IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Utility Patent Application (Non-Provisional)

TITLE

An adjustable therapeutic face mask

FIELD OF THE INVENTION

[0001] The present invention relates to a therapeutic device. More particularly, the present invention relates to a therapeutic full face light therapy mask for providing light therapy to a user's skin. A further and more specific aspect of the present invention relates to a therapeutic face mask having a plurality of light emitting diodes (LEDs) for providing multi-wavelength light spectrum with various intensities to a user's skin.

BACKGROUND OF THE INVENTION

[0002] Various devices have been known in the prior art that are used for skin therapy, skin rejuvenation, and other beauty treatment purposes. These devices are able to provide significantly enhanced biological and/or therapeutic results. Accordingly, the use of light therapy to enhance the characteristics of the skin is widely accepted. However, various devices available for applying electrical energy to the skin are having significant structural and functional shortcomings.

[0003] Presently, most of the known light therapy devices are providing light energy to the skin via light therapy tubes that engage with the surface of the user's skin, either directly or indirectly. This process can be quite uncomfortable for a user in case of a light tube directly contacting the user's skin and can result in irritation of the skin after prolonged contact. The therapeutic benefits of the aforementioned devices take place substantially within the area where the light tubes are in contact with the skin. Further, the devices which provide indirect contact of the light tube with the skin via an intermediate layer in between are not able to disperse the desired light intensity due to loss of light in the intermediate

layer. As a result, beneficial light therapy becomes unevenly distributed and ineffective to the user.

[0004] There are some light therapy devices which are not having battery thereby requiring an electrical connector to be coupled with an external electric power supply which is not possible always.

[0005] The light therapy face mask known in the prior art do not enable the face mask to have communication with an external device in order to perform a plurality of functions.

[0006] The light therapy face mask products which are available in the market are of fixed size and are hand-held type devices. These hand-held type face masks have proven quite less satisfactory in providing the best or desired light dispersion. The alternative is a customer visiting a doctor to receive light treatment which is neither convenient nor affordable.

[0007] A hands-free therapeutic experience is always better than the device to be held in a particular position for extended periods of time during the therapy. Numerous assemblies have been conceived for mounting face mask devices by varieties of straps, bands, wraps, and cords which can result in a pressing of the support and mounting assembly closely against the head or back side neck area of a patient. There is always a need to minimize the extent of such mounting and supporting assemblies in order to make their impact on the patient thereby enhancing the patient's comfort during the therapy. Customers always rely on those face mask light therapy products which are light-weight and which require minimal supporting means during the therapeutic usage. As a user's face comes in different shape and size, the face mask should also be able to adjust according to the user's face shape and size in order to have an efficient therapeutic application of the face mask on the desired area on the face of the user. Additionally, the currently available devices for facial treatment are using separate patches which must rest on the eye area of a user so as to block the light from the light tubes inside the mask.

[0008] Therefore, there is a long felt need for an improved face mask for light therapy that can be readily adaptable to communicate therapeutic light to areas near the eyes thereby preventing any possible causation of damage to the eyes of a patient.

OBJECTS OF THE PRESENT INVENTION

[0009] It would be highly advantageous, therefore, to alleviate the shortcomings and the deficiencies inherent in the prior art. Few of the objects of the present invention are listed below:

- It is an object of the present invention to provide a therapeutic face mask which provides light therapy to a plurality of disorders of the facial skin of a user;
- It is another object of the present invention to provide a therapeutic face mask that is easy to use;
- It is a further object of the present invention to provide a therapeutic face mask that can be placed on a user's face and that can be made to disperse different colors and intensities of light based on the user's input;
- It is an additional object of the present invention to provide a therapeutic face mask which prevents the direct contact of the light tubes with the user's skin;
- It is a further object of the present invention to provide a therapeutic face mask that is comfortable to use and does not require to be held in a particular position when used by a user;
- It is still further object of the present invention to provide a therapeutic face mask that allows therapeutic light to be evenly and uniformly dispersed over the facial skin of a user;
- It is another object of the present invention to provide a therapeutic face mask that can be connected to an external device having a software application to control a plurality of characteristics of the light without removing the face mask from a user's face;

- It is yet another object of the present invention to provide a therapeutic face mask that is having an internal rechargeable power supply unit;
- It is a further object of the present invention to provide a therapeutic face mask which prevents the light illumination near a user eyes area to avoid light damage or irritation to a patient's or user's eyes;
- It is another object of the present invention to provide a therapeutic face mask which allows a user to perform another task when undergoing light therapy; and
- It is another object of the present invention to provide a therapeutic face mask utilizing a multi-wavelength spectrum of light with variable intensities to stimulate the development of collagen and to destroy the acne causing bacteria on the facial area of a user.

Other objects, aspects, features, and goals of the present invention will be better understood from the detailed description of the present invention.

SUMMARY OF THE INVENTION

[0010] It should be understood that the present invention disclosure is not limited to particular systems and methodologies described herein, as there can be multiple possible aspects of the present invention disclosure which are not expressly illustrated herein. It is to be understood that the terminology used in the description is for the purpose of describing the particular versions or embodiments only and is not intended to limit the scope of the present invention disclosure.

[0011] According to an aspect of the present invention, an adjustable therapeutic face mask is disclosed. The adjustable therapeutic face mask comprises a mask body having an interior portion and an exterior portion, a flexible circuit board that includes a plurality of light emitting diodes (LEDs), a controlling unit and a transparent silicone material sheet.

[0012] The mask body is substantially concave shaped to accommodate a user's face and has separate cutouts for eyes, nostrils, and mouth so that the user can see and breathe

normally when undergoing therapy sessions. The flexible circuit board is situated between the interior portion of the mask body and the transparent silicon material sheet. The exterior portion of the mask body has a forehead cover, right and left cheek covers and a chin cover for improving aesthetic appearance of the therapeutic mask and providing support to the mask body. The forehead cover accommodates a mounting bracket which is attached to the exterior portion of the mask body via screws thereby creating a hollow portion with the forehead cover. The hollow portion accommodates a set of rechargeable batteries and the controlling unit. A push button is protruding through the forehead cover where the user can select different colors of the lights for skin treatment. The therapeutic mask has a charging port for recharging the batteries by directly plugging-in an adapter to an external electric socket or via a universal serial bus (USB) cable or any other suitable charging medium.

[0013] According to another aspect of the present invention, the controlling unit has a communication module which allows a wired or wireless communication with an electronic communication device including but not limited to a mobile, a laptop, or computer and the like.

[0014] A software application is installed in the electronic communication device and a connection via Wi-Fi, Bluetooth, near field communication (NFC) is established with the therapeutic face mask. The software application allows the user to select the desired color, frequency, wavelength of the light without removing the mask from his/her face.

[0015] To use the therapeutic face mask, a user has to wear the face mask on his/her face by tightening the mask with a strap that is detachably attached to the forehead cover and left and right cheek covers of the therapeutic face mask. The strap is made of elastic material and can be adjusted as per the size and shape of the user's face. The user can change the color, intensity, frequency, and wavelength of the LEDs by using the buttons protruding through the forehead cover or the user can change the color, intensity, frequency, and wavelength of the light by using the software application installed in his/her electronic communication device. Once the user selects a particular color, frequency, intensity, and wavelength, the therapeutic session is initiated by the therapeutic mask. After

the therapeutic session is concluded, the light emitting diodes stop emitting the light thereby making the therapeutic face mask to go OFF.

[0016] According to an additional aspect of the present invention, a user can choose any color including but not limited to red, blue, violet, white as per his requirement as each color has its own beneficial effect on the user's skin.

[0017] According to another aspect of the present invention, the flexible circuit board can have red, blue, green (RBG) LEDs in order to enhance the luminosity of the therapeutic face mask.

[0018] According to yet another aspect of the present invention, the outer edges of the transparent silicon material sheet near the eyes area of the user are made opaque through painting or through any other suitable method so as to prevent the illumination of light on the user's eyes thereby preventing any possible effect on the normal vision of the user and allowing the user to perform his/her normal task when undergoing the therapy.

[0019] The following description is illustrative in nature and is not intended to be in any way limiting. In addition to the illustrative aspects, embodiments, and features described above, further aspects, embodiments, and features will be apparent by reference to the following detailed description in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

[0020] The accompanying drawings illustrate the best mode for carrying out the invention as presently contemplated and set forth hereinafter. The present invention may be more clearly understood from a consideration of the following detailed description of the preferred embodiments taken in conjunction with the accompanying drawings wherein like reference letters and numerals indicate the corresponding parts in various figures in the accompanying drawings, and in which:

Fig. 1 illustrates an isometric view of an adjustable therapeutic face mask according to one embodiment of the present invention;

Fig. 2 illustrates a front side view of the adjustable therapeutic face mask according to one embodiment of the present invention;

Fig. 3 illustrates a back side view of the adjustable therapeutic face mask according to one embodiment of the present invention;

Fig. 4 illustrate a side view of the adjustable therapeutic face mask according to one embodiment of the present invention; and

Fig. 5 illustrate a top view of the adjustable therapeutic face mask according to one embodiment of the present invention.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

[0021] Embodiments of the present invention disclosure will be described more fully hereinafter with reference to the accompanying drawings in which like numerals represent like elements throughout the figures, and in which example embodiments are shown.

[0022] The detailed description and the drawings illustrate specific exemplary embodiments by which the disclosure may be practiced. These embodiments are described in detail to enable those skilled in the art to practice the disclosure. It is to be understood that other embodiments may be utilized, and other changes may be made, without departing from the spirit or scope of the present disclosure. The following detailed description is therefore not to be taken in a limiting sense, and the scope of the present disclosure is defined by the appended claims. Embodiments of the claims may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein.

[0023] Embodiments of the present invention disclosure are discussed below with reference to the Figures. However, those skilled in the art will readily appreciate that the detailed description given herein with respect to these figures is for explanatory purposes as the disclosure extends beyond these limited embodiments. For example, it should be appreciated that those skilled in the pertinent art will, in light of the teachings of the present invention disclosure recognize a multiplicity of alternate and suitable approaches

depending upon the needs of the particular application to implement the functionality of any given details described herein beyond the particular implementation choices in the following embodiments described and shown. That is to say that there are numerous modifications and variations of the present invention disclosure that are too numerous to be listed here, but that all fit within the scope of the disclosure. Also, singular words should be read as plural and vice versa and masculine as feminine and vice versa, where appropriate, and alternative embodiments do not necessarily imply that the two are mutually exclusive.

[0024] It is to be further understood that the present disclosure is not limited to the particular methodology, compounds, materials, manufacturing techniques, uses, and applications, described herein, as these may vary. It is also to be understood that the terminology used herein is used for the purpose of describing particular embodiments only, and is not intended to limit the scope of the present disclosure. It must be noted that as used herein and in the appended claims, the singular forms "a," "an," and "the" include the plural reference unless the context clearly dictates otherwise. Thus, for example, a reference to "an element" is a reference to one or more elements and includes equivalents thereof known to those skilled in the art. Similarly, for another example, a reference to "a step" or "a means" is a reference to one or more steps or means and may include sub-steps and subservient means. All conjunctions used are to be understood in the most inclusive sense possible. Thus, the word "or" should be understood as having the definition of a logical "or" rather than that of a logical "exclusive or" unless the context clearly necessitates otherwise. Structures described herein are to be understood also to refer to functional equivalents of such structures. The language that may be construed to express approximation should be so understood unless the context clearly dictates otherwise.

[0025] Unless defined otherwise, all technical and scientific terms used herein have the same meanings as commonly understood by one of ordinary skill in the art to which this disclosure belongs. Preferred methods, techniques, devices, and materials are described, although any methods, techniques, devices, or materials similar or equivalent to those

described herein may be used in the practice or testing of the present disclosure. Structures described herein are to be understood also to refer to functional equivalents of such structures. The present disclosure will now be described in detail with reference to embodiments thereof as illustrated in the accompanying drawings.

[0026] Referring now to FIG.1 through FIG.5, a therapeutic face mask **100** is shown according to one embodiment of the present invention. The therapeutic face mask **100** is in a shape of the human face and have different cutouts for eyes, nostrils and mouth area to allow a user to see, breath and speak normally when using the therapeutic face mask **100** and comfortably fixing it on the user's face. The therapeutic face mask **100** is comprising a mask body **110** having an interior portion **113** and an exterior portion **114**, a flexible circuit board **120** having a plurality of light emitting diodes (LEDs) **121** towards the interior portion **113** of the mask body **110**, a controlling unit **150** coupled to the exterior portion **114** of the mask body, and a transparent silicone material sheet **130** covering the flexible circuit board **120** towards the interior portion **113** of the mask body **110**. The mask body **110** is made of a rigid material.

[0027] The flexible circuit board **120** also has the same cutouts for eyes, nostrils, and mouth as the mask body **110** have. The flexible circuit board **120** is situated between the mask body **110** and the transparent silicone material sheet **130**. Further, the light emitting diode **121** mounted on the flexible circuit board **120** are in electrical communication with a set of rechargeable batteries **160**.

[0028] The exterior portion **114** of the mask body **110** is supported by a forehead cover **140**, a left cheek cover **141**, a right cheek cover **142**, and a chin cover **143**. The forehead cover **140** with the mask body **110** make a hollow recess which accommodates a mounting bracket **170** for storing the controlling unit **150** and a set of batteries **160**. The forehead cover **140**, left cheek cover **141**, right cheek cover **142**, and the chin cover **143** are also enhancing the aesthetic appearance of the face mask. The mounting bracket **170** is fixed to the mask body **110** via a plurality of screws **171** inserted in corresponding screw thread

hole **111** on the mask body **110**. Further, the left and the right cheek cover (**141**, **142**) also fixed to the mask body **110** via a set of screws.

[0029] A push button **151** is protruding through the forehead cover **140** to provide input to the controlling unit **150**. A notification light **153** is also protruding through the forehead cover **140** for providing notification for battery charging and battery drain. Further, a charging port **152** is also protruding through the forehead cover **140** and is in electrical communication with the set of rechargeable batteries **160**.

[0030] A strap **190** is divided into four arms with two arms in the left side and two arms in the right side in order to fix the strap **190** on to the mask body **110**. The two left arms have two rounded portions (**191**, **192**) snugly fitted in a port **144** on the forehead cover **140** and a port **146** on the left cheek cover **141** respectively. Further, the two right arms also have two rounded portions (**193**, **194**) snugly fitted in a port **145** on the forehead cover **140** and a port **147** on the right cheek cover **142** respectively. The strap **190** also has an adjuster element **195** to adjust the strap **190** when worn by the user.

[0031] The transparent silicone material sheet **130** also has cutouts for the eyes, nostrils, and mouth in order to completely align with the mask body **110**. Left and right side edges near the eyes area (**131**, **132**) of the transparent silicone material sheet **130** are made opaque to avoid light damage or irritation to a patient's eyes.

[0032] According to another embodiment of the present invention, the controlling unit **150** can have a communication module which enables a wired or wireless communication with an external device including but not limited to a mobile, a laptop, or the computer and the like.

[0033] A software application can be installed in the external device and a connection via Wi-Fi, Bluetooth, near field communication (NFC)is established with the therapeutic face mask **100**. The software application allows the user to select the desired color, frequency, wavelength of the light without removing the therapeutic face mask **100** from his/her face.

[0034] According to an advantageous embodiment of the present invention, the flexible circuit board **120** can have red, blue, green (RBG) type LEDs in order to enhance the luminosity of the therapeutic face mask **100**.

[0035] According to another advantageous embodiment of the present invention, the therapeutic face mask **100** is having a set of rechargeable batteries **160** allowing the user to use the therapeutic face mask **100** in the hands-free mode and on the go.

[0036] Best Mode of using the present invention: To use the therapeutic face mask **100**, a user has to wear the therapeutic face mask **100** on to his/her face by tightening the therapeutic face mask **100** with a strap **190** that is detachably attached to the forehead cover **140** and left and right cheek cover (**141**, **142**) of the therapeutic face mask **100**. The strap **190** is made of elastic material and can be adjusted as per the size and shape of the user's face. The user can change the color, intensity, frequency and wavelength of the light emitting diodes **121** by using the push buttons **151** protruding through the forehead cover **140** or the user can change the color, intensity, frequency and wavelength of the light by using the software application installed in his/her external device. Once the user selects a particular color, frequency, intensity, and wavelength the therapeutic face mask **100** initiates the therapeutic session. After the session concludes, the light emitting diodes **121** stops emitting the light or the therapeutic face mask **100** goes into OFF mode.

[0037] In the most preferred embodiment of the present invention, the therapeutic face mask is a full face therapy treatment mask for alleviating the wrinkles and acne on the facial area of the user. The present therapeutic face mask device utilizes multi-wave spectrums of LED lights to stimulate collagen development wherein the multi-wave spectrum preferably consists of LED lights of wavelength 880nm, 660nm, 630nm, and 605nm. These particular wavelengths of LED light are found to be effective in destroying the acne causing bacteria particularly at the wavelength value of 630nm and 415nm. These LEDs are custom dual chip/spectrum Surface Mount Technology (SMT) Medical Grade LEDs. Further, these LEDs are embedded in a clear and transparent sheet of silicon material using thermoplastic rubber (TPR), or in thermoplastic polyurethane (TPU) or in a

thermoplastic elastomer (TPE). The design of the present therapeutic mask is unique in that it incorporates the mask body made of polycarbonate skeleton with aesthetic metallic coverings on the exterior to provide a unique cosmetic design. The area treating the skin is unique in that the construction and production of the device incorporates a unique silicone injection overlay to protect the flexible printed circuit board (PCB) and light emitting diodes (LEDs) while providing extreme clarity to deliver multi-wavelength light spectra to the skin surface of the user. The present therapeutic face mask device is portable and operates on either a direct 110v/220v adapter or rechargeable battery. The present therapeutic face mask device is adapted to function in at least one functioning mode viz., either in the mode of treatment of wrinkle or in the mode of treatment of acne or a combination of both. The present therapeutic face mask device incorporates a software adapted to control the features of optical output, treatment times, operation, recharging and auto shut off features.

[0038] Certain embodiments of this invention are described herein, including the best mode known to the inventors for carrying out the invention. Of course, variations on these described embodiments will become apparent to those of ordinary skill in the art upon reading the foregoing description. The inventor expects skilled artisans to employ such variations as appropriate, and the inventors intend for the invention to be practiced otherwise than specifically described herein. Accordingly, this invention includes all modifications and equivalents of the subject matter recited in the claims appended hereto as permitted by applicable law. Moreover, any combination of the above-described elements in all possible variations thereof is encompassed by the invention unless otherwise indicated herein or otherwise clearly contradicted by context.

[0039] Although specific embodiments and certain structural arrangements have been illustrated and described herein, it will be clear to those skilled in the art that various other modifications and embodiments may be made incorporating the spirit and scope of the underlying inventive concepts and that the same is not limited to the particular methods

and structure herein shown and described except in so far as determined by the scope of the appended claims.

What is claimed is:

1. An adjustable therapeutic face mask with a mask body covering the facial region of a user, said mask body comprising:

- an interior portion and an exterior portion, said interior portion including a flexible circuit board including a plurality of light emitting diodes towards the interior portion of said mask body wherein said plurality of light emitting diodes are configured to emit light radiation with varied color and intensities covering a wide range of wavelengths;

- a controlling unit enclosed in said exterior portion and adapted to control the functioning of a plurality of functional units of said face mask including the controlling of said color and intensities; and

- a sheet of transparent silicone, said silicone sheet adapted to cover said flexible electronic circuit board, said mask body having openings for eyes, nostrils, and mouth including said openings in said flexible circuit board and said sheet of transparent silicone to facilitate the comfortable fixing of said face mask on to the facial region of said user, said flexible circuit board fixed in between said mask body and said transparent silicon sheet towards said interior portion, said mask body secured onto the facial region of said user using a fixing means.

2. The adjustable therapeutic face mask according to claim 1, wherein said mask body is made of a rigid material.

3. The adjustable therapeutic face mask according to claim 1, wherein said controlling of color and intensities is through a set of buttons including push buttons mounted towards said exterior portion.

4. The adjustable therapeutic face mask according to claim 1, wherein said controlling unit and said plurality of light emitting diodes are powered by a set of rechargeable batteries enclosed in said mask body.

5. The adjustable therapeutic face mask according to claim 1, wherein said light emitting diodes are spectrum specific dual chip light emitting diodes.

6. The adjustable therapeutic face mask according to claim 1, wherein said fixing means is a stretchable strap detachably attached to said face mask.

7. An adjustable therapeutic face mask with a mask body covering the facial region of a user, said mask body comprising:

- an interior portion and an exterior portion, said interior portion including a flexible circuit board including a plurality of light emitting diodes towards the interior portion of said mask body wherein said plurality of light emitting diodes are configured to emit light radiation with varied color and intensities covering a wide range of wavelengths;

- a controlling unit enclosed in said exterior portion and adapted to control the functioning of a plurality of functional units of said face mask including the controlling of said color and intensities;

- a communication module enclosed in said controlling unit and adapted to enable the communication between an external digital electronic communication device with said face mask; and

- a sheet of transparent silicone, said silicone sheet adapted to cover said flexible electronic circuit board, said mask body having openings for eyes, nostrils, and mouth including said openings in said flexible circuit board and said sheet of transparent silicone to facilitate the comfortable fixing of said face mask on to the facial region of said user, said flexible circuit board fixed in between said mask body and said transparent silicon sheet towards said interior portion, said mask body secured onto the facial region of said user using a fixing means.

8. The adjustable therapeutic face mask according to claim 7, wherein a user can adjust colors and intensities of said plurality of light emitting diodes using a software application installed in said external digital electronic communication device without removing said face mask.

9. The adjustable therapeutic face mask according to claim 7, wherein said light radiation from said light emitting diodes stimulate collagen development in the facial skin of said user thereby facilitating the reduction in wrinkles and further facilitating the treatment of mild to moderate acne including inflammatory acne.

10. The adjustable therapeutic face mask according to claim 5, wherein said dual chip light emitting diodes emit light having the wavelength doublets of 880nm/630nm, 660nm/605nm and 630nm/415nm.

11. The adjustable therapeutic face mask according to claim 7, wherein the material of said sheet of transparent silicone is a thermoplastic rubber, or a thermoplastic elastomer.