

What is claimed is:

1. A plasma processing apparatus comprising:

a base to which a bias power, whose magnitude is changed during plasma processing on a target substrate, is applied;

an electrostatic chuck, provided on the base, having a central portion on which the target substrate is mounted and an outer peripheral portion on which a focus ring is mounted to surround the target substrate, the central portion protruding upward with respect to the outer peripheral portion and being thicker than the outer peripheral portion; and

a dielectric layer, provided between the outer peripheral portion of the electrostatic chuck and the base, having an electrostatic capacitance that reduces a difference between an electrostatic capacitance of the central portion of the electrostatic chuck and an electrostatic capacitance of the outer peripheral portion of the electrostatic chuck.

2. The plasma processing apparatus of claim 1, wherein a thickness and a relative dielectric constant of the dielectric layer are selected such that a combined electrostatic capacitance of the electrostatic capacitance of the dielectric layer and the electrostatic capacitance of the outer peripheral portion of the electrostatic chuck is equal to the electrostatic capacitance of the central portion of the electrostatic chuck.

3. The plasma processing apparatus of claim 1 or 2, wherein the focus ring is mounted on the outer peripheral portion of the electrostatic chuck in a state where a part of a lower surface of the focus ring is in contact with the outer peripheral portion of the electrostatic chuck, and

a thickness and a relative dielectric constant of the dielectric layer are selected such that a value obtained by multiplying a combined electrostatic capacitance of the electrostatic capacitance of the dielectric layer and the electrostatic capacitance of the outer peripheral portion of the electrostatic chuck by a ratio of an area of the part of the lower surface of the focus ring to an area of an upper

surface of the focus ring is equal to the electrostatic capacitance of the central portion of the electrostatic chuck.

4. The plasma processing apparatus of any one of claims 1 to 3, wherein in a state where the target substrate is mounted on the central portion of the electrostatic chuck and the focus ring is mounted on the outer peripheral portion of the electrostatic chuck, a height of an upper surface of the focus ring is equal to a height of an upper surface of the target substrate.

5. The plasma processing apparatus of any one of claims 1 to 4, wherein the dielectric layer is formed on the base without an adhesive interposed therebetween.

6. A plasma processing method for performing plasma processing on a target substrate by using the plasma processing apparatus described in any one of claims 1 to 5.