CLAIMS

What is claimed is:

1. A handheld device, comprising:

a reservoir configured to store a fluid topical composition comprising particulate materials for modifying appearance of a keratinous surface and to dispense a pressurized flow of the composition;

an accumulator including an expandable chamber in fluidly communication with the reservoir, the expandable chamber being biased towards a deflated configuration so that, when filled with the composition the chamber expands against this bias applying pressure to the composition stored therein;

a supply valve between the reservoir and the accumulator regulating the flow of the composition from the reservoir to the accumulator;

a pressure sensor generating pressure data corresponding to a pressure of the composition in the accumulator;

a processing arrangement receiving the pressure data from the pressure sensor, analyzing the pressure data to determine whether the pressure in the accumulator is above a predetermined threshold value and controlling the supply valve to maintain the pressure of the accumulator within a range between the predetermined threshold value and a predetermined ceiling value; and

a deposition arrangement fluidly connected to an outlet of the accumulator and dispensing the composition from the accumulator under control of the processing arrangement as a pressurized spray of droplets that form a thin layer of the composition covering an area on the surface, wherein the pressurized spray is propelled by the pressure from the accumulator.

2. The handheld device of claim 1, wherein at least a portion of a wall of the expandable chamber is formed from an elastic material.

3. The handheld device of claim 2, wherein the elastic material comprises a silicone elastomer.

4. The handheld device of claim 1, wherein the accumulator comprises a piston forming a portion of the interior surface of the chamber, and a spring biasing the piston towards the deflated configuration.

5. The handheld device of claim 1, wherein an increase in the pressure of the accumulator expands a volume of the chamber at a rate from about 3 KPa/µL to about 5 KPa/µL.

6. The handheld device of claim 1, wherein the predetermined ceiling value is less than a pressure of the reservoir.

7. The handheld device of claim 1, wherein the pressure of the reservoir ranges from about 12 psi to about 30 psi.

8. The handheld device of claim 1, wherein the reservoir comprises a storage chamber charged with the composition and a propellant, and a dip tube through which the composition is dispensed from the storage chamber.

9. The handheld device of claim 1, wherein the reservoir has a volume of no more than 15 ml.

10. The handheld device of claim 1, wherein the predetermined threshold value is about 5 psi.

11. The handheld device of claim 10, wherein the predetermined ceiling value is about 7 psi.

12. The handheld device of claim 1, wherein the deposition arrangement comprises at least one nozzle configured to dispense a pressurized pulse of the composition from the accumulator.

13. The handheld device of claim 12, wherein the nozzle is an atomizer nozzle configured to dispense a pressurized spray of droplets of the composition from the accumulator.

14. The handheld device of claim 1, wherein the processing arrangement controls operation of the device in a cleaning mode during which the processor controls the supply valve to maintain the pressure in the accumulator above a cleaning threshold value, the cleaning threshold value being higher than the predetermined ceiling value, and directs the deposition arrangement to dispense the composition from the accumulate
+or until the pressure in the accumulator falls below the predetermined ceiling value.

15. The handheld device of claim 14, wherein the cleaning threshold value is selected such that the deposition arrangement dispenses the composition from the accumulator at a pressure that provides force sufficient to dislodge obstructions in the deposition arrangement.

16. The handheld device of claim 15, wherein the cleaning threshold value is about 10 psi.

17. A method for dispensing a topical composition comprising particulate materials for modifying appearance of a keratinous surface, the method comprising:

supplying, via a supply valve, a pressurized flow of the composition to an accumulator including an expandable chamber therein, the chamber being biased towards a deflated configuration so that, when filled with the composition the chamber expands against this bias applying pressure to the composition stored therein;

generating, by a pressure sensor, pressure data corresponding to a pressure of the composition in the accumulator;

analyzing, by a processing arrangement, the pressure data received from the pressure sensor to determine whether the pressure in the accumulator is above a predetermined threshold value and to control the supply valve to maintain the pressure of the accumulator within a range between the predetermined threshold value and a predetermined ceiling value; and

dispensing, by a deposition arrangement fluidly connected to an outlet of the accumulator, the composition from the accumulator under control of the processing arrangement as a pressurized spray of droplets that form a thin layer of the composition covering an area on the surface, wherein the pressurized spray is propelled by the pressure from the accumulator.

18. The method of claim 17, wherein the deposition arrangement is inverted during at least a portion of the dispensing step.

19. A method for purging fluid from air-exposed regions of a topical sprayer, comprising:

supplying, via a supply valve, a pressurized flow of a topical composition to an accumulator including an expandable chamber therein, the chamber being biased towards a deflated configuration so that, when filled with the composition the chamber expands against this bias applying pressure to the composition stored therein;

generating, by a pressure sensor, pressure data corresponding to a pressure of the composition in the accumulator;

analyzing, by a processing arrangement, the pressure data received from the pressure sensor to determine whether the pressure in the accumulator is above a cleaning threshold value and to control the supply valve to maintain the pressure of the accumulator above the cleaning threshold value; and

dispensing, by a deposition arrangement fluidly connected to an outlet of the accumulator, the composition from the accumulator under control of the processing arrangement until the pressure in the accumulator falls below a predetermined ceiling value,

wherein the cleaning threshold value is higher than the predetermined ceiling value, and is selected such that the deposition arrangement dispenses the composition from the accumulator at a pressure that provides force sufficient to dislodge obstructions in the deposition arrangement.