Claims

1. A substrate processing apparatus (100, 300), comprising:

a vertical flow reaction chamber (130);

a flow guiding part (110, 310) and a substrate support (120, 220) at a horizontally central area of the reaction chamber (130),

the substrate support (120, 220) residing underneath the flow guiding part (110, 310), and

the flow guiding part (110, 310) forcing the vertical flow (115, 315) from above the flow guiding part (110, 310) to go round the flow guiding part (110) on its downward way towards the substrate support (120), wherein the flow guiding part (110, 310) comprises openings to eject gas from inside of the flow guiding part (110, 310) to the reaction chamber (130).

2. The apparatus of claim 1, wherein the apparatus (100) provides for a curved flow path (115) within the reaction chamber (130) with at least one turn.

3. The apparatus of claim 1 or 2, wherein the apparatus (100) provides for a curved flow path within the reaction chamber with a plurality of turns where in each turn the flow path widens.

4. The apparatus of any preceding claim, comprising at least one further flow guiding part (111, 112) at a side area of the reaction chamber (130).

5. The apparatus of claim 4, comprising a plurality of process chemical inlets (125) above the level of an uppermost flow guiding part.

6. The apparatus of any preceding claim, comprising a reaction chamber lid (145, 345) with the flow guiding part (110, 310) hanging from the reaction chamber lid (145, 345).

7. The apparatus of claim 6, comprising a downwardly extending protrusion (351) in a central area of the lid (345).

8. The apparatus of any preceding claim, wherein the flow guiding part (110, 310) is a plate-like part or has a cone-shaped form.

9. The apparatus of any preceding claim, comprising a reaction chamber lid (145, 345) with openings to eject gas into the reaction chamber (130).

10. The apparatus of claim 9, comprising a horizontally centered upside-down oriented cone (351) in the lid (345) with said openings.

11. The apparatus of any preceding claim, comprising a flow channel from a reaction chamber lid (345) to the flow guiding part (310) providing a fluid connection from inside of the lid (345) to the inside of the flow guiding part (310).

12. The apparatus of any preceding claim, wherein the reaction chamber is provided with an upper ring (111) above the flow guiding part (110, 310), the upper ring (111) serving as a further flow guiding part.

13. The apparatus of any preceding claim, wherein the reaction chamber is provided with a lower ring (112) below the flow guiding part (110, 310), the lower ring (112) serving as a further flow guiding part.

14. The apparatus of claim 12 and 13, wherein the flow guiding parts (110, 310, 111, 112) force the curved flow path to travel in between the upper ring (111) and the flow guiding part (110, 310), and in between the flow guiding part (110, 310) and the lower ring (112).

15. The apparatus of any preceding claim, wherein the flow guiding part (110, 310) is a part with rotational symmetry.

16. The apparatus of any preceding claim, wherein a rotation symmetry axis of the flow guiding part (110, 310) is aligned with a rotation axis of the reaction

chamber (130).

17. A method for operating a substrate processing apparatus (100, 300), comprising:

providing a vertical flow reaction chamber (130) having a flow guiding part (110, 310) and a substrate support (120, 220) at a horizontally central area of the reaction chamber (130), the substrate support (120, 220) residing underneath the flow guiding part (110, 310), and

the flow guiding part (110, 310) forcing the vertical flow (115, 315) from above the flow guiding part (110, 310) to go round the flow guiding part (110) on its downward way towards the substrate support (120), wherein the flow guiding part (110, 310) comprises openings to eject gas from inside of the flow guiding part (110, 310) to the reaction chamber (130).

18. The method of claim 17, comprising:

providing a curved flow path (115) within the reaction chamber (130) with at least one turn.

19. The method of claim 17 or 18, comprising:

providing a curved flow path within the reaction chamber with a plurality of turns where in each turn the flow path widens.