sodium acetate crystals, the process would absorb heat and refrigerate the face mask; the refrigerated face mask can be applied to the face again to cool the face skin. By the above processes, a cold compress following a hot compress can be available, which can improve the absorption of the skincare products and shrink the skin pores.

Comparative Example 1

[0113] The face mask in Comparative Example 1 is similar to that in Example 6 except that no thermal-insulation layer 2 is provided, and it is used in the same way as described in Example 6.

[0114] The results show that the duration of the heat generation (in a heat range above 37℃) for the face mask in Example 6 is about 35 minutes, while it is only about 20 minutes for the face mask in Comparative Example 1; and the duration of the refrigeration for the face mask in Example 6 is about 30 minutes, while it is only about 20 minutes for the face mask in Comparative Example 1. In addition, it has been demonstrated in experiments that due to the thermal-insulation layer according to the invention the heat generation/refrigeration in Example 6 is significantly more homogeneous than that in Comparative Example 1, that is, the face mask in Example 6 overcomes the problem of the face mask in Comparative Example 1 which is either too hot or too cold for most of the time it is being used. Compared with Comparative Example 1, the face mask in Example 6 improves the absorption effect of the skincare and the moisture content of the skin.

Example 7

[0115] The example mainly relates to a three-dimensional face mask which has a facial concave-convex shape formed by joining two sheets together. Compared with the traditional face mask made from a single sheet of material, the three-dimensional face mask can fit the face better, so as to uniformly clean and nourish the face skin.

[0116] As shown in Figure 8, the three-dimensional face mask 10 comprises a left side sheet 21 and a right side sheet 22 respectively matching the left area of the face and the right area of the face. Either of the front edge portions 111, 121 of the left side sheet 21and the right side sheet 22 is provided with an adhesive material, and the left side sheet21and the right side sheet 22 are thereby adhered together by adhesive material along the median line of the face. Figure 9 is a schematic view showing a face mask consisting of the right side sheet and left side sheet of Figure 8 when

the right side sheet and left side sheet are adhered together.

[0117] In this example, the left side sheet 21and the right side sheet 22 are symmetrical along the median line of the face. Of course, the present application is not limited to this, the left side sheet 21 and the right side sheet 22 may also be unsymmetrical in other examples. However, from the perspective of somatology, it is easier to fit the face when the two sheets are symmetrical. Since the two sheets are adhered together to form a facial concave-convex shape, it is possible to keep this three-dimensional face mask completely adhering to every facial curve, so as to overcome the deficiencies of the traditional face mask, which is built from a single mask sheet and is liable to wrinkle and slack, thereby the traditional one-piece face mask cannot be uniformly and reliably applied to the face and affects the cosmetic and cleaning effect.

[0118] As shown in Figure 8, either of the front edge portion 111 of the left side sheet 21 and the front edge portion 121 of the right side sheet 22 is provided with a protrusion 112,122 projecting outwards from above down and matching the shape of the left area or right area of the external nose. A notch 113,123 corresponding to the mouth is respectively provided below the protrusion112, 122. After the two sheets are joined together, the notch 113, 123 are joined and form a mouth portion matching the mouth. There is no adhesive material provided on the notch 113, 123 of the front edge portion 111,121. The portion of the front edge portion below the notch 113,123 respectively has an arc shape 114,124 with a certain radian and extends downwards to the bottom the face mask. Since either of the front edge portion 111 of the left side sheet 21 and front edge portion 121 of the right side sheet 22 has a protrusion projecting outwards from above down and matching the shape of the left area or right area of the external nose, after the left side sheet 21 and the right side sheet 22 are joined together, the three-dimensional face mask would naturally have a nose-like protrusion from above down on the user's nose, so as to reliably fit the nose. Since the portion of the front edge portion 111, 121 below the notch 113, 123 respectively has an arc shape with a certain radian and extends downwards to the bottom the face mask, after the left side sheet 21 and the right side sheet 22 are joined together, the lower half of the face mask has a curved surface which can reliably fit the jaw, so as to improve the adherence to the face.

[0119] Figure 10 shows the concave-convex shape of the three dimensional face mask which has been applied to the user's face. A nose-like protrusion is formed after the protrusion112, 122 are joined together, and an elliptical notch corresponding to the mouth is formed after the notch 113,

123 are joined together, and a curved surface is formed after the arc shape 114,124 are joined together, so as to fit the lower face and jaw. It can be seen that compared with the traditional sheet-mask, the present three-dimensional face mask fits the user's face which has a concave-convex shape better, so that it can be uniformly applied to the entire face and uniformly clean and nourish the face skin.

[0120] Preferably, a notch 115,125 which is concaved inwards is provided on the eye-and-glabella portion of either of the front edge portion 111 , 121 of the left side sheet 21 and the right side sheet 22 which faces the user's eyes and glabella, just above the protrusion 112, 122. The notch 114, 124 can be almost semielliptical or semicircular, as long as the eyes are uncovered but the skin around the eyes is almost covered. On either of the front edge portions 111,121 of the left side sheet 21 and the right side sheet 22, neither the notch 113, 123 corresponding to the mouth nor the notch 115,125 corresponding to the eye-and-glabella is provided with adhesive material. That is, the left side sheet and the right side sheet are provided with an adhesive material on either of the front edge portions, except the notch 113, 123 corresponding to the mouth and the notch 115,125 corresponding to the eye-and-glabella, and the left side sheet and the right side sheet are thereby adhered together by the adhesive material.

[0121] Preferably, as shown in Figure 8, the rear edge portions of the left side sheet 21 and the right side sheet 22 are respectively provided with a fixing strap 118, 128, and preferably, the fixing strap 118, 128 are respectively provided with a velcro 119, 129. After applied to the face, the three-dimensional face mask can be attached to the user's head by the fixing strap and tighten by the velcro. The velcro, also known as hook-and-loop or hook-and-pile, is a common fastener used on the clothes, which is consisted of two components, typically, the first component features tiny hooks; the second features even smaller and "hairier" loops.

[0122] In this example, as shown in Figure 11, either of the face portions 116, 126 of the left side sheet 21 and the right side sheet 22 of the three-dimensional face mask 10 comprises a structure of two layers: a carrier layer 131 loaded with functional material and a thermal-insulation layer 132; wherein the carrier layer 131 is loaded with refrigerating or heat-generating chemical material 1311. As shown in Figure 11, the thermal-insulation layer132 is in contact with the skin 4.

[0123] In this example, the carrier layer 131 loaded with functional material and the thermal-insulation layer 132 are adhered together by, for example, the adhesive or thermal bonding,

Example 12

[0134] As shown in Figure 19, in Example 12, the face mask 20 has notches 201 corresponding to the user's eyes, and notch 202 corresponding to the mouth, and notch 203 corresponding to the nostril. The two sides of the face mask 20 are provided with a fixing strap 104, and the fixing strap 104 is provided with a velcro105.

[0135] After applied to the face, the face mask 20 can be attached to the user's head by the fixing strap 104 and tighten by the velcro105.

[0136] In this example, as shown in Figure 19, the face portion of the face mask comprises a structure of two layers: a carrier layer 131 loaded with functional material and a thermal-insulation layer 132; wherein the carrier layer 131 is loaded with refrigerating or heat-generating chemical material 1311. As shown in Figure 20, the thermal-insulation layer 132 is in contact with the skin 4.

[0137] In this example, the carrier layer 131 loaded with functional material and the thermal-insulation layer 132 are adhered together by, for example, the adhesive or thermal bonding, so they are applied to the skin as a whole. In some cases, the thermal-insulation layer 132 is not adhered together with the carrier layer 131 loaded with functional material. That is, in use, the thermal-insulation layer is first applied to the skin, then the carrier layer 131 loaded with functional material is applied, and the similar effect can also be obtained.

[0138] In this example, the carrier layer 131 loaded with functional material is made of transparent PVC material. In this example, the functional material 1311 loaded in the carrier layer 131 is a sodium acetate solution at a concentration of 80-90%, and a stainless steel disc 1312 which is concave in shape is also loaded in the carrier layer 131. The carrier layer 131 loaded with functional material is made of transparent OPP film, so the stainless steel disc 1312 can be seen by the user. When a hot compress is needed, press the stainless steel disc 1312 with the hand to cause sodium acetate to form crystals and release heat.

[0139] In this example, the thermal-insulation layer 132 is formed by a PET aluminum film made of PET and silvery aluminum.

Example 13

[0140] Figure 21 shows a multifunctional temperature self-regulating face mask according to

Example 17

[0147] As shown in Figures 24-25, in this example, the eye portion of the eye mask 30 comprises a structure of two layers: a carrier layer 131 loaded with functional material and a thermal-insulation layer 132; wherein the carrier layer 131 is loaded with refrigerating or heat-generating chemical material 1311. As shown in Figure 25, the thermal-insulation layer 132 is in contact with the skin 4.

[0148] In this example, the carrier layer 131 loaded with functional material and the thermal-insulation layer 132 are adhered together by, for example, the adhesive or thermal bonding, so they are applied to the skin as a whole. In some cases, the thermal-insulation layer 132 is not adhered together with the carrier layer 131 loaded with functional material.

[0149] In this example, the carrier layer 131 loaded with functional material is made of transparent PVC material. In this example, the functional material 1311 loaded in the carrier layer 131 is a sodium acetate solution at a concentration of 80-90%, and a stainless steel disc 1312 which is concave in shape is also loaded in the carrier layer 131. The carrier layer 131 loaded with functional material is made of transparent OPP film, so the stainless steel disc 1312 can be seen by the user. When a hot compress is needed, press the stainless steel disc 1312 with the hand to cause sodium acetate to form crystals and release heat. In this example, the eye mask can be reused when immersing it into hot water at about 80℃ for 2-3 minutes to dissolve the crystals. In order to increases the using life of the eye mask, the nucleating agent, 10 wt. % sodium silicate, is added in the oversaturated aqueous solution of sodium acetate.

[0150] In this example, the thermal-insulation layer 132 is formed by a PET aluminum film made of PET and silvery aluminum.

[0151] In this example, the heat given off from the carrier layer loaded with functional material can relax the muscle around the eyes, enlarge blood vessel and accelerate blood circulation, so as to relieve swelling, dry eye syndrome and eye irritation. In addition, a thermal-insulation layer formed of a material having waterproof and thermal-insulation properties is provided between the carrier layer and the skin. When used, the thermal-insulation layer ensures the heat given off from the carrier layer loaded with functional material is evenly and stably transferred to the skin, and the heat will not spread out quickly from the skin, so as to avoid scalding caused by too high initial temperature and maintain stable and suitable holding temperature. Further, the

thermal-insulation layer prevents the water or oil in the skincare product, external medicine or healthcare product or sweat from permeating into the functional material, so as to avoid uncontrollable peak heating temperature and cross-contamination between the chemical reaction products of the functional material and the water or oil in the skincare product, or healthcare product or the sweat, which may cause skin infection. When applied to the face, the heat given off by the carrier layer loaded with functional material and maintained by the thermal-insulation layer makes the skin comfortable, improves blood circulation and enlarges facial pores, so as to clean skin dirt and sebaceous secretion. When used in combination with a skincare product, the absorption of the effective ingredients in said traditional eye mask or skincare product is improved, so the amount of skincare product used is reduced and skincare effect is enhanced. In addition, the use is convenient, environmentally friendly and low-cost.

[0152] In this example, a slit 315 is vertically cut along a lower half of a central vertical axis of the eye mask. Due to this, after applied to the eyes, a left side piece and a right side piece of the eye mask can naturally splay outward on the portion of nose bridge, so as to fit the user's eyes in shape, that is, the left side piece and the right side piece of the eye mask are symmetrically arranged along the nose bridge and naturally splay outward to the two sides of the slit so as to be reliably adhered to the eyes.

Example 18

[0153] Figure 26 shows a multifunctional temperature self-regulating eye mask according to Example 18 of the present invention. The difference of Example 18 over Example 17 is that the eye mask 30 is also provided with two hanging parts 321, and the hanging parts 321 have ears slits 322 which can hung on the user's ears. In use, the eye mask can be reliably attached to the user's eyes by the hanging parts 321, so the eye mask would not easily move or fall off from the eyes.

Example 19

[0154] In this example, there is provided a layer of water-soluble hydrogel on the surface of the thermal-insulation layer 132 of the eye mask that is in contact with the skin, so as to adhere the multilayer film to the user's body. In practice, the water-soluble hydrogel layer may comprise an active ingredient of a topically-applied healthcare product, a topically-applied medicine or a

WHAT IS CLAIMED IS:

1. A multifunctional temperature self-regulating film, from outside to inside, comprising at least:

a carrier layer loaded with functional materials, and

a thermal-insulation layer directly contacted with the skin;

wherein the carrier layer loaded with functional materials has a sealed cavity sealed with a flexible water-impermeable material, the sealed cavity is at least loaded with a refrigerating or heat-generating chemical material; wherein the thermal-insulation layer is made of a material having waterproof and thermal-insulation properties;

wherein the thermal-insulation layer is a metal plating film made of metal and polyethylene terephthalate, oriented polypropylene, nylon, polyethylene or cast polypropylene film.

2. The multifunctional temperature self-regulating film according to claim 1, wherein the thermal-insulation layer is a metallized polyethylene terephthalate film made of polyethylene terephthalate film and metal.

3. The multifunctional temperature self-regulating film according to claim 2, wherein the metal used for the metallized polyethylene terephthalate film is aluminum, nickel, chromium or a mixture thereof.

4. The multifunctional temperature self-regulating film according to claim 1, wherein the flexible water-impermeable material is made of plastics, synthetic rubbers, synthetic fibers, waterproof fabrics or waterproof papers.

5. The multifunctional temperature self-regulating film according to claim 4, wherein the flexible water-impermeable material is transparent.

6. The multifunctional temperature self-regulating film according to claim 1, wherein the sealed cavity is loaded with

a solid-liquid phase change material which generates heat when the material changes from liquid to solid, and

an actuating means which is used to trigger an exothermic state of the solid-liquid phase change material.

7. The multifunctional temperature self-regulating film according to claim 6, after the liquid-to-solid phase change process of the solid-liquid phase change material has been triggered, the film maintains a heating temperature at 40℃ to 55℃, and the heating time lasts 5 to 30 minutes.

8. The multifunctional temperature self-regulating film according to claim 7, wherein the solid-liquid phase change material is an oversaturated aqueous solution of sodium acetate, the actuating means is a flexible metal disc which takes a shape of an arc and has a plurality of corrugations on its surface, and the flexible metal disc is located in the oversaturated aqueous solution of sodium acetate.

9. The multifunctional temperature self-regulating film according to claim 8, wherein the oversaturated aqueous solution of sodium acetate is added with a nucleating agent.

10. The multifunctional temperature self-regulating film according to claim 9, wherein the nucleating agent is selected from one or more of the group consisting of sodium borate, sodium sulfate, sodium silicate, sodium pyrophosphate, and sodium phosphate dibasic dodecahydrate.

11. The multifunctional temperature self-regulating film according to claim 6, wherein at least one side of the carrier layer is provided with a fluid reservoir; the fluid reservoir and the carrier layer are manufactured in one piece, and they are interconnected by an existing one-way valve; the fluid reservoir is loaded with fluid, when the fluid reservoir is pressed by an external force, the fluid loaded in the fluid reservoir is injected into the carrier layer through the one-way valve to adjust the temperature of the carrier layer.

12. The multifunctional temperature self-regulating film according to claim 1, wherein the sealed cavity is loaded with a solid refrigerating chemical material which absorbs heat when the material changes from solid to liquid; at least one side of the carrier layer is provided with a fluid reservoir; the fluid reservoir and the carrier layer are manufactured in one piece, and they are interconnected by an existing one-way valve; the fluid reservoir is loaded with fluid, when the fluid reservoir is pressed by an external force, the fluid loaded in the fluid reservoir is injected into the carrier layer through the one-way valve to dissolve the solid refrigerating chemical material, such that the solid refrigerating chemical material changes from solid to liquid to absorb heat and lower the temperature of the film.

13. The multifunctional temperature self-regulating film according to claim 12, after the solid-to-liquid phase change process of the solid refrigerating chemical material has been triggered, the film maintains a cooling temperature at -3℃ to 20℃, and the cooling time lasts 5 to 30 minutes.

14. The multifunctional temperature self-regulating film according to claim 12, wherein the solid refrigerating chemical material is selected from one or more of the group consisting of urea, ammonium chloride and ammonium nitrate, and the fluid loaded in the fluid reservoir is clean water; wherein the weight ratio of the solid refrigerating chemical material to the clean water is 1:1.

15. The multifunctional temperature self-regulating film according to claim 11 or 12, wherein a suitable amount of thickener is added in the fluid loaded in the fluid reservoir.

16. The multifunctional temperature self-regulating film according to claim 11 or 12, wherein the sealed cavity and/or the fluid reservoir is further loaded with a pigment.

17. The multifunctional temperature self-regulating film according to any one of claims 1 to 14, wherein the film is ergonomically designed in shape to be applied to various body parts.

18. The multifunctional temperature self-regulating film according to claim 17, wherein there is provided a layer of water-soluble hydrogel on the surface of the thermal-insulation layer that is in contact with the skin, the layer of soluble hydrogel being used for adhering the film to the skin.

19. The multifunctional temperature self-regulating film according to claim 18, wherein there is provided an active ingredient of a topically-applied healthcare product, a topically-applied medicine or a skincare product in the layer of water-soluble hydrogel.

20. The multifunctional temperature self-regulating film according to claim 17, wherein the film is 2 mm to 15 mm thick.

21. A method of using the multifunctional temperature self-regulating film according to claim 17, wherein the film is used in combination with a topically-applied medicine, a health care product, a skincare product or a traditional nourishing face mask .

22. A multifunctional temperature self-regulating three-dimensional face mask which has a facial concave-convex shape formed by joining two sheets together, wherein the face portion of the three-dimensional face mask is made of the multifunctional temperature self-regulating film according to claim 17.

23. The multifunctional temperature self-regulating three-dimensional face mask according to claim 22, wherein the three-dimensional face mask comprises a left side sheet and a right side sheet respectively matching the left area of the face and the right area of the face, front edge portions of the left side sheet and the right side sheet are provided with an adhesive material, the left side sheet and the right side sheet are thereby adhered together by the adhesive material along a median line of the face to form a facial concave-convex shape.

24. The multifunctional temperature self-regulating three-dimensional face mask according to

claim 23, wherein either of the front edge portions of the left side sheet and the right side sheet has a protrusion projecting outwards from above down and matching the shape of the left area or right area of the external nose, a mouth portion which is a notch matching the mouth is provided below the protrusion, a portion of the front edge portion below the notch has an arc shape with a certain radian and extends downwards to the bottom the face mask; except the notch matching the mouth, either of the front edge portions of the left side sheet and the right side sheet is provided with an adhesive material, and the left side sheet and the right side sheet are thereby adhered together by the adhesive material.

25. The multifunctional temperature self-regulating three-dimensional face mask according to claim 24, wherein a glabella portion of either of the front edge portions of the left side sheet and the right side sheet which faces a space between the user's eyebrows, just above the protrusion, is formed as an arc which is slightly concaved inwards.

26. The multifunctional temperature self-regulating three-dimensional face mask according to claim 24, wherein an eye-and-glabella portion of either of the front edge portions of the left side sheet and the right side sheet which faces the user's eyes and glabella, just above the protrusion, is formed as a notch which is concaved inwards; except the eye-and-glabella portion and the mouth portion, either of the front edge portions of the left side sheet and the right side sheet are provided with an adhesive material , and the left side sheet and the right side sheet are thereby adhered together by the adhesive material.

27. The multifunctional temperature self-regulating three-dimensional face mask according to claim 23, there is a fixing strap provided on either of the rear edge portions of the left side sheet and the right side sheet, and there is a velcro provided at the end of the fixing strap.

28. A method of using the multifunctional temperature self-regulating three-dimensional face mask according to claim 22, wherein the three-dimensional face mask is used in combination with a topically-applied medicine, a health care product, a skincare product or a traditional nourishing face

mask.

29. A multifunctional temperature self-regulating face mask, wherein the face portion of the face mask is made of the multifunctional temperature self-regulating film according to claim 17.

30. The multifunctional temperature self-regulating face mask according to claim 29, wherein the face mask has notches matching the user's nose and mouth, respectively.

31. The multifunctional temperature self-regulating face mask according to claim 30, wherein the face mask also has notches matching the user's eyes.

32. The multifunctional temperature self-regulating face mask according to claim 31, wherein there is a fixing strap provided on either side of the face mask, and there is a velcro provided at the end of the fixing strap.

33. A method of using the multifunctional temperature self-regulating face mask according to claim 29, wherein the face mask is used in combination with a topically-applied medicine, a health care product, a skincare product or a traditional nourishing face mask.

34. A multifunctional temperature self-regulating eye mask, wherein the eye portion of the eye mask is made of the multifunctional temperature self-regulating film according to claim 17.

35. The multifunctional temperature self-regulating eye mask according to claim 34, wherein the eye mask comprises hanging parts which have ears slits and can be hung on the user's ears.

36. The multifunctional temperature self-regulating eye mask according to claim 35, wherein a slit is vertically cut along a lower half of a central vertical axis of the eye mask.