CLAIMS

We claim:

1. A radiative cooling metal plate, wherein the radiative cooling metal plate comprises a metal substrate, a first adhesive layer and a radiative cooling functional layer stacked in order, the radiative cooling functional layer is located on a surface of the metal substrate, the first adhesive layer is arranged between the metal substrate and the radiative cooling functional layer, and an elongation at break of the radiative cooling functional layer is in a range of 1% to 300%,

wherein, the radiative cooling functional layer comprises an emissive layer and a first protective layer,

an elongation at break of the first protective layer is in a range of 1% to 300%; an elongation at break of the emissive layer is in a range of 20% to 280%,

a material of the first protective layer comprises a second polymer and a third polymer,

wherein a material of the second polymer is at least one of high weather resistance polyester, polyvinylidene fluoride, ethylene-tetrafluoroethylene copolymer, and fluorocarbon resin, a material of the third polymer is poly methyl methacrylate, and a mass ratio of the second polymer to the third polymer is 50:45-75:10,

a material of the emissive layer comprises a first polymer,

a mass ratio of the first polymer to the emissive layer is in a range of 85% to 100%,

a material of the first polymer comprises at least one of poly (4-methyl-1-pentene), polyethylene terephthalate, polyethylene naphthalate, poly 1,4-cyclohexylene dimethylene terephthalate, poly (ethylene terephthalateco-1, 4-cyclohexylene dimethylene terephthalate), poly (ethylene terephthalate-acetate), poly methyl methacrylate, polycarbonate, acrylonitrile styrene copolymer, acrylonitrile-butadiene styrene terpolymer, polyvinyl chloride, polypropylene, polyethylene, polyamide, ethylene-methyl acrylate copolymer, polyhydroxyethyl methacrylate, teflon, perfluoro(ethylene-propylene) copolymer, polyperfluoroalkoxy resin, polytrifluorochloroethylene, ethylene-chlorotrifluoroethylene copolymer, ethylene-tetrafluoroethylene copolymer, polyvinylidene fluoride, polyfluoroethylene, thermoplastic polyurethane, and polystyrene.

2. The radiative cooling metal plate of claim 1, wherein an average reflectivity of the radiative cooling functional layer at a wavelength of 0.3 μm to 2.5 μm is greater than or equal to 75% and an average emissivity of the radiative cooling functional layer at a wavelength of 8 μm to 13 μm is greater than or equal to 85%.

3. The radiative cooling metal plate of claim 1, wherein under any one of three following conditions where a xenon lamp aging time is greater than or equal to 1000 hours, a wet heat aging time is greater than or equal to 1000 hours, and a salt spray aging time is greater than or equal to 600 hours, an attenuations of an average reflectivity of the radiative cooling metal plate at a wavelength of 0.3 μm to 2.5 μm is less than or equal to 20%, and an attenuations of an average emissivity of the radiative cooling metal plate at a wavelength of 8 μm to 13 μm is also less than or equal to 20%.

4. The radiative cooling metal plate of claim 1, wherein an adhesive force of the radiative cooling functional layer is 0 grade tested by a scribe test method.

5. The radiative cooling metal plate of claim 1, wherein a thickness of the radiative cooling functional layer is in a range of 50 μm to 300 μm.

6. The radiative cooling metal plate of claim 1, wherein the radiative cooling functional layer further comprises a reflective layer.

7. The radiative cooling metal plate of claim 6, wherein the reflective layer is located between the emissive layer and the first adhesive layer, and a ratio of a thickness of the reflective layer to that of the radiative cooling functional layer is in a range of 0.01% to 0.1%.

8. The radiative cooling metal plate of claim 6, wherein the reflective layer comprises a middle portion and a packaging portion disposed at both ends of the middle portion, the packaging portion is configured to insulate and protect for the middle portion, a material of the middle portion comprises at least one of silver, aluminum, stainless steel, titanium, gold and copper, and a material of the packaging portion comprises alloy and/or metal oxide.

9. The radiative cooling metal plate of claim 6, wherein a thickness of the first protective layer is in a range of 20μm to 150 μm.

10. The radiative cooling metal plate of claim 6, wherein the radiative cooling metal plate further comprises a second adhesive layer disposed between the emissive layer and the first protective layer.

11. The radiative cooling metal plate of claim 1, wherein a material of the first adhesive layer is a solvent type adhesive comprising at least one of polyurethane, polyacrylate, organosilicon, rubber and epoxy.

12. The radiative cooling metal plate of claim 1, wherein a material of the first adhesive layer is a film type hot melt adhesive comprising at least one of ethylene acrylic acid copolymer, ethylene-vinyl acetate copolymer, poly methyl methacrylate, maleic anhydride grafted polymer, hydrogenated styrene-butadiene block copolymer, styrene-isoprene-styrene block copolymer, polystyrene-butadiene copolymer, polyurethane, hydrogenated petroleum resin, rosin resin, ethylene-butene copolymer and ethylene-octene copolymer.

13. The radiative cooling metal plate of claim 1, wherein a thickness of the first adhesive layer is in a range of 3μm to 25 μm.

14. The radiative cooling metal plate of claim 6, wherein the radiative cooling metal plate further comprises a second protective layer which is a release layer, the second protective layer is disposed on a surface of the first protective layer away from the radiative cooling functional layer, a material of the second protective layer comprises one of polyethylene terephthalate, polyethylene and polypropylene, a bonding force of the second protective layer is in a range of 50 g/25 mm to 500 g/25 mm.

15. The radiative cooling metal plate of claim 1, wherein a thickness of the metal substrate is in a range of 100 μm to 2000 μm.

16. A method for preparing the radiative cooling metal plate of any one of claims 1 to 15, comprising following steps:

providing the metal substrate; and

forming the first adhesive layer and the radiative cooling functional layer in order on the surface of the metal substrate.

17. The method of claim 16, wherein before the step of forming the first adhesive layer and the radiative cooling functional layer in order on the surface of the metal substrate, further comprising a step of cleaning the metal substrate.

18. A radiative cooling profiled metal plate, wherein the radiative cooling profiled metal plate is formed by pressing the radiative cooling metal plate according to any one of claims 1 to 15,

wherein edges of the lapping type radiative cooling profiled metal plate are respectively provided with a first lapping portion and a second lapping portion, the first lapping portion and the second lapping portion extend along a longitudinal direction of the lapping radiative cooling profiled metal plate, and the first lapping portion of one lapping type radiative cooling profiled metal plate is connected to the second lapping portion of another adjacent lapping type radiative profiled metal plate by lapping.