WHAT IS CLAIMED IS:

1. A method of processing a substrate, comprising:

(a) loading the substrate into a process container at a loading temperature;

(b) setting an interior of the process container to a film formation temperature;

(c) forming a metal film on a surface of the substrate by supplying a process gas into the process container;

(d) setting the interior of the process container to an unloading temperature lower than the loading temperature; and

(e) unloading the substrate from the process container.

2. The method of Claim 1, wherein the process gas includes a metal-containing gas and a reducing gas, and

wherein in (c), a cycle is performed a predetermined number of times, the cycle including:

supplying the metal-containing gas into the process container; and

supplying the reducing gas into the process container.

3. The method of Claim 1, wherein in at least a portion of (b), one of a reducing gas, a high-thermal conductive gas, and a reductive high-thermal conductive gas is supplied into the process container.

4. The method of Claim 3, wherein in at least a portion of (b), a supply amount of one of the reducing gas, the high-thermal conductive gas, and the reductive high-thermal conductive gas into the process container is increased.

5. The method of Claim 2, wherein the reducing gas that is supplied in (c) is a reductive

high-thermal conductive gas, and

wherein the method further comprises (f) supplying a high-thermal conductive gas into the process container before (c).

6. The method of Claim 5, wherein in at least a portion of (f), a supply amount of the high-thermal conductive gas is increased.

7. The method of Claim 1, wherein in at least a portion of (d), the interior of the process container is kept in a vacuum state, and an internal temperature of the process container is changed.

8. The method of Claim 1, wherein in at least a portion of (d), at least one selected from the group of a reducing gas, a high-thermal conductive gas, and a reductive high-thermal conductive gas is supplied into the process container.

9. The method of Claim 1, further comprising: before (d),

(g) setting the interior of the process container to a holding temperature; and

(h) keeping the interior of the process container at the holding temperature.

10. The method of Claim 9, wherein in at least a portion of (g), the interior of the process container is kept in a vacuum state.

11. The method of Claim 9, wherein in at least a portion of (g), at least one selected from the group of a reducing gas, a high-thermal conductive gas, and a reductive high-thermal conductive gas is supplied into the process container.

12. The method of Claim 9, wherein in at least a portion of (h), a reducing gas is supplied

into the process container.

13. The method of any one of Claims 3, 8, 11, and 12, wherein the reducing gas is a hydrogen-containing gas.

14. The method of Claim 13, wherein the hydrogen-containing gas contains a hydrogen gas, and

wherein a mass fraction of the hydrogen gas in the hydrogen-containing gas is 70% or more.

15. The method of Claim 1, wherein the metal film is a film containing molybdenum.

16. The method of Claim 2, wherein the metal-containing gas contains a halogen element.

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

(a) loading a substrate into a process container at a loading temperature;

(b) setting an interior of the process container to a film formation temperature;

(c) forming a metal film on a surface of the substrate by supplying a process gas into the process container;

(d) setting the interior of the process container to an unloading temperature lower than the loading temperature; and

(e) unloading the substrate from the process container.

18. A substrate processing apparatus comprising:

a process container whose interior is controlled to be set to a loading temperature, a film formation temperature, and an unloading temperature lower than the loading temperature

and in which a substrate is processed;

a loading and unloading equipment configured to load the substrate into the process container and unload the substrate from the process container; and

a process gas supply system configured to form a metal film on a surface of the substrate by supplying a process gas into the process container.

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

(a) loading a substrate into a process container at a loading temperature;

(b) setting an interior of the process container to a film formation temperature;

(c) forming a metal film on a surface of the substrate by supplying a process gas into the process container;

(d) setting the interior of the process container to an unloading temperature lower than the loading temperature; and

(e) unloading the substrate from the process container.