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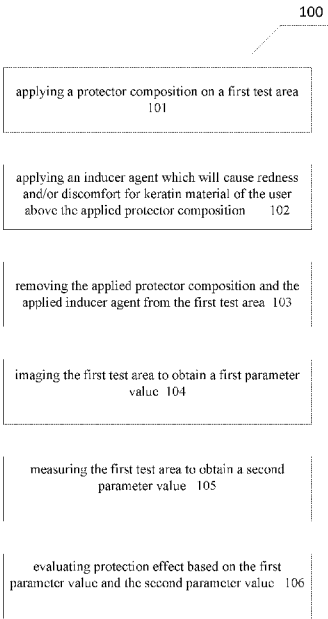


Fig.1

(57) Abstract: There is provided a method and a computing device for evaluating protection effect of a protector composition to be applied on keratin material of a user, and the method comprises the steps of: applying the protector composition on a first test area of keratin material of the user; applying an inducer agent which will cause redness and/or discomfort for keratin material of the user above the applied protector composition; removing the applied protector composition and the applied inducer agent from the first parameter value; measuring the first test area by a device for testing transepidermal water loss of the keratin material to obtain a second parameter value; and evaluating protection effect based on the first parameter value and the second parameter value.

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A METHOD AND A COMPUTING DEVICE FOR EVALUATING
PROTECTION EFFECT OF A PROTECTOR COMPOSITION TO BE
APPLIED ON KERATIN MATERIAL OF A USER

5 TECHNICAL FIELD

The disclosure relates to the field of cosmetics. More specifically, the disclosure relates to a method and a computing device for evaluating protection effect of a protector composition to be applied on keratin material of a user.

10

BACKGROUND

Nowadays, people are increasingly pursuing external beauty. By dressing, keratin material makeup and various kinds of hair care, the needs of beauty can be achieved. Typically, people apply some protector
15 compositions on keratin material before applying some makeup products, hair care products and so on. In prior art, there are no fast and efficient methods for evaluating protection effect of protector compositions to be applied on keratin materials.

Thus, there is a need for a method for evaluating protection effect of a
20 protector composition to be applied on keratin material of a user more particularly in terms of redness values and discomfort for keratin material in a fast and more efficient manner.

SUMMARY

25 The summary is provided to introduce a selection of concepts in a simplified form that are further described below in detailed description. This summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended to be used to limit the scope of the claimed subject matter.

30 Various aspects and features of the disclosure are described in further detail below.

According to a first aspect of the disclosure, there is provided a

method for evaluating protection effect of a protector composition to be applied on keratin material of a user, the method comprises applying the protector composition on a first test area of keratin material of the user; applying an inducer agent which will cause redness and/or discomfort for keratin material of the user above the applied protector composition; removing the applied protector composition and the applied inducer agent from the first test area; imaging the first test area by an imaging device to obtain a first parameter value;

measuring the first test area by a device for testing transepidermal water loss of the keratin material to obtain a second parameter value; and evaluating protection effect based on the first parameter value and the second parameter value.

In an embodiment of the first aspect of the disclosure, the method also comprises obtaining a first self-perceived sensation information for the first test area from the user after the step of removing the applied protector composition and the applied inducer agent from the first test area; and evaluating protection effect based on the first parameter value, the second parameter value and the first self-perceived sensation information.

In another embodiment of the first aspect of the disclosure, the method also comprises applying the inducer agent on a second test area of the user directly; removing the applied inducer agent from the second test area; imaging the second test area by the imaging device to obtain a third parameter value; measuring the second test area by the device for testing transepidermal water loss of the keratin material to obtain a fourth parameter value; and evaluating protection effect by comparing the first parameter value and the third parameter value and comparing the second parameter value and the fourth parameter value.

In yet another embodiment of the first aspect of the disclosure, the method also comprises obtaining a first self-perceived sensation information for the first test area after the step of removing the applied protector composition and the applied inducer agent from the first test area; obtaining a second self-perceived sensation information for the second test

area from said user after the step of removing the applied inducer agent from the second test area; wherein the evaluating step also comprises evaluating protection effect based on comparing result between the first parameter value and the third parameter value, comparing result between
5 the second parameter value and the fourth parameter value and comparing result between the first self-perceived sensation information and the second self-perceived sensation information.

According to a second aspect of the disclosure, there is provided a computing device for evaluating protection effect of a protector
10 composition to be applied on keratin material of a user, comprises an imaging device including computational circuitry configured to image a first test area of keratin material of the user to obtain a plurality of first images; a measurement unit including computational circuitry configured to measure the first test area to obtain a second parameter value; and a
15 processor including computational circuitry configured to process the plurality of first images for the first test area to obtain a first parameter value and evaluate protection effect based on the first parameter value and the second parameter value; wherein before imaging the first test area, the first test area is applied a protector composition; then is applied an inducer
20 agent which will cause redness and/or discomfort for keratin material of the user above the applied protector composition; finally the applied protector composition and the applied inducer agent are removed from the first test area.

In another embodiment of the second aspect of the disclosure, the
25 processor includes computational circuitry configured to also receive a first self-perceived sensation information for the first test area from the user after the applied protector composition and the applied inducer agent are removed from the first test area; and evaluate protection effect based on the first parameter value, the second parameter value and the first
30 self-perceived sensation information.

In yet another embodiment of the second aspect of the disclosure, the imaging device includes computational circuitry configured to also image a

second test area to obtain a plurality of second images; the measurement unit includes computational circuitry configured to measure the second test area to obtain a fourth parameter value; and the processor includes computational circuitry configured to process the plurality of second
5 images for the second test area to obtain a third parameter value and to evaluate protection effect by comparing the first parameter value and the third parameter value and comparing the second parameter value and the fourth parameter value; before imaging the second test area, the second test area is applied the inducer agent directly; then the applied inducer agent is
10 removed from the second test area.

In yet another embodiment of the second aspect of the disclosure, the processor includes computational circuitry configured to receive a first self-perceived sensation information for the first test area from the user after the applied protector composition and the applied inducer agent are
15 removed from the first test area and also receive a second self-perceived sensation information for the second test area from said user after the applied inducer agent is removed from the second test area; and evaluate protection effect based on comparing results between the first parameter value and the third parameter value, comparing results between the second
20 parameter value and the fourth parameter value; and comparing results between the first self-perceived sensation information and the second self-perceived sensation information.

In an example of the disclosure, the step of imaging is performed by an imager device and the step of measuring is performed by a device for
25 testing transepidermal water loss of the keratin material.

In an example of the disclosure, the first test area and the second test area can be one of ear back, forearm and any area of the keratin material. In an example of the disclosure, the first parameter value and the third parameter value are redness values of the keratin material; the second
30 parameter value and the fourth parameter value are transepidermal water loss values of the keratin material and the first and the second self-perceived sensation information are information related to itching,

burning and stinging. In an example, the step of removing the applied protector composition and the applied inducer agent from the first test area is performed in about 5-15mins after the steps of applying an inducer agent which will cause redness and/or discomfort for keratin material of the user above the applied protector composition. In an example, the step of removing the applied inducer agent from the second test area is performed in about 5-15mins after the steps of applying the inducer agent on a second test area directly. In a preferred example, the protector composition is applied in about 0.01g-0.1g/cm² and the inducer agent is applied in about 0.1g-1g/cm².

According to a third aspect of the disclosure, there is provided a computer readable medium having stored thereon instructions that when executed cause a computing device to perform the method according to the first aspect of the disclosure.

According to a fourth aspect of the disclosure, there is provided a method for evaluating protection effect of a plurality of different protector compositions to be applied on keratin material of a user, the method comprising the steps of: applying each of the plurality of different protector compositions on each of a first plurality of test areas in ear back of the user and on each of a second plurality of test areas in forearm of the user respectively; applying inducer agents which will cause redness and/or discomfort for keratin material of the user above each of the applied different protector compositions respectively; removing the applied different protector compositions and the applied inducer agents from the first plurality of test areas and from the second plurality of test areas respectively; imaging the first plurality of test areas by an imaging device to obtain a first plurality of parameter values; measuring the second plurality of test areas by a device for testing transepidermal water loss value of the keratin material to obtain a second plurality of parameter values; and evaluating protection effect based on the first plurality of parameter values and the second plurality of parameter values.

According to an embodiment in a fourth aspect of the disclosure, the

method also comprises the steps of obtaining a first plurality of self-perceived sensation information for the first plurality of test areas from the user after the step of removing the applied different protector compositions and the applied inducer agents from the first plurality of test areas; and evaluating protection effect based on the first plurality of parameter values, the second plurality of parameter values and the first plurality of self-perceived sensation information.

According to another embodiment in a fourth aspect of the disclosure, the method also comprises the steps of applying the inducer agents on a third test area in ear back of the user and on a fourth test area in forearm of the user directly; removing the applied inducer agents from the third test area and the fourth test area; imaging the third test area by the imaging device to obtain a third parameter value; measuring the fourth test area by the device for testing transepidermal water loss of the keratin material to obtain a fourth parameter value; and evaluating protection effect by comparing the first plurality of parameter values and the third parameter values and comparing the second plurality of parameter values and the fourth parameter value.

According to yet another embodiment in a fourth aspect of the disclosure, the method also comprises the steps of obtaining a third self-perceived sensation information for the third test area after the step of removing the applied inducer agent from the third test area; wherein the evaluating step also comprising evaluating protection effect by comparing the first plurality of parameter values and the third parameter values; comparing the second plurality of parameter values and the fourth parameter value; and comparing the first plurality of self-perceived sensation information and the third self-perceived sensation information.

In an embodiment of a fourth aspect of the disclosure, the first plurality of parameter values and the third parameter value are redness values of the keratin material in ear back; the second plurality of parameter values and the fourth parameter value are transepidermal water loss values of the keratin material in forearm.

In an embodiment of a fourth aspect of the disclosure, the steps of removing are performed in about 5-15mins after the steps of applying the inducer agents above the applied different protector compositions on the first plurality of test areas and on the second plurality of test areas and
5 applying the inducer agents on the third test area and on the fourth test area directly.

In an embodiment of a fourth aspect of the disclosure, the first plurality of self-perceived sensation information and the third self-perceived sensation information are information related to itching,
10 burning and stinging.

In an embodiment of a fourth aspect of the disclosure, the different protector compositions are applied in about $0.01\text{g}-0.1\text{g}/\text{cm}^2$, and the inducer agents are applied in about $0.1\text{g}-1\text{g}/\text{cm}^2$.

According to the disclosure, an objective and subjective evaluation for
15 protector composition to be applied on keratin material of the user can be achieved in a fast and more efficient manner, thus a more accurate and quantified evaluation result can be obtained.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other aspects, features, and benefits of various
20 embodiments of the disclosure will become more fully apparent, by way of example, from the following detailed description with reference to the accompanying drawings, in which like reference numerals or letters are used to designate like or equivalent elements. The drawings are illustrated
25 for facilitating better understanding of the embodiments of the disclosure and not necessarily drawn to scale, in which:

Fig. 1 illustrates a flowchart of a method 100 of evaluating protection effect of a protector composition to be applied on keratin material of a user in accordance with a first embodiment of a first aspect of the present
30 disclosure;

Fig. 2 illustrates a flowchart of a method 200 of evaluating protection effect of a protector composition to be applied on keratin material of a user

in accordance with a second embodiment of a first aspect of the present disclosure;

Fig. 3 illustrates a flowchart of a method 300 of evaluating protection effect of a protector composition to be applied on keratin material of a user in accordance with a third embodiment of a first aspect of the present disclosure;

Fig. 4 illustrates a flowchart of a method 400 of evaluating protection effect of a protector composition to be applied on keratin material of a user in accordance with a fourth embodiment of a first aspect of the present disclosure;

Fig. 5 illustrates a block diagram of a computing device 500 of evaluating protection effect of a protector composition to be applied on keratin material of a user in accordance with a second aspect of the present disclosure.

DETAILED DESCRIPTION

Embodiments herein will be described in detail hereinafter with reference to the accompanying drawings, in which embodiments are shown. These embodiments herein may, however, be embodied in many different forms and should not be construed as being limited to the embodiments set forth herein. The elements of the drawings are not necessarily to scale relative to each other. Like numbers refer to like elements throughout.

The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting. As used herein, the singular forms "a", "an" and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms "comprises" "comprising," "includes" and/or "including" when used herein, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

Unless otherwise defined, all terms (including technical and scientific

terms) used herein have the same meanings as commonly understood. It will be further understood that a term used herein should be interpreted as having a meaning consistent with its meaning in the context of this specification and the relevant art and will not be interpreted in an idealized
5 or overly formal sense unless expressly so defined herein.

The present technology is described below with reference to block diagrams and/or flowchart illustrations of methods, apparatus (systems) and/or computer program products according to the present embodiments. It is understood that blocks of the block diagrams and/or flowchart
10 illustrations, and combinations of blocks in the block diagrams and/or flowchart illustrations, may be implemented by computer program instructions. These computer program instructions may be provided to a processor, controller or controlling unit of a general purpose computer, special purpose computer, and/or other programmable data processing
15 apparatus to produce a machine, such that the instructions, which execute via the processor of the computer and/or other programmable data processing apparatus, create means for implementing the functions/acts specified in the block diagrams and/or flowchart block or blocks.

Accordingly, the present technology may be embodied in hardware
20 and/or in software (including firmware, resident software, micro-code, etc.). Furthermore, the present technology may take the form of a computer program product on a computer-usable or computer-readable storage medium having computer-usable or computer-readable program code embodied in the medium for use by or in connection with an instruction
25 execution system. In the context of this document, a computer-usable or computer-readable medium may be any medium that may contain, store, communicate, propagate, or transport the program for use by or in connection with the instruction execution system, apparatus, or device.

Embodiments herein will be described below with reference to the
30 drawings.

The inventive concept is to evaluate protection effect of a protector composition to be applied on keratin material of a user more particularly in

terms of redness values and discomfort for keratin material.

Fig. 1 illustrates a flowchart of a method 100 of evaluating protection effect of a protector composition to be applied on keratin material of a user in accordance with a first embodiment of a first aspect of the present disclosure.

Before method 100, some actions should be prepared. The user is not allowed to use any cosmetics (including routine skin care products) on back ear 24 hours before the test and is not allowed to take sauna or bath. Before testing, the user should know written informed consent and complete inclusion/non-inclusion criteria (primary eligibility) and medical history. When testing, the user should clean back ear test area with water and pat dry with paper towel; wait in a constant temperature and humidity environment for 30 minutes.

The method 100 begins. At block 101, a protector composition is applied on a first test area of keratin material of the user. In the context of the disclosure, the protector composition can be a protection product for keratin material of the user. In an example, the test area can be one of ear back, forearm and any area of the user body. In an example, the protector composition is applied in about $0.01\text{g}-0.1\text{g}/\text{cm}^2$. At block 102, an inducer agent which will cause redness and/or discomfort for keratin material of the user is applied above the applied protector composition. The inducer agent can be those with high pH ingredient and risk to induce keratin material redness, and discomfort. In an example, the inducer agent is applied in about $0.1\text{g}-1\text{g}/\text{cm}^2$. At block 103, the applied protector composition and the applied inducer agent is removed from the first test area. The block 103 is performed in a predefined time period after the block 102. In an example, the predefined time period can be from 5mins to 30mins, preferably from 5mins-15mins. At block 104, the first test area is imaged by an imaging device to obtain a first parameter value. More particularly, in order to obtain more accurate result, the first test area is imaged by the imaging device more times to obtain a plurality of first images and then the plurality of first images are processed to obtain

redness value for keratin material. In an example, such imaging device can be a camera, a mobile phone with imaging capability, a notebook with imaging capability and so on. At block 105, the first test area is measured to obtain a second parameter value. In an example, block 105 can be performed by a device for testing transepidermal water loss of the keratin material and the second parameter value can be transepidermal water loss values of the keratin material. Order of performing blocks 104, 105 can be exchanged. At block 106, protection effect is evaluated based on the first parameter value and the second parameter value. By method 100, protection effect such as in terms of redness and discomfort of protector composition for keratin material can be obtained in a fast and an objective manner.

Fig. 2 illustrates a flowchart of a method 200 of evaluating protection effect of a protector composition to be applied on keratin material of a user in accordance with a second embodiment of a first aspect of the present disclosure.

In order to evaluate protection effect of a protector composition to be applied on keratin material of a user better, the disclosure relates to an objective evaluation combined with subjective evaluation method for protection effect of a protector composition to be applied on keratin material of a user.

As shown in Fig. 2, method 200 comprises blocks 201, 202, 203, 204, 205, 206 and 207. Blocks 201, 202, 203, 204, 205 are the same as blocks 101, 102, 103, 104, 105 shown in Fig. 1. Thus, blocks 201, 202, 203, 204, 205 are not described in detailed. As shown in Fig. 2, the protector composition is applied on the first test area (see block 201) and then the inducer agent is applied on the applied protector composition (see block 202); by blocks 203, 204, a first parameter value and a second parameter value are obtained respectively. In an example, the first parameter value can be a redness value of keratin material for the first test area and the second parameter value can be transepidermal water loss values of the keratin material for the second test area.

At block 206, a first self-perceived sensation information for the first test area is obtained from the user after the block 203 of removing. Preferably, the first self-perceived sensation information for the first test area is obtained from the user in 5mins to 30mins, preferably in 5mins-15mins after the block 203 of removing. In an example, the first self-perceived sensation information is information related to itching, burning and stinging. Order of performing blocks 204, 205, 206 can be exchanged. At block 207, protection effect is evaluated based on the first parameter value, the second parameter value and the first self-perceived sensation information. Compared with classical self-assessment to evaluate protection efficacy on keratin material from chemical treatment, the disclosure can achieve an objective evaluation combined with subjective evaluation method.

In order to better understand the technical solutions of methods 100, 200, an embodiment will be given. In such an embodiment, we can take an area in ear back as the first test area and take some kind of scalp protector as protector composition to be used during the test. Before test, the first test area must be kept dry. Then, some steps are occurred as follows:

First, apply 0.08g scalp protector on one side of ear back, place the scalp protector in the center of the test area 2cm x 2cm with a scraper, and the scraper is at a 45-degree angle with the first test area. Gently spread the protector and slowly extend it to all sides, and evenly distribute the scalp protector in the first test area.

Second, apply 0.5g inducer agent on the 2cmx2cm for the first test area on ear back. Place the inducer agent above the scalp protector with a scraper, and the scraper is at a 45-degree angle with first test area. Gently spread the inducer agent and slowly extend it to all sides, and evenly distribute the inducer agent in the first test area. The inducer agent can be any chemical composition may cause irritation or discomfort to keratin material.

Third, remove the above applied scalp protector and the inducer agent respectively from the first test area in 5mins to 30mins, preferably in 5mins-15mins after the first step and the second step;

Fourth, image the first test area to obtain a plurality of first images and measure the first test area to obtain transepidermal water loss values of the keratin material;

Fifth, process the plurality of first images by a processor to obtain
5 redness values of the keratin material;

Finally, evaluate protection effect based on the redness values and transepidermal water loss values.

Further, we can observe the redness values and transepidermal water loss values on a display, thus the user can obtain protection effect in a fast
10 and more accurate manner.

In order to evaluate protection effect of a protector composition to be applied on keratin material of a user better, in an example, we can also consider some subjective factors. For example, after the third step, we can obtain the first self-perceived sensation information related to itching,
15 burning and stinging from the user. Finally, protection effect is evaluated based on the redness values, transepidermal water loss values and the first self-perceived sensation information. By so, an objective evaluation combined with subjective evaluation method for protector composition can be achieved.

20 Of course, we can also take an area of forearm as the first test area and the above steps are performed.

In order to better obtain protection effect compared with situations with no protector composition, Fig. 3 shows a flowchart of a method 300 of evaluating protection effect of a protector composition to be applied on
25 keratin material of a user in accordance with a third embodiment of a first aspect of the present disclosure. In an embodiment of Fig. 3, a second test area is selected as a reference area. As shown in Fig. 3, left branch in method 300 comprises blocks 301, 302, 303, 304, 305, which are the same as blocks 101, 102, 103, 104, 105 shown in Fig. 1. Thus, blocks 301, 302,
30 303, 304, 305 are not described in detailed. Similar to those described in Fig. 1, at block 304, the first test area is imaged to obtain a first parameter value which can be redness value; at block 305, the first test area is

measured to obtain a second parameter value which can be transepidermal water loss value of the keratin material. Order of performing blocks 304, 305 can be exchanged.

Right branch in method 300 comprises blocks 301', 303', 304', 305'.

- 5 Note that in order to keep reference numbers in other figures consistent, reference number 302' is not used. At block 301', the inducer agent which will cause redness and/or discomfort for keratin material of the user is directly applied on the second test area of the user. After a predefined time period, the applied inducer agent is removed from the second test area
- 10 shown at block 303'. In an example, the predefined time period can be from 5mins to 30mins, preferably from 5mins-15mins. At block 304', the second test area is imaged by an imaging device to obtain a third parameter value. In an example, such imaging device can be a camera, a mobile phone with imaging capability, a notebook with imaging capability and so
- 15 on.. In an example, the third parameter value can be a redness value of keratin material for the second test area. At block 305', the second test area is measured to obtain a fourth parameter value. In an example, block 305' can be performed by a device for testing transepidermal water loss values of the keratin material and the fourth parameter value can be
- 20 transepidermal water loss value of the keratin material. Order of performing blocks 304', 305' can be exchanged. Thus, the first parameter value and the third parameter value correspond to situations with the protector composition and without the protector composition respectively and are related to redness values for the keratin material. The second
- 25 parameter value and the fourth parameter value correspond to situations with the protector composition and without the protector composition respectively and are related to transepidermal water Loss values of the keratin material. At block 306, protection effect is evaluated by comparing the first parameter value and the third parameter value and comparing the
- 30 second parameter value and the fourth parameter value. In an example, change difference for redness value between the first parameter value and the third parameter value and change difference for transepidermal water

loss values between the second parameter value and the fourth parameter value can be obtained, which can reflect protection effect compared with situations with no protector composition in an intuition manner.

In order to better obtain protection effect compared with situations
5 with no protector composition, an objective evaluation combined with subjective evaluation method for protection effect of a protector composition to be applied on keratin material of a user is proposed. Fig. 4 illustrates a flowchart of a method 400 of evaluating protection effect of a protector composition to be applied on keratin material of a user in
10 accordance with a fourth embodiment of a first aspect of the present disclosure. In an embodiment of Fig. 4, a second test area is selected as a reference area. As shown in Fig. 4, left branch in method 400 comprises blocks 401, 402, 403, 404, 405 which are the same as blocks 201, 202, 203, 204, 205 shown in Fig. 2. Thus, blocks 401, 402, 403, 404, 405 are not
15 described in detail. Similar to those described in Fig. 2, at block 404, the first test area is imaged to obtain a first parameter value which can be redness value for the keratin material; at block 405, the first test area is measured to obtain a second parameter value which can be transepidermal water loss value of the keratin material. Order of performing blocks 404,
20 405 can be exchanged.

Right branch in method 400 comprises blocks 401', 403', 404', 405'. Note that in order to keep reference numbers in other figures consistent, reference number 402' is not used. At block 401', the inducer agent which will cause redness and/or discomfort for keratin material of the user is
25 directly applied on a second test area of the user. After a predefined time period, the applied inducer agent is removed from the second test area shown at block 403'. In an example, the predefined time period can be from 5mins to 30mins, preferably from 5mins-15mins. At block 405', the second test area is imaged by an imaging device to obtain a third parameter
30 value. In an example, the third parameter can be redness value of keratin material. In an example, such imaging device can be a camera, a mobile phone with imaging capability, a notebook with imaging capability and so

on. At block 405', the second test area is measured to obtain a fourth parameter value. In an example, block 405' can be performed by a device for testing transepidermal water Loss of the keratin material and the fourth parameter value can be transepidermal water loss value of the keratin material. At block 406, a first self-perceived sensation information for the first test area is obtained from the user after the block 403 of removing. At block 406', a second self-perceived sensation information for the second test area is obtained from the user after block 403' of removing. Order of performing blocks 404, 405, 406 can be exchanged. Order of performing blocks 404', 405', 406' can be exchanged. In an example, the first and the second self-perceived sensation information are information related to itching, burning and stinging. At block 407, protection effect is evaluated based on comparing results between the first parameter value and the third parameter value; comparing results between the second parameter value and the fourth parameter value and comparing results between the first self-perceived sensation information and the second self-perceived sensation information. Herein, the first parameter value and the third parameter value correspond to situations with protector composition and without protector composition respectively and are related to redness values for the keratin material. The second parameter value and the fourth parameter value correspond to situations with protector composition and without protector composition respectively and are related to transepidermal water loss values of the keratin material. In an example, change difference for redness value between the first parameter value and the third parameter value and change difference for transepidermal Water loss values between the second parameter value and the fourth parameter value can be obtained. Such change differences combined with self-perceived sensation information can reflect protection effect compared with situations with no protector composition in an intuition manner in terms of objective signs such as redness, and subjective signs such as itching, burning and stinging.

In order to better understand the technical solutions of methods 300,

400, an embodiment will be given. In such an embodiment, we can take two areas in ear back as a first test area and a second test area; take some kind of scalp protector as protector composition to be used during the test. Before test, the first test area and the second test area must be kept dry.

5 Then, some steps are occurred as follows:

First, apply 0.08g scalp protector on the first test area of ear back, place the scalp protector in the center of the test area 2cm x 2cm with a scraper, and the scraper is at a 45-degree angle with first test area. Gently spread the protector and slowly extend it to all sides, and evenly distribute
10 the scalp protector in the first test area.

Second, apply 0.5g inducer agent on the 2cmx2cm for the first test area on ear back. Place the inducer agent above the scalp protector with a scraper, and the scraper is at a 45-degree angle with first test area. Gently spread the inducer agent and slowly extend it to all sides, and evenly distribute the
15 inducer agent in the first test area. The inducer agent can be any chemical composition may cause irritation or discomfort to keratin material.

Further, similar step to second step is occurred in the second test area. Apply 0.5g inducer agent on the 2cmx2cm for the second test area on ear back. The scraper is at a 45-degree angle with second test area. Gently
20 spread the inducer agent and slowly extend it to all sides, and evenly distribute the inducer agent in the second test area.

Third, remove the above applied scalp protector and the inducer agent respectively from the first test area in 5mins to 30mins, preferably in 5mins-15mins after the first step and the second step. Further, remove the
25 above applied inducer agent from the second test area in 5mins to 30mins, preferably in 5mins-15mins after the similar step to the second step;

Fourth, image the first test area to obtain a plurality of first images and measure the first test area to obtain transepidermal water loss value of the keratin material. Further, image the second test area to obtain a
30 plurality of second images and measure the second test area to obtain transepidermal water loss value of the keratin material.

Fifth, process the plurality of first images and second images by a

processor to obtain redness values of the keratin material for the first test area and the second test area respectively;

Finally, evaluate protection effect based on comparing results of the redness values for the first test area and the second test area and comparing
5 results of transepidermal water loss values for the first test area and the second test area.

Further, we can observe the redness values and transepidermal water loss values for the first test area and the second test area in a histogram form on a display of a computing device, thus the user can obtain
10 protection effect compared with situations with no protector composition in an intuition manner.

In order to evaluate protection effect of a protector composition to be applied on keratin material of a user better, we can consider some subjective factors. For example, after the third step, we can obtain the first
15 and the second self-perceived sensation information related to itching, burning and stinging from the user. Finally, protection effect is evaluated based on the comparing results of redness values for the first test area and the second test area, comparing results of transepidermal water loss values for the first test area and the second test area and comparing results of the
20 first and second self-perceived sensation information. By so, an objective evaluation combined with subjective evaluation method for protector composition can be achieved.

Of course, we can also take an area of forearm as the second test area or take two areas of forearm as the first test area and the second area and
25 the above steps are performed.

In an embodiment of a third aspect of the disclosure, we can obtain protection effect of a plurality of different protector compositions in a faster and more accuracy manner. More particularly, we can select a plurality of test areas to be applied a plurality of different protector
30 compositions respectively and then applied the same inducer agent which will cause redness and/or discomfort for keratin material of the user on the applied different protector composition respectively. Then, steps of

removing, imaging and measuring are performed on the plurality of test areas similar to the above-mentioned steps. Thus, we will obtain a plurality set of parameter values for each of the plurality of test areas. In an example, such parameter values can be redness values and transepidermal water loss values and can be displayed in a histogram form on a display of a computing device. Based on such parameter values displayed on the display, we can obtain protection effect for different protector compositions in a faster, more intuitive and more accurate manner. In practice, redness measurement and self-assessment are more recommended on ear back and measuring transepidermal water loss values is more recommended on forearm. In a preferred embodiment for this situation, each of the plurality of different protector compositions is applied on each of a first plurality of test areas in ear back of the user and on each of a second plurality of test areas in forearm of the user respectively; inducer agents which will cause redness and/or discomfort for keratin material of the user is applied above each of the applied different protector compositions respectively; the applied different protector compositions and the applied inducer agents is removed from the first plurality of test areas and from the second plurality of test areas respectively; the first plurality of test areas is imaged by an imaging device to obtain a first plurality of parameter values; the second plurality of test areas by a device for testing transepidermal water loss value of the keratin material is measured to obtain a second plurality of parameter values; and protection effect is evaluated based on the first plurality of parameter values and the second plurality of parameter values. In an embodiment, the first plurality of parameter values are redness values of the keratin material in ear back; the second plurality of parameter values are transepidermal water loss values of the keratin material in forearm.

In order to evaluate protection effect of the plurality of protector compositions to be applied on keratin material of a user better, we can consider some subjective factors. In an embodiment of the third aspect, we can obtain the plurality of self-perceived sensation information related to

itching, burning and stinging from the user for the plurality of test areas, which can be displayed in percentage form, in a histogram form or in other form on a display. Finally, protection effect is evaluated based on the comparing results of redness values for the plurality of test areas, 5 comparing results of transepidermal water loss values for the plurality of test areas and comparing results of the plurality of sensation information. By so, an objective evaluation combined with subjective evaluation method for the plurality of protector compositions can be achieved. In practice, redness measurement and self-assessment are more recommended 10 on ear back. Thus, in a preferred embodiment for this situation, a first plurality of self-perceived sensation information for the first plurality of test areas from the user is obtained after the step of removing the applied different protector compositions and the applied inducer agents from the first plurality of test areas. Protection effect for a plurality of different 15 protector products is evaluated based on the first plurality of parameter values, the second plurality of parameter values and the first plurality of self-perceived sensation information. In an embodiment, the first plurality of parameter values are redness values of the keratin material in ear back; the second plurality of parameter values are transepidermal water loss 20 values of the keratin material in forearm. In an embodiment, the first plurality of self-perceived sensation information are information related to itching, burning and stinging.

In order to obtain protector effect compared with no protector compositions, in an embodiment for the third aspect, we also select a new 25 test area as a test area without applying any protector compositions. Such new test area can be applied the inducer agent directly. Then, steps of removing, imaging and measuring are performed on the new test area similar to the above-mentioned steps. Further, redness values and transepidermal water loss value for the new test area can be obtained, 30 which can also be displayed in a histogram form on a display. Based on these parameter values with applying protector compositions and without applying protector compositions, we can obtain protection effects

compared with no protector compositions easily and quickly. In a preferred example, differences between these parameter values with applying protector compositions and without applying protector compositions can be displayed on the display. By observing such differences, protector effect
5 can be recognized more easily. In practice, redness measurement and self-assessment are more recommended on ear back. Thus, in a preferred embodiment for this situation, the inducer agents are applied on a third test area in ear back of the user and on a fourth test area in forearm of the user directly; the applied inducer agents are removed from the third test area
10 and the fourth test area after a predefined time period such as 5mins-15mins; the third test area is imaged by the imaging device to obtain a third parameter value; the fourth test area is measured by the device for testing transepidermal water loss of the keratin material to obtain a fourth parameter value; protection effect is evaluated by comparing the first
15 plurality of parameter values and the third parameter values and comparing the second plurality of parameter values and the fourth parameter value. In an embodiment, the first plurality of parameter values and the third parameter value are redness values of the keratin material in ear back; the second plurality of parameter values and the fourth parameter value are
20 transepidermal water loss values of the keratin material in forearm.

In order to obtain protector effect compared with no protector compositions, in an embodiment for the third aspect, we also select a new test area as a test area without applying any protector compositions. We can obtain a self-perceived sensation information related to itching,
25 burning and stinging from the user for the new test area, which can be displayed in percentage form, in a histogram form or in other form on a display. Then, steps of removing, imaging and measuring are performed on the new test area similar to the above-mentioned steps. Further, redness values and transepidermal water loss value for the new test area can be
30 obtained, which can also be displayed in a histogram form on a display. Based on these parameter values obtained with applying protector compositions and without applying protector compositions, we can obtain

protection effects compared with no protector compositions easily and quickly. In a preferred example, differences between these parameter values obtained with applying protector compositions and without applying protector compositions and comparing results between some self-perceived sensation information can be displayed on the display. By observing such differences, protector effect can be recognized more easily. In practice, redness measurement and self-assessment are more recommended on ear back. Thus, in a preferred embodiment for this situation, a third self-perceived sensation information for the third test area is also obtained after the step of removing the applied inducer agent from the third test area; wherein the evaluating step also comprising evaluating protection effect by comparing the first plurality of parameter values and the third parameter values; comparing the second plurality of parameter values and the fourth parameter value; and comparing the first plurality of self-perceived sensation information and the third self-perceived sensation information. In an embodiment, the first plurality of parameter values and the third parameter values are redness values of the keratin material in ear back; the second plurality of parameter values and the fourth parameter value are transepidermal water loss values of the keratin material in forearm. In an embodiment, the first plurality of self-perceived sensation information and the third self-perceived sensation information are information related to itching, burning and stinging.

In the context of the disclosure, the amounts of protector composition and the inducer agent to be applied and size of test area are only example and are not limited to the above-mentioned values. Preferably, the protector composition is applied in about $0.01\text{g}-0.1\text{g}/\text{cm}^2$ and the inducer agent is applied in about $0.01\text{g}-1\text{g}/\text{cm}^2$.

Fig. 5 illustrates a block diagram of a computing device 500 of evaluating protection effect of a protector composition to be applied on keratin material of a user in accordance with a second aspect of the present disclosure.

The computing device 500 comprises an imaging device 501, a

measurement unit 502 and processor 503. The imaging device 501 includes computational circuitry configured to image a first test area of keratin material of the user to obtain a plurality of first images. The measurement unit 502 includes computational circuitry configured to measure the first test area to obtain a second parameter value. The processor 503 includes computational circuitry configured to obtain a first parameter value for the first test area and evaluate protection effect based on the first parameter value and the second parameter value.

Before imaging the first test area, several steps are performed. First, a protector composition is applied on the first test area of keratin material of the user. In the context of the disclosure, the protector composition can be a protection product for keratin material of the user. In an example, the test area can be one of ear back, forearm and any area of the user body. Next, an inducer agent which will cause redness and/or discomfort for keratin material of the user is applied above the applied protector composition. The inducer agent can be those with high pH ingredient and risk to induce keratin material redness and discomfort. Next, the applied protector composition and the applied inducer agent are removed from the first test area within a predefined time period after applying the inducer agent. In an example, the predefined time period can be from 5mins to 30mins, preferably from 5mins-15mins. In an example, such imaging device can be a mobile phone with imaging capability, a notebook with imaging capability and so on. In an example, the measurement unit can be a device for testing transepidermal water loss value of the keratin material and the second parameter value can be transepidermal water loss value of the keratin material. More particularly, the images are processed to obtain redness value of keratin material. By such computing device, protection effect such as redness and discomfort of protector composition for keratin material can be obtained in a fast and objective manner.

In order to evaluate protection effect of a protector composition to be applied on keratin material of a user better, the disclosure relates to an objective evaluation combined with subjective evaluation method for

protection effect of a protector composition to be applied on keratin material of a user. In an example, the processor 503 includes computational circuitry configured to also receive a first self-perceived sensation information for the first test area from the user after the applied composition and the applied inducer agent are removed from the first test area; and evaluate protection effect based on the first parameter value, the second parameter value and the first self-perceived sensation information. In an example, the first parameter value is related to redness value and the second parameter value is related to transepidermal water loss value. In an example, the first self-perceived sensation information is information related to itching, burning and stinging.

In order to better obtain protection effect compared with situations with no protector composition, in an embodiment, a second test area is selected as a reference area and the agent which will cause redness and/or discomfort for keratin material of the user is directly applied on the second test area of the user. After a predefined time period, the applied inducer agent is removed from the second test area. In an example, the predefined time period can be from 5mins to 30mins, preferably from 5mins-15mins. Then, the second test area is imaged by an imaging device 501 to obtain a plurality of first images. The processor 502 processes the images for the second test area to obtain a third parameter value. In an example, such imaging device 501 can be a camera, a mobile phone with imaging capability, a notebook with imaging capability and so on. Then, the second test area is measured to obtain a fourth parameter value by a measurement unit 502 such as a device for testing transepidermal water loss value of the keratin material and the fourth parameter value can be transepidermal water loss value of the keratin material. Herein, the first parameter value and the third parameter value correspond to situations with protector composition and without protector composition respectively and are related to redness values. The second parameter value and the fourth parameter value correspond to situations with protector composition and without protector composition respectively and are related to transepidermal water

loss values of the keratin material. The processor 503 is configured to evaluate protection effect by comparing the first parameter value and the third parameter value and comparing the second parameter value and the fourth parameter value. In an example, change difference for redness value
5 between the first parameter value and the third parameter value and change difference for transepidermal water loss values between the second parameter value and the fourth parameter value can be obtained and can be displayed in a histogram form on a display of the computing device, which can reflect protection effect compared with situations with no protector
10 composition in an intuition manner.

In order to better obtain protection effect compared with situations with no protector composition, an objective evaluation combined with subjective evaluation method for protection effect of a protector composition to be applied on keratin material of a user is proposed. In an
15 example, a second test area is selected as a reference area.

The inducer agent which will cause redness and/or discomfort for keratin material of the user is directly applied on the second test area of the user. After a predefined time period, the applied inducer agent is removed from the second test area. In an example, the predefined time period can be
20 from 5mins to 30mins, preferably from 5mins-15mins. Then, the second test area is imaged by an imaging device 501 to obtain a plurality of second images for the second test area. The processor 503 processes the plurality of second images to obtain a third parameter value. The second test area is measured to obtain a fourth parameter value by a measurement unit 502
25 such as a device for testing transepidermal water loss value of the keratin material and the fourth parameter value can be transepidermal water loss value of the keratin material. The first self-perceived sensation information for the first test area is obtained from the user after removing the applied protector composition and applied inducer agent from the first test area and
30 the second self-perceived sensation information for the second test area is obtained from the user after removing the applied inducer agent from the second test area. In an example, the first and the second self-perceived

sensation information are information related to itching, burning and stinging. Herein, the first parameter value and the third parameter value correspond to situations with protector composition and without protector composition respectively and are related to redness values for keratin material. The second parameter value and the fourth parameter value correspond to situations with protector composition and without protector composition respectively and are related to transepidermal water loss values of the keratin material. In an embodiment, the processor 503 is also configured to evaluate protection effect based on comparing results between the first parameter value and the third parameter value; comparing results between the second parameter value and the fourth parameter value and comparing results between the first self-perceived sensation information and the second self-perceived sensation information. In an example, change difference for redness value between the first parameter value and the third parameter value and change difference for transepidermal water loss values between the second parameter value and the fourth parameter value can be obtained. Such change differences combined with self-perceived sensation information can reflect protection effect compared with situations with no protector composition in an intuition manner in terms of objective signs such as redness and subjective signs such as itching, burning and stinging.

Computing device 500 can be, for example, a server of a service provider, a device associated with a client (e.g, a client device), a system on a chip, and/or any other suitable computing device or computing system. In various implementations, computing device 500 can take a variety of different configurations. For example, computing device 500 can be implemented as a computer-like device including a personal computer, desktop computer, multi-screen computer, laptop computer, netbook, and the like. Computing device 500 can also be implemented as a mobile device-like device that includes mobile devices such as mobile phones, portable music players, portable gaming devices, tablet computers, multi-screen computers, and the like. Computing device 500 can also be

implemented as a television-like device that includes a device having or connected to a generally larger screen in a casual viewing environment. These devices include televisions, set-top boxes, game consoles, and the like.

5 In an embodiment, computational circuitry includes, among other things, one or more computing devices such as a processor (e.g., a microprocessor, a quantum processor, qubit processor, etc.), a central processing unit (CPU), a digital signal processor (DSP), an application-specific integrated circuit (ASIC), a field programmable gate
10 array (FPGA), and the like, or any combinations thereof, and can include discrete digital or analog circuit elements or electronics, or combinations thereof. In an embodiment, computational circuitry includes one or more ASICs having a plurality of predefined logic components. In an embodiment, computational circuitry includes one or more FPGAs, each
15 having a plurality of programmable logic components.

In an embodiment, computation circuitry includes one or more electric circuits, printed circuits, flexible circuits, electrical conductors, electrodes, cavity resonators, conducting traces, ceramic patterned electrodes, electro-mechanical components, transducers, and the like.

20 In an embodiment, computational circuitry includes one or more components operably coupled (e.g., communicatively, electromagnetically, magnetically, ultrasonically, optically, inductively, electrically, capacitively coupled, wirelessly coupled, and the like) to each other. In an embodiment, circuitry includes one or more remotely located components.
25 In an embodiment, remotely located components are operably coupled, for example, via wireless communication. In an embodiment, remotely located components are operably coupled, for example, via one or more communication modules, receivers, transmitters, transceivers, and the like.

In an embodiment, computation circuitry includes memory that, for
30 example, stores instructions or information. Non-limiting examples of memory include volatile memory (e.g., Random Access Memory (RAM), Dynamic Random Access Memory (DRAM), and the like), non-volatile

memory (e.g., Read-Only Memory (ROM), Electrically Erasable Programmable Read-Only Memory (EEPROM), Compact Disc Read-Only Memory (CD-ROM), and the like), persistent memory, and the like. Further non-limiting examples of memory include Erasable Programmable
5 Read-Only Memory (EPROM), flash memory, and the like. In an embodiment, memory is coupled to, for example, one or more computing devices by one or more instructions, information, or power buses. In an embodiment, computational circuitry includes one or more databases stored in memory. In an embodiment, computational circuitry includes one
10 or more look-up tables stored in memory.

In an embodiment, computational circuitry includes one or more computer-readable media drives, interface sockets, Universal Serial Bus (USB) ports, memory card slots, and the like, and one or more input/output components such as, for example, a graphical user interface, a display, a
15 keyboard, a keypad, a trackball, a joystick, a touch-screen, a mouse, a switch, a dial, and the like, and any other peripheral device. In an embodiment, computational circuitry includes one or more user input/output components that are operably coupled to at least one computing device configured to control (electrical, electromechanical,
20 software-implemented, firmware-implemented, or other control, or combinations thereof) at least one parameter associated with, for example, determining one or more tissue thermal properties responsive to detected shifts in turn-on voltage.

In an embodiment, computational circuitry includes electrical
25 circuitry forming a general purpose computing device configured by a computer program (e.g., a general purpose computer configured by a computer program which at least partially carries out processes and/or devices described herein, or a microprocessor configured by a computer program which at least partially carries out processes and/or devices
30 described herein), electrical circuitry forming a memory device (e.g., forms of memory (e.g., random access, flash, read only, etc.)), electrical circuitry forming a communications device (e.g., a modem, communications switch,

optical-electrical equipment, etc.), and/or any non-electrical analog thereto, such as optical or other analogs.

An embodiment of the disclosure may be an article of manufacture in which a non-transitory machine-readable medium (such as microelectronic
5 memory) has stored thereon instructions (e.g., computer code) which program one or more data processing components (generically referred to here as a “processor”) to perform the operations described above. In other embodiments, some of these operations might be performed by specific hardware components that contain hardwired logic (e.g., dedicated digital
10 filter blocks and state machines). Those operations might alternatively be performed by any combination of programmed data processing components and fixed hardwired circuit components.

While the embodiments have been illustrated and described herein, it will be understood by those skilled in the art that various changes and
15 modifications may be made, and equivalents may be substituted for elements thereof without departing from the true scope of the present technology. In addition, many modifications may be made to adapt to a particular situation and the teaching herein without departing from its central scope. Therefore it is intended that the present embodiments not be
20 limited to the particular embodiment disclosed as the best mode contemplated for carrying out the present technology, but that the present embodiments include all embodiments falling within the scope of the appended claims.

CLAIMS

1. A method for evaluating protection effect of a protector composition to be applied on keratin material of a user, the method comprising the steps of:

- applying the protector composition on a first test area of keratin material of the user;

- applying an inducer agent which will cause redness and/or discomfort for keratin material of the user above the applied protector composition;

- removing the applied protector composition and the applied inducer agent from the first test area;

- imaging the first test area by an imaging device to obtain a first parameter value;

- measuring the first test area by a device for testing transepidermal water loss value of the keratin material to obtain a second parameter value; and

- evaluating protection effect based on the first parameter value and the second parameter value.

2. The method according to claim 1, also comprising the steps of:

- obtaining a first self-perceived sensation information for the first test area from the user after the step of removing the applied protector composition and the applied inducer agent from the first test area; and

- evaluating protection effect based on the first parameter value, the second parameter value and the first self-perceived sensation information.

3. The method according to claim 1, also comprising the steps of:

- applying the inducer agent on a second test area of the user directly;

- removing the applied inducer agent from the second test area;

- imaging the second test area by the imaging device to obtain a third parameter value;

- measuring the second test area by the device for testing transepidermal water loss of the keratin material to obtain a fourth

parameter value; and

-evaluating protection effect by comparing the first parameter value and the third parameter value and comparing the second parameter value and the fourth parameter value.

5 4. The method according to claim 3, also comprising the steps of:

- obtaining a first self-perceived sensation information for the first test area after the step of removing the applied protector composition and the applied inducer agent from the first test area; and

10 - obtaining a second self-perceived sensation information for the second test area from said user after the step of removing the applied inducer agent from the second test area;

wherein the evaluating step also comprising evaluating protection effect based on comparing results between the first parameter value and the third parameter value, comparing results between the second parameter value and the fourth parameter value; and comparing result between the first self-perceived sensation information and the second self-perceived sensation information.

5. The method according to any one of claims 1-4, wherein the steps of imaging comprising:

20 -imaging the first and second test areas by the imaging device to obtain a plurality of first images and a plurality of second images; and

-processing the plurality of first images and the plurality of second images to obtain redness values of the keratin material for the first and second test areas.

25 6. The method of any one of claims 1-4, wherein the steps of measuring comprising:

-measuring the first and second test areas by the device for testing trans epidermal water loss of the keratin material;

30 -obtaining transepidermal water loss values of the keratin material for the first and second test areas; and

-displaying the transepidermal water loss values on a display of the device.

7. The method according to any one of claims 1 to 4, wherein the first test area and the second test area can be one of ear back, forearm and any area of the keratin material.

8. The method according to any one of claims 1 to 4, wherein the first parameter value and the third parameter value are redness values of the keratin material; the second parameter value and the fourth parameter value are transepidermal water loss values of the keratin material.

9. The method according to any one of claims 1 to 4, wherein the steps of removing are performed in about 5-15mins after the steps of applying the inducer agent above the applied protector composition on the first test area and applying the inducer agent on the second test area directly.

10. The method according to any one of claims 2 to 4, wherein the first self-perceived sensation information and the second self-perceived sensation information are information related to itching, burning and stinging.

11. The method according to any one of claims 1 to 10, wherein the protector composition is applied in about $0.01\text{g}-0.1\text{g}/\text{cm}^2$, and the inducer agent is applied in about $0.1\text{g}-1\text{g}/\text{cm}^2$.

12. A computing device for evaluating protection effect of a protector composition to be applied on keratin material of a user, comprising:

- an imaging device including computational circuitry configured to image a first test area of keratin material of the user to obtain a plurality of first images;

- a measurement unit including computational circuitry configured to measure the first test area to obtain a second parameter value;

- a processor including computational circuitry configured to process the plurality of first images for the first test area to obtain a first parameter value and evaluate protection effect based on the first parameter value and the second parameter value;

wherein before imaging the first test area, the first test area is applied

a protector composition; then is applied an inducer agent which will cause redness and/or discomfort for keratin material of the user above the applied protector composition, finally the applied protector composition and the applied inducer agent are removed from the first test area.

5 13. The computing device according to claim 12, wherein the processor includes computational circuitry configured to also receive a first self-perceived sensation information for the first test area from the user after the applied protector composition and the applied inducer agent are removed from the first test area; and evaluate protection effect based on
10 the first parameter value, the second parameter value and the first self-perceived sensation information.

14. The computing device according to claim 12, wherein the imaging device includes computational circuitry configured to also image a second test area to obtain a plurality of second images;

15 the measurement unit includes computational circuitry configured to measure the second test area to obtain a fourth parameter value; and

the processor includes computational circuitry configured to process the plurality of second images for the second test area to obtain a third parameter value and evaluate protection effect by comparing the first
20 parameter value and the third parameter value and comparing the second parameter value and the fourth parameter value;

wherein before imaging the second test area, the second test area is applied the inducer agent directly; then the applied inducer agent is removed from the second test area.

25 15. The computing device according to claim 14, wherein the processor includes computational circuitry configured to receive a first self-perceived sensation information for the first test area from the user after the applied protector composition and the applied inducer agent are removed from the first test area and also receive a second self-perceived
30 sensation information for the second test area from said user after the applied inducer agent is removed from the second test area; and evaluate protection effect based on comparing results between the first parameter

value and the third parameter value, comparing results between the second parameter value and the fourth parameter value; and comparing results between the first self-perceived sensation information and the second self-perceived sensation information.

5 16. The computing device according to any one of claims 12 to 15, wherein the measuring unit is a device for testing transepidermal water loss value of the keratin material.

10 17. The computing device according to any one of claims 12 to 15, wherein the first test area and the second test area can be one of ear back, forearm and any area of the keratin material.

15 18. The computing device according to any one of claims 12 to 15, wherein the first parameter value and the third parameter value are redness values of the keratin material; the second parameter value and the fourth parameter value are transepidermal water loss values of the keratin material.

19. The computing device according to any one of claims 12 to 18, wherein the first self-perceived sensation information and the second self-perceived sensation information are information related to itching, burning and stinging.

20 20. A computer readable medium having stored thereon instructions that when executed cause a computing device to perform the method according to one of claims 1-11.

25 21. A method for evaluating protection effect of a plurality of different protector compositions to be applied on keratin material of a user, the method comprising the steps of:

- applying each of the plurality of different protector compositions on each of a first plurality of test areas in ear back of the user and on each of a second plurality of test areas in forearm of the user respectively;

30 - applying inducer agents which will cause redness and/or discomfort for keratin material of the user above each of the applied different protector compositions respectively;

- removing the applied different protector compositions and the

applied inducer agents from the first plurality of test areas and from the second plurality of test areas respectively;

- imaging the first plurality of test areas by an imaging device to obtain a first plurality of parameter values;

5 - measuring the second plurality of test areas by a device for testing transepidermal water loss value of the keratin material to obtain a second plurality of parameter values; and

- evaluating protection effect based on the first plurality of parameter values and the second plurality of parameter values.

10 22. The method according to claim 21, also comprising the steps of:

- obtaining a first plurality of self-perceived sensation information for the first plurality of test areas from the user after the step of removing the applied different protector compositions and the applied inducer agents from the first plurality of test areas; and

15 - evaluating protection effect based on the first plurality of parameter values, the second plurality of parameter values and the first plurality of self-perceived sensation information.

23. The method according to claim 21, also comprising the steps of:

20 - applying the inducer agents on a third test area in ear back of the user and on a fourth test area in forearm of the user directly;

- removing the applied inducer agents from the third test area and the fourth test area;

- imaging the third test area by the imaging device to obtain a third parameter value;

25 - measuring the fourth test area by the device for testing transepidermal water loss of the keratin material to obtain a fourth parameter value; and

30 -evaluating protection effect by comparing the first plurality of parameter values and the third parameter values and comparing the second plurality of parameter values and the fourth parameter value.

24. The method according to claim 23, also comprising the steps of:

- obtaining a third self-perceived sensation information for the third

test area after the step of removing the applied inducer agent from the third test area;

wherein the evaluating step also comprising evaluating protection effect by comparing the first plurality of parameter values and the third parameter values; comparing the second plurality of parameter values and the fourth parameter value; and comparing the first plurality of self-perceived sensation information and the third self-perceived sensation information.

25. The method according to any one of claims 21 to 24 , wherein the first plurality of parameter values and the third parameter value are redness values of the keratin material in ear back; the second plurality of parameter values and the fourth parameter value are transepidermal water loss values of the keratin material in forearm.

26. The method according to any one of claims 21 to 24, wherein the steps of removing are performed in about 5-15mins after the steps of applying the inducer agents above the applied different protector compositions on the first plurality of test areas and on the second plurality of test areas and applying the inducer agents on the third test area and on the fourth test area directly.

27. The method according to any one of claims 22 to 24, wherein the first plurality of self-perceived sensation information and the third self-perceived sensation information are information related to itching, burning and stinging.

28. The method according to any one of claims 21 to 27, wherein the different protector compositions are applied in about $0.01\text{g}-0.1\text{g}/\text{cm}^2$, and the inducer agents are applied in about $0.1\text{g}-1\text{g}/\text{cm}^2$.

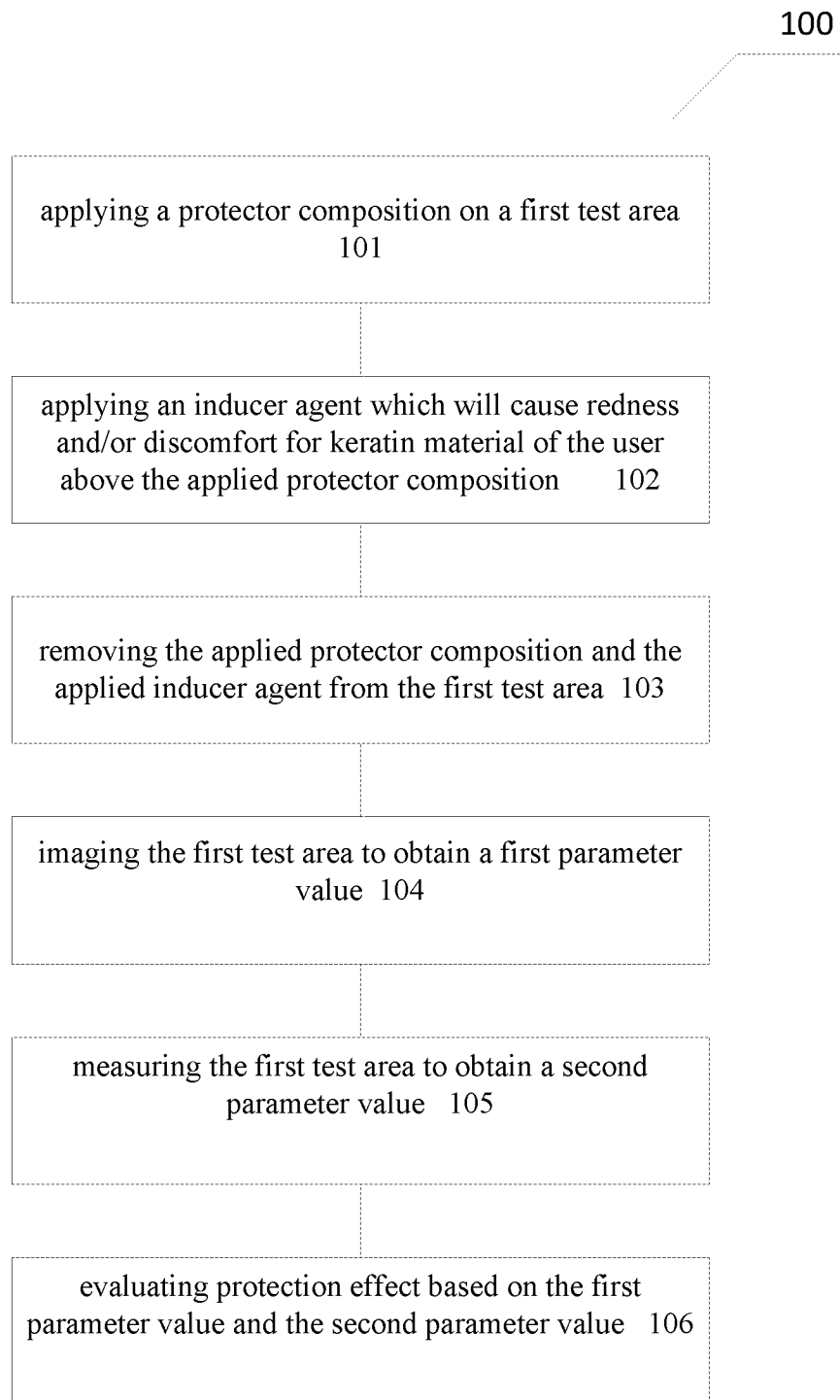


Fig.1

200

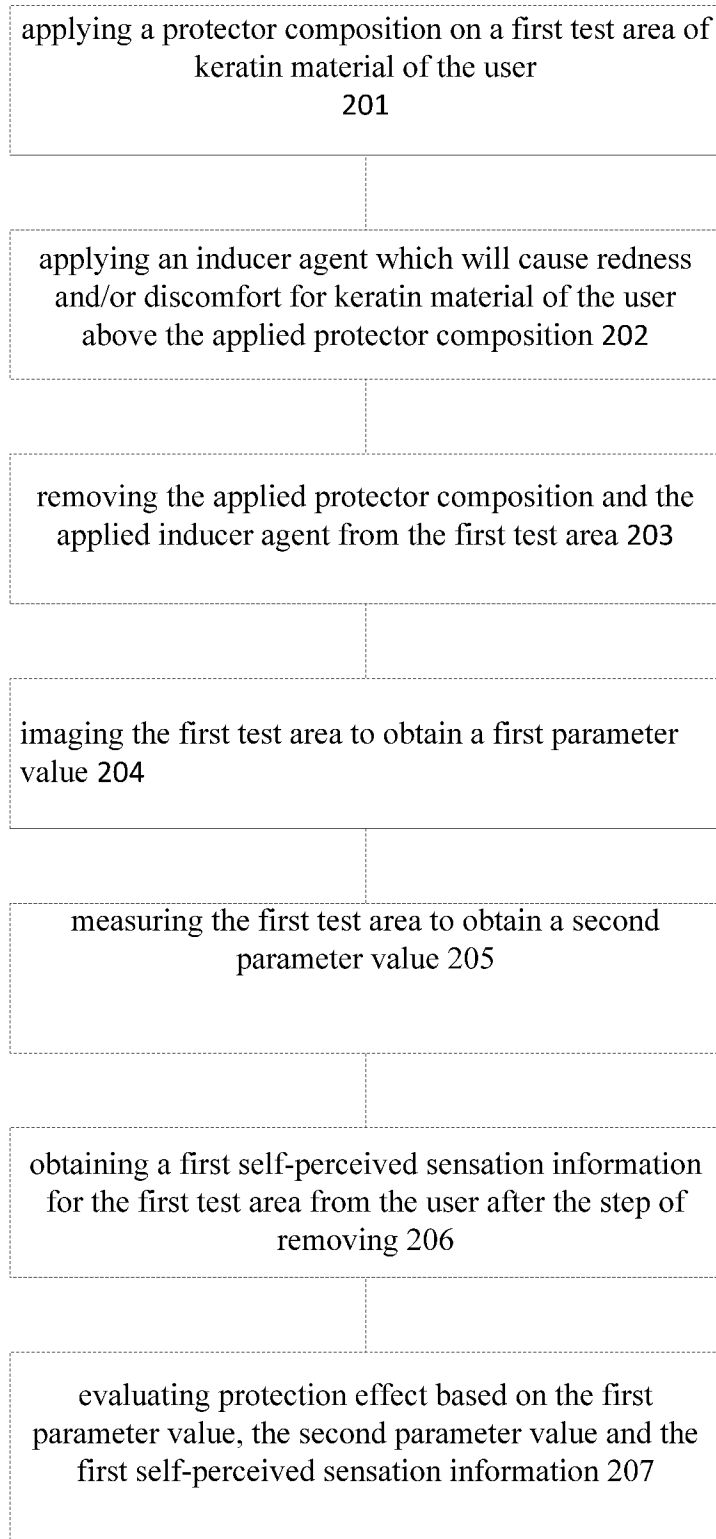


Fig.2

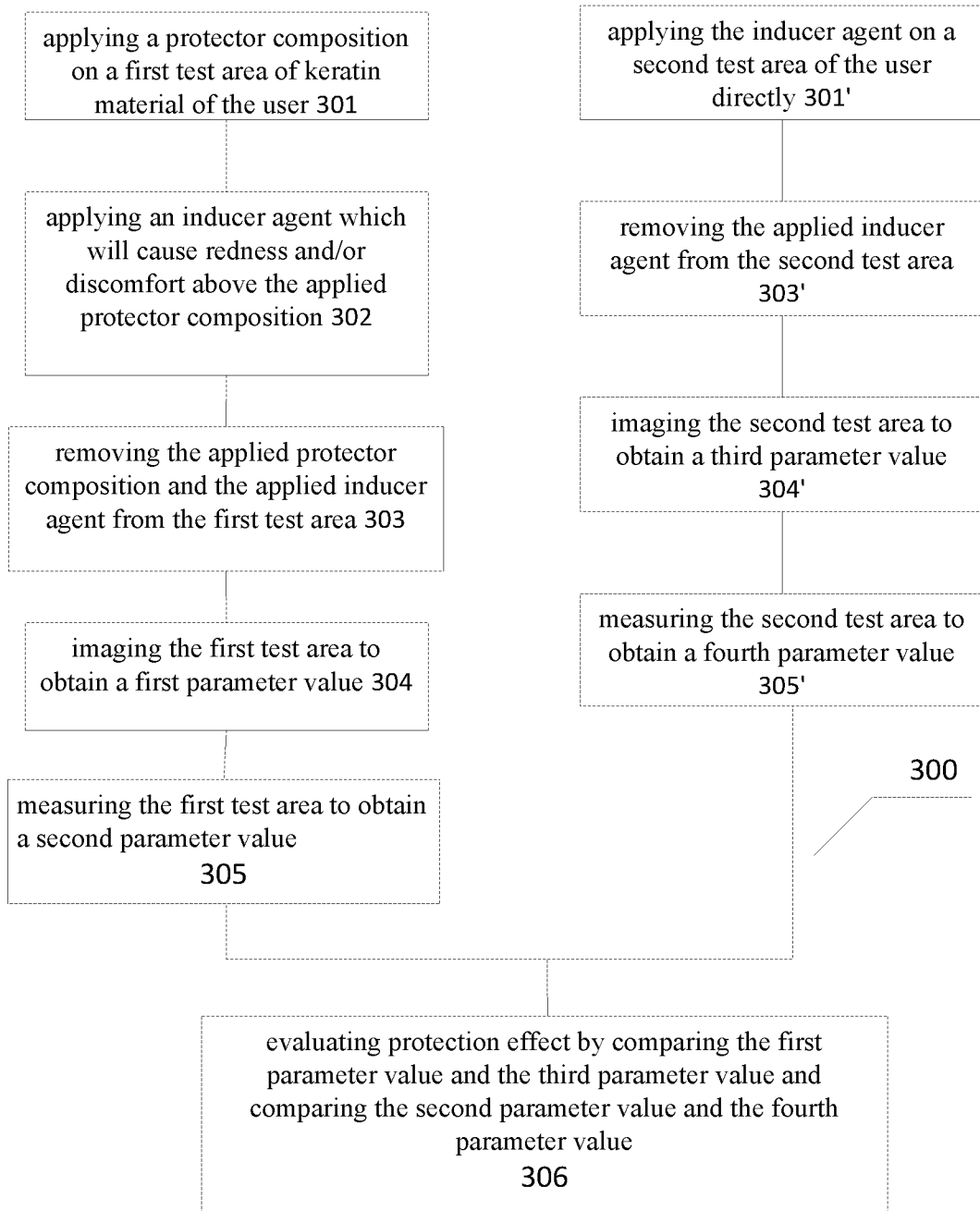


Fig.3

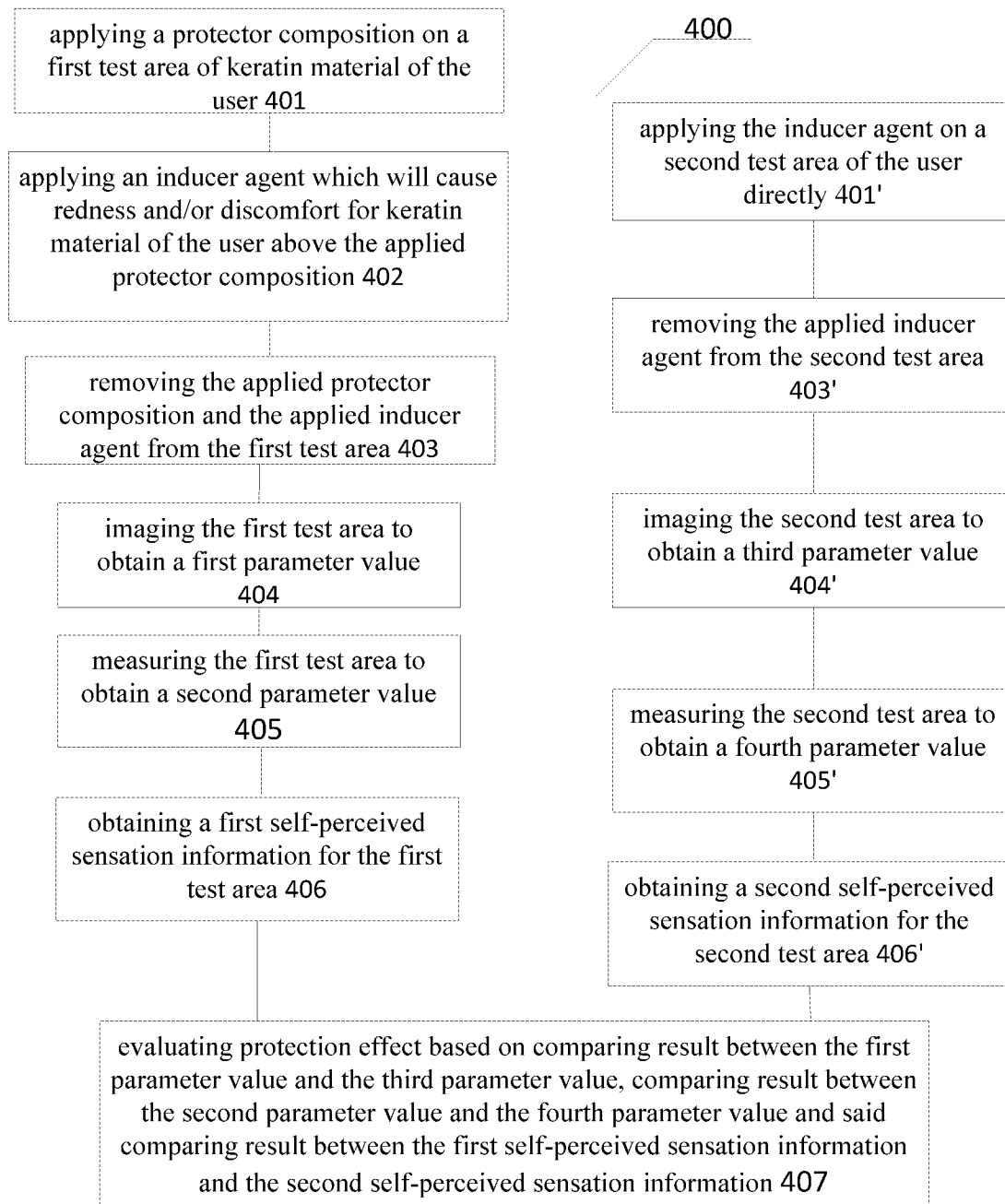


Fig.4

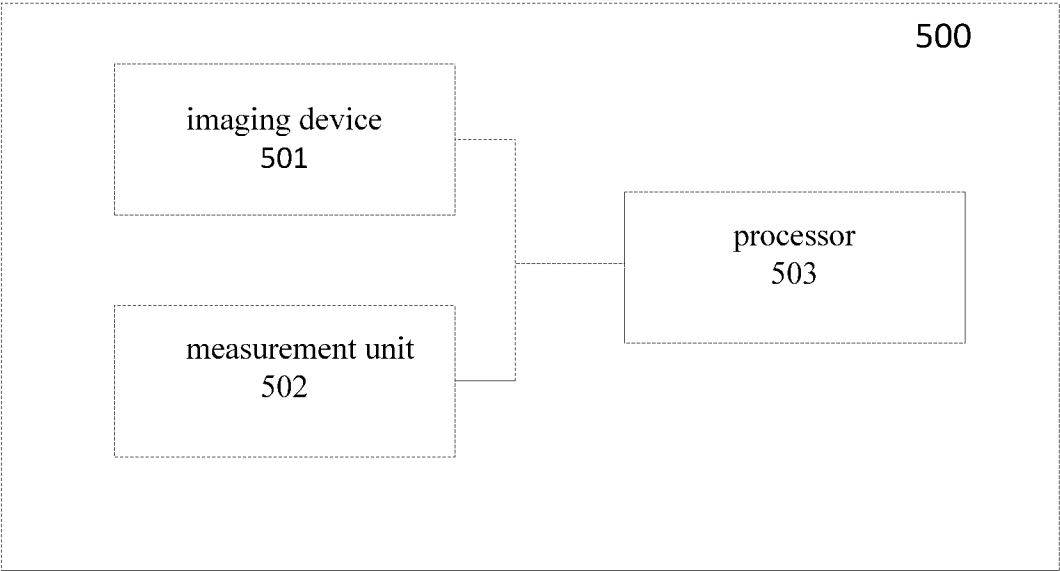


Fig.5

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2022/102230

A. CLASSIFICATION OF SUBJECT MATTER

A61Q 19/00(2006.01)i

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)

A61Q 19

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

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

CNTXT,ENTXT,VEN transepidermal, water,loss, imag+,lactic acid,capsaicin,evaluat+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2018071190 A1 (GCT GMBH) 15 March 2018 (2018-03-15) description, paragraphs 0178-0202	1-28
Y	CN 111249209 A (GUANGDONG BAWEI BIOTECHNOLOGY CO LTD) 09 June 2020 (2020-06-09) description, paragraphs 0080-0096	1-28
Y	WO 2018193565 A1 (KAO CORP) 25 October 2018 (2018-10-25) description, paragraph 0040	12-20
Y	CN 103284909 A (Xue Yujia) 11 September 2013 (2013-09-11) description, paragraphs 0041-0047	1-28
A	US 2016374917 A1 (COR S A R L) 29 December 2016 (2016-12-29) the whole document	1-28



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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“D” document cited by the applicant in the international application

“E” earlier application or patent but published on or after the international filing date

“L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

“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

23 March 2023

Date of mailing of the international search report

24 March 2023

Name and mailing address of the ISA/CN

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2022/102230

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