WHAT IS CLAIMED IS:

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

forming a nitride film containing a predetermined element on a substrate in a process chamber by performing a cycle a predetermined number of times, the cycle including sequentially performing:

(a) supplying a first precursor gas containing a molecular structure containing the predetermined element to the substrate with a pressure of the process chamber being set to a first pressure;

(b) supplying a second precursor gas, which is different from the first precursor gas and contains a molecular structure containing the predetermined element and a halogen element bonded to an atom of the predetermined element and not containing a bond between atoms of the predetermined element, to the substrate with the pressure of the process chamber being set to a second pressure higher than the first pressure; and

(c) supplying a nitriding agent to the substrate.

2. The method of Claim 1, wherein a thermal decomposition temperature of the second precursor gas is lower than that of the first precursor gas.

3. The method of Claim 1, wherein at least one selected from the group of the first pressure and the second pressure is determined based on a desired ratio of the predetermined element in the nitride film.

4. The method of Claim 3, wherein the desired ratio of the predetermined element in the nitride film is larger than a ratio of the predetermined element in stoichiometric composition of the nitride film.

5. The method of Claim 3, wherein the second pressure is smaller than a pressure under which particles are generated due to bonding of molecules generated by thermal decomposition of the second precursor gas in (b).

6. The method of Claim 1, wherein at least one selected from the group of a first flow rate, which is a supply flow rate of the first precursor gas in (a), and a second flow rate, which is a supply flow rate of the second precursor gas in (b), is determined based on a desired ratio of the predetermined element in the nitride film.

7. The method of Claim 6, wherein the desired ratio of the predetermined element in the nitride film is larger than a ratio of the predetermined element in stoichiometric composition of the nitride film.

8. The method of Claim 6, wherein the second flow rate is smaller than a supply flow at which particles are generated due to bonding of molecules generated by thermal decomposition of the second precursor gas in (b).

9. The method of any one of Claims 6 to 8, wherein the second flow rate is larger than the first flow rate.

10. The method of any one of Claims 1 to 9, wherein the first precursor gas contains a molecular structure containing a halogen element bonded to an atom of the predetermined element.

11. The method of any one of Claims 1 to 10, wherein in (a), a layer containing the

predetermined element is discontinuously formed on a surface of the substrate.

12. The method of Claim 11, wherein in (a), a coverage of the layer containing the predetermined element on the surface of the substrate is less than 70%.

13. The method of Claim 10, wherein the first precursor gas is a halosilane gas.

14. The method of Claim 13, wherein the first precursor gas is a chlorosilane gas.

15. The method of any one of Claims 1 to 14, wherein the second precursor gas contains a molecular structure containing one atom of the predetermined element.

16. The method of Claim 1, wherein the second precursor gas contains a molecular structure containing hydrogen bonded to the atom of the predetermined element.

17. The method of Claim 16, wherein the second precursor gas is a halosilane gas.

18. The method of Claim 17, wherein the second precursor gas is a chlorosilane gas.

19. The method of any one of Claims 1 to 18, wherein the second precursor gas includes at least one selected from the group of a monochlorosilane gas, a dichlorosilane gas, and a trichlorosilane gas.

20. The method of Claim 19, wherein the first precursor gas includes a tetrachlorosilane gas.

21. The method of Claim 1, wherein the nitriding agent is a hydrogen nitride-based gas.

22. A method of processing a substrate, comprising:

forming a nitride film containing a predetermined element on the substrate in a process chamber by performing a cycle a predetermined number of times, the cycle including sequentially performing:

(a) supplying a first precursor gas containing a molecular structure containing the predetermined element to the substrate with a pressure of the process chamber being set to as a first pressure;

(b) supplying a second precursor gas, which is different from the first precursor gas and contains a molecular structure containing the predetermined element and a halogen element bonded to an atom of the predetermined element and not containing a bond between atoms of the predetermined element, to the substrate with the pressure of the process chamber being set to a second pressure higher than the first pressure; and

(c) supplying a nitriding agent to the substrate.

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

forming a nitride film containing a predetermined element on a substrate in a process chamber by performing a cycle a predetermined number of times, the cycle including sequentially performing:

(a) supplying a first precursor gas containing a molecular structure containing the predetermined element to the substrate with a pressure of the process chamber being set to a first pressure;

(b) supplying a second precursor gas, which is different from the first precursor gas and contains a molecular structure containing the predetermined element and a halogen element bonded to an atom of the predetermined element and not containing a

bond between atoms of the predetermined element, to the substrate with the pressure of the process chamber being set to as a second pressure higher than the first pressure; and

(c) supplying a nitriding agent to the substrate.

24. A substrate processing apparatus comprising:

a process chamber in which a substrate is accommodated;

a first precursor gas supply system configured to supply a first precursor gas containing a molecular structure containing a predetermined element into the process chamber;

a second precursor gas supply system configured to supply a second precursor gas, which is different from the first precursor gas and contains a molecular structure containing the predetermined element and a halogen element bonded to an atom of the predetermined element and not containing a bond between atoms of the predetermined element, into the process chamber;

a nitriding agent supply system configured to supply a nitriding agent into the process chamber; and

a controller configured to be capable of controlling the first precursor gas supply system, the second precursor gas supply system, and the nitriding agent supply system to perform a process of forming a nitride film containing the predetermined element on the substrate by performing a cycle a predetermined number of times, the cycle sequentially performing (a), (b), and (c) of Claim 1 in the process chamber.