to 15 cm, more preferably from 1 cm to 12 cm, even more preferably from 2 cm to 10 cm and even more preferably still from 3 cm to 8 cm. This dimension enables the upper lip portion to cover a desirable length of the upper lip and thus achieve the desired depilatory action. In a preferred embodiment, the upper lip portion is adapted to be placed to be at least partially contiguously with the upper border of the upper vermilion lip, to enable depilatory action to be achieved on the skin immediately surrounding the upper vermilion lip while lowering the risk of depilatory composition contacting the upper vermilion lip, where it may cause irritation.

In another preferred embodiment, the coated region comprises a lower lip portion adapted to be placed below a human mouth, preferably wherein the lower lip portion is adapted to be placed to be least partially contiguously with the lower border of the lower vermilion lip to enable depilatory action to be achieved on the skin immediately surrounding the lower vermilion lip while lowering the risk of depilatory composition contacting the lower vermilion lip, where it may cause irritation.

Depilatory articles of the present invention may comprise at least two finger-tabs being substantially free of depilatory composition and positioned on substantially opposing sides of the coated region. These finger tabs enable a user to apply tension to the coated region of the substrate. Surprisingly, applicants have found that applying tension across the coated region of the depilatory article creates an effect of temporarily causing the coated region to exhibit an apparent increased rigidity, enabling the user to accurately position the coated region, and hence depilatory composition on to the desired region of the body. Tensioning the coated region may be achieved in a number of ways, non-limiting examples of which include holding the depilatory

article either side of the coated region, for example with the hands or a tool, so as to apply tension between the areas being held. Alternatively, depilatory articles of the present invention may comprise at least one finger-tab being substantially free of depilatory composition and positioned to allow the weight of the article to tension the coated region when being held by the finger-tab.

In a preferred embodiment, at least one finger tab extends from the nearest point on the perimeter of the coated region by a minimum of 1 cm, preferably from 1.5 cm to 5 cm, more preferably from 2 cm to 4 cm and even more preferably from 2.5 cm to 3.5 cm. In another preferred embodiment, both finger-tabs extend from the nearest point on the perimeter of the coated region by a minimum of 1 cm, preferably from 1.5 cm to 5 cm, more preferably from 2 cm to 4 cm and even more preferably from 2.5 cm to 3.5 cm, in order to aid handling of the depilatory article.

In a preferred embodiment, the depilatory articles of the present invention are packaged to prevent water loss and/or oxygen permeation. Alternatively, the depilatory articles of the present invention are packaged in water impermeable packaging. Examples of suitable packaging materials include films of EVOH; PP; PE; Nylon; foil laminates (including metalized PET; BOPP and PE), mixtures thereof, laminates thereof or multi-laminates thereof. More preferably, the packaging comprises an inert gas and even more preferably the inert gas comprises at least one of nitrogen, argon or carbon dioxide. Alternatively, the packaging comprises a partial vacuum.

A second aspect being a method of removing hair from the skin is also provided by the present invention, comprising the steps of:

(a) applying a depilatory article according to the present invention to the surface of the skin, preferably mammalian and more preferably human skin,

(b) leaving said depilatory article in contact with the skin for a period of at least 1 minute, preferably 2 to 10 minutes, more preferably 2 to 8 minutes,

(c) removing said depilatory article from the surface of the skin, and

(d) preferably rubbing, scraping, rinsing or wiping the surface of the skin in the area to which the depilatory article was applied.

Advantageously, the method of removing hair from the skin further comprises the step of tensioning the coated region of the depilatory article prior to applying it to the skin.

The same means used to apply tension to the coated region may be used to ensure that the depilatory article is applied to the surface of the body such that the coated region is applied under tension to the unwanted hair in order to maintain the improved handling characteristics described above. In a preferred embodiment, the tension is kept substantially constant during application of the depilatory article. The flexible nature of the substrate allows the substrate to conform to the surface of the body to offer improved contact between the depilatory composition and the unwanted hair. In a preferred embodiment, the tension may be at least partially, more preferably substantially completely released from the coated region after applying the depilatory article to the skin in order to improve the conformability of the depilatory article.

A third aspect being a depilatory kit is also provided by the present invention, which comprises at least one depilatory article of the present invention, packaging for said depilatory article(s), and at least one of a third component selected from:

a) a pre-treatment skin care composition which may comprise ingredients to promote skin conditioning (e.g. emollients), hair hydration or provide a skin barrier (e.g. hydrophobic materials) and intended for use prior to applying the depilatory article.

b) a post-treatment skin care composition which may comprise ingredients to promote skin conditioning; moisturizers, skin rejuvenation compositions (targeted for fine lines, wrinkles and uneven skin tone, for example), cosmetic compositions (e.g., foundation, rouge), sunscreens and the like as described herein above. The complementary post treatment skin care compositions may be leave-on or rinse-off compositions. The skin care compositions may also be designed to immediately follow application of the hair removal products. For example, a finishing composition may be applied to the same skin area to combat lingering odour and irritation caused by residual depilatory agent. The finishing composition may comprise a metal oxide (e.g., zinc oxide, aluminum oxide, and magnesium oxide) that is capable of complexing with any remaining depilatory agent remaining on the targeted skin area to reduce continued odour and subsequent skin irritation.

c) a tool to assist in the removal of hair and/or depilatory composition from the skin.

d) indications (which may include instructions and/or illustrations) relating to at least one aspect of usage of the depilatory article or another component of the kit.

Reference is made to the figures, which disclose a non-limiting embodiment of the invention. Fig.1 depicts a plan view of a depilatory article of the present invention, comprising a substrate (1) and an depilatory composition (2). Fig. 2 depicts a side view of a depilatory article of the present invention, further comprising a protective release layer (3). Fig.3 depicts a side view of a depilatory article of the present invention in use, i.e. applied to keratinous tissue which comprises the skin (4), hair strands (5) outside the depilatory composition (2) and hair strands (6) within the depilatory composition (2).

Example

The following examples further describe and demonstrate one embodiment within the scope of the present invention. The examples are given solely for the purpose of illustration and are not to be construed as a limitation of the present invention, as many variations thereof are possible.

Comparative Example:

Comparative Formulation Ingredient	% w/w
DI water	89.96
Chondrus Crispus (Carrageenan CI-123)[1]	1.50
Sodium Silicate 42% w/w in water (Cognis 60)[2]	1.04
Calcium Hydroxide[3]	1.50
Calcium Thioglycolate Trihydrate[4]	6.00

1 Carrageenan CI-123 available from CPKelco

2 Sodium Silicate 42% w/w in water (Cognis 60) available from Cognis

3 Calcium Hydroxide Reag. Ph. Eur. puriss. p.a. available from Sigma-Aldrich Co.

4 Calcium Thioglycolate Trihydrate 99.8% available from BRUNO BOCK Chemische Fabrik GmbH & Co.

A 400 ml speed mixer plastic pot was sanitized and DI water directly weighed in. The Calcium Hydroxide and Sodium Silicate were added followed by the addition of Carrageenan over a period of 10 minutes with mixing (increasing mixing speed if required). After a further 10 minutes of mixing, the Calcium Thioglycolate was then added and the batch continued to be mixed for a further 10 minutes. The batch was then transferred to a thick walled 400 ml glass beaker and milled for 2 minutes using an IKA T50 (5,200 rpm). The yield point was determined

to be 0.96 Pa via a stress controlled amplitude sweep at a frequency of 1 Hz and a temperature of 25 °C after 24 hours from making the batch. The yield point was taken as the 10% decrease in magnitude of the elastic modulus G' linear plateau value.

A rectangular test area of 1.5 cm in width and 3.5 centre in length was clearly marked in the center of a cast HDPE 85% LLDPE 15% polymer blend film (manufactured on a Merritt-Davis casting line with LBI 85% M6030 and Exxon Mobil 15% LD2001; 23 microns in thickness and cut to 30 cm in length and 30 cm in width). The comparative formulation above was disposed to a thickness of 1.1 mm, width of 1.5 cm and length of 3.5 cm covering the test area using a stencil and wiper blade. The stencil was left in place for 30 seconds after the comparative formulation had been disposed before being removed. The comparative formulation disposed on the test area was left for a further 30 seconds and the flexible 3M SBOPP 9741 release liner film (89 microns in thickness, 2.5 cm in width and 4.5 cm in length) was carefully placed onto the comparative formation. The comparative formulation was in contact with the treated surface of the 3M SBOPP 9741, which completely covered the test area. After a further 30 seconds, the 3M SBOPP 9741 release liner film was carefully held at one end and lifted away from the comparative formulation in a motion acting along its length. The total length of the comparative formulation was measured with a ruler. The length of the rectangular test area was subtracted from the total length to afford the elongation deformation. The experiment was repeated three times and the average elongation deformation was reported to the nearest 0.1 cm.

Inventive Example:

Inventive Formulation Ingredient	% w/w
DI water	87.46
Chondrus Crispus (Carrageenan CI-123)[1]	4.00
Sodium Silicate 42% w/w in water (Cognis 60)[2]	1.04
Calcium Hydroxide[3]	1.50
Calcium Thioglycolate Trihydrate[4]	6.00

1 Carrageenan CI-123 available from CPKelco

2 Sodium Silicate 42% w/w in water (Cognis 60) available from Cognis

3 Calcium Hydroxide Reag. Ph. Eur. puriss. p.a. available from Sigma-Aldrich Co.

4 Calcium Thioglycolate Trihydrate 99.8% available from BRUNO BOCK Chemische Fabrik GmbH & Co.

A 400 ml speed mixer plastic pot was sanitized and DI water directly weighed in. The Calcium Hydroxide and Sodium Silicate were added followed by the addition of Carrageenan over a period of 10 minutes with mixing (increasing mixing speed if required). After a further 10 minutes of mixing, the Calcium Thioglycolate was then added and the batch continued to be mixed for a further 10 minutes. The batch was then transferred to a thick walled 400 ml glass beaker and milled for 2 minutes using an IKA T50 (5,200 rpm). The yield point was determined to be 234 Pa via a stress controlled amplitude sweep at a frequency of 1 Hz and a temperature of 25 °C after 24 hours from making the batch. The yield point was taken as the 5% decrease in magnitude of the elastic modulus G' linear plateau value.

A rectangular test area of 1.5 cm in width and 3.5 cm in length was clearly marked in the center of a cast HDPE 85% LLDPE 15% polymer blend film (manufactured on a Merritt-Davis casting line with LBI 85% M6030 and Exxon Mobil 15% LD2001; 23 microns in thickness and cut to 30 cm in length and 30 cm in width). The inventive formulation above was disposed to a thickness of 1.1 mm, as a rectangle of width 1.5 cm and length 3.5 cm covering the test area using a stencil and wiper blade. The stencil was left in place for 30 seconds after the inventive formulation had been disposed before being removed. The inventive formulation disposed on the test area was left for a further 30 seconds and the flexible 3M SBOPP 9741 release liner film (89 microns in thickness, 2.5 cm in width and 4.5 cm in length) was carefully placed onto the inventive formation. The inventive formulation was in contact with the treated surface of the 3M SBOPP 9741, which completely covered the test area. After a further 30 seconds, the 3M SBOPP 9741 release liner film was carefully held at one end and lifted away from the inventive formulation in a motion acting along its length. The total length of the inventive formulation was measured with a ruler. The length of the rectangular test area was subtracted from the total length to afford the elongation deformation. The experiment was repeated three times and the elongation deformation was reported to the nearest 0.1 cm.

Comparison of Elongation Deformations

	Comparative Formulation	**Inventive Formulation**
Elongation deformation after release layer removal	0.8 cm	0.0 cm

The results show that the inventive formulation does not experience deformation on the substrate under the conditions experienced during the removal of the release liner.

The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as “40 mm” is intended to mean “about 40 mm.”

CLAIMS

What is claimed is:

1. A depilatory article comprising:

i) a substrate; and

ii) a depilatory composition disposed on the substrate, the coating of depilatory composition forming a coated region of the substrate and having a substrate facing side and a non-substrate facing side, wherein said depilatory composition has a yield point from 50 Pa to 2000 Pa, preferably from 65 Pa to 1200 Pa, more preferably from 80 Pa to 750 Pa and even more preferably from 100 Pa to 500 Pa measured via a stress controlled amplitude sweep; at a frequency of 1Hz and a temperature of 25°C and wherein the depilatory article comprises a protective release layer, preferably a water impermeable protective release layer placed on the non-substrate facing side of the depilatory composition.

2. A depilatory article according to claim 1, wherein the depilatory composition displays an elastic modulus G' which exceeds its viscous modulus G" at all frequencies below 60 rad/s, preferably below 20 rad/s, more preferably below 10 rad/s and even more preferably below 1 rad/s; when measured via a strain controlled frequency sweep; at a strain of 1% and a temperature of 25°C.

3. A depilatory article according to either preceding claim, wherein the depilatory composition is shear thinning, preferably wherein the dynamic viscosity of the depilatory composition is 1000 Pa.s to 10000 Pa.s at a shear rate of 0.1 s^{-1} and the dynamic viscosity of the depilatory composition is 0.1 Pa.s to 1 Pa.s at a shear rate of 1000 s^{-1} measured at a temperature of 25°C.

4. A depilatory article according to any preceding claim, wherein the depilatory composition is aqueous, preferably comprising water in an amount of greater than 40%, more preferably from 50% to 98%, even more preferably from 60% to 95% and even more preferably still from 70% to 90%, by weight of the depilatory composition.

5. A depilatory article according to claim any preceding claim, wherein the depilatory composition comprises a thickener, preferably a polymeric thickener and more preferably

carrageenan, and preferably present in an amount of from 0.01% to 20%, more preferably 0.1% to 10%, even more preferably 0.3% to 5% and even more preferably still 0.5% to 3% by weight of the depilatory composition.

6. A depilatory article according to any preceding claim, wherein the substrate has a rigidity in the range of from 5.00 g/cm to 0.08 g/cm, preferably from 3.00 g/cm to 0.08 g/cm, more preferably from 1.80 g/cm to 0.10 g/cm, even more preferably from 0.80 g/cm to 0.15 g/cm and even more preferably still from 0.60 g/cm to 0.25 g/cm.

7. A depilatory article according to any preceding claim, wherein the substrate has a secant modulus at 2% strain of greater than 689.5 bar (10,000 psi), more preferably greater than 1379.0 bar (20,000 psi), even more preferably greater than 2068.4 bar (30,000 psi) and even more preferably still greater than 2757.9 bar (40,000 psi).

8. A depilatory article according to any preceding claim, wherein the substrate is water impermeable, preferably wherein the substrate comprises a plastic sheet, more preferably a polyolefin, more preferably a polyethylene and even more preferably high density polyethylene.

9. A depilatory article according to either preceding claim, wherein the depilatory composition comprises a reducing agent, preferably thioglycolic acid or a thioglycolate salt, preferably present in an amount of from 0.3% to 20%, preferably from 0.8% to 15%, more preferably from 1% to 10% by weight of the depilatory composition.

10. A depilatory article according to claim 9, wherein the reducing agent comprises a divalent cation, preferably a divalent metal cation, more preferably a calcium cation.

11. A depilatory article according to any preceding claim, wherein the depilatory composition comprises a base, preferably a buffering base and preferably in a concentration range of from 0.1% to 10.0%, more preferably from 0.5% to 8.0% and even more preferably from 1.0% to 5.0%, by weight of the depilatory composition.

12. A depilatory article according to claim 11, wherein the base comprises a divalent cation, preferably a divalent metal cation, more preferably a calcium cation, magnesium cation, zinc cation or mixtures thereof and even more preferably a calcium cation.

13. A depilatory article according to any preceding claim, wherein said substrate is substantially planar.

14. A method of removing hair from the skin, comprising the steps of:

(a) applying a depilatory article according to any preceding claim to the surface of the skin, preferably mammalian and more preferably human skin,

(b) leaving said depilatory article in contact with the skin for a period of greater than 1 minute, preferably 2 to 10 minutes, more preferably 2 to 8 minutes

(c) removing said depilatory article from the surface of the skin, and

(d) preferably rubbing, scraping, rinsing or wiping the surface of the skin in the area to which the depilatory article was applied

15. A depilatory kit, comprising:

(a) at least one depilatory article according to any of claims 1-13,

(b) optionally, at least one of a pre-treatment skin care composition, a post-treatment skin care composition and/or a tool to assist removal of hair and/or depilatory composition after use, and

(c) packaging for said depilatory kit.

Fig.1.

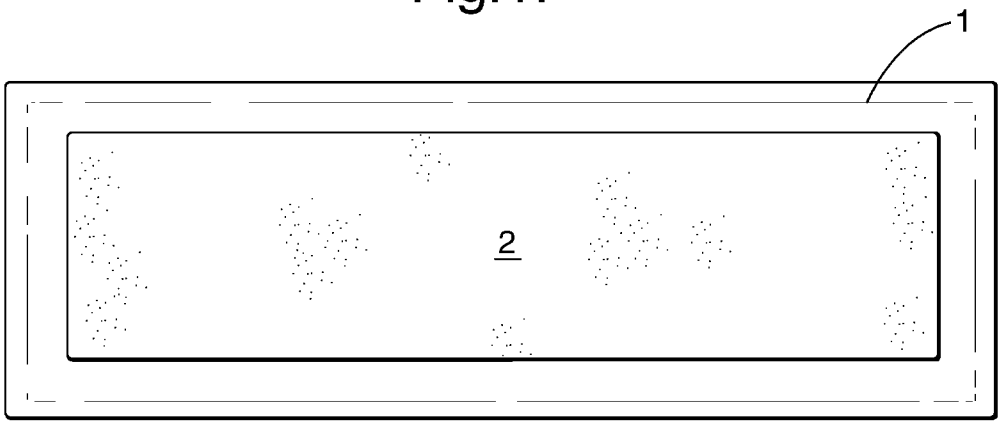


Fig.2.

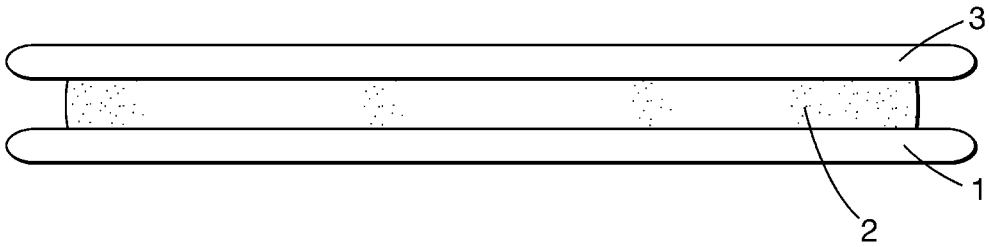
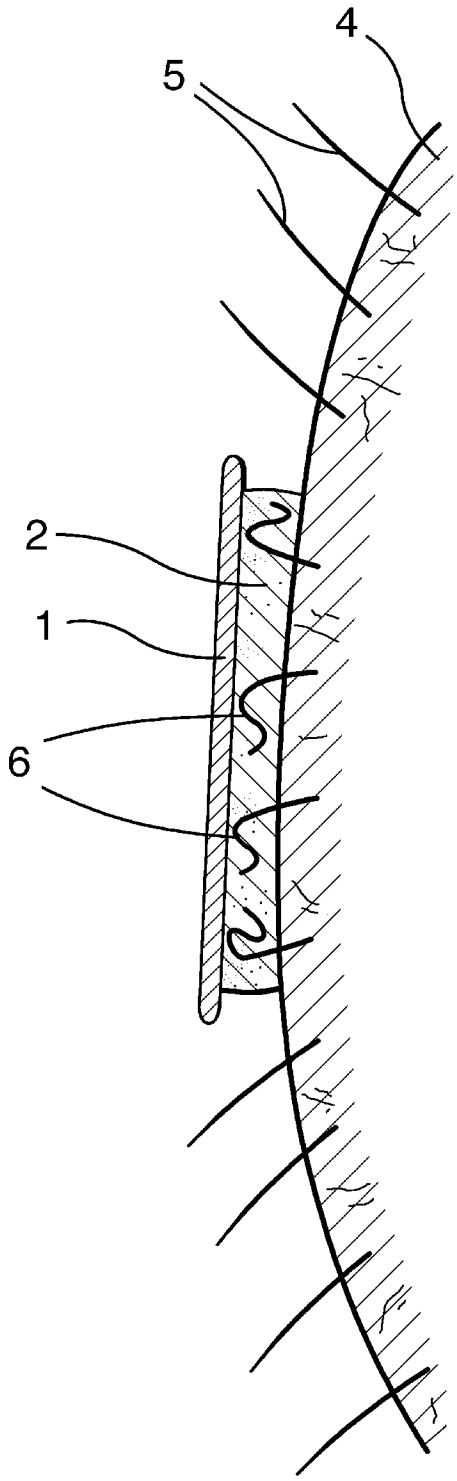


Fig.3.



INTERNATIONAL SEARCH REPORT

International application No
PCT/US2011/025142

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61K8/02 A61Q9/04 A61K8/73
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)
A61K A61Q

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 practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/146380 A1 (NAMBU HIROMI [JP] ET AL) 10 October 2002 (2002-10-10) paragraphs [0002], [0005], [0018] - [0021], [0 86] - [0005], [0083], [0 89], [0 94], [105] - [0116]; claims 1, 9; examples	1-15
X	"Sheet depilatory - comprises viscous depilatory included between two parts of a folded sheet or two sheets", WPI / THOMSON,, vol. 1988, no. 19, 4 April 1988 (1988-04-04), XP002592344, abstract	1-15

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X Further documents are listed in the continuation of Box C.

X 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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"O" document referring to an oral disclosure, use, exhibition or other means

"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	Date of mailing of the international search report
2 May 2011	11/05/2011

Name and mailing address of the ISA/	Authorized officer
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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2011/025142

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