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(54) **AEROSOL FORMING DEVICE**

(57) A heating assembly (30) and an aerosol generating device. The heating assembly (30) aerosol generating comprises a base body (31), an infrared layer (32), and a heating element (33); the base body (31) is used for inserting an aerosol generating product (A); the infrared layer (32) surrounds the base body (31) and is used for radiating infrared rays when heated so as to heat and atomize the aerosol generating product (A); the heating element (33) surrounds the base body (31) and is used for heating the infrared layer (32) when powered on. According to the heating assembly (30), the heating efficiency is effectively improved, good heating uniformity is achieved, and the problem that the aerosol generating product (A) is burnt due to local high temperature is avoided.

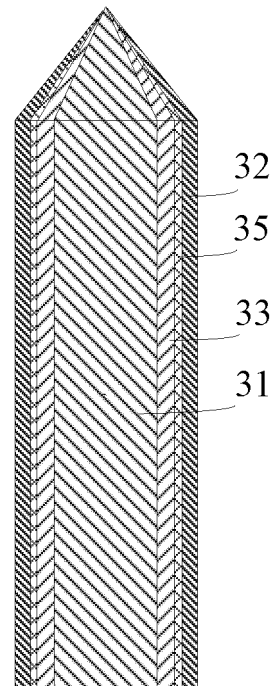


FIG. 3b

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Description

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The present disclosure claims the priority of Chinese Patent Application No. 2021114232748 filed November 26, 2021, which is herein incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] The present disclosure relates to a field of electronic atomization devices, and in particular to a heating assembly and an aerosol generating device.

BACKGROUND

[0003] Heat-not-burning (HNB) aerosol generating devices are increasingly attracting attention and favor of people since they have advantages such as safety, convenience, health, and environmental protection, etc.

[0004] An existing HNB aerosol generating device generally includes a heating assembly and a power supply assembly. The heating assembly is configured to heat and atomize aerosol generating products when powered on, and the power supply assembly is connected to the heating assembly and configured to supply power to the heating assembly. Currently, the heating assembly generally heats the aerosol generating products by thermal conduction to atomize the aerosol generating products and form aerosols.

[0005] However, the manner of heating the aerosol generating products by the heat conduction is prone to produce local high temperatures, which leads to a problem of the aerosol generating products being burnt. In addition, since heat conduction efficiencies of the aerosol generating product are lower, temperature differences between the inside and the outside of the aerosol generating products are large, and the heating uniformity is poor, which not only affects the taste, but also results in low utilization rates of the aerosol generating products and longer preheating time.

SUMMARY OF THE DISCLOSURE

[0006] A heating assembly and an aerosol generating device provided in embodiments of the present disclosure are intended to solve a problem of the existing heating assembly being prone to burning the aerosol forming products and poor heating uniformity of the aerosol forming products due to heating the aerosol forming products through thermal conduction.

[0007] In order to solve the above technical problem, a technical solution adopted in the present disclosure is to provide a heating assembly. The heating assembly includes a base body, configured to be inserted into an aerosol generating product; an infrared layer, externally surrounding the base body and configured to radiate in-

frared rays when heated to heat and atomize the aerosol generating product; and a heating element, externally surrounding the base body and configured to heat the infrared layer when powered on.

[0008] In some embodiments, the heating element is a heating layer provided on the outer surface of the base body and insulated from the base body; the infrared layer is provided on the surface of the heating layer away from the base body.

[0009] In some embodiments, the thickness of the infrared layer ranges from 10 μm to 100 μm ; and a micro-nano structure is formed in the surface of the infrared layer away from the base body.

[0010] In some embodiments, a material of the infrared layer includes one or more of black silicon, cordierite, transition metal oxide series spinel, rare earth oxide, ion co-doped perovskite, silicon carbide, zircon, and boron nitride.

[0011] In some embodiments, the thickness of the infrared layer ranges from 1 μm to 10 μm ; and a material of the infrared layer is CrC, TiCN, or diamond-like.

[0012] In some embodiments, the infrared layer is provided on the outer surface of the base body; the heating element is a heating layer provided on the surface of the infrared layer away from the base body.

[0013] In some embodiments, the heating assembly further includes a protective layer, provided on the surface of the heating layer away from the infrared layer, capable of allowing the infrared rays to pass through, and configured to protect the heating layer.

[0014] In some embodiments, the thickness of the protective layer ranges from 5 μm to 60 μm ; a micro-nano structure is formed in a surface of the protective layer away from the base body.

[0015] In some embodiments, the entire outer surface of the base body is covered by the infrared layer, and a ratio of an area of the heating layer to an area of the infrared layer is less than 40%.

[0016] In some embodiments, the heating assembly further includes a transition layer, provided between the infrared layer and the heating layer.

[0017] In some embodiments, the thickness of the heating layer ranges from 5 μm to 20 μm .

[0018] In some embodiments, the base body is in a shape of a sheet, needle or rod; wherein the radial size of the needle or rod base body ranges from 1.8 mm to 2.5 mm.

[0019] In some embodiments, the base body is an insulating material.

[0020] In some embodiments, the insulating material is ceramic.

[0021] In some embodiments, the base body includes a conductive body and an insulating layer provided on the outer surface of the conductive body.

[0022] In some embodiments, the conductive body is in a shape of a sheet, a needle, or a rod, and a material of the conductive body is metal.

[0023] In order to solve the above technical problem,

another technical solution adopt in the present disclosure is to provided an aerosol generating device. The aerosol generating device includes a heating assembly, configured to heat and atomize an aerosol generating product when powered on, and the heating assembly is the heating assembly described above; and a power supply assembly, connected to the heating assembly and configured to supply power to the heating assembly.

[0024] The embodiments of the present disclosure provide a heating assembly and an aerosol generating device. The heating assembly provides a base body for an aerosol generating product to be inserted in. Meanwhile, an infrared layer is provided around a periphery of the base body to radiate infrared rays when the infrared layer is heated, so as to heat and atomize the aerosol generating product through radiated infrared rays. Due to stronger radiation abilities of the infrared rays, not only may a preheating efficiency of the aerosol generating product be improved, but also a temperature difference between the inside and the outside of the aerosol generating product may be reduced effectively, such that the heating uniformity of the aerosol generating product is improved and the problem of the aerosol generating product being burnt due to a local high temperature is avoided. In addition, a heating element is provided around the periphery of the base body, such that the infrared layer is heated when the heating element is powered on to render the infrared layer to radiate the infrared rays.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025]

FIG. 1 is a structural schematic view of an aerosol generating device according to an embodiment of the present disclosure.

FIG. 2 is a structural schematic view of a needle-shaped heating assembly.

FIG. 3a is a horizontal sectional view of a first embodiment of the heating assembly shown in FIG. 2.

FIG. 3b is a vertical sectional view of the first embodiment of the heating assembly shown in FIG. 2.

FIG. 4a is a horizontal sectional view of a second embodiment of the heating assembly shown in FIG. 2.

FIG. 4b is a vertical sectional view of the second embodiment of the heating assembly shown in FIG. 2.

FIG. 5 is a structural schematic view of a sheet-shaped heating assembly.

FIG. 6 is a vertical sectional view of a first embodiment of the heating assembly shown in FIG. 5.

FIG. 7 is a vertical sectional view of a second embodiment of the heating assembly shown in FIG. 5.

FIG. 8 is a vertical sectional view of a third embodiment of the heating assembly shown in FIG. 5.

[0026] Reference numerals in the accompanying drawings: aerosol generating product A; power supply assembly 10; circuit 20; heating assembly 30/30a/30b; base body 31; conductive body 311; insulating layer 312; infrared layer 32; heating element 33; protective layer 34; transition layer 35.

DETAILED DESCRIPTION

[0027] The technical solutions in the embodiments of the present disclosure are clearly and completely described in conjunction with the drawings in the embodiments of the present disclosure in the following. Obviously, the described embodiments are only a part of the embodiments of the present disclosure, and not all embodiments. All other embodiments acquired by the ordinary skilled in the art based on the embodiments in the present disclosure without the creative work are all within the scope of the present disclosure.

[0028] Terms "first", "second", and "third" are used in the present disclosure only for purposes of description, and are not intended to indicate or imply relative importance or significance or to imply the number of indicated technical features. Thus, the feature defined with "first", "second", and "third" may explicitly or implicitly include one or more of such a feature. In the description of the present disclosure, the term "a plurality of" or "multiple" means two or more, such as, two, three, etc., unless specified otherwise. All the directional indicators (such as up, down, left, right, front, rear...) in the embodiments of the present disclosure are only used for explaining relative positions, movement situations, and the like between components in a specific posture (as shown in the drawings). If the specific posture changes, the directional indicators may change accordingly. In addition, terms "including" and "having", and any modification thereof are intended to cover un-exclusive inclusion. For example, a process, method, system, product, or device that may include a series of steps or units is not limited to the listed steps or units, but may optionally also include steps or units not listed, or may optionally include other steps or units inherent to these processes, methods, products, or equipment.

[0029] "Embodiment" mentioned herein means that a particular feature, structure, or characteristic described with reference to embodiments may be included in at least one embodiment of the present disclosure. The appearances of the term "embodiment" in various places in the specification do not necessarily all indicate the same embodiment, nor indicate a separate or alternative embodiment which is mutually exclusive with other embodiments. Those skilled in the art will understand explicitly and implicitly that the embodiments described herein may be combined with other embodiments.

[0030] The present disclosure is illustrated in detail in conjunction with the drawings and embodiments in the following.

[0031] As shown in FIG. 1, FIG. 1 is a structural sche-

matic view of an aerosol generating device according to an embodiment of the present disclosure. In this embodiment, the aerosol generating device is provided and includes a cavity, a power supply assembly 10, a circuit 20, and a heating assembly 30.

[0032] The aerosol generating product A is removably received in the cavity. In an embodiment, the aerosol generating product has a tobacco-containing material which may release volatile compounds from a substrate when heated, or may be a non-tobacco material which is suitable for electrically-heating smoke generation after heated. The aerosol generating product A adopts a solid substrate and may include one or more of a vanilla leaf, a tobacco leaf, a homogenized tobacco, or an expanded tobacco, in a form of one or more of powders, granules, fragmented spaghetti, a strip, or a sheet. Alternatively, the solid substrate may contain additional volatile flavor compounds of the tobacco or non-tobacco, such that the additional volatile flavor compounds are released when the substrate is heated.

[0033] At least a part of the heating assembly 30 extends into the cavity. When the aerosol generating product A is received in the cavity, the heating assembly 30 is inserted into the aerosol generating product A for heating, such that the aerosol generating product A is caused to release a plurality of volatile compounds which are only formed through heating process. The power supply assembly 10 is configured to supply power. The circuit 20 is configured to conduct a current between the power supply assembly 10 and the heating assembly 30. The heating assembly 30 may be a heating assembly 30a/30b as described in the following embodiments.

[0034] Existing heating assemblies generally heat aerosol generating products in a heat conduction manner. However, this manner is prone to generating local high temperatures in portions where the aerosol generating products A are contacted with the heating assemblies, which leads to a problem of the aerosol generating products A are burnt. In addition, since the heat conduction efficiencies of the aerosol generating products A are low, not only is preheating time longer, but also temperature differences between portions of the aerosol generating products A in contact with the heating assemblies and portions of the aerosol generating products A away from the heating assemblies are larger, which causes poorer heating uniformity of the aerosol generating products A. In this way, the taste of vaping is affected, and meanwhile utilization rates of the aerosol generating products A are lower.

[0035] In order to solve the above technical problem, the embodiments of the present disclosure provide a heating assembly 30a/30b. The heating assembly 30a/30b radiates the infrared rays when powered on and heat the aerosol generating product A through the infrared rays. Since the infrared rays have stronger radiation abilities, a preheating efficiency of the aerosol generating product A is improved, and a temperature difference between the outside and inside of the aerosol generating

product A may be effectively reduced, such that the heating uniformity of the aerosol generating product A is improved and the problem of the aerosol generating product A being burnt due to a local high temperature is avoided.

[0036] As shown in FIG. 2, FIG. 2 is a structural schematic view of a needle-shaped heating assembly 30a. FIG. 3a is a horizontal sectional view of a first embodiment of the heating assembly 30a shown in FIG. 2. FIG. 3b is a vertical sectional view of the first embodiment of the heating assembly 30a shown in FIG. 2. In the first embodiment, the heating assembly 30a is provided and has a shape of a rod or a needle, and may be applied in different fields, such as an electronic cigarette, a medical treatment, cosmetology, etc. The heating assembly 30a includes a base body 31, an infrared layer 32, and a heating element 33. A vertical direction involved in the present disclosure refers to a direction of the length of the heating assembly 30a/30b, while a horizontal direction refers to a direction perpendicular to the direction of the length of the heating assembly 30a/30b.

[0037] The base body 31 is configured to be inserted into the aerosol generating product A. The aerosol generating product A may be a plant-grass-leaf type substrate or a paste substrate, etc. As shown in FIG. 2, the base body 31 has a shape of a solid rod or needle to enhance the strength of the base body 31. A radial size of a needle-shaped or rod-shaped base body 31 may range from 1.8 millimeters to 2.5 millimeters. A material of the base body 31 may be a high-temperature resistant insulating material such as ceramic, quartz glass, mica, or the like, to prevent two electrodes from short-circuiting, which is taken as an example in the first embodiment. In an embodiment, the base body 31 may be transparent quartz. The base body 31 may include a main body portion and an insertion portion connected axially. A radial size of the insertion portion is gradually reduced along the direction away from the main body portion. In a process of inserting the base body 31 into the aerosol generating product A, the insertion portion of the base body 31 is firstly inserted into the aerosol generating product A, so as to reduce an insertion resistance.

[0038] The heating element 33 is a heating layer, and the thickness of the heating layer may range from 5 μm to 20 μm . In an embodiment, as shown in FIG. 3a and FIG. 3b, the heating element 33 is provided on the outer surface of the base body 31 and configured to heat the infrared layer 32 when powered on. The heating element 33 may be formed on the entire outer surface of the base body 31 by means of immersion plating, silk-screening, sputtering, painting, printing, and the like. The outer surface of the base body 31 refers to a side surface of the base body 31, excluding an upper end surface and a lower end surface, and this embodiment of the present disclosure all takes such as an example. In this embodiment, two electrodes may be provided at two preset positions of the heating element 33. The two electrodes are configured to be connected to a positive lead and a negative lead, respectively, so as to be connected to the

power supply assembly. In other embodiments, the outer surface of the base body 31 may also refer to the side surface as well as the upper end surface and the lower end surface of the base body 31. The heating element 33 may also be in a shape of an arc with a notch along a circumferential direction of the base body 31, and two ends at which the notch of the heating element 33 is located may form the two electrodes respectively connected to the positive lead and the negative lead, which is not limited in the present disclosure. The heating element 33 may be a heating film, e.g., a heating film layer of precious metal e-paste, silver palladium, ruthenium system, gold paste, etc. and a heating film layer of base metal e-paste.

[0039] In this embodiment, the infrared layer 32 is provided on the surface of the heating element 33 away from the base body 31 and provided around the entire outer surface of the base body 31. The infrared layer 32 is configured to radiate the infrared rays when heated, so as to heat and atomize the aerosol generating product A. The aerosol generating product A is heated and atomized through radiated infrared rays, which effectively improves a heating efficiency and leads to a better heating uniformity, such that the problem of the aerosol generating product A being burnt due to the local high temperature of the aerosol generating product A is avoided. It is to be noted that, the infrared layer 32 described in the embodiment of the present disclosure does not generate heat itself, the heating element 33 generates heat after powered on and conducts the heat to the infrared layer 32, such that a temperature of the infrared layer 32 is changed.

[0040] Both the heating element 33 and the infrared layer 32 are provided around the entire outer surface of the base body 31. In this way, the heating assembly 30a may be ensured to evenly radiate the infrared rays along the circumferential direction of the base body 31 after the heating element 33 is powered on, such that the heating assembly 30a may evenly heat the aerosol generating product A along the circumferential direction of the base body 31 after the aerosol generating product A is inserted. As a result, locally heating, being burnt, and an influence on the taste of vaping are avoided.

[0041] In some embodiments, the infrared layer 32 may be an infrared heating film, such as an infrared ceramic coating. Of course, the infrared layer 32 may also be a metal layer, a conductive ceramic layer, or a conductive carbon layer. The shape of the infrared layer 32 may be a continuous film, a porous mesh, or a strip. The material, shape, and size of the infrared layer 32 may be set according to requirements. An infrared heating wavelength ranges from 2.5 μm to 20 μm . For characteristics of a heated aerosol-forming substrate, a heating temperature is usually required to be 350°C or more, and an energy radiation pole value is mainly in the band of 3-5 μm .

[0042] In an embodiment, the thickness of the infrared layer 32 ranges from 10 μm to 100 μm . For example, the

thickness of the infrared layer 32 ranges from 20 μm to 40 μm . In this embodiment, the infrared layer 32 may be prepared in a thick film printing manner. The material of the infrared layer 32 includes one or more of black silicon, cordierite, transition metal oxide series spinel, rare earth oxide, ion co-doped perovskite, silicon carbide, zircon, and boron nitride.

[0043] In another embodiment, the thickness of the infrared layer 32 ranges from 20 μm to 500 μm . For example, the thickness of the infrared layer 32 ranges from 10 μm to 100 μm . In this embodiment, the infrared layer 32 may be prepared in a casting molding manner, and a raw tape thereof is then fired with the base body 31 into one piece. This manner has a high production operability. In this embodiment, a micro-nano structure is formed in the surface of the infrared layer 32 away from the base body 31 and configured to reduce the adhesion of the aerosol generating product A and facilitate subsequent cleaning of the heating assembly 30a, such that the user experience is improved. The micro-nano structure may be formed by using a laser engraving a pattern on a dried raw tape obtained after the raw tape formed in the casting molding manner is dried. Additionally, the micro-nano structure may be a pattern such as a circle, a rhombus, a hexagon, and the like. A length or size of each edge of the pattern may range from 0.1 mm to 1 mm.

[0044] In another embodiment, the thickness of the infrared layer 32 ranges from 1 μm to 10 μm . For example, the thickness of the infrared layer 32 ranges from 1 μm to 5 μm . In this embodiment, the infrared layer 32 is a thin film coating. The material of the infrared layer 32 is CrC, TiCN, diamond-like carbon (DLC).

[0045] Further, as shown in FIGS. 3a and 3b, the heating assembly 30a further includes a transition layer 35. The transition layer 35 is provided between the infrared layer 32 and the heating layer, and may surround the base body 31 along the circumferential direction of the base body 31 in a circle and configured to buffer an expansion coefficient between the heating layer and the infrared layer 32 and improve the overall flatness of the heating assembly 30a. The thickness of the transition layer 35 may range from 5 μm to 10 μm . A material of the transition layer 35 may be SiO_2 or silicate glass.

[0046] The heating assembly 30a is provided in the embodiment of the present disclosure. The base body 31 is provided for inserting the aerosol-generated article A. In addition, the heating element 33 and the infrared layer 32 are provided on the outer surface of the base body 31 in sequence and configured to heat the infrared layer 32 when the heating element 33 is powered on, such that the infrared layer 32 radiates the infrared rays and the aerosol generating product A is heated and atomized through the radiated infrared rays. In this way, the heating efficiency is improved, the heating uniformity is better, and the problem of the aerosol generating product A being burnt due to the local high temperature is avoided. By arranging the infrared layer 32 on the surface of the heating element 33 away from the base body 31,

the heating element 33 may be avoided to block the radiated infrared rays, which improves the heating efficiency. Furthermore, by arranging the transition layer 35 between the infrared layer 32 and the protective layer 34, which facilitates the adhesion between the infrared layer 32 and the heating element 33 and thereby improves the overall flatness of the heating assembly 30a.

[0047] In a second embodiment, as shown in FIG. 4a and FIG. 4b, FIG. 4a is a horizontal sectional view of a second embodiment of the heating assembly 30a shown in FIG. 2, FIG. 4b is a vertical sectional view of the second embodiment of the heating assembly 30a shown in FIG. 2, the heating assembly 30a is provided. A difference between the heating assembly 30a provided in the first embodiment described above is that the infrared layer 32 is provided on the outer surface of the base body 31 and the heating element 33 is provided on the surface of the infrared layer 32 away from the base body.

[0048] Further, as shown in FIGS. 4a and 4b, a difference between the second embodiment and the first embodiment is that the heating assembly 30a further includes a protective layer 34 provided on the surface of the heating element 33 away from the infrared layer 32. The protective layer 34 is capable of allowing the infrared rays to pass through and configured to protect and seal the heating element 33, so as to avoid the heating element 33 being scratched in the process of inserting the aerosol generating product A. In this embodiment, the micro-nano structure is formed in a surface of the protective layer 34 away from the base body 31. The micro-nano structure is formed in a manner similar to the manner of forming the micro-nano structure in the above embodiments. The protective layer 34 may be a protective glass layer. A material of the protective layer 34 may be an infrared-transparent glass. The thickness of the protective layer 34 may range from 5 μm to 60 μm .

[0049] The infrared layer 32 covers the entire outer surface of the base body 31. A ratio of an area of the heating element 33 to an area of the infrared layer 32 is less than a threshold value, such that a heating ratio of the radiated infrared rays is improved while the heating assembly 30a is ensured to have a certain heating efficiency. In this way, the uniformity of a temperature field of the aerosol generating product A, the taste of vaping an aerosol generated by atomizing the aerosol generating product A, and the utilization rate of the aerosol generating product A may be improved. The threshold value may be 30%-50%. For example, the threshold value may be 40%.

[0050] It is to be noted that, the infrared layer 32, the heating element 33, the protective layer 34, and the transition layer 35 mentioned above may be provided around the main body portion of the base body 31. The outer surface of the insertion portion of the base body 31 may be provided with one layer of a protective layer to protect the insertion portion. Of course, the infrared layer 32 and/or the heating element 33, the protective layer 34, and the transition layer 35 may also be provided around the entire outer surface of the base body 31, which is not

limited in the present disclosure.

[0051] The heating assembly 30a provided in the embodiment further includes the protective layer 34, and the protective layer 34 is able to protect the heating element 33 from being scratched by the aerosol-generating product A. Moreover, by setting the ratio of the area of the heating element 33 to the area of the infrared layer 32 to be less than the threshold value, a ratio of the infrared rays in radiated rays may be increased, such that the heating uniformity of the aerosol generating product A is ensured.

[0052] In a third embodiment, as shown in FIGS. 5 and 6, FIG. 5 is a structural schematic view of a sheet-shaped heating assembly 30b, and FIG. 6 is a vertical sectional view of a first embodiment of the heating assembly 30b shown in FIG. 5, the heating assembly 30b is provided. Different from the heating assembly 30a provided in the first embodiment and the second embodiment, the base body in the third embodiment is sheet-shaped, i.e., a shape of a plate, and the base body 31 includes a conductive body 311 and an insulating layer 312 provided on the outer surface of the conductive body 311.

[0053] The conductive body 311 is configured to be inserted into the aerosol generating product A. The conductive body 311 is sheet-shaped. A material of the conductive body 311 may be a stainless steel such as SUS430, SUS444, or the like, so as to improve the overall strength of the conductive body 311 and avoid the conductive body 311 being bended or fractured in the process of being inserted into the aerosol generating product A. The insulating layer 312 may be a glass insulating layer. The thickness of the insulating layer 312 may range from 5 μm to 20 μm . For example, the thickness of the insulating layer 312 may be 5 μm to 10 μm .

[0054] In this embodiment, as shown in FIG. 6, in an embodiment, the heating element 33 is formed on the surface of the insulating layer 312 away from the base body 31. The heating element 33 may be formed by means of immersion plating or screen-printing. The infrared layer 32 is provided on the surface of the heating element 33 away from the insulating layer 312 and serves as the outermost layer of the heating assembly 30a. The infrared layer 32 may be a thick film infrared layer 32 having a thickness ranging from 10 μm to 40 μm . A material of the thick film infrared layer 32 includes one or more of black silicon, cordierite, a transition metal oxide series spinel, rare earth oxide, ion co-doped perovskite, silicon carbide, zircon, and boron nitride.

[0055] In another embodiment, as shown in FIG. 7, FIG. 7 is a vertical sectional view of a second embodiment of the heating assembly 30b shown in FIG. 5, the insulating layer 312 may be formed on the surface of the conductive body 311 by means of physical vapor deposition (PVD). The thickness of the insulating layer 312 may range from 1 μm to 5 μm . The heating element 33 may be formed on the surface of the insulating layer 312 away from the conductive body 311 by means of the immersion plating. In this embodiment, the heating assem-

bly 30b further includes the transition layer 35, and the transition layer 35 may be formed on the surface of the heating element 33 away from the insulating layer 312 by means of PVD. The material of the transition layer 35 may be the same with the material of the insulating layer 312. The thickness of the transition layer 35 may range from 1 μm to 5 μm , e.g., 1-2 μm . Further, in this embodiment, the infrared layer 32 is formed on the surface of the transition layer 35 away from the heating element 33. The infrared layer 32 may also be formed by means of the PVD. The thickness of the infrared layer 32 may range from 1 μm to 5 μm , e.g., 1-2 μm . The material of the infrared layer 32 is CrC, TiCN, diamond-like thin film (DLC).

[0056] In another embodiment, FIG. 8 is a vertical sectional view of a third embodiment of the heating assembly 30b shown in FIG. 5, the infrared layer 32 is provided on the surface of the base body 31, and the heating element 33 is disposed on the surface of the infrared layer 32 away from the base body 31. In this embodiment, the heating assembly 30b further includes the protective layer 34, and the protective layer 34 is provided on the surface of the heating element 33 away from the infrared layer 32 to protect the heating element 33. The protective layer 34 may be the infrared-transparent glass, a specific structure and function of which are similar to those of the protective layer 34 in the second embodiment described above and may refer to the above description for details.

[0057] It is to be noted that, the infrared layer 32, the heating element 33, the protective layer 34, and the transition layer 35 described in this embodiment may be formed on the surface of the base body 31 at a single side, which may save a cost. Of course, both opposite surfaces of the base body 31 may also be formed with the infrared layer 32 and/or the heating element 33, the protective layer 34, and the transition layer 35, so as to ensure the heating uniformity. The surface of the base body 31 refers to the upper end surface or the lower end surface of a plate-shaped base body 31, rather than a side surface corresponding to the thickness.

[0058] The heating assembly 30b provided in this embodiment includes the conductive body 311 made of the stainless steel, such that the overall strength of the conductive body 311 may be effectively improved and thereby the conductive body 311 may be avoided to be bended or fractured in the process of being inserted into the aerosol generating product A. Furthermore, by configuring the conductive body 311 to be sheet-shaped, the surface area of the conductive body 311 is increased a lot compared to the rod-shaped or needle-shaped base body 31, which may increase the uniformity of the temperature field of the aerosol generating product A and thus enhance the taste of vaping the aerosol formed by atomization.

[0059] The heating element 33 involved in any of the above embodiments may also have a temperature coefficient of resistance (TCR) characteristic so as to serve as a temperature sensor. That is, the resistance value of

the heating element 33 has a monotonic one-to-one corresponding relationship with a temperature value of the heating element 33. For example, the resistance value increases with an increase of the temperature value of the heating element 3, or the resistance value decreases with the increase of the temperature value of the heating element 33. This characteristic allows the heating assembly 30a/30b to monitor a temperature value of the heating assembly 30a/30b by detecting the resistance value of the heating element 33. In this way, the heating assembly 30a/30b may regulate the temperature field of the heating assembly 30a/30b to achieve the best effect of the taste of vaping. Compared to the solution in the prior art which requires to additionally arrange a temperature-measuring element, such as a temperature-measuring sensor, since the heating element 33 is layer-shaped, the heating element 33 may be directly deposited on the surface of the base body 31 or the infrared layer 32 without a need to arrange a mounting groove on the surface of the base body 31 or the infrared layer 32 or utilize a fixing member such as a screw to mount and fix the heating element 33, such that the heating element 33 is not only easy to be arranged, but also occupies a smaller space. In addition, since the heating element 33 may be selected to cover some specific positions of the base body 31 or the infrared layer 32 and a larger area of the surface of the base body 31 or the infrared layer 32 according to actual needs, such that temperatures of a specific region of the surface of the base body 31 and/or the infrared layer 32 may be measured and an accuracy of the temperature measurement is higher, and temperatures of a major region of the base body 31 and/or the infrared layer 32 may be measured, which effectively enlarges a temperature measurement scope of the heating assembly 30a/30b.

[0060] In some embodiments, the heating element 33 may at least cover a region with the highest temperature of the heating assembly 30a/30b to avoid the problem of a local over-high temperature affecting the taste generated after heating the aerosol generating product A. It will be appreciated that, in some embodiments, if the region with the highest temperature of the heating assembly 30a/30b corresponds to a region of the base body 31, the heating element 33 at least covers the region of the base body 31; if the region with the highest temperature of the heating assembly 30a/30b corresponds to a position of the infrared layer 32, the heating element 33 at least covers this position of the infrared layer 32.

[0061] The above description is merely exemplary embodiments of the present disclosure and is not intended to limit the scope of the present disclosure. Any transformation for an equivalent structure or equivalent process made by virtue of the specification and the drawings, or a direct or an indirect application in other related technical fields, shall fall into the scope of the present disclosure.

Claims**1.** A heating assembly, comprising:

a base body, configured to be inserted into an aerosol generating product;
 an infrared layer, externally surrounding the base body and configured to radiate infrared rays when heated to heat and atomize the aerosol generating product; and
 a heating element, externally surrounding the base body and configured to heat the infrared layer when powered on.

2. The heating assembly according to claim 1, wherein the heating element is a heating layer provided on the outer surface of the base body and insulated from the base body; the infrared layer is provided on the surface of the heating layer away from the base body.

3. The heating assembly according to claim 2, wherein the thickness of the infrared layer ranges from 10 μm to 100 μm ; and a micro-nano structure is formed in the surface of the infrared layer away from the base body.

4. The heating assembly according to claim 2, wherein a material of the infrared layer comprises one or more of black silicon, cordierite, transition metal oxide series spinel, rare earth oxide, ion co-doped perovskite, silicon carbide, zircon, and boron nitride.

5. The heating assembly according to claim 2, wherein the thickness of the infrared layer ranges from 1 μm to 10 μm ; and a material of the infrared layer is CrC, TiCN, or diamond-like.

6. The heating assembly according to claim 1, wherein the infrared layer is provided on the outer surface of the base body; the heating element is a heating layer provided on the surface of the infrared layer away from the base body.

7. The heating assembly according to claim 6, comprising:
 a protective layer, provided on the surface of the heating layer away from the infrared layer, capable of allowing the infrared rays to pass through, and configured to protect the heating layer.

8. The heating assembly according to claim 7, wherein the thickness of the protective layer ranges from 5 μm to 60 μm ; a micro-nano structure is formed in a surface of the protective layer away from the base body.

9. The heating assembly according to claim 6, wherein the entire outer surface of the base body is covered

by the infrared layer, and a ratio of an area of the heating layer to an area of the infrared layer is less than 40%.

10. The heating assembly according to claim 2, comprising:
 a transition layer, provided between the infrared layer and the heating layer.

11. The heating assembly according to claim 2, wherein the thickness of the heating layer ranges from 5 μm to 20 μm .

12. The heating assembly according to claim 1, wherein the base body is in a shape of a sheet, needle or rod; wherein the radial size of the needle or rod base body ranges from 1.8 mm to 2.5 mm.

13. The heating assembly according to claim 1, wherein the base body is an insulating material

14. The heating assembly according to claim 13, wherein the insulating material is ceramic.

15. The heating assembly according to claim 1, wherein the base body comprises a conductive body and an insulating layer provided on the outer surface of the conductive body.

16. The heating assembly according to claim 15, wherein the conductive body is in a shape of a sheet, a needle, or a rod, and a material of the conductive body is metal.

17. An aerosol generating device, comprising:

a heating assembly, configured to heat and atomize an aerosol generating product when powered on, and the heating assembly is a heating assembly as claimed in claim 1; and
 a power supply assembly, connected to the heating assembly and configured to supply power to the heating assembly.

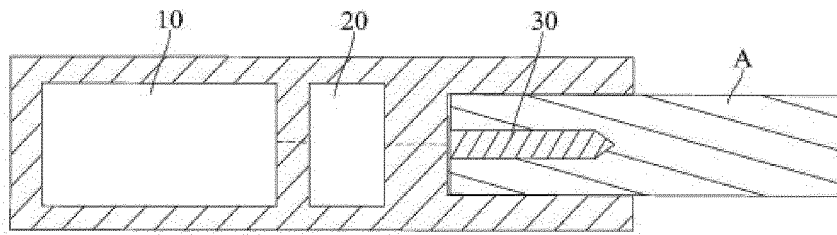


FIG. 1

30a

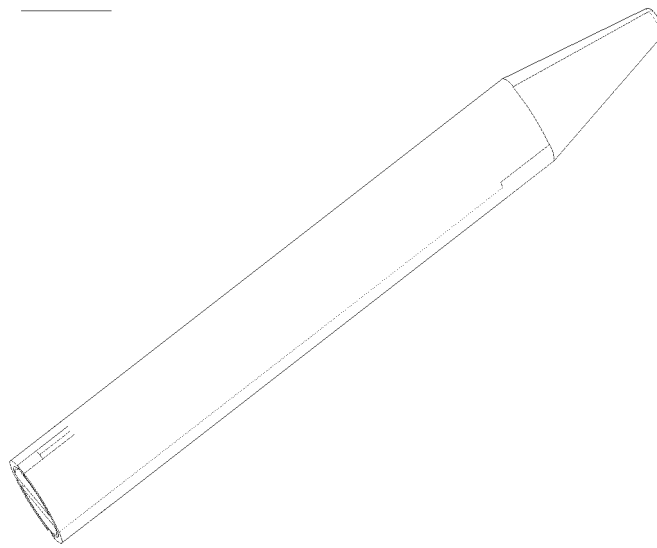


FIG. 2

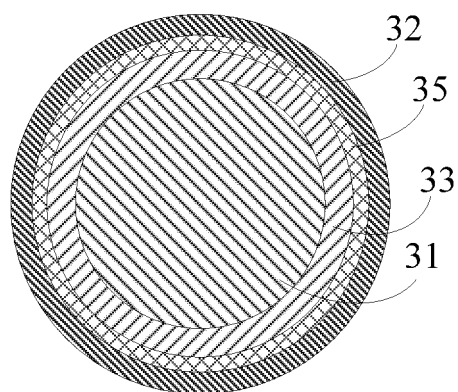


FIG. 3a

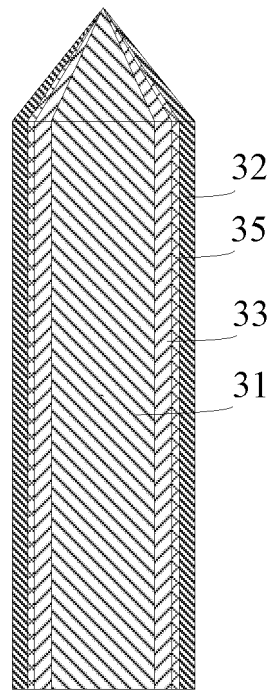


FIG. 3b

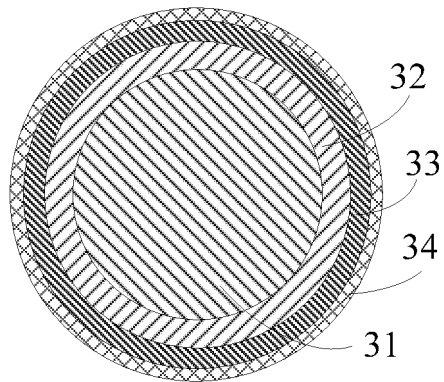


FIG. 4a

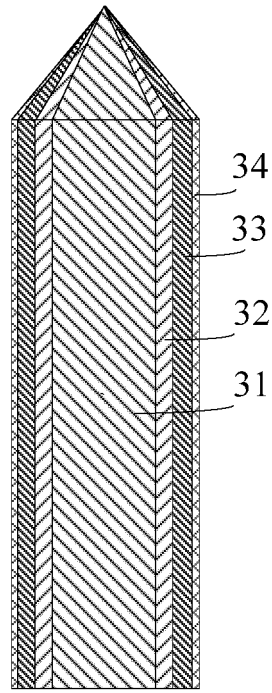


FIG. 4b

30b

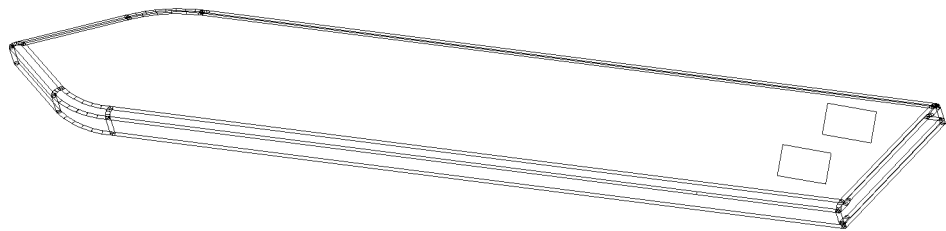


FIG. 5

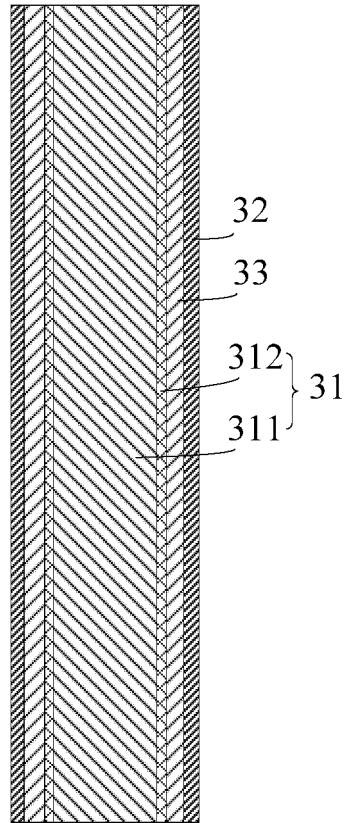


FIG. 6

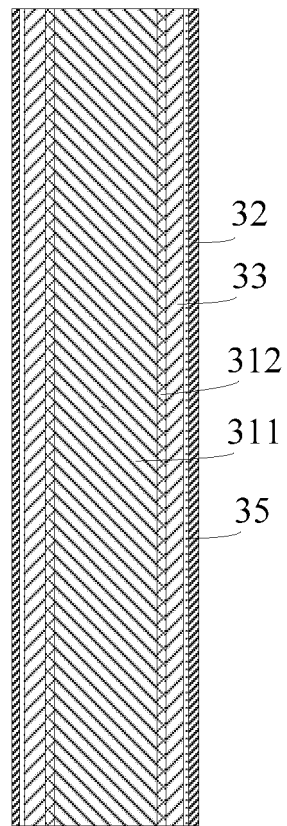


FIG. 7

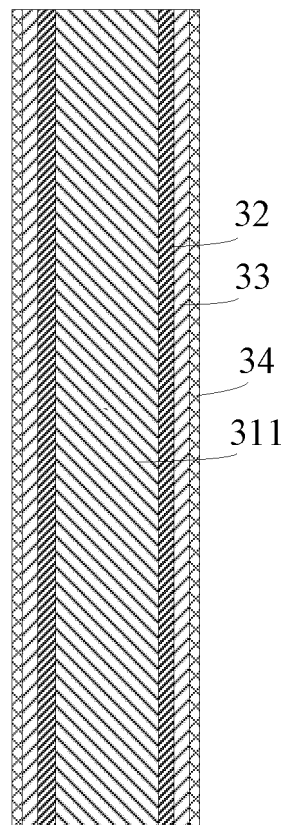


FIG. 8

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2022/129353

A. CLASSIFICATION OF SUBJECT MATTER A24F 40/465(2020.01)i According to International Patent Classification (IPC) or to both national classification and IPC																			
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) A24F, H05B Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched																			
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) CNABS, CNTXT, CNKI, ENTXT, VEN: 雾化, 气溶胶, 加热组件, 基体, 红外, 辐射, 围绕, 绝缘, 保护, 过渡, 电源, atomize +, insert+, connect+, aerosol, heat+, components, substrate, infrared, radiant, surround+, insulat+, protect+, transitional, power																			
C. DOCUMENTS CONSIDERED TO BE RELEVANT																			
<table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>PX</td> <td>CN 114158786 A (SHENZHEN SMOORE TECHNOLOGY LIMITED) 11 March 2022 (2022-03-11) see claims 1-17</td> <td>1-17</td> </tr> <tr> <td>PX</td> <td>CN 216931913 U (SHENZHEN SMOORE TECHNOLOGY LIMITED) 12 July 2022 (2022-07-12) see description, paragraphs 39-46</td> <td>1-2, 6, 17</td> </tr> <tr> <td>PX</td> <td>CN 114052297 A (SHENZHEN MAISHI TECHNOLOGY CO., LTD.) 18 February 2022 (2022-02-18) see description, paragraphs 39-46</td> <td>1-2, 6, 17</td> </tr> <tr> <td>PX</td> <td>CN 216776103 U (SHENZHEN MAISHI TECHNOLOGY CO., LTD.) 21 June 2022 (2022-06-21) see claims 1-14, and description, paragraphs 43 and 60</td> <td>1-17</td> </tr> <tr> <td>Y</td> <td>CN 113115996 A (SHENZHEN FIRST UNION TECHNOLOGY CO., LTD.) 16 July 2021 (2021-07-16) see description, paragraphs 58-76</td> <td>1-17</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	PX	CN 114158786 A (SHENZHEN SMOORE TECHNOLOGY LIMITED) 11 March 2022 (2022-03-11) see claims 1-17	1-17	PX	CN 216931913 U (SHENZHEN SMOORE TECHNOLOGY LIMITED) 12 July 2022 (2022-07-12) see description, paragraphs 39-46	1-2, 6, 17	PX	CN 114052297 A (SHENZHEN MAISHI TECHNOLOGY CO., LTD.) 18 February 2022 (2022-02-18) see description, paragraphs 39-46	1-2, 6, 17	PX	CN 216776103 U (SHENZHEN MAISHI TECHNOLOGY CO., LTD.) 21 June 2022 (2022-06-21) see claims 1-14, and description, paragraphs 43 and 60	1-17	Y	CN 113115996 A (SHENZHEN FIRST UNION TECHNOLOGY CO., LTD.) 16 July 2021 (2021-07-16) see description, paragraphs 58-76	1-17	
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Date of the actual completion of the international search 16 January 2023	Date of mailing of the international search report 29 January 2023																		
Name and mailing address of the ISA/CN China National Intellectual Property Administration (ISA/CN) No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088, China Facsimile No. (86-10)62019451	Authorized officer Telephone No.																		

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2022/129353

C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2021143840 A1 (SHENZHEN FIRST UNION TECHNOLOGY CO., LTD.) 22 July 2021 (2021-07-22) see description, page 5, paragraph 4-page 7, paragraph 5	1-17
Y	WO 2021143909 A1 (SHENZHEN FIRST UNION TECHNOLOGY CO., LTD.) 22 July 2021 (2021-07-22) see description, page 4, line 16-page 5, 5-to-last line	1-17
Y	WO 2021223716 A1 (SHENZHEN FIRST UNION TECHNOLOGY CO., LTD.) 11 November 2021 (2021-11-11) see description, paragraphs 8-12, 32 and 45-52	1-17
Y	WO 2021208883 A1 (SHENZHEN FIRST UNION TECHNOLOGY CO., LTD.) 21 October 2021 (2021-10-21) see description, paragraphs 28-41	1-17
A	CN 110418580 A (RAI STRATEGIC HOLDINGS, INC.) 05 November 2019 (2019-11-05) entire document	1-17
A	CN 111820476 A (SHENZHEN KANGBOTE TECHNOLOGY DEVELOPMENT CO., LTD.) 27 October 2020 (2020-10-27) entire document	1-17
A	CN 113057375 A (SHENZHEN FIRST UNION TECHNOLOGY CO., LTD.) 02 July 2021 (2021-07-02) entire document	1-17

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2022/129353

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 114158786 A	11 March 2022	None	
CN 216931913 U	12 July 2022	None	
CN 114052297 A	18 February 2022	None	
CN 216776103 U	21 June 2022	None	
CN 113115996 A	16 July 2021	None	
WO 2021143840 A1	22 July 2021	KR 20220126762 A	16 September 2022
		EP 4091479 A1	23 November 2022
WO 2021143909 A1	22 July 2021	EP 4091477 A1	23 November 2022
		KR 20220127913 A	20 September 2022
WO 2021223716 A1	11 November 2021	None	
WO 2021208883 A1	21 October 2021	None	
CN 110418580 A	05 November 2019	RU 2019120156 A	11 January 2021
		EP 3550997 A1	16 October 2019
		WO 2018104920 A1	14 June 2018
		JP 2020513245 A	14 May 2020
		KR 20190091345 A	05 August 2019
		US 2018160730 A1	14 June 2018
CN 111820476 A	27 October 2020	None	
CN 113057375 A	02 July 2021	None	

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Patent documents cited in the description

- CN 2021114232748 [0001]