Claims

1. A substrate processing method, comprising:

forming a film containing a first element on a substrate by performing a cycle a predetermined number of times, the cycle including performing:

(a) supplying a first precursor gas containing the first element and a halogen element to the substrate to form a first layer, which contains the first element and the halogen element and inhibits the first element from being adsorbed on the first layer;

(b) supplying a second precursor gas different from the first precursor gas and containing the first element to the substrate, on which the first layer is formed, to thereby form a second layer, which contains the first element; and

(c) supplying a reaction gas to the substrate on which the second layer is formed,

wherein a number of atoms of the first element contained in each molecule of the first precursor gas is one, and

wherein a number of atoms of the first element contained in each molecule of the second precursor gas is two or more.

2. The method of Claim 1, wherein the first layer decreases adsorption sites allowing atoms of the first element to be adsorbed on a surface of the substrate.

3. The method of Claim 1, wherein the substrate includes a recess, and the film is formed on an inner surface of the recess.

4. The method of Claim 3, wherein a step coverage of the first layer formed on the inner surface of the recess is greater than a step coverage of a layer which is formed on the inner surface of the recess when the second precursor gas is supplied to the substrate without supplying the first precursor gas.

5. The method of Claim 1, wherein the second precursor gas further contains a halogen element.

6. The method of Claim 1, wherein bonding hands other than bonding hands adsorbed on a surface of the substrate among a plurality of bonding hands of the first element constituting the first layer are terminated by the halogen element.

7. The method of Claim 1, wherein the second layer containing a bond between the atoms of the first element is formed to have a thickness of more than one atomic layer in (b).

8. The method of Claim 1, wherein a ratio of bonds between the atoms of the first element contained in the second layer is greater than a ratio of bonds between the atoms of the first element contained in the first layer.

9. The method of Claim 1, wherein the first layer has a thickness of less than one atomic layer.

10. A method of manufacturing a semiconductor device, comprising:

forming a film containing a first element on a substrate by performing a cycle a predetermined number of times, the cycle including performing:

(a) supplying a first precursor gas containing the first element and a halogen element to the substrate to form a first layer, which contains the first element and the halogen element and inhibits the first element from being adsorbed on the first layer;

(b) supplying a second precursor gas different from the first precursor gas and containing the first element to the substrate, on which the first layer is formed, to thereby

form a second layer, which contains the first element; and

(c) supplying a reaction gas to the substrate on which the second layer is formed,

wherein a number of atoms of the first element contained in each molecule of the first precursor gas is one, and

wherein a number of atoms of the first element contained in each molecule of the second precursor gas is two or more.

11. A program that causes, by a computer, a substrate processing apparatus to perform a process comprising:

forming a film containing a first element on a substrate by performing a cycle a predetermined number of times, the cycle including performing:

(a) supplying a first precursor gas containing the first element and a halogen element to the substrate to form a first layer, which contains the first element and the halogen element and inhibits the first element from being adsorbed on the first layer;

(b) supplying a second precursor gas different from the first precursor gas and containing the first element to the substrate, on which the first layer is formed, to thereby form a second layer, which contains the first element; and

(c) supplying a reaction gas to the substrate on which the second layer is formed,

wherein a number of atoms of the first element contained in each molecule of the first precursor gas is one, and

wherein a number of atoms of the first element contained in each molecule of the second precursor gas is two or more.

12. A substrate processing apparatus, comprising:

a first precursor gas supply system configured to supply a first precursor gas containing a first element and a halogen element to a substrate;

a second precursor gas supply system configured to supply a second precursor gas different from the first precursor gas and containing the first element to the substrate;

a reaction gas supply system configured to supply a reaction gas to the substrate; and

a controller configured to be capable of controlling the first precursor gas supply system, the second precursor gas supply system, and the reaction gas supply system so as to perform a process including forming a film containing the first element on the substrate by performing a cycle a predetermined number of times, the cycle including performing:

(a) supplying the first precursor gas to the substrate to form a first layer, which contains the first element and the halogen element and inhibits the first element from being adsorbed on the first layer;

(b) supplying the second precursor gas to the substrate, on which the first layer is formed, to thereby form a second layer, which contains the first element; and

(c) supplying the reaction gas to the substrate on which the second layer is formed,

wherein a number of atoms of the first element contained in each molecule of the first precursor gas is one, and

wherein a number of atoms of the first element contained in each molecule of the second precursor gas is two or more.