CLAIMS

WHAT IS CLAIMED IS:

1. A gas inlet assembly of a process chamber in a semiconductor process apparatus, configured to transport a process gas to a gas inlet pipeline communicating with the process chamber, comprising:

a plurality of mixing chambers arranged sequentially along a gas inlet direction, any two neighboring mixing chambers communicating with each other;

a gas inlet connector communicating with a most upstream mixing chamber in the gas inlet direction;

wherein:

a most downstream mixing chamber in the gas inlet direction communicates with the gas inlet pipeline; and

a gas outlet direction of the gas inlet assembly is same as the gas inlet direction;

the gas inlet assembly further comprises a gas inlet member, one or more mixing members, and a jet plate connected sequentially along the gas inlet direction, wherein:

grooves with openings facing the gas inlet direction are formed at the gas inlet member and the one or more mixing members;

the gas inlet connector is arranged at the gas inlet member;

the groove of the gas inlet member cooperates with a most upstream mixing member in the gas inlet direction to form the mixing chamber;

in any two neighboring mixing members, a groove of an upstream mixing member cooperates with a downstream mixing member to form a mixing chamber; and

the jet plate is arranged at an opening of the groove of the most downstream mixing member in the gas inlet direction and cooperates with the groove of the most downstream mixing member in the gas inlet direction to form a mixing chamber;

a gas inlet hole is arranged at a bottom of the groove of the gas inlet member;

the gas inlet connector communicates with the gas inlet hole;

a gas uniform hole is arranged at a bottom of the groove of the one or more mixing members;

any two neighboring mixing chambers communicate with each other through the gas uniform hole;

a jet hole is arranged at the jet plate; and

the most downstream mixing chamber in the gas inlet direction communicates with the gas inlet pipeline through the jet hole;

at least one isolation member is arranged in the groove and configured to divide the groove into a plurality of sub-grooves in a direction perpendicular to the gas inlet direction;

a plurality of gas inlet holes are provided and are divided into a plurality of gas inlet hole groups;

a number of the gas inlet hole groups is same as a number of the sub-grooves, and the gas inlet hole groups is in a one-to-one correspondence with the sub-grooves;

a plurality of gas uniform holes are provided and divided into a plurality of gas uniform hole groups;

a number of the gas uniform hole groups is same as the number of the sub-grooves, and the gas uniform hole groups is in a one-to-one correspondence with the sub-grooves;

a plurality of jet holes are provided and divided into a plurality of jet hole groups;

a number of the jet hole groups is same as the number of the sub-grooves, and the jet hole groups is in a one-to-one correspondence with the sub-grooves;

a gas outlet direction of the jet hole is the gas outlet direction;

each gas uniform hole group includes a plurality of gas uniform holes;

the plurality of gas uniform holes in the same gas uniform hole group are arranged in a rectangular array;

diameters of the plurality of gas uniform holes gradually increase from a center of the sub-groove to edges on two sides in a direction where a longer side of the rectangular array is located.

2. The gas inlet assembly according to claim 1, wherein from upstream to downstream along the gas inlet direction, a number of rows of gas uniform holes in different gas uniform hole groups gradually increases, and a number of gas uniform holes in a same row in different gas uniform hole groups gradually increases.

3. The gas inlet assembly according to claim 2, wherein in the gas inlet direction, gas uniform holes in any two neighboring gas uniform hole groups are staggered.

4. The gas inlet assembly according to claim 1, wherein:

each jet hole group includes a plurality of jet holes;

the plurality of jet holes are arranged in an array;

diameters of the plurality of jet holes are same and smaller than diameters of the gas uniform holes;

a number of rows of the plurality of jet holes of the jet hole group is greater than a number of rows of the plurality of gas uniform holes of the corresponding gas uniform hole group; and

a number of jet holes of any row of the jet hole group is greater than the number of the gas uniform holes in a same row of the corresponding gas uniform hole group.

5. A gas inlet device, comprising the gas inlet assembly, the gas inlet pipeline, and the transition assembly according to any one of claims 1 to 4, wherein the gas inlet assembly and the transition assembly are arranged at two ends of the gas inlet pipeline, respectively, and the gas inlet pipeline communicates with the process chamber through the transition assembly.

6. The gas inlet device according to claim 5, wherein the gas inlet pipeline includes a gradually expanding pipe segment and a straight pipe segment arranged sequentially along the gas inlet direction, and a cross-sectional size of the gradually expanding pipe segment gradually increases along the gas inlet direction.

7. The gas inlet device according to claim 5, wherein:

a division plate is arranged in the gas inlet pipeline and configured to divide the gas inlet pipeline into a plurality of gas flow channels along a direction perpendicular to the gas inlet direction;

the division plate includes a uniform thickness portion and a gradually thinning portion arranged sequentially along the gas inlet direction; and

a thickness of the gradually thinning portion gradually decreases along the gas inlet direction.

8. The gas inlet device according to claim 5, wherein:

the transition assembly includes a plurality of transition members inserted sequentially along the gas inlet direction;

a most upstream transition member in the gas inlet direction is inserted into the gas inlet pipeline; and

a most downstream transition member in the gas inlet direction communicates with the process chamber.

9. The gas inlet device according to claim 8, wherein:

the gas inlet pipeline is made of quartz; and

the transition member is made of graphite.

10. A semiconductor processing apparatus, comprising a process chamber and the gas inlet device of the process chamber according to any one of claims 5 to 9.