ELECTROSTATIC CHUCK AND PLASMA PROCESSING APPARATUS

FIELD

[0001] The disclosure relates to an electrostatic chuck (ESC) and a plasma processing apparatus.

BACKGROUND

[0002] An ESC has gas supply holes for supplying a heat transfer gas introduced from the back surface of the ESC to the upper surface of the ESC to cool a wafer. For example, Patent Literature 1 describes a substrate support including an ESC to support a wafer, an electrostatic electrode located in the ESC, and gas supply holes that are open in the upper surface of the ESC to connect with a heat transfer gas channel extending through the ESC from its upper surface to the lower surface.

CITATION LIST

PATENT LITERATURE

[0003] Patent Literature 1: Japanese Unexamined Patent Application Publication No. 2021-82788

BRIEF SUMMARY

TECHNICAL PROBLEM

[0004] One or more aspects of the disclosure are directed to a technique for preventing or reducing occurrence of abnormal discharge in gas supply holes for supplying a heat transfer gas.

SOLUTION TO PROBLEM

[0005] An electrostatic chuck according to a first aspect of the disclosure includes a substrate support to support at least one of a substrate or an edge ring, an electrostatic electrode inside the substrate support to electrostatically clamp at least one of the substrate or the edge ring, and an electrode inside the substrate support and located on a plane different from a plane on which the electrostatic electrode is located. The substrate support has a through-hole extending through the substrate support from an upper surface of the substrate support to a lower surface of the substrate support. The electrode is at least partially located between the electrostatic electrode and the through-hole.

[0005a] According to a second aspect of the disclosure, there is provided a plasma processing apparatus, including: a plasma processing chamber; a base in the plasma processing

chamber; an electrostatic chuck on the base; and a radio-frequency power supply electrically coupled to the base or an electrode inside the electrostatic chuck, wherein the electrostatic chuck includes a substrate support to support at least one of a substrate or an edge ring, an electrostatic electrode inside the substrate support, the electrostatic electrode being configured to electrostatically clamp at least one of the substrate or the edge ring, and an electrode inside the substrate support, the electrode being located on a plane different from a plane on which the electrostatic electrode is located, the substrate support has a through-hole extending through the substrate support from an upper surface of the substrate support to a lower surface of the substrate support, and the electrode is at least partially located between the electrostatic electrode and the through-hole.

ADVANTAGEOUS EFFECTS

[0006] The technique according to the above aspects of the disclosure can prevent or reduce occurrence of abnormal discharge in gas supply holes for supplying a heat transfer gas.

BRIEF DESCRIPTION OF DRAWINGS

[0007] FIG. 1 is a diagram of a plasma processing system according to one embodiment.

FIG. 2 is a diagram of a plasma processing apparatus with an example structure according to one embodiment.

FIGs. 3A to 3C are diagrams of an electrostatic chuck (ESC) according to one embodiment, showing its electrode structure.

FIG. 4 is a sectional view taken along line B-B in FIG. 3B.

FIG. 5 is a longitudinal sectional view of an ESC according to one embodiment, showing its electrode structure.

FIG. 6A is a diagram of a second electrode portion in a first modification of one embodiment.

FIG. 6B is a diagram of a second electrode portion in a second modification of one embodiment.

FIG. 6C is a diagram of a second electrode portion in a third modification of one embodiment.

DETAILED DESCRIPTION

[0008] One or more embodiments of the disclosure will now be described with reference to the drawings. Like reference numerals denote like components in the drawings. Such components may not be described repeatedly.