## [CLAIMS]

[Claim 1]

A substrate processing method ~~of manufacturing a semiconductor device~~, comprising

forming an oxide film containing a predetermined element on a surface of a substrate, wherein the surface is provided with a pattern formed thereon such that a thickness distribution of the oxide film on the surface of the substrate becomes a predetermined distribution by performing a cycle a predetermined number of times, the cycle comprising:

(a) forming a first layer containing the predetermined element on the surface of the substrate by supplying a source gas containing the predetermined element to the substrate from an outer periphery of the substrate toward the surface of the substrate; and

(b) forming an oxide layer containing the predetermined element on the surface of the substrate by supplying an oxidizing gas to the substrate from the outer periphery of the substrate toward the surface of the substrate to oxidize the first layer,

wherein (a) and (b) are performed non-simultaneously, and a supply time of supplying the oxidizing gas to the substrate in (b) is selected to adjust the ~~such that a~~ thickness distribution of the oxide film ~~becomes a predetermined distribution~~ on the surface of the substrate by selecting the supply time to be a first time if the predetermined distribution is a convex shaped distribution and selecting the supply time to be a second time greater than the first time if the predetermined distribution is a concave shaped distribution.

[Claim 2]

The method of claim 1, wherein the supply time of supplying the oxidizing gas to the substrate in (b) is selected such that the thickness distribution of the oxide film on the surface of the substrate is adjusted from ~~a~~ the convex shaped distribution to ~~a~~ the concave shaped distribution.

[Claim 3]

The method of claim 1, wherein the supply time of supplying the oxidizing gas to the substrate in (b) is selected to be longer than a supply time during which the thickness distribution of the oxide film becomes ~~a~~ the convex shaped distribution on the surface of the substrate.

[Claim 4]

The method of claim 1, wherein the supply time of supplying the oxidizing gas to the substrate in (b) is selected such that the thickness distribution of the oxide film is uniformized on the surface of the substrate.

[Claim 5]

The method of claim 4, wherein the supply time of supplying the oxidizing gas to the substrate in (b) is selected such that a uniformity of a thickness of the oxide film on the surface of the substrate is equal to or less than a predetermined value.

[Claim 6]

The method of claim 1, wherein the supply time of supplying the oxidizing gas to the substrate in (b) is selected to be shorter than a supply time during which the

thickness distribution of the oxide film becomes ~~a~~ the concave shaped distribution on the surface of the wafer.

[Claim 7]

The method of claim 1, wherein the oxidizing gas is supplied in (b) from the outer periphery of the substrate toward a center of the substrate.

[Claim 8]

The method of claim 7, wherein the oxidizing gas is supplied in (b) from a supply port facing the outer periphery of the substrate toward the center of the substrate.

[Claim 9]

The method of claim 7, wherein the oxidizing gas is diffused in (b) from the outer periphery of the substrate toward the center of the substrate.

[Claim 10]

The method of claim 1, wherein a plurality of substrates comprising the substrate are arranged in a multistage manner with a predetermined interval therebetween.

[Claim 11]

The method of claim 10, wherein the supply time of supplying the oxidizing gas to the substrate in (b) is selected based on the predetermined interval such that the thickness distribution of the oxide film becomes the predetermined distribution on the surface of the substrate.

[Claim 12]

The method of claim 10, wherein the supply time of supplying the oxidizing gas to the substrate in (b) is selected to be longer as the predetermined interval becomes narrower.

[Claim 13]

The method of claim 1, wherein the supply time of supplying the oxidizing gas to the substrate in (b) is selected based on a surface area of an upper surface of the substrate such that the thickness distribution of the oxide film becomes the predetermined distribution on the surface of the substrate.

[Claim 14]

The method of claim 13, wherein the supply time of the oxidizing gas is selected to be longer as the surface area of the upper surface of the substrate becomes larger.

[Claim 15]

A substrate processing apparatus, comprising:

~~a process chamber;~~

a source gas supplier configured to supply a source gas containing a predetermined element to a substrate with a pattern formed on a surface thereof ~~in the process chamber~~ from an outer periphery of the substrate toward the surface of the substrate;

an oxidizing gas supplier configured to supply an oxidizing gas to the substrate from the outer periphery of the substrate toward the surface of the substrate; and

a controller configured to be capable of controlling the source gas supplier and the oxidizing gas supplier to form an oxide film containing the predetermined element on the surface of the substrate such that a thickness distribution of the oxide film on the surface of the substrate becomes a predetermined distribution by performing a cycle a predetermined number of times, the cycle comprising:

(a) forming a first layer containing the predetermined element on the surface of the substrate by supplying the source gas to the substrate; and

(b) forming an oxide layer containing the predetermined element on the surface of the substrate by supplying the oxidizing gas to the substrate to oxidize the first layer,

wherein (a) and (b) are performed non-simultaneously, and the controller is further configured to be capable of selecting a supply time of supplying the oxidizing gas to the substrate in (b) to adjust the ~~such that a~~ thickness distribution of the oxide film ~~becomes a predetermined distribution~~ on the surface of the substrate by selecting the supply time to be a first time if the predetermined distribution is a convex shaped distribution and selecting the supply time to be a second time greater than the first time if the predetermined distribution is a concave shaped distribution.

[Claim 16]

A program that causes, by a computer, a substrate processing apparatus to perform:

forming an oxide film containing a predetermined element on a surface of a substrate wherein the surface is provided with a pattern formed thereon such that a thickness distribution of the oxide film on the surface of the substrate becomes a

predetermined distribution by performing a cycle a predetermined number of times, the cycle comprising:

(a) forming a first layer containing the predetermined element on the surface of the substrate in a process chamber of the substrate processing apparatus by supplying a source gas containing the predetermined element to the substrate from an outer periphery of the substrate toward the surface of the substrate; and

(b) forming an oxide layer containing the predetermined element on the surface of the substrate by supplying an oxidizing gas to the substrate from the outer periphery of the substrate toward the surface of the substrate to oxidize the first layer,

wherein (a) and (b) are performed non-simultaneously, and a supply time of supplying the oxidizing gas to the substrate is selected in (b) ~~such that a~~to adjust the thickness distribution of the oxide film ~~becomes a predetermined distribution~~ on the surface of the substrate by selecting the supply time to be a first time if the predetermined distribution is a convex shaped distribution and selecting the supply time to be a second time greater than the first time if the predetermined distribution is a concave shaped distribution.

[Claim 17]

A method of manufacturing a semiconductor device, comprising:

forming an oxide film containing a predetermined element on a surface of a substrate wherein the surface is provided with a pattern formed thereon such that a thickness distribution of the oxide film on the surface of the substrate becomes a predetermined distribution by performing a cycle a predetermined number of times, the cycle comprising:

(a) forming a first layer containing the predetermined element on the surface of the substrate by supplying a source gas containing the predetermined element to the substrate from an outer periphery of the substrate toward the surface of the substrate; and

(b) forming an oxide layer containing the predetermined element on the surface of the substrate by supplying an oxidizing gas to the substrate from the outer periphery of the substrate toward the surface of the substrate to oxidize the first layer,

wherein (a) and (b) are performed non-simultaneously, and a supply time of supplying the oxidizing gas to the substrate in (b) is selected to adjust the thickness distribution of the oxide film on the surface of the substrate by selecting the supply time to be a first time if the predetermined distribution is a convex shaped distribution and selecting the supply time to be a second time greater than the first time if the predetermined distribution is a concave shaped distribution.