[CLAIMS]

[Claim 1]

A vaporizing system comprising:

a vaporization chamber provided with a first end and a second end;

a first fluid supplier connected to the vaporization chamber at the second end and configured to supply toward the first end a mixed fluid containing a first carrier gas and a liquid source mixed with each other; and

a second fluid supplier connected to the vaporization chamber at the first end and configured to supply a second carrier gas such that the second carrier gas flows along an inner wall of the vaporization chamber when being supplied through the first end, wherein the second fluid supplier comprises an outlet hole and a plurality of introduction holes connected to the outlet hole at different locations of an inner wall of the second fluid supplier around the outlet hole along directions passing each other so as to generate a spiral-shaped flow of the second carrier gas.

[Claim 2]

The vaporizing system of claim 1, wherein the second fluid supplier is configured such that the second carrier gas flows in a spiral shape in the vaporization chamber.

[Claim 3]

The vaporizing system of claim 1, wherein the first end is provided at a lower portion of the vaporization chamber, and

the second carrier gas supplied by the second fluid supplier is configured to flow upward while being rotated in the vaporization chamber.

[Claim 4]

The vaporizing system of claim 1, wherein the second carrier gas comprises a heated inert gas.

[Claim 5]

The vaporizing system of claim 1, wherein a side wall of the vaporization chamber is provided with a discharge hole through which a vaporized gas obtained by vaporizing the mixed fluid by the second carrier gas is discharged from the vaporization chamber.

[Claim 6]

The vaporizing system of claim 1, wherein a side wall of the vaporization chamber is provided with a plurality of discharge holes evenly arranged in a circumferential direction thereof, wherein a vaporized gas obtained by vaporizing the mixed fluid by the second carrier gas is discharged from the vaporization chamber through the plurality of discharge holes.

[Claim 7]

The vaporizing system of claim 1, wherein a surface of the inner wall of the vaporization chamber is surface treated so as to suppress an adhesion of the liquid source.

[Claim 8]

The vaporizing system of claim 7, wherein the surface treated surface of the inner wall of the vaporization chamber is precision polished.

[Claim 9]

The vaporizing system of claim 7, wherein the surface treated surface of the inner wall of the vaporization chamber is coated.

[Claim 10]

The vaporizing system of claim 5, wherein the inner wall of the vaporization chamber located closer to the second fluid supplier than the discharge hole is surface treated so as to suppress an adhesion of the liquid source.

[Claim 11]

The vaporizing system of claim 1, wherein the second fluid supplier comprises:

a structure into which the second carrier gas is introduced,

wherein the outlet hole is provided in the structure such that the second carrier gas flows into the outlet hole via the plurality of introduction holes provided in the structure.

[Claim 12]

The vaporizing system of claim 11, wherein each of the plurality of introduction holes is provided along a tangential direction of the inner wall of the second fluid supplier around the outlet hole in the structure.

[Claim 13]

The vaporizing system of claim 11, wherein the plurality of introduction holes is configured so as not to obstruct a flow of the second carrier gas supplied to the outlet hole.

[Claim 14]

The vaporizing system of claim 1, wherein a speed at which the first carrier gas is introduced into the vaporization chamber is greater than a speed at which the liquid source is introduced into the vaporization chamber.

[Claim 15]

The vaporizing system of claim 1, wherein the first fluid supplier comprises:

a carrier gas chamber of a predetermined volume; and

a spray nozzle arranged so as to vertically penetrate the carrier gas chamber, and

wherein a carrier gas supply hole through which the first carrier gas is introduced is provided in the carrier gas chamber.

[Claim 16]

The vaporizing system of claim 15, wherein an ejection port provided parallel to a front end of the spray nozzle and through which the carrier gas chamber communicates with the vaporization chamber is provided at a lower surface of the carrier gas chamber.

[Claim 17]

The vaporizing system of claim 16, wherein the ejection port is provided around the front end of the spray nozzle.

[Claim 18]

The vaporizing system of claim 17, wherein an inner diameter of the ejection port is smaller than an inner diameter of the carrier gas supply hole.

[Claim 19]

A substrate processing apparatus at least comprising:

a process chamber in which a substrate is processed;

a vaporizer configured to generate a vaporized gas by vaporizing a liquid source; and

a source gas supplier configured to supply the vaporized gas as a source gas into the process chamber,

wherein the vaporizer comprises:

a vaporization chamber provided with a first end and a second end;

a first fluid supplier connected to the vaporization chamber at the second end and configured to supply toward the first end a mixed fluid containing a first carrier gas and a liquid source mixed with each other; and

a second fluid supplier connected to the vaporization chamber at the first end and configured to supply a second carrier gas such that the second carrier gas flows along an inner wall of the vaporization chamber when being supplied through the first end, wherein the second fluid supplier comprises an outlet hole and a plurality of introduction holes connected to the outlet hole at different locations of an inner wall of the second fluid supplier around the outlet

hole along directions passing each other so as to generate a spiral-shaped flow of the second carrier gas.

[Claim 20]

A method of manufacturing a semiconductor device, comprising:

(a) supplying a source gas into a process chamber in which a substrate is accommodated;

(b) removing the source gas from the process chamber;

(c) supplying a reactive gas into the process chamber in which the source gas is removed; and

(d) removing the reactive gas from the process chamber,

wherein a vaporized gas obtained by vaporizing a liquid source by a vaporizer is supplied as the source gas in (a), and

wherein the vaporizer comprises:

a vaporization chamber provided with a first end and a second end;

a first fluid supplier connected to the vaporization chamber at the second end and configured to supply toward the first end a mixed fluid containing a first carrier gas and a liquid source mixed with each other; and

a second fluid supplier connected to the vaporization chamber at the first end and configured to supply a second carrier gas such that the second carrier gas flows along an inner wall of the vaporization chamber when being supplied through the first end, wherein the second fluid supplier comprises an outlet hole and a plurality of introduction holes connected to the outlet hole at different locations of an inner wall of the second fluid supplier around the outlet hole along directions passing each other so as to generate a spiral-shaped flow of the second carrier gas.