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Inventor(s)	Akerele; Dominic

Pneumatic propulsion device for efficient hair active deposition and application

Abstract

A dispensing device, including a housing configured to surround the dispensing device, a first connection configured to connect to a water source, a second connection configured to connect to a gas source, a formula reservoir configured to hold one or more formulas, a mixing zone configured to mix water from the water source, and gas from the gas source, and formula from the formula reservoir into a mixture, a charged substrate configured to coacervate the mixture, and a plurality of openings fluidly coupled to the mixing zone, the plurality of openings configured to deposit a mixture of the one or more formulas, the gas, and the water onto a surface.

Inventors: **Akerele; Dominic (Brooklyn, NY)**

Applicant: **L'Oreal** (Paris, FR)

Family ID: **1000008766182**

Assignee: **L'Oreal (Paris, FR)**

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Primary Examiner: Carroll; Jeremy

Attorney, Agent or Firm: CHRISTENSEN O'CONNOR JOHNSON KINDNESS PLLC

Background/Summary

SUMMARY

(1) This summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. This summary is not intended to identify key features of the claimed subject matter, nor is it intended to be used as an aid in determining the scope of the claimed subject matter.

(2) In one aspect, the present disclosure describes a dispensing device, including a housing configured to surround the dispensing device, a first connection configured to connect to a water source, a second connection configured to connect to a gas source, a formula reservoir configured to hold one or more formulas, a mixing zone configured to mix water from the water source, and gas from the gas source, and formula from the formula reservoir into a mixture, a charged substrate configured to enable coacervation of the mixture, and an opening fluidly coupled to the mixing zone, the opening configured to deposit a mixture of the one or more formulas, the gas, and the water onto a surface.

(3) In another aspect, a dispensing system including the dispensing device described herein and one

or more formulas is disclosed.
(4) In yet another aspect, the present disclosure also describes a method of dispensing a mixture with a dispensing device, the method includes dispensing water from a water source, gas from a gas source into a mixing zone, opening a plurality of valves on a plurality of formula reservoirs, depositing a set amount of each formula of a plurality of formulas into the mixing zone, mixing the water, the gas, and the plurality of formulas to form a mixture, and dispensing the mixture onto a surface.
(5) In another aspect, a method of dispensing a mixture with a dispensing device, the method including dispensing water from a water source, gas from a gas source into a mixing zone, opening a plurality of valves on a plurality of formula reservoirs, depositing a set amount of each formula of a plurality of formulas into the mixing zone, mixing the water, the gas, and the plurality of formulas to form a mixture, passing the mixture over a charged substrate, enabling coacervation in the mixture, and dispensing the mixture onto a surface is disclosed.

Description

DESCRIPTION OF THE DRAWINGS
(1) The foregoing aspects and many of the attendant advantages of this invention will become more readily appreciated as the same become better understood by reference to the following detailed description, when taken in conjunction with the accompanying drawings, wherein:
(2) FIG. **1**A is an example device, in accordance with the present technology;
(3) FIG. **1**B is an internal view of the example device in FIG. **1**A, in accordance with the present technology;
(4) FIG. **2**A is an internal view of another example device, in accordance with the present technology;
(5) FIG. **2**B shows a plurality of formula reservoirs, in accordance with the present technology;
(6) FIG. **3**A is another example device, in accordance with the present technology;
(7) FIG. **3**B is a perspective view of the example device of FIG. **3**A, in accordance with the present technology;
(8) FIG. **3**C is an internal view of the example device of FIG. **3**A, in accordance with the present technology;
(9) FIG. **4** shows the example device of FIG. **3**A connected to an external water source and an external gas source, in accordance with the present technology;
(10) FIG. **5** is an example system, in accordance with the present technology;
(11) FIG. **6** is example formula inside example packaging, in accordance with the present technology;
(12) FIG. **7** is an example recipe, in accordance with the present technology;
(13) FIG. **8** is an example method of dispensing a mixture, in accordance with the present technology;
(14) FIG. **9** is an example method of dispensing a mixture according to a recipe, in accordance with the present technology; and
(15) FIG. **10** is an example method of dispensing a mixture according to an identity of one or more formulas, in accordance with the present technology
DETAILED DESCRIPTION
(16) While illustrative embodiments have been illustrated and described, it will be appreciated that various changes can be made therein without departing from the spirit and scope of the invention.
(17) The present disclosure described a device configured to mix water and compressed gas with one or more formulas to make a mixture, pass the mixture over a charged substrate to enable coacervation of the mixture, and deposit the mixture onto a surface. In some embodiments, the

mixture is a shampoo, conditioner, leave in shampoo or conditioner, a hair serum, or a hair mask. In some embodiments, the one or more formulas are active ingredients for hair treatment. In some embodiments, the mixture has a high concentration or coacervate molecules that are able to be applied through one or a plurality of openings. In some embodiments, the coacervate molecules improve the cosmetic performance and sensory performance of the mixture, when applied to hair. As a result, a user may achieve softer, smoother, shinier hair, with reduced frizz.

(18) In one aspect, the present disclosure describes a dispensing device, including a housing configured to surround the dispensing device, a first connection configured to connect to a water source, a second connection configured to connect to a gas source, a formula reservoir configured to hold one or more formulas, a mixing zone configured to mix water from the water source, and gas from the gas source, and formula from the formula reservoir into a mixture, a charged substrate, and an opening fluidly coupled to the mixing zone, the opening configured to deposit a mixture of the one or more formulas, the gas, and the water onto a surface.

(19) In some embodiments, the formula reservoir is located in the mixing zone. In some embodiments, the formula reservoir comprises a valve, wherein the valve is configured to release an amount of the formula into the mixing zone. In some embodiments, the formula reservoir is a first formula reservoir of a plurality of formula reservoirs and the valve is a first valve of a plurality of valves, and wherein each formula reservoir of the plurality of formula reservoirs comprises a valve of the plurality of valves and is configured to hold a formula of the one or more formulas.

(20) In some embodiments, the charged substrate is a charged plastic with a metal netting surrounding it. In some embodiments, the dispensing device further includes a processor communicatively coupled to the plurality of valves and configured to direct each valve of the plurality of valves to dispense a specific amount of each formula into the mixing zone. In some embodiments, the processor is communicatively coupled to a smart device.

(21) In some embodiments, the water source is disposed inside the housing. In some embodiments, the gas source is disposed inside the housing.

(22) In some embodiments, the dispensing device further includes an actuator configured to direct the dispensing device to begin mixing the water, the gas, and the one or more formulas.

(23) In another aspect, a dispensing system including the dispensing device described herein and one or more formulas is disclosed.

(24) In some embodiments, the one or more formulas are a liquid, a solid, a gel, a formula disposed within a dissolvable membrane, or combinations thereof. In some embodiments, the one or more formulas are one or more cosmetic ingredients.

(25) In some embodiments, the system further comprises a smart device communicatively coupled to the dispensing device, wherein the smart device is configured to generate a recipe comprising the one or more cosmetic ingredients.

(26) In some embodiments, the one or more formulas is contained in a packaging, and wherein the packaging comprises an ID tag. In some embodiments, the smart phone is further configured to read to ID tag, and determine the recipe based on an identity of the one or more formula.

(27) In yet another aspect, the present disclosure also describes a method of dispensing a mixture with a dispensing device, the method includes dispensing water from a water source, gas from a gas source into a mixing zone, opening a plurality of valves on a plurality of formula reservoirs, depositing a set amount of each formula of a plurality of formulas into the mixing zone, mixing the water, the gas, and the plurality of formulas to form a mixture, and dispensing the mixture onto a surface.

(28) In some embodiments, the method further comprises providing a recipe, wherein the recipe comprises the set amount for each formula of the plurality of formulas to be deposited from the plurality of valves. In some embodiments, the method further comprises loading the device with a one or more formulas. In some embodiments, the method further comprises identifying the plurality of formulas loaded into the device and determining the set amount of each formula based

on the identity of the one or more formulas.
(29) In some embodiments, the mixture is a shampoo, a conditioner, a hair mask, a leave in conditioner, a heat treatment, or a leave in shampoo.
(30) FIG. **1**A is an example device, in accordance with the present technology. In some embodiments, the device **100** includes a housing **110**, an actuator **120**, and a plurality of openings **140**A, **140**B, **140**C . . . **140**N. In some embodiments, the device further includes a lid **130** connected to a formula reservoir as shown in FIG. **1**B. While the device **100** is illustrated as rectangular, it should be understood that the device **100** and the housing **110** can take any number of form factors, including a device with a handle, as shown in FIGS. **3**A-**3**C, a circular or ovular form factor, an organic shape, or a polygon. In some embodiments, the housing **10** is waterproof. In some embodiments, the housing **110** may be plastic, metal, or rubber.
(31) In some embodiments, the device **100** includes an actuator **120**. Though the actuator **120** is illustrated in FIG. **1**A as a button on the device **100**, in some embodiments, the actuator **120** may take the form of a switch, toggle, touch-type capacitive button, or the like. In still other embodiments, the actuator **120** is a user interface, capable of receiving touch input or button input from a user. In other embodiments, the actuator **120** is not located on the housing **110** and may instead be on a smart device, such as a smartphone or tablet. In operation, a user can press or select the actuator **120** to begin mixing water and gas and eventually deposit a mixture onto a surface, as described in detail herein.
(32) In some embodiments, the device **100** includes a lid **130** or entrance, configured to cover a formula reservoir (as shown in FIG. **1**B) where a user may load or unload formula into the device. In some embodiments, the lid **130** may be a raised component, such as a hinged door, but in other embodiments, the lid **130** may be flush with the housing **110** or recessed into the housing **110**. In operation, a user or machine can remove the lid **130** to deposit formula into the formula reservoir of the device. In some embodiments, the lid **130** may be a screw on lid, a snap on lid, or the like.
(33) In some embodiments, the device **100** includes a plurality of openings, **140**A, **140**B, **140**C . . . **140**N. In some embodiments, the plurality of openings **140**A, **140**B, **140**C . . . **140**N are located on a single place of the device **100**. In other embodiments, the plurality of opening **140**A, **140**B, **140**C . . . **140**N can be on any number of the surfaces of the device **100**. In some embodiments, the plurality of openings **140**A, **140**B, **140**C . . . **140**N may be holes, but in other embodiments they may be valves. In operation, water, formula, and gas move through the device **100**, and are eventually deposited through the plurality of openings **140**A, **140**B, **140**C . . . **140**N.
(34) FIG. **1**B is an internal view of the example device in FIG. **1**A, in accordance with the present technology. In some embodiments, the device **100** further includes a water source **115**, a gas source **125**, a first connection **135**A, a second connection **135**B, a formula reservoir **145**, a mixing zone **155**, a power source **170**, a processor **180**, and a charged substrate **190**.
(35) In some embodiments, the water source **115** and the gas source **125** are disposed within the housing **110** of the device. In some embodiments, the water source **115**, the gas source **125**, or both are disposed outside of the housing **110**, as shown and described in FIGS. **3**A-**3**C. In some embodiments, the water source is a hot water source or a cold-water source, in some embodiments, the water source is a tank of water. In some embodiments, the water source is fully contained within the housing **110**. In some embodiments, a portion of the water source **110** may protrude from the housing. In some embodiments, the water source is removable, replaceable, refillable, or a combination thereof.
(36) In some embodiments, the gas source **125** is a CO **2** cartridge. In some embodiments, the gas source **125** is removable, replaceable, refillable, or a combination thereof. In some embodiments, the gas source **125** is fully contained within the housing **110**, but in other embodiments, a portion of the gas source **125** may protrude from the housing **110**.
(37) In operation the water source **115** is configured to dispense water into the first connection **135**A. Similarly, the gas source **125** is configured to dispense gas into the second connection **135**A.

In some embodiments, as the gas and water are dispensed, they mix. In some embodiments, the water and gas mix in a mixing zone **155**, as described herein.

(38) In some embodiments, the device further includes a first and second connection **135**A, **135**B. In some embodiments, the first connection **135**A is configured to connect to the water source. In some embodiments, the second connection **135**B is configured to connect to the gas source. In some embodiments, the first and second connections **135**A, **135**B may be valves or pipes connected to their respective sources. In some embodiments, the first and second connections **135**A, **135**B may be screwed or popped into place. In some embodiments, the first and second connections **135**A, **135**B may be slid through an opening in the water source **115** or the gas source **125** respectively. In some embodiments, the first and second connection **135**A, **135**B may be connected to the water and gas sources **115**, **125** respectively with a first and second valve. In such embodiments, the first and second valve may be configured to dispense the water and gas into the first and second connection **135**A, **135**B.

(39) In some embodiments, the device **100** further includes a mixing zone **155**. While the mixing zone **135** is illustrated as a reservoir, this is merely an example. In some embodiments, the mixing zone is a continuation of the first and second connections **135**A, **135**B and configured to mix water and gas as they flow or are directed into the formula reservoir **145**. In some embodiments, the mixing zone **155** includes a mechanism for mixing the gas and water, such as a stirrer.

(40) In some embodiments, the device **100** includes a power source **170**. In some embodiments, the power source **170** is configured to power the device. In some embodiments, the power source **170** is a battery, a capacitor, or the like. In some embodiments, the power source **170** may have a wired connection, such as a cable configured to plug into an outlet.

(41) In some embodiments, the device **100** includes a processor **180**. In some embodiments, the processor **180** is configured to direct the water source **115**, the gas source **125**, or a combination thereof to dispense water, gas, or both. In some embodiments, the processor directs a specific amount of gas, water, or both to enter the formula reservoir **145**. As described herein, in some embodiments, the amount of water and gas may be determined by an identity of the one or more formulas in the device **100**, a recipe transmitted to the processor **180**, or hardcoded into the processor **180**.

(42) In some embodiments, the device **100** further includes a formula reservoir **145**. In some embodiments, the formula reservoir **145** is configured to hold one or more formulas. In some embodiments, the formula may be a solid, such as a porous solid, a liquid, a gel, or encapsulated in a dissolvable membrane. As the water and gas enter the formula reservoir **145**, the water and gas mix with the formula to form a mixture, which is dispensed out of the plurality of openings **140**A, **140**B, **140**C . . . **140**N. In some embodiments, the formulation reservoir is directly above and fluidly coupled to the plurality of openings **140**A, **140**B, **140**C . . . **140**N.

(43) In some embodiments, the device **100** further includes a charged substrate. In some embodiments, the charged substrate is a charged plastic with a metal netting. In some embodiments, the charged substrate **190** is configured to enable coacervation of a mixture of one or more formulas, the water, and the gas. In some embodiments, ions from the charged substrate **190** are generated from the heat exchange between the water and compressed gas on the charged surface **190**. As such, the mixture of formula, water, and gas the device **100** dispenses contains concentrated coacervated cationic actives.

(44) In operation, water and gas are mixed together and deposited into the formula reservoir **145**. In the formula reservoir, the mixed gas and water are further mixed with one or more formulas to form a mixture. The mixture then flows over (or through) the charged substrate **190**, which enables coacervation of the mixture. The coacervated mixture, now containing a high concentration of coacervate molecules, is then dispensed out of the plurality of openings **140**A, **140**B, **140**C . . . **140**N onto a surface.

(45) FIG. **2**A is an internal view of another example device **100**, in accordance with the present

technology. In some embodiments, the formula reservoir **145** is connected to the mixing zone **155** through a third connection **135**C. In such embodiments, the water, gas, and one or more formulas are all mixed simultaneously in the mixing zone **155** to form a mixture. The mixture then flows through or over the charged substrate **190**.

(46) FIG. **2**B shows a plurality of formula reservoirs **145**A, **145**B, **145**C, in accordance with the present technology. In some embodiments, the formula reservoir **145** is a first formula reservoir **145**A. In some embodiments, the device **100** includes a plurality of formula reservoirs **145**A, **145**B, **145**C. In some embodiments, each formula reservoir is configured to contain a formula F**1**, F**2**, F**3**. While three formula reservoirs **145**A, **145**B, **145**C holding three formulas F**1**, F**2**, F**3**, are illustrated it should be understood that any number of reservoirs holding any number of formulas may be included in device **100**.

(47) In some embodiments, each formula reservoir **145**A, **145**B, **145**C includes a valve **185**A, **185**B, **185**C. In some embodiments, each valve **185**A, **185**B, **185**C is communicatively connected to the processor **180**. In some embodiments, the processor **180** directs each valve **185**A, **185**B, **185**C to open and close for a set amount of time, to dispense a specific amount of each formula F**1**, F**2**, F**3** based on a recipe. In some embodiments, the recipe includes a specific amount for each formula F**1**, F**2**, F**3** to create a desired mixture. In some embodiments, the desired mixture is a shampoo, conditioner, leave-in shampoo or conditioner, hair serum, or hair mask. In some embodiments, the valves **185**A, **185**B, **185**C dispense the formulas F**1**, F**2**, F**3** into a mixing zone (such as mixing zone **155**). In some embodiments, the valves dispense the formulas F**1**, F**2**, F**3** directly over the charged substrate **190** and through the openings **140**A, **140**B, **140**C . . . **140**N.

(48) FIG. **3**A is another example device **300**, in accordance with the present technology. In some embodiments, the device **300** is handheld. In some embodiments, the device **300** can further be shaped like a shower head. In some embodiments, the device **300** includes an actuator **320**, a first connection **335**A, a second connection **335**B and a plurality of openings **340**A, **340**B, **340**C . . . **340**N.

(49) In some embodiments, the first connection **335**A and the second connection **335**B are disposed on the device, such as when a gas source, a water source, or both are not located inside the device **300**. While the first and second connections **335**A, **335**B are illustrated as protruding from the device **300**, in some embodiments, they may be recessed into the device **300** or flush with the device housing. In some embodiments, the first and second connections **335**A, **335**B are configured to attach to a water source and a gas source, respectively, either directly or with an additional adaptor as shown in FIG. **4**. In some embodiments, the first and second connections **335**A, **335**B may be threaded, configured to snap onto the respective source, magnetized, or the like.

(50) While the plurality of openings **340**A, **340**B, **340**C . . . **340**N are arranged in a circle, it should be understood that the plurality of openings can take any form or orientation. In some embodiments, the plurality of openings **340**A, **340**B, **340**C . . . **340**N are fluidly coupled with the internal components of the device **300** as shown in FIG. **3**C.

(51) FIG. **3**B is a perspective view of the example device of FIG. **3**A, in accordance with the present technology.

(52) In some embodiments, the actuator **320** may protrude from the device **300**, but it should be understood that the actuator **320** may also be flush with the device **300** or recessed. In operation, when a user presses the actuator **320**, the device **300** takes in both water and gas through the first connection **335**A and the second connection **335**B, respectively.

(53) FIG. **3**C is an internal view of the example device of FIG. **3**A, in accordance with the present technology. In some embodiments, the device **300** may include a formula reservoir **345**, configured to hold one or more formulas F. In some embodiments, the formula F may be enclosed in a dissolvable membrane, such as is illustrated in FIG. **3**C. In such embodiments, the dissolvable membrane may dissolve in response to the water and gas entering the formula reservoir **345**. In some embodiments, the formula reservoir **345** may have an opening that allows a user to deposit or

load the device **300** with the formula F.
(54) In operation, when a user pressed the actuator **320**, water and gas flow into the device **100** through the first and second connection **335**A, **335**B respectively. In some embodiments, the gas and water mix before entering the formula reservoir **345**. In the formula reservoir **345**, the gas and water mix with one or more formulas F. In some embodiments, the mixed gas, water, and formula form a mixture, and the mixture is dispensed onto a surface through the plurality of openings **340**A, **340**B, **340**C . . . **340**N after passing over or through a charged substrate **390**. In some embodiments, the surface is hair, skin, or the hands of a user.
(55) FIG. **4** shows the example device of FIG. **3**A connected to an external water source **415** and an external gas source **425**, in accordance with the present technology. In some embodiments, the device **400**. In some embodiments, the device **400** is configured to attach to an external water source **415** and an external gas source **425**. In some embodiments, the external water source **415** may be a water tank, a sink, or a shower post. In some embodiments, the external gas source **425** may be a CO **2** cartridge, a gas line, or the like.
(56) In operation, a user can connect the first connection **435**A to a water source **415**, and the second connection **435**B to a gas source **425**. In some embodiments, the user may utilize another adaptor as illustrated, but in other embodiments, the user may connect the sources the device **400** directly.
(57) FIG. **5** is an example system, in accordance with the present technology. In some embodiments, a system including a device **500** (or any device **100**, **200**, **300**, **400** as described herein) and a smart device **1000** is disclosed. In some embodiments, the device **500** and the smart device **1000** are communicatively coupled to one another, such as through Bluetooth LTE, cellular data, Wi-Fi, RFID, a wired connection, or the like.
(58) In some embodiments, the smart device **1000** may include, in addition to or in place of actuator **530**, an application that allows a user to direct the device **500** to create the mixture as described herein. In some embodiments, the smart device may provide the device **500** with a recipe including an amount of water, and amount of gas, and an amount of one or more formulas. In some embodiments, the user can select a formula or recipe with the smart device to determine the amounts of water, gas, and one or more formulas, as described in detail herein.
(59) FIG. **6** is example formula F inside example packaging **2000**, in accordance with the present technology. In some embodiments, the system further includes formula F**1**, F**2**, F**3** . . . FN. In some embodiments, the formula F**1**, F**2**, F**3** . . . FN is disposed within a packaging **2000**. While the formula F**1**, F**2**, F**3** . . . FN is illustrated as formula encapsulated in dissolvable membranes (or "pods"), the formula may also be a liquid, a solid, a gel, or the like. In some embodiments, the formula F**1**, F**2**, F**3** . . . FN is a cosmetic ingredient. In some embodiments, the one or more formulas F**1**, F**2**, F**3** . . . FN are active ingredients that when mixed with water and gas, form a shampoo, a conditioner, a leave-in shampoo or conditioner, a hair serum, or a hair mask.
(60) In some embodiments, the packaging **2000** further includes an identifier **2010**. In some embodiments, the identifier **2010** may be a QR code, an RFID tag, or the like. In operation, the identifier **2010** identifies the formula F**1**, F**2**, F**3** . . . FN inside the packaging and can direct a smart device **1000** to tell the device **500** the recipe for creating the mixture. In some embodiments, the device **500** includes a component capable of reading the identifier, so that the device **500** receives the recipe directly. In some embodiments, the packaging **2010** may include more than one formula F**1**, F**2**, F**3** . . . FN. In such embodiments, the identifier **2010** may include a recipe that is transmitted to the smart device **1000**, and includes the amount of each formula F**1**, F**2**, F**3** . . . FN that should be dispensed or mixed. In some embodiments, the smart device **1000** or the device **500** generates the recipe based on one or more identifiers **2010** on one or more packaging **2000**. In some embodiments, the one or more formulas F**1**, F**2**, F**3** . . . FN may be portioned in a manner consistent with the recipe. For example, a first formula F**1** in the specific amount needed for the recipe may be contained in a dissolvable membrane, and a second formula F**2** in a different specific

amount needed for the recipe may be contained in a different dissolvable membrane, or in a separate chamber of the first dissolvable membrane. In such embodiments, a user could load the device with one pod of each formula F**1**, F**2**, or the combined pod with both portioned formulas F**1**, F**2** to mix and dispense the desired formula. In some embodiments, the packaging **2000** may include a written recipe instructing the user to load the device with a set amount of each formula F**1**, F**2**, F**3** . . . FN to create a desired mixture.

(61) FIG. **7** is an example recipe, in accordance with the present technology. In some embodiments, the smart device, the device, or the packaging identifier generates a recipe for dispensing a mixture. In some embodiments, the recipe includes a set amount of one or more formulas. In some embodiments, the recipe further includes a set amount of gas, water, or both to form the mixture. For example, the recipe may instruct the device to apply one amount of a shampoo, another amount of an additional ingredient, such as a UV protecting ingredient, and a set amount of water and gas to form a shampoo with UV protecting properties. It should be understood that recipe **7000** is an example, and any number of formulas at any quantity can be generated. In some embodiments, the recipe **7000** is hardcoded into the processor of the device. In some embodiments, the recipe **7000** is selected by a user with the device of the smart device.

(62) FIG. **8** is an example method **800** of dispensing a mixture, in accordance with the present technology. The method **800** begins in block **810**, when water and gas are dispensed into a mixing zone. The water and gas may mix in a separate location or may mix as a result of flowing through the device. In some embodiments, the device actively mixes the gas and water, such as with a stirrer. In other embodiments, the gas and water mix together as they flow through the device. In some embodiments, the water and gas flow through a first and second connection, respectively, into the mixing zone.

(63) In block **815**, the water and gas are mixed with one or more formulas to form a mixture. As described herein, in some embodiments, the mixture is a shampoo or conditioner. In some embodiments, the mixture is a leave-in shampoo or conditioner. In some embodiments, the mixture is a hair mask or hair serum.

(64) In block **820**, the mixture is passed through (or over) the charged substrate. In some embodiments, the charged substrate is a charged plastic covered in a metal net. In some embodiments, when the mixture is passed over the charged substrate, coacervation of the mixture occurs. In some embodiments, ions from the charged substrate **190** are generated from the heat exchange between the water and compressed gas on the charged surface **190**. As such, in some embodiments, after passing over the charged substrate, the mixture of formula contains concentrated coacervated cationic actives.

(65) In block **825**, the mixture containing the coacervated cationic actives is dispensed onto a surface. In some embodiments, the surface is a user's hair. In some embodiments, the mixture containing the coacervated cationic actives benefits the user's hair. In some embodiments, the mixture allows for softer, smoother, and/or shinier hair. In some embodiments, the mixture reduces frizz in the user's hair. The method **800** then proceeds to block **830**.

(66) In block **830**, the method **800** ends.

(67) FIG. **9** is an example method **900** of dispensing a mixture according to a recipe, in accordance with the present technology. The method **900** begins in block **910**. In block **910**, water and gas are dispensed into a mixing zone. As described herein, the mixing zone may be a separate reservoir that allows the water and gas to mix, or an area where the water and gas naturally mix as they flow through the device.

(68) In block **915**, a recipe is provided, the recipe including a set amount of each formula needed for the recipe. In some embodiments, the recipe is provided by the device itself, the smart device, or the packaging of the one or more formulas. In some embodiments, the recipe directs the device to deposit a set amount of each formula in the recipe into the mixing zone, or over the charged substrate.

(69) In block **920**, the plurality of valves on the plurality of formula reservoirs. In some embodiments, the processor of the device directs the plurality of valves to open for to deposit the set amount of each formula. In some embodiments, the plurality of valves is configured to deposit formula for an amount of time, independent of each other.
(70) In block **925**, a set amount of each formula is deposited into the mixing zone, according to the recipe. In some embodiments, the set amount of each formula is passed directly over the charged substrate.
(71) In block **930**, the one or more formulas is mixed with water and gas to form a mixture. In some embodiments, the mixture is a shampoo or a conditioner. In some embodiments, the mixture may be a leave-in shampoo or conditioner. In some embodiments, the mixture is a hair mask or hair serum.
(72) In block **935**, the mixture is passed through or over the charged substrate. In some embodiments, by passing the mixture over the charged substrate, coacervation of the mixture occurs. In some embodiments, ions from the charged substrate **190** are generated from the heat exchange between the water and compressed gas on the charged surface **190**. As such, in some embodiments, after passing over the charged substrate, the mixture of formula contains concentrated coacervated cationic actives.
(73) In block **940**, the mixture is dispensed onto a surface. In some embodiments, the surface is skin or hair.
(74) In block **945**, the method ends.
(75) FIG. **10** is an example method **1100** of dispensing a mixture according to an identity of one or more formulas, in accordance with the present technology. The method **1100** begins in block **1110**. In block **1110**, water and gas are dispensed into a mixing zone, as described herein.
(76) In block **1115**, the plurality of formulas is identified. In some embodiments, the formula is identified by a packaging of the formula, or a packaging identifier configured to be read with a smart device. In some embodiments, the device is configured to identify the plurality of formulas. In some embodiments, the device is configured to select a mixture based on the identity of the plurality of formulas. In some embodiments, a user selects a mixture from a list of mixtures possible based on the plurality of formulas inside the device.
(77) In block **1120**, a plurality of valves on the plurality of formula reservoirs are opened. In some embodiments, the processor directs the plurality of valves to open for a set amount of time, so as to deposit a set amount of formula.
(78) In block **1125**, the set amount of formula is deposited into the mixing zone according to the identity of the plurality of formulas.
(79) In block **1130**, the one or more formulas is mixed with water and gas to form a mixture. In some embodiments, the mixture is a shampoo or a conditioner. In some embodiments, the mixture may be a leave-in shampoo or conditioner. In some embodiments, the mixture is a hair mask or hair serum.
(80) In block **1135**, the mixture is passed through or over the charged substrate. In some embodiments, by passing the mixture over the charged substrate, coacervation of the mixture occurs. In some embodiments, ions from the charged substrate **190** are generated from the heat exchange between the water and compressed gas on the charged surface **190**. As such, in some embodiments, after passing over the charged substrate, the mixture of formula contains concentrated coacervated cationic actives.
(81) In block **1140**, the mixture is dispensed onto a surface. In some embodiments, the surface is skin or hair.
(82) In block **1145**, the method ends.
(83) The order in which some or all of the blocks in the method should not be deemed to be limiting. Rather, one or ordinary skill in the art having the benefit of the present disclosure will understand that some of the blocks may be executed in a variety of orders not illustrated, or even in

parallel.
(84) The detailed description set forth above in connection with the appended drawings, where like numerals reference like elements, are intended as a description of various embodiments of the present disclosure and are not intended to represent the only embodiments. Each embodiment described in this disclosure is provided merely as an example or illustration and should not be construed as preferred or advantageous over other embodiments. The illustrative examples provided herein are not intended to be exhaustive or to limit the disclosure to the precise forms disclosed. Similarly, any steps described herein may be interchangeable with other steps, or combinations of steps, in order to achieve the same or substantially similar result. Generally, the embodiments disclosed herein are non-limiting, and the inventors contemplate other embodiments within the scope of this disclosure may include structures and functionalities from more than one specific embodiment shown in the figures and described in the specification.
(85) In the foregoing description, specific details are set forth to provide a thorough understanding of exemplary embodiments of the present disclosure. It will be apparent to one skilled in the art, however, that the embodiments disclosed herein may be practiced without embodying all the specific details. In some instances, well-known process steps have not been described in detail in order not to unnecessarily obscure various aspects of the present disclosure. Further, it will be appreciated that embodiments of the present disclosure may employ any combination of features described herein.
(86) The present application may include references to directions, such as “vertical,” “horizontal,” “front,” “rear,” “left,” “right,” “top,” and “bottom,” etc. These references, and other similar references in the present application, are intended to assist in helping describe and understand the particular embodiment (such as when the embodiment is positioned for use) and are not intended to limit the present disclosure to these directions or locations.
(87) The present application may also reference quantities and numbers. Unless specifically stated, such quantities and numbers are not to be considered restrictive, but exemplary of the possible quantities or numbers associated with the present application. Also in this regard, the present application may use the term “plurality” to reference a quantity or number. In this regard, the term “plurality” is meant to be any number that is more than one, for example, two, three, four, five, etc. The term “about,” “approximately,” etc., means plus or minus 5% of the stated value. The term “based upon” means “based at least partially upon.”
(88) The principles, representative embodiments, and modes of operation of the present disclosure have been described in the foregoing description. However, aspects of the present disclosure, which are intended to be protected, are not to be construed as limited to the particular embodiments disclosed. Further, the embodiments described herein are to be regarded as illustrative rather than restrictive. It will be appreciated that variations and changes may be made by others, and equivalents employed, without departing from the spirit of the present disclosure. Accordingly, it is expressly intended that all such variations, changes, and equivalents fall within the spirit and scope of the present disclosure as claimed.

Claims

1. A dispensing device, comprising: a housing configured to surround the dispensing device; a first connection configured to connect to a water source; a second connection configured to connect to a gas source; a formula reservoir configured to hold one or more formulas; a mixing zone configured to mix water from the water source, and gas from the gas source, and formula from the formula reservoir into a mixture; a charged substrate configured to enable coacervation the mixture; and a plurality of openings fluidly coupled to the mixing zone, the opening configured to deposit a mixture of the one or more formulas, the gas, and the water onto a surface.
2. The dispensing device of claim 1, wherein the formula reservoir is located in the mixing zone.

3. The dispensing device of claim 1, wherein the formula reservoir comprises a valve, wherein the valve is configured to release an amount of the formula into the mixing zone.
4. The dispensing device of claim 3, wherein the formula reservoir is a first formula reservoir of a plurality of formula reservoirs and the valve is a first valve of a plurality of valves, wherein each formula reservoir of the plurality of formula reservoirs comprises a valve of the plurality of valves, and wherein each formula reservoir is configured to hold a formula of the one or more formulas.
5. The dispensing device of claim 4, wherein the dispensing device further comprises a processor communicatively coupled to the plurality of valves and configured to: direct each valve of the plurality of valves to dispense a specific amount of each formula of the one or more formulas into the mixing zone.
6. The dispending device of claim 5, wherein the processor is communicatively coupled to a smart device.
7. The dispensing device of claim 1, wherein the charged substrate is a charged plastic surrounded by a metal netting.
8. The dispensing device of claim 1, wherein the water source, the gas source, or both are disposed inside the housing.
9. The dispensing device of claim 1, wherein the dispensing device further comprises an actuator configured to direct the dispensing device to begin mixing the water, the gas, and the one or more formulas.
10. A dispensing system comprising: the dispensing device of claim 1; and one or more formulas.
11. The dispensing system of claim 10, wherein the one or more formulas are a liquid, a solid, a gel, a formula disposed within a dissolvable membrane, or combinations thereof.
12. The dispensing system of claim 10, wherein the one or more formulas are one or more cosmetic ingredients.
13. The dispensing system of claim 10, wherein the system further comprises a smart device communicatively coupled to the dispensing device, wherein the smart device is configured to generate a recipe comprising the one or more cosmetic ingredients.
14. The dispensing system of claim 13, wherein the one or more formulas is contained in a packaging, and wherein the packaging comprises an ID tag.
15. The dispensing system of claim 14, wherein the smart phone is further configured to read to ID tag, and determine the recipe based on an identity of the one or more formula.