Claims

~~1. A ceramic heating element, comprising:~~

~~A honeycomb ceramic body, wherein porous channels are arranged in the honeycomb ceramic body, and the porous channels are circular holes or polygonal holes;~~

~~A heating printed circuit, wherein the heating printed circuit is arranged around the outer surface of the honeycomb ceramic body to heat the air passing through the porous channels.~~

~~2. The ceramic heating element of the claim 1, wherein the alumina ceramic tube body is an alumina honeycomb ceramic body, and the alumina honeycomb ceramic body has a density being not less than 3.86 g/cm^3.~~

~~3. The ceramic heating element of the claim 1, wherein the porous channels are uniformly distributed in the honeycomb ceramic body.~~

~~4. The ceramic heating element of the claim 1, wherein the porous channels are arranged in the center of the honeycomb ceramic body.~~

~~5. The ceramic heating element of any one of claims 1-4, wherein, the honeycomb ceramic body is a cylinder with a circular or polygonal cross section.~~

~~6. An air-heating type heat not burn heating device, comprising:~~

~~A ceramic heating element of any one of claims 1-5;~~

~~A preheating device, wherein the ceramic heating element is arranged below the preheating device.~~

~~7. The air-heating type heat not burn heating device of the claim 6, wherein preheating device comprises a preheating tube, a deflector is arranged between the preheating tube and the ceramic heating element, and a plurality of guide holes are arranged on the deflector.~~

~~8. The air-heating type heat not burn heating device of the claim 6, wherein the ceramic heating element and the preheating device are arranged in a sealing sleeve.~~

~~9. The air-heating type heat not burn heating device of the claim 6, wherein the preheating device comprises a thin-wall alumina ceramic tube for preheating, a cavity in the center of the thin-wall alumina ceramic tube is used for placing smoking product; an opening at one end of the thin-wall alumina ceramic tube and a base plate forms a cup body, and a plurality of hot air flow holes are arranged on the base plate.~~

~~10. The non-contact air-heating type heat not burn heating device of the claim 9, wherein the thin-wall alumina ceramic tube body has a density not less than 3.86 g/cm^3.~~

~~11. The air-heating type heat not burn heating device of the claim 9, wherein a plurality of hot air flow holes are uniformly arranged around a virtual circle in the center of the base plate, and the hot air flow holes are circular holes with a diameter ranging from 0.1mm to 2 mm.~~

~~12. The air-heating type heat not burn heating device of the claim 9, wherein the base plate is made of high-purity alumina ceramics.~~

~~13~~1. ~~The preparation~~A method of ~~the~~ preparing a ceramic heating element ~~of any one of claims 1-5~~, wherein the preparation method comprises the following steps:

Step 1: Preparation of alumina ceramic sludge: adding 0.01-0.05 parts (by weight) of magnesium nitrate, 0.01-0.05 parts of zirconium oxychloride, 0.01-0.05 parts of yttrium nitrate, 1.5~2.5 parts of oleic acid, 1~2 parts of lubricant, 3~15 parts of binder and 10~30 parts of deionized water into 100 parts of nano alumina powder, putting them into a mixing machine, and mix them for 1~ 5h at a temperature below 30℃, thus to prepare the alumina honeycomb ceramic sludge with uniform distribution and a solid content of 75-85% for later use;

Step 2: Molding of alumina honeycomb ceramics: adding the alumina honeycomb ceramic slurry prepared in step 1 into a screw-type ceramic extrusion molding machine with a vacuum degassing device, and extruding hollow, thin-wall honeycomb ceramic blanks out of the ceramic slurry through the die head as pushed by the screw;

Step 3: Drying of alumina honeycomb ceramic blanks: moving the ceramic blanks prepared in step 2 to an oven, make them dry and dehydrate for 5 to 10 minutes under 40 -50°C hot air, thus to obtain a ceramic green body with satisfactory appearance and straightness;

Step 4: Debinding of the alumina ceramic green body: biscuiting the ceramic green body prepared in step 3 at 1100-1200°C to obtain a biscuit ceramic;

Step 5: Firing of alumina honeycomb ceramic: placing the biscuit ceramic prepared in step 4 in a high-temperature molybdenum tube and firing it in a hydrogen atmosphere or directly in the air at 1600-1800°C to obtain an alumina honeycomb ceramic;

Step 6: Preparation of alumina honeycomb ceramic surface heating printed circuit and its wire: print a thick-film electric heating wire on the outer surface of the alumina honeycomb ceramic prepared in step 5 using screen printing technology, after the printed circuit is dried up, apply silver solder on a bonding pad to stick the wire, dry them up in the oven again, and then move them to a furnace for sintering at 800°C-1500°C, thus to obtain an integrally sintered wire and printed circuit, and simultaneously, complete silver soldering of the wire in the furnace.

~~14~~2. The ~~preparation~~ method of ~~the ceramic heating element of~~ claim 1~~3~~, wherein the nano alumina powder used in step 1 has a purity of 99.99% or above, a particle size of 350 nm, and a specific surface area of $7m^2/g$.

~~1~~3. A ceramic heating element as claimed in claim 1, comprising:

A honeycomb ceramic body, wherein porous channels are arranged in the honeycomb ceramic body, and the porous channels are circular holes or polygonal holes;

A heating printed circuit, wherein the heating printed circuit is arranged around the outer surface of the honeycomb ceramic body to heat the air passing through the porous channels;~~.~~

wherein the porous channels are uniformly distributed in the honeycomb ceramic body;

wherein the porous channels are arranged in the center of the honeycomb ceramic body;

wherein, the honeycomb ceramic body is a cylinder with a circular or polygonal cross section.

~~2.~~4. The ceramic heating element of the claim ~~1~~3, wherein the alumina ceramic tube body is an alumina honeycomb ceramic body, and the alumina honeycomb ceramic body has a density being not less than $3.86\ g/cm^3$.

~~3. The ceramic heating element of the claim 1, wherein the porous channels are uniformly~~

~~distributed in the honeycomb ceramic body.~~

~~4. The ceramic heating element of the claim 1, wherein the porous channels are arranged in the center of the honeycomb ceramic body.~~

~~5. The ceramic heating element of any one of claims 1-4, wherein, the honeycomb ceramic body is a cylinder with a circular or polygonal cross section.~~

~~6~~5. An air-heating type heat not burn heating device, comprising:

A ceramic heating element ~~of any one~~ of claim 3~~s 1-5~~;

A preheating device, wherein the ceramic heating element is arranged below the preheating device.

~~7. The air-heating type heat not burn heating device of the claim 6,~~ wherein preheating device comprises a preheating tube, a deflector is arranged between the preheating tube and the ceramic heating element, and a plurality of guide holes are arranged on the deflector;~~.~~

wherein the preheating device comprises a thin-wall alumina ceramic tube for preheating, a cavity in the center of the thin-wall alumina ceramic tube is used for placing smoking product; an opening at one end of the thin-wall alumina ceramic tube and a base plate forms a cup body, and a plurality of hot air flow holes are arranged on the base plate.

~~8~~6. The air-heating type heat not burn heating device of the claim ~~6~~5, wherein the ceramic heating element and the preheating device are arranged in a sealing sleeve.

~~9. The air-heating type heat not burn heating device of the claim 6, wherein the preheating device comprises a thin-wall alumina ceramic tube for preheating, a cavity in the center of the thin-wall alumina ceramic tube is used for placing smoking product; an opening at one end of the thin-wall alumina ceramic tube and a base plate forms a cup body, and a plurality of hot air flow holes are arranged on the base plate.~~

~~10~~7. The non-contact air-heating type heat not burn heating device of the claim ~~9~~5, wherein the thin-wall alumina ceramic tube body has a density not less than 3.86 g/cm^3.

~~11~~8. The air-heating type heat not burn heating device of the claim ~~9~~5, wherein a plurality of hot air flow holes are uniformly arranged around a virtual circle in the center of the base plate, and the hot air flow holes are circular holes with a diameter ranging from 0.1mm to 2 mm.

~~12~~9. The air-heating type heat not burn heating device of the claim ~~9~~5, wherein the base plate is made of high-purity alumina ceramics.