CLAIMS

WHAT IS CLAIMED IS:

1. An epitaxial device, comprising:

a chamber;

a submount disposed in the chamber to carry a to-be-processed workpiece;

a gas intake structure disposed at a sidewall of the chamber to provide a process gas to a to-be-processed surface of the to-be-processed workpiece, the gas intake structure including:

a plurality of first gas intake passages configured to provide a first process gas containing a gas for an epitaxial reaction to the entire to-be-processed surface along a first direction, the first direction being parallel to the to-be-processed surface; and

two second gas intake passages that are arranged at intervals along a second direction and are symmetrical with respect to each other, and correspond to two adjustment areas adjacent to edges on both sides of the to-be-processed surface respectively, wherein at least one first gas intake passage is disposed between the two second gas intake passages, each second gas intake passage provides a second process gas to the corresponding adjustment area along the first direction, the second process gas is configured to adjust a concentration of the gas for the epitaxial reaction flowing through the adjustment areas, and the second direction is perpendicular to the first direction and parallel to the to-be-processed surface; and

an exhaust structure arranged at a sidewall of the chamber opposite to the gas intake structure.

2. The epitaxial device according to claim 1, wherein:

the second process gas contains the gas for the epitaxial reaction; and

a content of the gas for the epitaxial reaction in the second process gas is lower than a content of the gas for the epitaxial reaction in the first process gas.

3. The epitaxial device according to claim 1, wherein:

a ratio of a radius of the to-be-processed surface over a width of each of the two adjustment areas in the second direction is greater than or equal to about 15.

4. The epitaxial device according to claim 1, wherein:

a flow rate of the first process gas flowing out of the plurality of first gas intake passages is a same as a flow rate of the second process gas flowing out of the two second gas intake passages.

5. The epitaxial device according to claim 1, wherein:

the plurality of first gas intake passages is evenly arranged along the second direction.

6. The epitaxial device according to claim 1, wherein:

a total distribution distance of the plurality of first gas intake passages in the second direction is greater than or equal to a diameter of the to-be-processed surface.

7. The epitaxial device according to claim 1, wherein:

each second gas intake passage includes a plurality of auxiliary gas intake pipelines;

the plurality of auxiliary gas intake pipelines is arranged to form a shape corresponding to a radial cross-sectional shape of an equilateral polygon; and

a lowest point of the equilateral polygon and a lowest point of a radial cross-section of the plurality of first gas intake passages are in a same plane.

8. The epitaxial device according to claim 1, wherein:

a ratio of a total distribution distance of the two second gas intake passages in the second direction over a diameter of the to-be-processed surface ranges between 0.8 and 1.4.

9. The epitaxial device according to claim 1, wherein:

each first gas intake passage is spaced apart from an adjacent first gas intake passage by a distance approximately between 5 mm and 30 mm.

10. The epitaxial device according to claim 1, wherein:

a diameter of each first gas intake passage is greater than a diameter of each second gas intake passage; and

a ratio of the diameter of each first gas intake passage over the diameter of each second gas intake passage ranges between 60 and 6.

11. The epitaxial device according to claim 1, wherein:

the first process gas includes a carrier gas, the gas for the epitaxial reaction, and a dopant gas;

the carrier gas includes at least one of nitrogen or hydrogen;

the gas for the epitaxial reaction includes at least one of silane, silicon dichlorodihydrogen, silicon trichlorohydrogen, or silicon tetrachloride; and

the dopant gas includes at least one of phosphine, diborane, or arsine.

12. The epitaxial device according to claim 1, wherein:

the second process gas includes at least one of a carrier gas, the gas for the epitaxial reaction, or a dopant gas;

the carrier gas includes at least one of nitrogen or hydrogen;

the gas for the epitaxial reaction includes at least one of silane, silicon dichlorodihydrogen, silicon trichlorohydrogen, or silicon tetrachloride; and

the dopant gas includes at least one of phosphine, diborane, or arsine.

13. A gas intake structure for an epitaxial device, comprising:

a plurality of first gas intake passages configured to provide a first process gas containing a gas for an epitaxial reaction to a to-be-processed surface of a to-be-processed workpiece along a first direction, the first direction being parallel to the to-be-processed surface; and

two second gas intake passages that are arranged at intervals along a second direction and are symmetrical with respect to each other, and correspond to two adjustment areas adjacent to edges on both sides of the to-be-processed surface respectively, wherein at least one first gas intake passage is disposed between the two second gas intake passages, each second gas intake passage provides a second process gas to the corresponding adjustment area along the first direction, the second process gas is configured to adjust a concentration of the gas for the epitaxial reaction flowing through the adjustment areas, and the second direction is perpendicular to the first direction and parallel to the to-be-processed surface.

14. The gas intake structure according to claim 13, wherein:

the second process gas contains the gas for the epitaxial reaction; and

a content of the gas for the epitaxial reaction in the second process gas is lower than a content of the gas for the epitaxial reaction in the first process gas.

15. The gas intake structure according to claim 13, wherein:

a flow rate of the first process gas flowing out of the plurality of first gas intake passages is a same as a flow rate of the second process gas flowing out of the two second gas intake passages.

16. The gas intake structure according to claim 13, wherein:

each second gas intake passage includes a plurality of auxiliary gas intake pipelines;

the plurality of auxiliary gas intake pipelines is arranged to form a shape corresponding to a radial cross-sectional shape of an equilateral polygon; and

a lowest point of the equilateral polygon and a lowest point of a radial cross-section of the plurality of first gas intake passages are in a same plane.

17. The gas intake structure according to claim 16, wherein:

each second gas intake passage includes three auxiliary gas intake pipelines; and

the three auxiliary gas intake pipelines are arranged to form a shape corresponding to a radial cross-sectional shape of an equilateral triangle.

18. The gas intake structure according to claim 13, wherein:

a diameter of each first gas intake passage is greater than a diameter of each second gas intake passage; and

a ratio of the diameter of each first gas intake passage over the diameter of each second gas intake passage ranges between 60 and 6.