CLAIMS

What is claimed is:

1. An applicator for selectively affecting a subject's subcutaneous tissue, comprising:

a housing;

a treatment cup mounted in the housing, wherein the treatment cup defines a tissue-receiving cavity and includes a temperature-controlled surface;

at least one thermal device coupled to the treatment cup and configured to receive energy via a flexible connector coupled to the applicator and to cool the temperature-controlled surface; and

at least one vacuum port coupled to the treatment cup and configured to provide a vacuum to draw the subject's tissue into the tissue-receiving cavity and against at least a portion of a treatment area of the temperature-controlled surface to selectively damage and/or reduce the subject’s subcutaneous tissue,

wherein the applicator has one or more of the following:

(a) a ratio of the treatment area to weight greater than or equal to 5 square inches per lb, or

(b) a ratio of the treatment area to tissue-draw depth greater than or equal to 8 inches.

2. The applicator of claim 1, wherein the treatment area to weight ratio is greater than or equal to 7 square inches per lb.

3. The applicator of claim 2, wherein the treatment area to weight ratio is greater than or equal to 10 square inches per lb.

4. The applicator as in any one of claims 1-3, wherein the treatment area to depth ratio is greater than or equal to 10 inches.

5. The applicator as in any one of claims 1-4, wherein the treatment area to depth ratio is greater than or equal to 12 inches.

6. The applicator as in any one of claims 1-5, wherein the treatment cup has a cross-sectional surface profile having a curvature which approximates a parabolic polynomial of fourth order or higher.

7. The applicator as in any one of claims 1-6, wherein the temperature-controlled surface has an Ra less than or equal to 35.

8. The applicator as in any one of claims 1-7, further comprising a first anti-condensation housing and a second anti-condensation housing, wherein the at least one thermal device comprises a first thermal device and a second thermal device, the first and second thermal devices being located at opposite sides of the treatment cup and within the respective first and second anti-condensation housings.

9. The applicator of claim 8, wherein the first and second thermal devices each include:

one or more thermoelectric elements; and

a fluid-cooled element thermally coupled to the one or more thermoelectric elements, wherein the weight of the applicator increases less than 5% when the fluid-cooled element is filled with water.

10. The applicator as in any one of claims 8-9, wherein the first and second thermal devices each include a plurality of addressable thermoelectric elements.

11. The applicator as in any one of claims 9 and 10, wherein each thermoelectric element is independently controllable.

12. The applicator as in any one of claims 9-11, wherein each thermoelectric element includes: (a) a first surface coupled to a bottom surface of the treatment cup and (b) a second surface coupled to the fluid-cooled element, the second surface being opposite the first surface.

13. The applicator as in any one of claims 1-12, further comprising an interconnect assembly connected to the housing and configured to be detachably coupled to a flexible connector via a bayonet connection.

14. The applicator of claim 13, further comprising one or more vacuum lines through which air flows to draw tissue into the treatment cup when the flexible connector provides a vacuum.

15. The applicator as in any one of claims 1-14, wherein the housing is waterproof according to at least one of IPX1, IPX3, IPX4, or IPX7.

16. The applicator as in any one of claims 1-15, further comprising:

a manifold configured to hold a removable gel trap while the applicator is held against the subject and the temperature-controlled surface faces the subject's tissue,

wherein the treatment cup further comprises one or more air-egress features connected to the at least one vacuum port, wherein the at least one vacuum port extends from the tissue-receiving cavity to the manifold.

17. The applicator of claim 16, wherein the manifold is inside the housing and is fluidly coupled between the at least one vacuum port and a flexible connector coupled to the applicator.

18. The applicator as in any one of claims 1-17, wherein the treatment cup includes a plurality of air-egress channels extending from the at least one vacuum port and across the temperature-controlled surface to allow for removal of air pockets between the subject’s tissue and the temperature-controlled surface when the vacuum is provided.

19. The applicator as in any one of claims 1-18, wherein the treatment cup includes a network of branching air-egress features extending across most of a width and/or length of the tissue-receiving cavity.

20. The applicator as in any one of claims 1-19, further comprising:

a gel trap including:

a container configured to capture gel, and

at least one sealing member configured to sealingly engage the applicator to fluidically couple the at least one vacuum port and a vacuum line in the applicator such that the container captures gel drawn out of the tissue-receiving cavity while allowing sufficient air flow between the tissue-receiving cavity and the vacuum line to hold the subject's tissue against the temperature-controlled surface.

21. The applicator as in any one of claims 1-19, wherein the applicator is configured to hold a gel trap in fluid communication with the tissue-receiving cavity such that a reservoir of the gel trap is remote from the temperature-controlled surface.

22. The applicator as in any one of claim 1-19, further comprising a gel trap configured to hold the gel away from heat flow paths between the treatment cup and the subject's tissue.

23. The applicator as in any one of claims 1-19, further comprising a backside receiving feature configured to hold a gel trap viewable from a backside of the applicator.

24. The applicator as in any one of claims 1-19, further comprising a gel trap configured for toolless installation and/or toolless removal from the applicator.

25. The applicator as in any one of claims 1-19, further comprising:

a manifold; and

a gel trap that establishes a fluid tight connection with the manifold upon manual insertion of the gel trap into the manifold.

26. The applicator as in any one of claims 1-19, wherein:

the housing includes an upper housing portion and a lower housing portion;

the treatment cup is mounted in the upper housing portion; and

the lower housing portion includes an aperture allowing a gel trap to be inserted into and removed from a manifold fluidically coupled to the at least one vacuum port and a flexible connector coupled to the applicator.

27. The applicator as in any one of claims 1-19, further comprising:

a manifold fluidly coupled between the at least one vacuum port and a flexible connector coupled to the applicator; and

a gel trap installable in the manifold to capture substances drawn out of the treatment cup while permitting airflow between the at least one vacuum port and the flexible connector.

28. The applicator as in any one of claims 1-27, further comprising a contamination circuit configured to detect presence of fluid within the housing.

29. The applicator of claim 28, wherein the contamination circuit is configured to switch from an open state to a closed state when the presence of the fluid is detected.

30. The applicator as in any one of claims 1-27, further comprising:

at least one moisture detector configured to switch from an open state to a closed state upon contact with moisture; and

a controller in communication with the at least one moisture detector and programmed to identify the moisture in the housing based on one or more signals indicative that the at least one moisture detector switched from the open state to the closed state.

31. The applicator of claim 30, wherein the at least one moisture detector includes a plurality of moisture detectors each configured to detect the presence of freestanding liquid capable of contacting circuitry within the applicator.

32. The applicator as in any one of claims 1-31, further comprising an interconnect assembly configured to releasably couple the applicator to a flexible connector, wherein the interconnect assembly includes a supply fluid line fitting, a return fluid line fitting, a vacuum line fitting, and an electrical connector.

33. The applicator of claim 32, wherein one or more of the supply fluid line fitting, return fluid line fitting, or vacuum line fitting are dripless fittings.

34. The applicator as in any one of claims 1-33, further including:

an interconnect assembly including a vacuum line fitting and an electrical connector; and

a cap detachably coupleable to the interconnect assembly to cover the electrical connector and including a throughhole which fluidically couples to the vacuum line fitting.