

4. ~~—An article, comprising:~~
a first side comprising a central cavity portion and a platform portion that
projects from the first side and that is not coplanar with the central cavity portion;
a second side opposite the first side; and
5 at least three hollow microneedles extending from the platform portion in a
first direction;
wherein the platform portion substantially surrounds the central cavity portion;
wherein the platform portion comprises an inner perimeter proximate the
central cavity portion and an outer perimeter distal the central cavity portion;
10 wherein each of the at least three hollow microneedles comprises a body that
comprises:
an outer surface;
a base segment having a base and a first shape that is defined by a first
section of the outer surface;
15 a tip segment having a tip and a second shape that is defined by a
second section of the outer surface, wherein the second shape is distinct from the first
shape;
a transition plane that delineates the base segment and the tip segment;
and
20 a central axis;
wherein each of the at least three hollow microneedles comprises a height
measured from the base to the tip;
wherein the tip segment of each of the at least three hollow microneedle defines at least
about 30% of the height of the microneedle.

25 5. ~~—The article of claim 4, wherein the base segment is conical-shaped and the tip
segment is substantially cylindrical-shaped.~~

30 6. ~~—The article of claim 4 or claim 5, wherein the height comprises a first height
component associated with the base segment and a second height component associated with
the tip segment; wherein the second height component is about 300 μm to about 825 μm .~~

35 7. ~~—An article, comprising:~~
a first side comprising a central cavity portion and a platform portion that
projects from the first side and that is not coplanar with the central cavity portion;
a second side opposite the first side; and

at least three hollow microneedles extending from the platform portion in a first direction;
wherein the platform portion substantially surrounds the central cavity portion;
wherein the platform portion comprises an inner perimeter proximate the central cavity portion and an outer perimeter distal the central cavity portion;
wherein each of the at least three hollow microneedles comprises a body that comprises:
an outer surface;
a base segment having a base and a first shape that is defined by a first section of the outer surface;
a tip segment having a tip and a second shape that is defined by a second section of the outer surface, wherein the second shape is distinct from the first shape;
a transition plane that delineates the base segment and the tip segment;
and
a central axis;
wherein the first side defines a first area;
wherein the platform portion defines a second area within the first area;
wherein the second area is less than about 40% of the first area.

84. The article of any one of the preceding claims, wherein the first side further comprises a microneedle-free peripheral portion extending laterally from at least a part of the outer perimeter of the platform portion, wherein the peripheral portion is canted away from the platform portion in a second direction opposite the first direction.

95. The article of ~~any one of the preceding claims;~~ claim 4, wherein the article further comprises a side wall portion that extends from the platform portion or, if present, the peripheral portion; ~~and~~ and wherein the sidewall portion extends substantially opposite the first direction.

106. The article of any one of the preceding claims, wherein the central cavity is a closed cavity.

117. The article of any one of claims 1 through 95, wherein the central cavity is a through-hole extending from the first side through the second side.

128. The article of any one of the preceding claims, wherein the platform is circinate.

139. The article of any one of the preceding claims, wherein the at least three hollow microneedles form a circinate array of microneedles ~~is circinate~~.

1410. The article of any one of the preceding claims, wherein a unitary body comprises the platform portion, the peripheral portion, and the central cavity portion.

1511. The article of any one of the preceding claims, wherein at least one microneedle of the ~~plurality~~ at least three hollow microneedles comprises:

- a base;
- an elongated body having a central axis and a body diameter;
- a tip portion comprising a tip, a first bevel face oriented diagonally with respect to the central axis and extending through at least 75% of the body diameter, a second bevel face oriented substantially perpendicular to the central axis and intersecting the first bevel face, a bevel opening defined by a first edge of the first bevel face and a second edge of the second bevel face; and
- a hollow channel that extends axially into the body from the bevel opening.

1612. The article of any one of the preceding claims, wherein at least one microneedle of the ~~plurality~~ at least three hollow microneedles comprises:

- a base;
- an elongated body having a central axis;
- a tip portion comprising a tip, a beveled surface, and a bevel opening in the beveled surface;
- a first channel that extends axially from the bevel opening through at least a portion of the elongated body, wherein the first channel has a first wall that is substantially aligned with the central axis; and
- a second channel that extends radially from the first channel to the bevel opening, wherein the second channel has a second wall that is oriented substantially orthogonal to the central axis;

wherein the first channel and second channel merge to form the bevel opening.

~~17~~13. The article of any one of the preceding claims, wherein ~~the~~ at least one microneedle ~~of at least three hollow microneedles~~ comprises a hollow channel extending through the article from a first opening proximate the tip to a second opening in the second side of the article.

~~18~~14. The article, ~~as claimed in~~ of any one of the preceding claims 1 through 17, for injecting fluid into a body.

~~19~~15. The article, ~~as claimed in~~ of any one of the preceding claims 1 through 17, for extracting fluid from a body.

~~20~~16. The article ~~according to~~ of claim 18-14 or claim ~~19~~15, wherein the article is operatively coupled to an actuator.

~~21~~17. The article ~~according to claim 20~~ of claim 16, wherein the actuator comprises an adhesive assembly, wherein the adhesive assembly comprises a skin-contact adhesive layer that, when the actuator is actuated, is urged against a skin surface.

~~22~~18. The article of ~~claim 1~~ or claim 2, wherein the first angle is less than about 45° and/or wherein the second angle is less than about 45°.

~~23~~. ~~The article of claim 6, wherein the height comprises a first height component associated with the base segment and a second height component associated with the tip segment; wherein the second height component is about 650 μm to about 800 μm.~~

~~24~~19. The article of any one of claims 1 through ~~7~~3, wherein the at least three microneedles forms a two-dimensional array.

~~25~~20. The article of claim ~~24~~19, wherein the array of microneedles is distributed all the way around the platform portion.