CLAIMS

1. A skin treatment apparatus comprising:

a microwave source for generating microwave electromagnetic energy;

an applicator for mounting over a region of skin, the applicator comprising:

an energy delivery structure for conveying the microwave electromagnetic energy; and

a microwave feed structure coupled between the microwave source and the energy delivery structure for launching the microwave electromagnetic energy into the energy delivery structure,

wherein the apparatus is controllable to deliver the microwave electromagnetic energy in a manner that induces a thermal profile in the region of skin, the thermal profile having a maximum temperature that occurs at a predetermined distance beneath a surface of the region of skin, and

wherein the energy delivery structure comprises a waveguide having a waveguide body that defines a waveguide cavity having an interior electrically conductive surface dimensioned to support propagation of the microwave electromagnetic energy, wherein the waveguide cavity comprises a treatment aperture for locating over the region of skin, the treatment aperture being dimensioned to emit the microwave electromagnetic energy as an electromagnetic field, and wherein the applicator comprises a deformable contact portion being a deformable rim on the waveguide body around the aperture.

2. A skin treatment apparatus according to claim 1, wherein the waveguide comprises a microwave shield on an interior wall adjacent the treatment aperture, the shield covering or occupying part or parts of the interior wall, and wherein the microwave shield is arranged to shape the emitted

microwave electromagnetic energy as a uniform electromagnetic field across the treatment aperture.

3. A skin treatment apparatus according to claim 2, wherein the microwave shield is made from dielectric material or metamaterial arranged to create a quasi perfect magnetic conductor boundary condition at two opposing sides of the aperture.

4. A skin treatment apparatus according to claim 3, wherein the waveguide of the applicator is dimensioned to carry the microwave frequency electromagnetic energy in a fundamental mode, and wherein the electromagnetic field emitted by the waveguide is in a quasi-TEM mode.

5. A skin treatment apparatus according to any preceding claim, wherein the deformable rim is detachable from the waveguide body.

6. A skin treatment apparatus according to any preceding claim, wherein the deformable rim has a metallised inner surface that is electrically connected to the interior electrically conductive surface of the waveguide cavity.

7. A skin treatment apparatus according to any preceding claim comprising a loading unit mountable on the waveguide to load the waveguide.

8. A skin treatment apparatus according to claim 7, wherein the loading unit is arranged to shape the microwave electromagnetic energy emitted by the waveguide.

9. A skin treatment apparatus according to claim 8, wherein the loading unit is arranged to shape the microwave electromagnetic into a fractionated electromagnetic field.

10. A skin treatment apparatus according to any one of claims 7 to 9, wherein the waveguide comprises a waveguide body that define a waveguide cavity having an interior electrically conductive surface dimensioned to support propagation of the microwave electromagnetic energy, wherein the waveguide cavity comprises a treatment aperture for locating over the region of skin, and wherein the loading unit is arranged as a cover mountable in or over the treatment aperture.

11. A skin treatment apparatus according to claim 10, wherein the cover is made of an electrical insulator or a dielectric material.

12. A skin treatment apparatus according to claim 1, wherein the energy delivery structure comprises a flexible substrate having a microwave emitting structure fabricated thereon.

13. A skin treatment apparatus according to claim 12, wherein the microwave emitting structure is a slotted microstrip antenna.

14. A skin treatment apparatus according to any preceding claim, wherein the amount of power generated by the microwave source is controllable.

15. A skin treatment apparatus according to claim 14, wherein the microwave source includes a monitoring system configured to detect the power delivered to the waveguide, and wherein the power generated by the microwave source is controlled on the basis of the delivered power detected by the monitoring system.

16. A skin treatment apparatus according to any preceding claim, wherein the applicator comprises an imaging device arranged to capture an image of the region of skin during treatment.

17. A skin treatment apparatus according to claim 16, wherein the imaging device is arranged to detect infrared radiation.

18. A skin treatment apparatus according to claim 17, wherein the imaging device is arranged to generate an output indicative of temperature at the surface of the region of skin, and wherein the microwave source is controllable based on the output from the imaging device.

19. A skin treatment apparatus according to any preceding claim comprising a cooling medium, wherein the cooling medium is arranged to induce a negative thermal gradient through the region of skin, and wherein the delivered microwave electromagnetic energy is arranged to induce a positive thermal gradient through the region of skin, and wherein the apparatus is arranged to balance the negative thermal gradient and positive thermal gradient to induce the thermal profile.

20. A skin treatment apparatus according to any preceding claim including a cooling system configured to deliver a cooling medium through the waveguide to the aperture.