WHAT IS CLAIMED IS:

1. An electrostatic chuck, comprising:

a base;

a heating layer disposed on the base;

an insulating layer disposed on the heating layer; and

an annular-shaped protection member surrounding an outer peripheral wall of the heating layer and detachably disposed on an outer side of the heating layer, wherein an outer diameter of the heating layer is smaller than both an outer diameter of the base and an outer diameter of the insulating layer; and

the annular-shaped protection member is detachable, the annular-shaped protection member is separately replaced, and replacing the annular-shaped protection member does not damage the heating layer.

2. The electrostatic chuck according to claim 1, wherein:

the annular-shaped protection member is elastic;

a height of the uncompressed and undeformed annular-shaped protection member in a vertical direction is greater than or equal to a gap between the base and the insulating layer; and

when being assembled between the base and the insulating layer, the annular-shaped protection member is capable of blocking the heating layer from a plasma.

3. The electrostatic chuck according to claim 2, wherein:

the height of the uncompressed and undeformed annular-shaped protection member in the vertical direction is greater than the gap between the base and the insulating layer; and

when being assembled between the base and the insulating layer, the annular-shaped protection member is compressed and deformed to block the heating layer from the plasma.

4. The electrostatic chuck according to claim 3, wherein:

when the annular-shaped protection member is not compressed or deformed, a cross-sectional shape of the annular-shaped protection member in a plane where a central axis of the electrostatic chuck is located is a rectangle, a square, a trapezoid, a circle, or an ellipse.

5. The electrostatic chuck according to claim 4, wherein:

when the cross-sectional shape is the rectangle, the square, or the trapezoid, any two adjacent sides of the rectangle, the square, or the trapezoid adopt a rounded corner transition.

6. The electrostatic chuck according to claim 5, wherein:

a radius of the rounded corner ranges approximately between 1mm and 3mm.

7. The electrostatic chuck according to claim 3, wherein:

a cross-sectional shape of the annular-shaped protection member in a plane where a central axis of the electrostatic chuck is located is a circle; and

a height of an annular space formed between the outer peripheral wall of the heating layer, an upper surface of the base, and a lower surface of the insulating layer in an axial direction of the electrostatic chuck is smaller than about 90% of a diameter of the cross-sectional shape.

8. The electrostatic chuck according to claim 4, wherein:

the cross-sectional shape is the rectangle, the square, or the trapezoid; and

an outer annular surface of the annular-shaped protection member is a concave surface.

9. The electrostatic chuck according to claim 8, wherein:

a minimum thickness of the annular-shaped protection member in a radial direction is greater than or equal to about 80% of a maximum thickness of the annular-shaped protection member in the radial direction.

10. The electrostatic chuck according to claim 8, wherein:

the cross-sectional shape of the concave outer annular surface of the annular-shaped protection member is an arc, a diagonal line, or a folded line;

the folded line extends in the vertical direction and includes at least two line segments;

any two adjacent line segments of the at least two line segments are connected; and

an angle formed between any two adjacent line segments is an acute angle, a right angle, or an obtuse angle.

11. The electrostatic chuck according to claim 1, wherein:

the annular-shaped protection member includes an annular-shaped body;

the annular-shaped body is disposed between the base and the insulating layer, and surrounds the outer peripheral wall of the heating layer;

a height of the uncompressed and undeformed annular-shaped protection member in a vertical direction is greater than or equal to a gap between the base and the insulating layer;

at least one annular-shaped extension portion is formed on an outer peripheral wall of the annular-shaped body;

when the number of the at least one annular-shaped extension portion is one, the annular-shaped extension portion extends upward on the outer peripheral wall of the annular-shaped body and covers an outer peripheral wall of the insulating layer with a top end of the annular-shaped extension portion not higher than an upper surface of the insulating layer, or extends downward on the outer peripheral wall of the annular-shaped body and covers an outer peripheral wall of the base; and

when the number of the at least one annular-shaped extension portion is two, an upper half of the annular-shaped extension portion extends upward on the outer peripheral wall of the annular-shaped body and covers the outer peripheral wall of the insulating layer with the top end thereof not higher than the upper surface of the insulating layer, and a lower half of the annular-shaped extension portion extends downward on the outer peripheral wall of the annular-shaped body and covers the outer peripheral wall of the base.

12. The electrostatic chuck according to any of claims 1-11, wherein:

the annular-shaped protection member is made of a perfluoro rubber.

13. A plasma processing apparatus comprising a processing chamber, wherein:

the electrostatic chuck according to any of claims 1-12 is configured inside the processing chamber.