WHAT IS CLAIMED IS:

1. A light-emitting device, comprising:

a first type semiconductor layer;

a patterned insulating layer, covering the first type semiconductor layer and having a plurality of insulating openings, wherein the insulating openings are separated from each other;

a light-emitting layer, located in the plurality of insulating openings and covering a portion of the first type semiconductor layer; and

a second type semiconductor layer, located on the light-emitting layer, wherein a sum of a thickness of the light-emitting layer and a thickness of the second type semiconductor layer is smaller than a sum of a distance that is between the bottom of the patterned insulating layer and the bottom of the light-emitting layer and a thickness of the patterned insulating layer, so that an upper surface of the second type semiconductor layer is lower than an upper surface of the patterned insulating layer.

2. The light-emitting device as claimed in claim 1, wherein the patterned insulating layer comprises an insulating top surface and an insulating bottom surface opposite to the insulating top surface, the insulating top surface is ~~far~~ away from the first type semiconductor layer compared with the insulating bottom surface, each of the plurality of insulating openings has a top aperture on the insulating top surface, each of the plurality of insulating openings has a bottom aperture on the insulating bottom surface, and the top aperture is greater than or equal to the bottom aperture.

3. The light-emitting device as claimed in claim 1, wherein the first type semiconductor layer has a first region and a second region, wherein the first region is not overlapped with the patterned insulating layer and is overlapped with the light-emitting layer, the second region is overlapped with the patterned insulating layer and is not overlapped with

the light-emitting layer, and a thickness of the first region is smaller than or equal to a thickness of the second region.

~~4. The light-emitting device as claimed in claim 1, wherein the patterned insulating layer comprises an insulating top surface and an insulating bottom surface opposite to the insulating top surface, the insulating top surface is far away from the first type semiconductor layer, and the second type semiconductor layer further covers the insulating top surface of the patterned insulating layer.~~

~~5~~4. The light-emitting device as claimed in claim 1, wherein the patterned insulating layer comprises an insulating top surface and an insulating bottom surface opposite to the insulating top surface, the insulating top surface is ~~far~~ away from the first type semiconductor layer compared with the insulating bottom surface, and the second type semiconductor layer does not cover the insulating top surface of the patterned insulating layer.

~~6~~5. The light-emitting device as claimed in claim 1, further comprising:

a light-transmitting conductive layer, located on the second type semiconductor layer.

~~7~~6. The light-emitting device as claimed in claim 1, further comprising:

a first electrode, electrically connected to the first type semiconductor layer; and

a second electrode, electrically connected to the second type semiconductor layer.

~~8~~7. The light-emitting device as claimed in claim 1, further comprising:

a substrate, wherein the first type semiconductor layer is located on the substrate.

~~9~~8. The light-emitting device as claimed in claim 1, wherein:

an aperture of each of the plurality of insulating openings is between 100 nm and 2000 nm;

a pitch between the adjacent plurality of insulating openings is between 100 nm and 1000 nm; and/or

a thickness of the patterned insulating layer is between 0.1 μm and 1.0 μm.

~~10~~9. The light-emitting device as claimed in claim ~~9~~8, wherein:

the aperture of each of the plurality of insulating openings is between 300 nm and 1000 nm;

the pitch between the adjacent plurality of insulating openings is between 100 nm and 500 nm; and/or

the thickness of the patterned insulating layer is between 0.5 μm and 1.0 μm.

~~11~~10. A manufacturing method of a light-emitting device, comprising:

forming a first type semiconductor layer on a substrate;

forming an insulating layer on the first type semiconductor layer, wherein the insulating layer has a plurality of insulating openings exposing a portion of the first type semiconductor layer;

forming a light-emitting layer in the plurality of insulating openings to cover a portion of the first type semiconductor layer; and

forming a second type semiconductor layer on the light-emitting layer, wherein a sum of a thickness of the light-emitting layer and a thickness of the second type semiconductor layer is smaller than a sum of a distance that is between the bottom of the insulating layer and the bottom of the light-emitting layer and a thickness of the insulating layer, so that an upper surface of the second type semiconductor layer is lower than an upper surface of the insulating layer.

~~12~~11. The manufacturing method of the light-emitting device as claimed in claim ~~11~~10, wherein the plurality of insulating openings are separated from each other.

~~13~~12. The manufacturing method of the light-emitting device as claimed in claim ~~11~~10, further comprising:

forming a light-transmitting conductive layer on the second type semiconductor

layer.

~~14~~13. The manufacturing method of the light-emitting device as claimed in claim ~~11~~10, further comprising:

forming a first electrode electrically connected to the first type semiconductor layer; and

forming a second electrode electrically connected to the second type semiconductor layer.

~~15~~14. The manufacturing method of the light-emitting device as claimed in claim ~~11~~10, wherein the plurality of insulating openings comprise a first insulating opening and a second insulating opening, and an aperture of the first insulating opening is smaller than an aperture of the second insulating opening.

~~16~~15. The manufacturing method of the light-emitting device as claimed in claim ~~15~~14, wherein the aperture of the first insulating opening is between 300 nm and 500 nm, and/or the aperture of the second insulating opening is between 500 nm and 1000 nm.

~~17~~16. The manufacturing method of the light-emitting device as claimed in claim ~~11~~10, wherein the plurality of insulating openings comprise a plurality of first insulating openings and a plurality of second insulating openings, and a pitch between the adjacent plurality of first insulating openings is greater than a pitch between the adjacent plurality of second insulating openings.

~~18~~17. The manufacturing method of the light-emitting device as claimed in claim ~~15~~14, wherein a pitch between adjacent plurality of first insulating openings is between 300 nm and 500 nm, and/or a pitch between adjacent plurality of second insulating openings is between 100 nm and 300 nm.

~~19~~18. A manufacturing method of a light-emitting apparatus, comprising:

forming a first light-emitting device by a substrate, wherein the first light-emitting device comprises:

a first type semiconductor layer;

a patterned insulating layer, covering the first type semiconductor layer and having a plurality of first insulating openings, wherein the plurality of first insulating openings are separated from each other;

a first light-emitting layer, located in the plurality of first insulating openings and covering a portion of the first type semiconductor layer; and

a second type semiconductor layer, located on the first light-emitting layer, wherein a sum of a thickness of the first light-emitting layer and a thickness of the second type semiconductor layer is smaller than a sum of a distance that is between the bottom of the patterned insulating layer and the bottom of the first light-emitting layer and a thickness of the patterned insulating layer, so that an upper surface of the second type semiconductor layer is lower than an upper surface of the patterned insulating layer; and

disposing the first light-emitting device on a circuit substrate to electrically connect the circuit substrate.

~~20~~19. The manufacturing method of the light-emitting apparatus as claimed in claim ~~19~~18, further comprising:

forming a second light-emitting device by the substrate, wherein the second light-emitting device comprises:

the first type semiconductor layer;

the patterned insulating layer, further having a plurality of second insulating openings, wherein the plurality of second insulating openings are separated from each other;

a second light-emitting layer, located in the plurality of second insulating

openings and covering a portion of the first type semiconductor layer; and

the second type semiconductor layer, located on the second light-emitting layer, wherein

apertures of the plurality of second insulating openings are different from apertures of the plurality of first insulating openings; and/or a pitch between the adjacent plurality of first insulating openings is different from a pitch between the adjacent plurality of second insulating openings; and

disposing the second light-emitting device on the circuit substrate to electrically connect the circuit substrate.

~~21~~20. The manufacturing method of the light-emitting apparatus as claimed in claim ~~20~~19, further comprising:

simultaneously transferring the first light-emitting device and the second light-emitting device formed by the substrate to a transfer substrate.

~~22~~21. The manufacturing method of the light-emitting apparatus as claimed in claim ~~20~~19, wherein the first light-emitting device or the second light-emitting device comprises a green light-emitting device or a blue light-emitting device, the manufacturing method further comprising:

disposing a red light-emitting device on the circuit substrate to electrically connect the circuit substrate, wherein a size of the red light-emitting device is greater than a size of the first light-emitting device and a size of the second light-emitting device.