CLAIMS

We claim:

1. A selective radiative cooling coating layer, wherein said coating layer comprises a radiative cooling functional layer manufactured by a radiative cooling functional coating material,

the radiative cooling functional layer comprises a first radiative cooling functional layer and a second radiative cooling functional layer stacked in order,

wherein the first radiative cooling functional layer comprises a radiative cooling functional resin and a first granular filler distributed in the radiative cooling functional resin, and is configured for reflecting the visible light and the near-infrared light and emitting heat through the atmospheric window in the form of infrared radiation;

the second radiative cooling functional layer comprises a radiative cooling functional resin and a second granular filler distributed in the radiative cooling functional resin, and is configured for reflecting the ultraviolet light and the visible light and emitting heat through the atmospheric window in the form of infrared radiation;

the first granular filler is aluminum silicate, pearl powder, silicon dioxide, calcium carbonate, barium sulfate, talcum powder, titanium dioxide, zinc sulfide, ceramic powder, ceramic bead, glass bead, or a combination thereof; and

the second granular filler is aluminum oxide, zinc oxide, zirconium oxide, cerium oxide, lanthanum oxide, rhodium dioxide, magnesium oxide, or a combination thereof.

2. The selective radiative cooling coating layer of claim 1, wherein the first radiative cooling functional layer has a thickness of 30 μm to 300 μm, and the second radiative cooling functional layer has a thickness of 10 μm to 60 μm.

3. The selective radiative cooling coating layer of claim 1, wherein the first radiative cooling functional layer comprises a first surface, and the second radiative cooling functional layer comprises a second surface away from the first surface,

wherein the selective radiative cooling coating layer further comprises a weather resistant resin layer located on the first surface of the first radiative cooling functional

layer, and/or a primer resin layer located on the second surface of the second radiative cooling functional layer; or

the selective radiative cooling coating layer further comprises a primer resin layer located on the first surface of the first radiative cooling functional layer, and/or a weather resistant resin layer located on the second surface of the second radiative cooling functional layer.

4. The selective radiative cooling coating layer of claim 3, wherein the weather resistant resin layer has a transmittance that is larger than or equal to 80%, and a material of the weather resistant resin layer comprises fluorine-containing resin, epoxy resin, polyester, polyurethane, acrylic resin, silicon resin, or a combination thereof,

a material of the primer resin layer comprises an epoxy resin and/or an acrylic resin.

5. The selective radiative cooling coating layer of claim 3, wherein the weather resistant resin layer has a thickness of 10 μm to 50 μm, and the primer resin layer has a thickness of 10 μm to 50 μm.

6. The selective radiative cooling coating layer of claim 1, wherein a weight ratio of the first granular filler to the first radiative cooling functional resin is in a range of 1:10 to 6:1;

a weight ratio of the second granular filler to the second radiative cooling functional resin is in a range of 1:10 to 6:1.

7. The selective radiative cooling coating layer of claim 1, wherein the first granular filler and the second granular filler has a shape of a rod, a sphere or an ellipsoid,

when the first granular filler is rod shaped or ellipsoid shaped, a ratio of a length of the first granular filler to a diameter of the first granular filler is in a range of 1:1 to 10:1; and

when the second granular filler is rod shaped or ellipsoid shaped, a ratio of a length of the second granular filler to a diameter of the second granular filler is in a range of 1:1 to 10:1.

8. The selective radiative cooling coating layer of claim 1, wherein the first granular filler is orderly arranged in the first radiative cooling functional layer, the first granular filler being uniformly and directionally distributed in the first radiative cooling functional layer; and/or

the second granular filler is orderly arranged in the second radiative cooling functional layer, the second granular filler being uniformly and directionally distributed in the second radiative cooling functional layer.

9. The selective radiative cooling coating layer of claim 1, wherein the first granular filler has a diameter in a range of 0.5 μm to 40 μm, and the second granular filler has a diameter in a range of 0.01 μm to 40 μm.

10. The selective radiative cooling coating layer of claim 1, wherein both the radiative cooling functional resin in the first radiative cooling functional layer and the radiative cooling functional resin in the second radiative cooling functional layer are epoxy resin, polyester, polyurethane, acrylic resin, silicone resin, or a combination thereof.

11. The selective radiative cooling coating layer of claim 1, wherein the first radiative cooling functional layer further comprises a directional agent configured for controlling an orientation of the first granular filler; and/or

the second radiative cooling functional layer further comprises a directional agent configured for controlling an orientation of the second granular filler.

12. The selective radiative cooling coating layer of claim 11, wherein the directional agent is aqueous acetic acid-butyl cellulose, ethylene-vinyl acetate copolymer wax emulsion, polyethylene wax, polyamide wax, or a combination thereof.

13. The selective radiative cooling coating layer of claim 1, wherein the first radiative cooling functional layer further comprises a pigment; and/or

the second radiative cooling functional layer further comprises a pigment.

14. The selective radiative cooling coating layer of claim 13, wherein the pigment is a fluorescent dye.

15. The selective radiative cooling coating layer of any one of claims 1-14, wherein the radiative cooling functional layer has a reflectivity of solar energy that is greater than or equal to 80% and an atmospheric window emissivity that is larger than or equal to 80%, and is able to provide a radiative cooling power of larger than or equal to $100W/m^2$ at room temperature.

16. A composite material comprising the selective radiative cooling coating layer of claim 1, wherein said coating layer comprises a substrate and the radiative cooling functional layer is disposed on the substrate.

17. The composite material of claim 16, wherein the substrate is metal, plastic, rubber, concrete, cement, asphalt, paper, textile, wood, ceramic tile, glass, or organic synthetic material.

18. An application method of the selective radiative cooling coating layer of claim 1, the application method comprising forming the selective radiative cooling coating layer on a surface of a main body, wherein the selective radiative cooling coating layer is configured for reflecting and/or emitting heat outwardly.

19. The application method of the selective radiative cooling coating layer of claim 18, the main body is one of a building, a photovoltaic module, a system comprising the photovoltaic module, an automobile, an outdoor product, greenhouses of agriculture, husbandry, and aquaculture, aerospace equipment, a cold chain transportation device, an

outdoor cabinet, textile industry, outdoor communication equipment, industrial equipment, a public service, a cooling water system, an energy system and energy-saving equipment.