LOW TEMPERATURE ELECTRONIC VAPORIZATION DEVICE AND METHODS

CROSS REFERENCE

[0001] This application claims priority to U.S. Provisional Patent Application Serial No. 61/524,308, filed August 16, 2011, which is incorporated herein by reference in its entirety.

BACKGROUND OF THE INVENTION

[0002] The use of tobacco products and the harmful side effects of smoking tobacco continue to gain increasing attention worldwide. As more regulations come into effect regarding smoking in the work place or in public, interest in developing alternative products is growing significantly. One method of reducing the harmful side effects of smoking is to not burn the tobacco products. This is because many of the harmful analytes, such as Hoffman analytes, obtained from smoking are received due to the burning of the material.

[0003] A difficulty of developing and marketing a device that can deliver an aerosolized tobacco product is catering to the user in terms of visual and physical appeal of use. A device that can be used multiple times to aerosolize a variety of different substances while providing similar sensations to the user as those from smoking, such as visual vapor, are desirable. A device and product that can aerosolize a tobacco product and reduce Hoffman analytes and mutagenic compounds delivered to a user as compared to smoking are also desirable.

SUMMARY OF THE INVENTION

[0004] Disclosed herein is a device for generating an inhalable aerosol comprising:

a. a body;

b. an aerosol generator in the body comprising a vaporization chamber, wherein the aerosol generator is configured to generate an inhalable aerosol from a vaporisable material in the vaporisation chamber wherein such inhalable aerosol is deliverable to a user; and

c. a lid removably coupled to the body of the device, wherein the lid is configured to cover the vaporisation chamber;

characterised in that the device further comprises a magnetic hinge about which a first side of the lid can swivel away from the body of the device into an open position when a force is exerted on a second side of the lid) in an opposite direction toward the body of the device, and the lid can be removed entirely by overcoming the magnetic force of the hinge.

[0005] A device for generating an inhalable aerosol is provided herein comprising: a mouthpiece, a body; an electronic heater within said body comprising a printed circuit board to heat a viscous vaporizable material to a generate an inhalable aerosol; and a temperature regulator. The inhalable aerosol can accommodate a pod comprising particles that are less than about 2 microns (in their longest dimension- whether length or width or depth) or loose leaf tobacco and other botanicals (no pods).

[0006] In one aspect, a resistive heating element and thermistor to monitor and precisely control vaporization temperature are disclosed for use in a device for aerosolizing a material. In some embodiments, the heating element comprises an electronic circuit with power transistor to drive the heater. In certain embodiments, the tail of the electronic circuit solders to a PCB (printed circuit board). In some embodiments, the device comprises aerogel

insulation to maintain efficiency and low exposed surface temperature. In certain embodiments, the aerogel is a silica aerogel with reinforcing fibers (e.g., Pyrogel 2250 flexible aerogel blanket). In some embodiments, the device comprises a single button interface wherein the single button interface provides means for on, off and wake from sleep.

[0007] In some embodiments, the electronic heater comprises a polyimide thin film ("flex") printed heater circuit (also or alternatively called a flexible heater circuit). In certain embodiments provide the electronic heater with soldered thermistor element for control loop. In certain embodiments, the device comprises a PID (proportional integral derivative) control loop to control operating temperature.

[0007A] In some embodiments, the device comprises a magnetic charge connector. In some embodiments, the device comprises time or sensor based standby activation to conserve battery power. This may also or

alternatively be called a standby mode. In certain embodiments, sensing means includes accelerometer or other tile/vibration sensor, capacitive (touch) sensor, or monitoring the thermistor to detect if the heater is being loaded by the user puffing on the device.

[0008] In some embodiments, the heater is a metallic heater wherein the heater component is heat staked, ultrasonic bonded or over-molded into a high temperature capable plastic component. The processes create a hermetic or dust seal. In some embodiments, a split mouthpiece design is disclosed for use in a device for aerosolizing a material. The half of the split mouthpiece is removable and conforms to contour of the device. In some embodiments, the mouthpiece attaches to the body of the device with rare earth magnet. In some embodiments, the mouthpiece attaches to the body with plastic detent or other similar mechanism. In other embodiments, the mouthpiece is integrated into the device with a hinge, or other mechanism (e.g., a string, or the like). In certain embodiments, the mouthpiece swivels or slides away to reveal the heating chamber. In certain embodiments, the mouthpiece is detached fully from the attachment mechanism for cleaning or replacement but still links to the device ("removably captured")

[0009] In another aspect provides an electronic stand-alone vaporizer device for use with loose leaf tobacco and/or other botanicals. In some embodiments, the device comprises a mouthpiece that retracts from said device with a push-push mechanism. In some embodiments, the push-push mechanism also turns the device on via a magnet embedded in the mouthpiece and a hall effect sensor on the PCB (printed circuit board). In certain embodiments, the mouthpiece comprises a compression spring, a leaf spring and a stainless steel tube attached to the mouthpiece with a catch groove and a toggle slider. In some embodiments, the device comprises a magnetic on/off control using reed or hall effect switch. In certain embodiments, the magnetic control is integrated into mouthpiece to eliminate additional buttons. In some embodiments, the mouthpiece adapts push-push mechanism for mouthpiece withdrawal and/or retraction. In some embodiments, the device comprises a magnetic lid to cover vaporization chamber. In some embodiments, the device comprises a thermally conductive shell to distribute excess heat and maintain low exposed surface temperature. In some embodiments, the device comprises a button-operated temperature selection with visual, audible indicator, and/or other sensory output (e.g. vibration). In some embodiments, the mouthpiece is integrated into the device with a hinge, or other mechanism (e.g., a string, or the like). In some embodiments, the vaporization device comprises a thin wall metal heating chamber. Thin walls allow for low thermal mass and thus fast startup. In some embodiments, the devices comprise a tilting lid using magnetic or snap attachments for the lid to stay in its closed position to prevent accidental opening. The tilting lid has no visible removal button.

[0010] In another aspect provides a device which emulates smoking wherein the device generates an aerosol for inhalation by a subject by heating a viscous material containing plant matter to about 150 °C and wherein the aerosol has a tactile response in the mouth or respiratory tract. The viscous material can comprise an aerosol-forming medium that can comprise at least one of propylene glycol and glycerin to produce a visual aerosol when heated. The viscous material can also comprise tobacco and flavorants.

[0011] The device can also deliver an active element to a user that is part of the aerosol. The active element can be absorbed in the respiratory tract. The aerosol can comprise particles less than about 2 microns in diameter.

[0012] The target temperature for heating the viscous material in the device can be about 100 °C to about 200 °C. Preferably, the target temperature is about 150 °C, which generates an aerosol.

[0013] In another aspect, a method of creating a tactile response in the mouth or respiratory tract is disclosed. The method comprises: deploying a smoke emulating device wherein the device generates a smokeless aerosol having a tactile response in the mouth or respiratory tract by heating a viscous material containing plant matter contained therein; heating the viscous material to a target temperature; generating an aerosol having the tactile response in the mouth or respiratory tract from the heated viscous material; and inhaling the aerosol. The viscous material can comprise an aerosol-forming medium that can comprise at least one of propylene glycol and glycerin to produce a visual aerosol when heated. The viscous material can also comprise at least one of tobacco and flavorants. The device can deliver an active element to a user that is part of the aerosol. The active element can be absorbed in the respiratory tract

[0014] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater comprising a heater circuit, an oven, and a printed circuit board within said body, said electronic heater configured to heat a viscous vaporizable material and generate an inhalable aerosol; and a temperature regulator.

[0015] In some embodiments, the mouthpiece is split or integrated into the device. In some embodiments, the mouthpiece retracts from the device with a push-push mechanism.

[0016] In some embodiments, the heater circuit is soldered to the heater circuit board. In some embodiments, the electronic heater comprises a resistive heating element and a thermistor configured monitor and precisely control vaporization temperature of the viscous vaporizable material. In some embodiments, the heater circuit is a thin film polyimide heater.

[0017] In some embodiments, the electronic heater is sealed by a hermetic or dust seal.

[0018] In some embodiments, the device comprises a magnetic control using reed or hall effect switch. In some embodiments, the magnetic control using reed or hall effect switch is integrated into the mouthpiece.

[0019] In some embodiments, the device comprises a magnetic lid.

[0020] In some embodiments, the device comprises a thermally conductive shell configured to distribute excess heat and configured maintain a low exposed surface temperature.

[0021] In some embodiments, the device comprises time based or sensor based standby mode activation. In some embodiments, the sensor comprises an accelerometer or other tactile/vibration sensor, capacitive (touch) sensor, or a sensor for monitoring the thermistor configured to detect if the heater is being loaded by the user puffing on the device.

[0022] In some embodiments, the device comprises a proportional integral derivative (PID) control loop configured to control operating temperature.

[0023] In some embodiments, the device comprises a thin wall metal heating chamber.

[0024] In some embodiments, the device comprises aerogel insulation. In some embodiments, the aerogel insulation comprises a silica aerogel with reinforcing fibers.

[0025] In some embodiments, the heater is thermal pressed, ultrasonic bonded or over-molded into a high temperature capable plastic component. In some embodiments, the heater is heat stated or heat swaged into a high temperature capable plastic component. In some embodiments, the heater is heat swaged into a high temperature capable plastic component.

[0026] In some embodiments, the device further comprises a magnetic charge connector configured to connect the device to a charger.

[0027] In some embodiments, the device comprises a single button interface.

[0028] In some embodiments, the viscous vaporizable material is in a removable pod. In some embodiments, the removable pod comprises particles of the viscous vaporizable material that are less than about 2 microns. In some embodiments, the removable pod comprises the viscous vaporizable material consisting essentially of particle sizes that are less than about 2 microns.

[0029] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; a temperature regulator and an aerogel insulation.

[0030] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; a temperature regulator and a magnetic charge connector.

[0031] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; a battery; a temperature regulator, and time or sensor based standby activation configured to conserve battery power.

[0032] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; a battery; a temperature regulator, and a temperature control loop.

[0033] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; a battery; a temperature regulator, and a single button interface.

[0034] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; a battery; a temperature regulator; wherein the electronic heater is sealed by a hermetic or dust seal.

[0035] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; a vaporization chamber; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; a temperature regulator; and a magnetic lid configured to cover the vaporization chamber.

[0036] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; a thermally conductive shell configured to distribute excess heat and maintain a low exposed surface temperature; and a temperature regulator.

[0037] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; and a temperature regulator; and a push-push mechanism configured to toggle the mouthpiece between a retracted and an "on" position.

[0038] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; a temperature regulator; and a button-operated temperature selection with a visual indicator, an audible indicator and/or a vibration indicator.

[0039] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; a temperature regulator; and a tilting lid comprising a magnetic attachment or a snap attachment configured to maintain the lid in its closed position and/or configured to prevent accidental opening.

[0040] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; and a temperature regulator, wherein the mouthpiece is integrated into the device.

[0041] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater comprising a heater circuit within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; and a temperature regulator; wherein the heater circuit has low resistance such that a single battery is capable of powering the device.

[0041A] Further, a device for generating an inhalable aerosol is provided herein comprising an electronic heater comprising an oven comprising an oven chamber; and a heater circuit attached to the oven, wherein the heater circuit heats as current is passed therethrough thereby conductively heating the oven and a vaporizable material in the oven to generate the inhalable aerosol.

[0041B] Furthermore, a device for generating an inhalable aerosol is provided herein comprising an electronic heater comprising an oven, an oven chamber, and a heater circuit contacting the oven; and internal insulation; wherein the electronic heater is sealed by a dust seal to prevent dust from the internal insulation from entering the oven chamber.

[0041C] Furthermore, a method for generating an inhalable aerosol is provided herein comprising, providing a device comprising an electronic heater comprising an oven, an oven chamber, and a heater circuit contacting the oven; and internal insulation , wherein the electronic heater is sealed by a dust seal to prevent dust from the internal insulation from entering the oven chamber.

[0041D] Furthermore, a device for generating an inhalable aerosol is provided herein comprising a body; a vaporization chamber inside the body; and a lid comprising a magnetic attachment; a closed position, wherein the lid is magnetically attached to the body and covers the vaporization chamber; a pivoted position, wherein the lid is magnetically attached to the body and one side of the lid is pivoted away from the vaporization chamber; and a removed position, wherein the lid is removed from the body.

[0041E] Furthermore, a method for generating an inhalable aerosol is provided herein comprising, providing a device comprising a body; a vaporization chamber; and a lid comprising a magnetic attachment; a closed position, wherein the lid is magnetically attached to the body and covers the vaporization chamber; a pivoted position, wherein the lid is magnetically attached to the body and one side of the lid is pivoted away from the vaporization chamber; and a removed position, wherein the lid is removed from the body.

[0041F] Furthermore, a device for generating an inhalable aerosol is provided herein comprising, an electronic heater and a sensor comprising an accelerometer or a vibration sensor, wherein the device is programmed to convert between three modes of operation based on the sensor, the three modes of operation comprising an on mode; a standby mode; and an off mode.

[0041G] Furthermore, a method of generating an inhalable aerosol is provided herein comprising, providing a device comprising, an electronic heater and a sensor comprising an accelerometer or a vibration sensor, wherein the device is programmed to convert between three modes of operation based on the sensor, the three modes of operation comprising an on mode; a standby mode; and an off mode.

[0041H] Furthermore, a device for generating an inhalable aerosol is provided herein comprising a single button interface configured to operate the device.

[0041I] Furthermore, a device for generating an inhalable aerosol is provided herein comprising a mouthpiece; a mechanism to toggle the mouthpiece between a retracted and an extended position; and a sensor configured to turn the device on based on the sensor's detection of the mouthpiece in the extended position, wherein the device generates an inhalable aerosol when it is on.

[0041J] Furthermore, a method for generating an inhalable aerosol is provided herein comprising, providing a device comprising a mouthpiece; a mechanism to toggle the mouthpiece between a retracted and an extended position; and a sensor configured to turn the device on based on the sensor's detection of the position of the mouthpiece in the extended position, wherein the device generates an inhalable aerosol when the device is turned on.

INCORPORATION BY REFERENCE

[0042] All publications, patents and patent applications mentioned in this specification are herein incorporated by reference to the same extent as if each individual publication, patent or patent application was specifically and individually indicated to be incorporated by reference.

BRIEF DESCRIPTION OF THE DRAWINGS

[0043] A better understanding of the features and advantages of the present invention will be obtained by reference to the following detailed description that sets forth illustrative embodiments, in which the principles of the invention are used, and the accompanying drawings of which:

[0044] **FIG. 1** illustrates a device comprising a single button interface, a LiPo battery, and body outer halves wherein the tail of flexible heater circuit is soldered to a PCB.

[0045] **FIG. 2** is a sectional view of the same embodiment as shown in **FIG. 1**.

[0046] FIG. 3 is a perspective view of the device with a detachable mouthpiece and a tactile button with LED-illuminated "halo" indicator.

[0047] FIG. 4 demonstrates a device of single piece with extruded aluminum outer body wherein the mouthpiece of the device retracts from device with a push-push mechanism.

[0048] FIG. 5 is a sectional detail view of the device as illustrated in FIG. 4.

[0049] FIG. 6 shows how the magnetically attached vaporization chamber lid works.

[0050] FIG. 7 shows how to charge the battery by an exemplary battery charging source (e.g. a USB charger).

[0051] FIG. 8 is a sectional detail view of the device charged by a USB charger.

DETAILED DESCRIPTION OF THE INVENTION

[0052] The invention described herein has a wide range of applications for inhalation of an active substance as will be appreciated by persons of skill in the art upon reviewing the disclosure. For example, the devices, cartridges (i.e. pods), such as disclosed in US application No. 11/485,168, systems, kits and methods could be used, for example, to inhale a tobacco product through the mouth or nose. The devices, systems, kits and methods could be used, for example, to inhale any substance, such as a botanical, pharmaceutical, nutraceutical, or any other substance providing a benefit or sensation to an end user.

[0053] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater comprising a heater circuit, an oven, and a printed circuit board within said body, said electronic heater configured to heat a viscous vaporizable material and generate an inhalable aerosol; and a temperature regulator.

[0054] In some embodiments, the mouthpiece is split or integrated into the device. In some embodiments, the mouthpiece retracts from the device with a push-push mechanism.

[0055] In some embodiments, the heater circuit is soldered to the heater circuit board. In some embodiments, the electronic heater comprises a resistive heating element and a thermistor configured to monitor and precisely control vaporization temperature of the viscous vaporizable material. In some embodiments, the heater circuit is a thin film polyimide heater.

[0056] In some embodiments, the electronic heater is sealed by a hermetic or dust seal.

[0057] In some embodiments, the device comprises a magnetic control using reed or hall effect switch. In some embodiments, the magnetic control using reed or hall effect switch is integrated into the mouthpiece.

[0058] In some embodiments, the device comprises a magnetic lid.

[0059] In some embodiments, the device comprises a thermally conductive shell configured to distribute excess heat and configured maintain a low exposed surface temperature.

[0060] In some embodiments, the device comprises time based or sensor based standby mode activation. In some embodiments, the sensor comprises an accelerometer or other tactile/vibration sensor, capacitive (touch) sensor, or a sensor for monitoring the thermistor configured to detect if the heater is being loaded by the user puffing on the device.

[0061] In some embodiments, the device comprises a proportional integral derivative (PID) control loop configured to control operating temperature.

[0062] In some embodiments, the device comprises a thin wall metal heating chamber.

[0063] In some embodiments, the device comprises aerogel insulation. In some embodiments, the aerogel insulation comprises a silica aerogel with reinforcing fibers.

[0064] In some embodiments, the heater is thermal pressed, ultrasonic bonded or over-molded into a high temperature capable plastic component. In some embodiments, the heater is heat stated or heat swaged into a high temperature capable plastic component. In some embodiments, the heater is heat swaged into a high temperature capable plastic component.

[0065] In some embodiments, the device further comprises a magnetic charge connector configured to connect the device to a charger.

[0066] In some embodiments, the device comprises a single button interface.

[0067] In some embodiments, the viscous vaporizable material is in a removable pod. In some embodiments, the removable pod comprises particles of the viscous vaporizable material that are less than about 2 microns. In some embodiments, the removable pod comprises the viscous vaporizable material consisting essentially of particle sizes that are less than about 2 microns.

[0068] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; a battery; a temperature regulator, and a single button interface. An exemplary device **100** is illustrated in **FIG. 1** comprising a single button interface **102** for on, off, wake from sleep mechanism and a heater circuit (**105**, tail shown) soldered to a PCB **104** and a battery **103** (e.g., a LiPo battery). As shown in **FIG. 1**, body outer halves **101** snap together to hold and protect the device. In some instances, the outer body is molded as one part. In some embodiments, the single button interface that provides mechanism for on, off and wake from sleep. In other embodiments, additional buttons are included for any of these functions. For example, pressing the single button for 1 second turns the device on. Continuing to hold the button for 5 seconds disables the motion-based low power standby and automatic shut-down. Alternatively, a second button may be used to disable the motion-based low power standby and and/or shut-down. If a user does not want the device to cool down while resting on a table, e.g., they can use this override. In some embodiments, upon power-up, if the single button is depressed for a very long period (>10 seconds), the device turns off again. This is to prevent inadvertent activation while in a purse, etc. While on, pressing the button momentarily turns it off. In some embodiments, a single or more than one button could report battery level (via LED blinks, for instance), change operating temperature of the device, or change the nominal intensity of the LED(s) – if the user is in a dark environment and does not want the light to be distracting. These various features could be triggered with one or more buttons or with the same button by pressing it for a prescribed duration or number of presses.

[0069] As described herein, an electronic heater comprises a heater circuit, an oven and a printed circuit board to heat a viscous vaporizable material to a generate an inhalable aerosol. The heater circuit may be flexible. In some embodiments, flexible heater circuits are typically etched from a copper- or constantan-

clad polyimide film. In some embodiments, a flexible heater is constructed by stamping (die-cutting) a thin sheet of constantan or copper. In this case, the heater circuit would have to be electrically insulated from adjacent conductive elements in the assembly, using polyimide or other suitable insulation that is stable at elevated temperatures. The heater circuit heats the attached oven which then heats the cartridge or active substance by thermal conduction. The resistive heater circuit heats up as current passes through it. Heat is then conducted from the circuit to the oven walls. Thermal conduction continues from the oven walls into the cartridge or active substance. Note that heat also transfers from the oven walls into the active substance or cartridge via convection and radiation, but most transfer occurs via conduction.

[0070] In some embodiments, the device comprises more than one button interface for on, off, wake from sleep mechanism and a heater circuit soldered to a PCB.

[0071] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; a battery; a temperature regulator, and time or sensor based standby activation configured to conserve battery power. In some embodiments, the device comprises time or sensor based standby activation to conserve battery power. This may also or alternatively be called a standby mode. The standby mode may also or alternatively be called sleep, or sleep mode. After non-use based on time, movement or lack thereof, position (e.g. vertical), or placement in a charging cradle, or after any combination of any of these, the device is programmed to convert to sleep mode (standby mode), in order to conserve battery power, at least. The device may be awoken from this standby or sleep mode by a change in any of: movement (e.g. horizontal from vertical, vertical from horizontal, or movement indicating the user has picked up the device), removal from the charging cradle, user touch, the user puffing on the device, or activation by pressing any button on the device (or any combinations thereof). After an extended period in standby mode, the device will turn off, to be awoken and/or turned on by the user pressing the button on the device, in some embodiments, or by the user puffing on the device. In such an embodiment, simply moving the device or removing it from its charging cradle will not activate the device once turned off. In other embodiments, moving the device or removing it from its charging cradle does turn on the device from off or standby mode.

[0072] In some embodiments, standby mode conserves battery power by lowering the regulation temperature of the device. For example, a large portion of the heat generated by the device is lost to the environment, whether or not the user is puffing on it. So maximizing the time the device spends in standby, and minimizing the internal temperature while it's in standby conserve power. However, when the device awakes from standby, it is desirable for it to return to the main operating temperature as quickly as possible, so as to give the impression of an uninterrupted puffing experience to the user. So a balance must be established. For example, on the current electronic cartridge-based device, the main operating temperature is 165 °C, and standby temperature is 150 °C. This temperature difference is slight enough that if the user wakes the device from standby, by the time the user starts puffing, the heater has had enough time to raise the temperature and the user perceives little or no interruption in production of vapor. In some embodiments, the temperature difference is set to be 30 °C, 25 °C, 20 °C, 15 °C, 10 °C, or 5 °C between the

main operating temperature and standby temperature. In some embodiments, the temperature difference is set to be any temperature from 30 °C to 5 °C between the main operating temperature and standby temperature.

[0073] In some embodiments, the battery is a disposable battery. In other embodiments, the battery is a rechargeable battery. In certain embodiments, the rechargeable battery is a lead-acid, nickel cadmium (NiCd), nickel metal hydride (NiMH), lithium ion (Li-ion), lithium ion polymer (Li-ion polymer or LiPo), or the like.

[0074] A rechargeable battery, storage battery, or accumulator is a type of electrical battery. It comprises one or more electrochemical cells, and is a type of energy accumulator. It is known as a secondary cell because its electrochemical reactions are electrically reversible. Rechargeable batteries come in many different shapes and sizes, ranging from button cells to megawatt systems connected to stabilize an electrical distribution network. Several different combinations of chemicals are commonly used, including: lead–acid, nickel cadmium (NiCd), nickel metal hydride (NiMH), lithium ion (Li-ion), and lithium ion polymer (Li-ion polymer, Li-poly, Li-Pol, LiPo, LIP, PLI or LiP).

[0075] The device is capable of creating temperatures high enough to aerosolize a product contained within the device. An exemplary device can comprise a mouthpiece and a body having a heater, an oven chamber, a LiPo battery, and a controller for maintaining the operating temperature. A user-selected temperature, as described above, could be used as an input to this system. In some embodiments, the temperature could be pre-set. Examples of operating temperature regulators of a device include a bimetallic actuator. Alternatively, a system could be employed to measure the current temperature, for example, with a thermocouple sensor and compare it to a prescribed temperature, for example, with a micro-controller, and by controlling an electromechanical valve, for example, servo or solenoid valve. A user-selected temperature, as described above, the selected temperature could be used as an input to this system. Typically, the operating temperatures of the device are no more than 200 °C.

[0076] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; a battery; a temperature regulator, and a temperature control loop. In certain embodiments provide the heater with soldered thermistor element for control loop. In certain embodiments, the device comprises a PID (proportional integral derivative) control loop to control operating temperature. The control loop serves to precisely regulate the desired setpoint temperature for the device. Depending on the design and intended use of the device, the set point temperature, in some embodiments, is fixed; in other embodiments, the set point temperature is user-selectable. The set point can also change dynamically during device operation. For example, in standby mode the set point is lowered a certain amount. In some embodiments, the input for the control loop is typically a thermistor, located on or adjacent to the heater circuit. This thermistor leads to a microcontroller which makes A/D measurements and the resulting value is used in calculating the PID control variable. The control variable then sets the duty cycle (and resulting power output) of the heater circuit.

[0077] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater comprising a heater circuit within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; and a temperature regulator; wherein the heater circuit has low resistance such that a single battery is capable of powering the device. In some embodiments, the heater circuit is of such low resistance that a single battery may be used to power the device. In some embodiments, the heater circuit resistance is chosen such that the power output of the heater circuit is high enough to reach the desired operating temperature, within an acceptable heat-up period, and such that it can withstand the loading of the system by a user puffing on the device. A rough calculation is provided by the relation: R = V^2 / P, where V is the battery voltage under load, P is the desired wattage of the heater, and R is the heater circuit resistance.

[0078] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; a battery; a temperature regulator; wherein the electronic heater is sealed by a hermetic or dust seal. As illustrated in **FIG. 2**, an exemplary device **200** comprises a thin-walled stainless steel tube **210** perforated the sealed lid of the capsule (i.e., a pod). The thin-walled stainless steel tube **210** (e.g. a metallic "oven") in the illustrated device is thermal pressed (e.g., heat staked or swaged), ultrasonic bonded or over-molded into a high temperature capable plastic component. The processes create a hermetic or dust seal (air-tight seal) **240**,which prevents environmental dust from entering the internal chambers of the device, as well as any dust from the internal insulation materials from escaping the device and entering the heating chamber. The plastic component may comprise any thermoplastic materials that provide high temperature stability. In some embodiments, the plastic component comprises polyphenylene sulfide (PPS, trade name Ryton), polyetherimide (PEI, trade name Ultem), liquid crystal polymer (LCP), or the like. In certain embodiments, the plastic component comprises PPS. PPS is used also for its general good moldability.

[0079] In certain embodiments, the oven is heat staked or heat swaged into a high temperature capable plastic component. As referring herein, with heat swaging, material is formed all the way around the perimeter of the mating edge. With heat staking, there would have a few posts of the thermoplastic that insert through holes in the formed metal oven, and then the posts are heated to form "rivets" of a sort). In certain embodiments, the oven is heat swaged into a high temperature capable plastic component. In some embodiments, the oven is bonded to the plastic component using adhesive. In certain embodiments, the adhesive is stable at high temperatures, such that the adhesive is not softened or off-gas. In some embodiments, the oven is joined to the plastic component by mechanical mechanism, such as using a crimp threaded connection, press fit, or the like. For any mechanical joining, in some embodiments, an o-ring is used between the two components to ensure the dust seal is created. It is important to minimize the thermal transfer at this junction, since that's how a lot of heat is transferred to the outer casing of the device (and thus, lost to the environment).

[0080] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; a temperature regulator and an aerogel insulation. In some embodiment the aerogel

insulation is an aerogel blanket. In some embodiments, the device comprises an insulation chamber **220** that includes an aerogel blanket (not shown in **FIG. 2**, see **FIG. 5**) to maintain efficiency and low exposed surface temperature. In some embodiments, the aerogel may be a silica aerogel with reinforcing fibers (e.g., Pyrogel 2250 flexible aerogel blanket).

[0081] As provided herein, the term, "aerogel" refers to a synthetic porous material derived from a gel, in which the liquid component of the gel has been replaced with a gas. The result is a solid with extremely low density and thermal conductivity. Aerogels are good thermal insulators because they almost nullify the three methods of heat transfer (convection, conduction, and radiation). They are good conductive insulators because they are composed almost entirely from a gas, and gases are very poor heat conductors. Silica aerogel is especially good because silica is also a poor conductor of heat (a metallic aerogel, on the other hand, would be less effective). They are good convective inhibitors because air cannot circulate through the lattice. Silica aerogel is the most common type of aerogel and the most extensively studied and used. It is a silica-based substance, derived from silica gel. Carbon aerogels are composed of particles with sizes in the nanometer range, covalently bonded together. They have very high porosity (over 50%, with pore diameter under 100 nm) and surface areas ranging between 400–1,000 m2/g. Aerogels made with aluminium oxide are known as alumina aerogels. These aerogels are used as catalysts, especially when "doped" with a metal different from Al. Nickel–alumina aerogel is the most common combination.

[0082] In some embodiments, the device also include two magnets **230** (e.g., gold-plated rare earth magnets, or the like) used as both mechanical attachment and battery charging conduits to a charging cradle (not shown). The magnets need to strong enough to hold the device in place in the charging cradle. In some embodiments, the magnets comprise NdFeB, grade N42. In some embodiments, the magnets have 6128 gauss of surface field. The pod **270** is inserted into the oven, which has a polyimide thin film heater and thermistor applied to its exterior. A polyimide thin film heater is constructed of a thin, high dielectric, lightweight organic polymer film which provides excellent tensile strength, tear resistance and dimensional stability.

[0083] Thus, provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; a temperature regulator and a magnetic charge connector.

[0084] In some embodiments, the battery used in the device is a single cell LiPo battery (e.g., 18-650 size 2600 mAh lithium ion single cell or 14-650 size 940 mAh lithium ion single cell) for repeated uses of the device. In some embodiments, the battery used for the device is other suitable rechargeable battery with 18-650 size 2600 mAh or 14-650 size 940 mAh. The device can be used for up to 10, 20, 30, 40, 50, 60 or more uses (depending what size of the rechargeable battery is employed). In some embodiments, the device can be used for more than 60 uses. The device can also be used for up to 1, 2, 3, 4, 5, 6, 7, or 8 hours or more of continuous or non-continuous use. A cartridge for use with the device can be disposed after each use or used for multiple uses. The long lasting use of a device provides the user the advantage of not having to service the device or recharge the battery on a regular basis.

[0085] Typically, the operating temperatures of the device are no more than 200 °C. Often the temperature required to aerosolize a product is between about 100 to 200 °C. In some embodiments, the temperature required to aerosolize a product is about 150 °C. Once the product within the device has been aerosolized, the aerosolized product is provided to a user through a mouthpiece. In many cases, an exemplary device is designed to emulate a smoking device, such as a cigarette, a pipe or a cigar holder.

[0086] In FIG. 3, the exemplary device **300** comprises a split mouthpiece (**310**) design where half is removable and conforms to contour of the device. In some embodiments, the mouthpiece attaches to body with rare earth magnet. In some embodiments, the mouthpiece attaches to body with plastic detent or other mechanism.

[0087] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; and a temperature regulator, wherein the mouthpiece is integrated into the device. In some embodiments, the mouthpiece is integrated into the device with a hinge, or other mechanism (such as a string, or the like). In certain embodiments, the mouthpiece swivels or slides away to reveal the heating chamber. In certain embodiments, the mouthpiece is detached fully from the attachment mechanism for cleaning or replacement but is still linked to the device ("removably captured") In some embodiments, the device also includes magnetic charge contacts **312** and a tactile button **302** with LED-illuminated "halo" indicator. The indicator reports information about the state of the device. In some embodiments, a saw-tooth pattern indicates that it is heating up. In some embodiments, solid pattern indicates that the set point temperature has been reached and the user can start puffing on the device. If the battery is critically low, in some embodiments, the LED indicator flashes several times (e.g., 5 times) and then the devices turn off. In some embodiments, while shaking the device, the motion sensor detects this and the LED indicates current battery level: for example, 3 flashes for full charge, 2 flashes for partial charge, and 1 flash for low charge. The device then resumes normal operation. When the device is placed in a charge cradle, in some embodiments, a saw-tooth pattern indicates that it is charging. In certain embodiments, when charging is complete, the LED turns solid. In some embodiments, error states can also be reported: if an internal failure is determined, the indicator flashes 10 times and the device turns itself off.

[0088] In some embodiments, the device comprises a detachable mouthpiece which can attach and/or insert into a removable pod. The mouthpiece is removed by quarter-turn to expose the removable pod. The removable pod comprises tobacco and/or other botanicals for use to generate an inhalable aerosol. The pod, in some embodiments, comprises particles less than about 2 microns in diameter. In some embodiments also provides vaporization devices for use with a viscous vaporizable material such as loose leaf tobacco and other botanicals (no pods).

[0089] FIG. 4 demonstrates exemplary devices (**400**) with a mouthpiece **410** retracted from device with a push-push mechanism. This also turns the devices on via a magnet embedded in the mouthpiece, and a hall effect sensor on the PCB. The devices include a LED indicator **460,** (or the like) and a single piece extruded aluminum outer body. In some embodiments, the LED indicator is a tri-color (RGB). In some embodiments, the LED indicator displays many colors. For example, when heating, the indicator glows purple. Once the

set point temperature is reached, it glows green. When in standby, it glows blue. If the device is shaken, battery indications are 3 blinks, and color determines the charge level: green for full charge, yellow for partial, and red for low. If the mouthpiece is removed fully from the device, the device immediately stops heating and the LED indicates the current user-selectable temperature setting: red for high, orange for medium, yellow for low temperature. Pressing the "temp set button" revealed by removing the mouthpiece cycles the temperature setting in firmware, and the new setting is reflected on the LED. Upon reinserting the mouthpiece, the device returns to normal heating operation. While charging, the LED is solid orange. When charging is complete, it turns solid green. Similar to the other embodiments, the LED can also report error states by flashing and/or distinct color of flashes. The colors described above may be changed to any colors in accordance with the practice of this invention.

[0090] In some embodiments, the device comprises a mouthpiece that retracts from said device with a push-push mechanism. In some embodiments, the push-push mechanism also turns the device on via a magnet embedded in the mouthpiece and a hall effect sensor on the PCB (printed circuit board). One of ordinary skill in the art would readily recognize other suitable mechanism to turn the device on with suitable sensor.

[0091] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; and a temperature regulator; and a push-push mechanism configured to toggle the mouthpiece between a retracted and an "on" position. An internal view of the exemplary device of **FIG. 4** is shown in **Fig. 5**. In such embodiment comprising a push-push mechanism, the device includes a vaporization chamber lid **576** (opposite of the mouthpiece **510**). The device comprises a deep-drawn stainless steel heating chamber **524** ("oven"), with polyimide thin film circuit heater applied. A push-push mechanism for retracting mouthpiece consists of compression spring **513**, leaf spring **512**, and stainless steel tube **511** attached to the mouthpiece **510**, with a catch groove **534** and a toggle slider **509**. Reed switch/hall effect sensor **533** is incorporated to detect if mouthpiece is inserted (device runs off). To extend the mouthpiece into the "on" position, the user presses on the mouthpiece **510**. The mouthpiece is attached to the tube **511**, so this action compresses the compression spring **513**. This action also causes the leaf spring **512** to flex away from the axis of the tube and onto the outer diameter of the toggle slider **509**. When the user then releases the mouthpiece, the compression spring pushes the mouthpiece & tube sub-assembly outward from the device. The angled lip of the leaf spring catches on the toggle slider, causing the slider to traverse the tube until it reaches a shoulder on the tube. At this point, the mouthpiece continues to extend out of the device, and the leaf spring now wipes along the toggle slider and continues along the shoulder of the outer diameter of the tube, which is of equivalent diameter and thus poses no resistance. When the catch groove of the tube intersects with the lip of the leaf spring, the mouthpiece stops, and is now in the extended, "on" position. Pressing the mouthpiece from the "on" position uses the push-push mechanism to move the mouthpiece to a retracted position. The push-push mechanism, thus, is configured to toggle the mouthpiece between an "on" position or an extended position such that the mouthpiece is extended from the body of the device, and a retracted position. In some embodiments, in the retracted position, the mouthpiece is fully within the body of the device. In some embodiments, in the retracted position, the mouthpiece is fully

within the body of the device but is exposed at the open end of the device. In some embodiments, in the retracted position, the mouthpiece is substantially within the body of the device such that a portion of the mouthpiece extends beyond the end out of the body of the device.

[0092] Many devices use a temperature regulation scheme in that the temperature regulator (bimetallic discs or other regulator) are located in close proximity to the area where temperature is most critical (at the oven). See temperature select button **535**, PCB **504**, O-ring seal **526** to control potential aerogel dusting, and insulation chamber **525** to contain aerogel blanket. Related art has typically located the temperature-sensitive component at the flow valve, which can be easily influenced by the cool temperature of expanding fuel gas and has minimally intimate contact with the vaporizing chamber. Examples of related devices and methods are described in US Patent Application **11/485,168**, US Patent **4,819,665**, US Patent **4,793,365**, US Patent **5,027,836** and PCT Application **WO 2006/082571**. The regulation scheme of an exemplary device may be tuned to a specific temperature by a simple twist of the oven.

[0093] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; a temperature regulator; and a button-operated temperature selection with a visual indicator, an audible indicator and/or a vibration indicator. In some embodiments, the device comprises a button-operated temperature selection with visual, audible indicator, and/or other sensory output (e.g. vibration). In some embodiments, a tactile (mechanical) switch is used as input to a microcontroller, which, via its software, indicates the change to the user (e.g, by visual LED, audible, vibration, or the like), and changes the set point temperature of the device. The switch can also be capacitive, resistive, or the like.

[0094] In some embodiments, the vaporization device comprises a thin wall metal heating chamber (or oven chamber). Thin walls allow for low thermal mass and thus fast startup. When the device use the viscous vaporizable material directly without including them in a pod (or a cartridge), the terms, "heating chamber", "oven chamber" and "vaporization chamber" are used interchangeably. For the device including a pod or a cartridge, the terms, "heating chamber "and "oven chamber" are used interchangeably.

[0095] Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; a vaporization chamber; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; a temperature regulator; and a magnetic lid configured to cover the vaporization chamber. In the exemplary devices **600** of **FIG. 6**, an exemplary magnetically-attached vaporization chamber lid **676** is shown. The lid **676** is nominally recessed entirely into the body of the device. This is to prevent inadvertent removal of the lid in the user's pocket, purse, etc. To remove the lid, the user presses a finger against one side of the oval-shaped lid. The underside of the lid is chamfered, such that this allows the opposite side of the lid to pivot up. Two rare earth magnets are embedded on either side of the lid, along its short axis. Two mating magnets are embedded in the body of the device at corresponding points. These magnets together form a "hinge" around which the lid can swivel. Once the lid is swiveled up, it is relatively easy to overcome the magnetic force and remove the lid entirely, allowing access to the vaporization chamber. In some embodiments, the vaporization chamber lid is attached by other mechanism such as screw-on, a snap on, or the like. Thus, in some embodiments, the devices comprise a tilting lid

using magnetic or snap attachments for the lid to stay in its closed position to prevent accidental opening. Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; a temperature regulator; and a tilting lid comprising a magnetic attachment or a snap attachment configured to maintain the lid in its closed position and/or configured to prevent accidental opening.

[0096] One of ordinary skill in the art would readily employ energy supply sources to charge battery. For example, in **FIG. 7**, a USB charger **724** with a USB charge cable **734** are shown. In some embodiments, the energy supply source is a wall mount charger. In some embodiments, the energy supply source is a car charger. In some embodiments, the energy supply source is a portable charger. In certain embodiments, the energy supply sources include solar powered, wind powered or other green energy powered chargers.

[0097] In some embodiments, the device comprises a thermally conductive shell to distribute excess heat and maintain low exposed surface temperature. In some embodiments, the thermally conductive shell is made of materials having low specific heat but high thermal conductivity. In some embodiments, the configuration of materials in the thermally conductive shell is such that the temperature of the shell is below 140 degrees F, below 130 degrees F, below 120 degrees F, below 110 degrees F, below 100 degrees F, at or below 140 degrees F, at or below 130 degrees F, at or below 120 degrees F, at or below 110 degrees F, at or below 100 degrees F, at or below 98.6 degrees F, at or below 90 degrees F, at or about room temperature, at or below about 140 degrees F, at or below about 140 degrees F, at or below about 130 degrees F, at or below about 120 degrees F, at or below about 110 degrees F, at or below about 100 degrees F, at or below a temperature at which skin will burn after 2 seconds of touch, at or below a temperature at which skin will burn after 5 seconds of touch, at or below a temperature at which skin will burn after 10 seconds of touch, and/or about at room temperature. This combination means heat will spread quickly, but when held there is not much energy to be absorbed into the hand. In some embodiments, the thermally conductive shell is made of aluminum, or the like. Provided herein is a device for generating an inhalable aerosol comprising: a mouthpiece; a body; an electronic heater within said body configured to heat a viscous vaporizable material and generate an inhalable aerosol; a thermally conductive shell configured to distribute excess heat and maintain a low exposed surface temperature; and a temperature regulator.

[0098] The internals view of the exemplary device charged by a USB charger is shown in **Fig. 8**. The device includes a charger base **827** (an exemplary USB charger) comprising a rare earth magnet charge base interface **824**. The battery **803** (e.g., a Li-ion battery) is charged with the help of a flex PCB **804** continues down to make contact with battery terminal Also shown for the device are button **802**, accelerometer **816**, aerogel **814** and thermistor **815** to monitor and precisely control vaporization temperature. The mouthpiece is attached to the body from points **844** and **845**. Various embodiments of mouthpiece as described herein or known to one of ordinary skilled in the art may be used.

[0099] Any material that is capable of being aerosolized and inhaled by a user may be incorporated into a device or cartridge of the invention as would be obvious to one skilled in the art. It is of particular interest that the material provides an experience to the user either in terms of tactile response in the respiratory tract,

or in terms of visual feedback regarding the exhalation of the inhaled material. For example, many materials have be contemplated for use with the present invention including, but not limited to, those containing tobacco, natural or artificial flavorants, coffee grounds or coffee beans, mint, chamomile, lemon, honey, tea leaves, cocoa, and other non-tobacco alternatives based on other botanicals. A device or cartridge of the invention can also be compatible for use with pharmaceutical compounds or synthetic compounds, either for pharmaceutical or pleasurable use. Any such compound which can be vaporized (or volatized) at a relatively low temperature and without harmful degradation products can be suitable for use with a cartridge or device of the invention. Examples of compounds include, but are not limited to, menthol, caffeine, taurine, and nicotine.

[00100] Active elements contained in botanicals vaporize at different temperatures. The device can be calibrated to establish a single stable temperature, intended for vaporizing specific products, for example. A controller can also be used to select a variety of temperature settings. The user would choose which setting based on the type of cartridge used. The controller can also affect a desired temperature mechanically, such as by changing flow rate of the valve, or electronically, such as by electromechanical valve and micro-controller intermediary. For example, to change the operating temperature of a device of the invention, the oven chamber can be moved in respect to the temperature regulator, such as bimetallic discs.

[00101] Here, tobacco or tobacco material is defined as any combination of natural and synthetic material that can be vaporized for pleasure or medicinal use. In one embodiment of the present invention, a cartridge can be prepared using cured tobacco, glycerin, and flavorings. Those skilled in the art of tobacco product manufacture are familiar with these and other ingredients used for cigarettes, cigars, and the like. The cartridge can be produced by chopping tobacco into fine pieces (for example, less than 2 mm diameter, preferably less than 1 mm), adding the other ingredients, and mixing until even consistency was achieved. In another embodiment, a cartridge can be prepared by processing the fill material into an even paste-like consistency (for example, particle size less than 1 mm), which facilitates the processing of filling the cartridge, for example, by use of an auger filler, peristaltic pump or a piston pump.

[00102] Preferably the material for use with a device of the invention or contained within a cartridge of the invention comprises at least one of a vapor-forming medium and a medium for providing a tactile response in a respiratory tract of a user. The aerosolized product from the material inserted into a device can be a combination of vapor phase gases as well as small droplets which have condensed out of vapor phase and remain suspended in the gas/air mixture (the latter constitutes the visible portion of the inhaled substance).

[00103] Propylene glycol (PG), glycerin, or a combination of both can be used as vapor-forming medium. Other vapor-forming media can be used with a cartridge and device of the invention. The vapor-forming medium serves to produce a visual vapor, such as a smoke-like vapor, when heated. This vapor can be visualized both before inhalation and during exhalation of the medium. PG has some advantages as compared to glycerin alone, as it exhibits a much higher vapor pressure at equivalent temperature and allows the device to operate at a lower temperature. Reducing the operating temperature conserves energy, and potentially can further improve the health benefits of using this system.

[00104] The user is prevented from touching the hot internal elements by surrounding insulating features. An exemplary device can include insulation for keeping the user from contacting the necessarily hot portion of the device. While greater thermal insulating ability is preferable so that the device performs with the best efficiency possible, an important aspect for the user is to perceive a relatively cool surface temperature. Various strategies can be employed to address the perception of the user regarding the temperature of the device. The device may be wrapped in a thermal insulating material that has enough durability for external use. Materials for this purpose have low thermal conductivity and low thermal capacity (specific heat). The combination of these properties can allow little heat to be transferred to the fingers of the user. Examples of materials with low thermal conductivity and capacity include some polymers and ceramics. A separate strategy is to use standoff features that keep the user from touching the higher temperature area directly. This can also minimize the contact area of the user's fingers and the device to additionally reduce perceived heat. The thermal conductivity and specific heat of the standoff features should be as low as possible.

[00105] Although preferred embodiments of the present invention have been shown and described herein, it will be obvious to those skilled in the art that such embodiments are provided by way of example only. Numerous variations, changes, and substitutions will now occur to those skilled in the art without departing from the invention. It should be understood that various alternatives to the embodiments of the invention described herein can be employed in practicing the invention. It is intended that the following claims define the scope of the invention and that methods and structures within the scope of these claims and their equivalents be covered thereby.

CLAIMS

1. A device for generating an inhalable aerosol comprising:

a. a body;

b. an aerosol generator in the body comprising a vaporization chamber, wherein the aerosol generator is configured to generate an inhalable aerosol from a vaporisable material in the vaporisation chamber wherein such inhalable aerosol is deliverable to a user; and

c. a lid removably coupled to the body of the device, wherein the lid is configured to cover the vaporisation chamber;

characterised in that the device further comprises a magnetic hinge about which a first side of the lid can swivel away from the body of the device into an open position when a force is exerted on a second side of the lid) in an opposite direction toward the body of the device, and the lid can be removed entirely by overcoming the magnetic force of the hinge.

2. The device of claim 1, wherein the hinge comprises two magnets in the lid and two magnets correspondingly placed in the body of the device so as to form the hinge around which the lid swivels.

3. The device of claim 1 or 2, wherein removal of the lid from the body of the device allows access to the vaporization chamber.

4. The device of any preceding claim, wherein the lid comprises a magnetic attachment or snap attachment configured to maintain the lid in the closed position and/or prevent accidental opening of the lid.

5. The device of any preceding claim, wherein the lid is recessed into the body of the device.

6. The device of any preceding claim, wherein the vaporization chamber is configured to accept the vaporizable material directly without placing the vaporizable material in a cartridge.

7. The device of any one of claims 1 to 5, wherein the vaporization chamber is configured to accept a cartridge containing the vaporizable material.

8. The device of any preceding claim, wherein an underside of the lid is chamfered.