cyanoacrylate adhesive to keep the holes closed until they heal. Such hole closure procedures would be time-intensive and prone to visible scarring.

[0009] Accordingly, there may be a need for a relatively simple, inexpensive, robust and safe cosmetic method and system that can be mechanical in nature, and would overcome at least some of such exemplary deficiencies described above, and that can be configured to produce fractional damage in biological tissue that leads to directional reduction of skin surface area without causing visible scarring.

SUMMARY

[00010] The present disclosure relates to exemplary embodiments of simple, inexpensive, and safe cosmetic methods and systems for mechanical generation of a plurality of small holes, e.g., microregions of damage, in biological tissue, such as skin, and for manipulating the treated skin to generate a cosmetically desirable reduction of skin area that can be enhanced and/or that has a particular or preferred direction. Such exemplary holes can have a width or diameter that is, e.g., between about 0.2 mm and 0.7 mm, or preferably between about 0.2 mm and 0.5 mm as measured along the tissue surface. Such holes can extend into or preferably through the entire thickness of the dermis. The fractional area of skin removed by formation of such holes in a treatment region can be between about 5% and 50%, or between about 10% and 30%. Formation of holes in this sub-millimeter size range and areal coverage is well-tolerated by the body, with minimal risk of scarring, infection, or other complications.

[00010a] In one aspect, there is provided a cosmetic method for producing an effect in skin tissue, comprising:

forming a plurality of holes in a region of the skin tissue using at least one coring needle; and

providing a stress that is at least one of a compressive stress or a tensile stress in the region of skin tissue after forming the holes,

wherein a diameter of the holes is between about 0.2 mm and 0.7 mm,

wherein the holes extend from the skin surface into the dermal layer of the skin,

wherein the holes extend over an areal fraction of a surface of the region that is between 5% and 50%,

wherein the stress provides a force in the region along a direction that is substantially parallel to the surface of the region, and

wherein the stress is maintained on the surface of the region until the holes have substantially closed.

[00011] An exemplary embodiment of a cosmetic method according to the present disclosure can be provided that can include a formation of a plurality of holes in a region of skin as described above, and then an application of tensile and/or compressive stresses in a direction generally along the surface of the skin to the treated region during subsequent healing process. Such stresses can enhance overall reduction in the treated region and/or provide a directional bias to the resulting shrinkage. The applied stresses can be maintained in the treated region until the holes have substantially closed and/or tissue regrowth has been effectively modified, e.g., between about 4-6 days or longer. In certain exemplary embodiments, this time period may be much shorter, e.g., on the order of several minutes or hours, if a tissue adhesive, glue, or the like is used to facilitate hole closure.

[00016a] In one aspect, there is provided a system for producing a cosmetic effect in skin tissue, comprising:

at least one coring needle structured to form a plurality of holes in a region of the skin tissue; and

a compression arrangement configured to produce and maintain a compressive stress over at least one portion of the region after the holes are formed,

wherein an inner diameter of the at least one coring needle is between about 0.2 mm and 0.7mm,

wherein the at least one needle is capable of forming or structured to form the holes that extend from the skin surface into the dermal layer of the skin, and

wherein the compression arrangement is configured to maintain the stress that provides a force in the region along a direction that is substantially parallel to the skin surface until the holes have substantially closed.

[00017] According to further exemplary embodiments of the present disclosure, a system can be provided for generating a plurality of holes in a region of skin that includes one or more coring needles that can remove small cores of tissue by inserting and withdrawing the needles from the skin. A plurality of such needles can be affixed to a substrate to facilitate motion and positioning of all of the needles simultaneously. Insertion and withdrawal of the needles can be controlled by an actuator, which can control the positioning of the needles and/or the substrate, if present, via a mechanical coupling or actuation of an electrical or pneumatic translator or the like.

[00018] The exemplary system can further include a compression arrangement capable of or configured for applying a compression device or substance to deform the treated region after the holes are formed therein. For example, the compression arrangement can include a surgical stapler, a suturing device, an applicator capable of applying a stretched film or a curable/shrinkable liquid to the skin surface, etc.

[00019] The herein described exemplary embodiments pertain to cosmetic method and apparatus. It shall further be noted that the herein described cosmetic method has been tested, and is a safe and routine procedure that can be practiced in beauty parlors or other settings. The presented method is a minimally-invasive a method. Moreover, the exemplary method is safe as it does not present a substantial health risk, and does not require professional medical expertise to be performed. No clinician is needed to perform the exemplary embodiments of the method described herein, and little or no risk, much less a health risk, is presented for a person being treated with said cosmetic method if standard cleanliness and sterilization procedures are employed, as shall become apparent from the following description.

[00020] Synergetic effects may arise from different combinations of the features and embodiments described herein, although all such combinations might not be described in detail. Further, it shall be noted that all embodiments of the present disclosure concerning method or system according to the exemplary embodiment of the present disclosure, might be carried out with the order of the steps or procedures as described, nevertheless this has not to be the only and essential order of the steps of the procedures of the method and the system. All different orders and combinations of the steps and procedures are herewith described.