

CLAIMS

1. An immersion exposure apparatus that exposes a substrate with an exposure beam via an optical member, comprising:
 - a substrate stage that has a table on which the substrate is mounted; and
 - a member that is different from the table and is provided at the substrate stage, wherein each of the table and the member maintains immersion liquid below the optical member by being located opposed to the optical member, and wherein, when the table is located opposed to the optical member, the table and the member are moved by the substrate stage relative to the optical member in a state in which a surface of the table and a surface of the member are arranged in juxtaposition with each other so that the immersion liquid below the optical member is moved from the table to the member.
2. An immersion exposure apparatus that exposes a substrate with an exposure beam via an optical member, comprising:
 - a substrate stage that has a table on which the substrate is mounted; and
 - a member that is different from the table and is provided at the substrate stage, wherein the table and the member are moved with respect to the optical member by the substrate stage so as to transit from a first state to a second state, the first state in which immersion liquid is maintained between the optical member and the table, the second state in which immersion liquid is maintained between the optical member and the member.
3. The immersion exposure apparatus according to claim 2, wherein the table and the member are moved with respect to the optical member while being arranged closed to each other.
4. The immersion exposure apparatus according to claim 2, wherein the table and the member are moved with respect to the optical member in a state in which a surface of the member is arranged in juxtaposition with a surface of the table, which is located opposed to the optical member.
5. The immersion exposure apparatus according to any one of claims 1 to 4, wherein, in a movement of the table and the member with respect to the optical member, immersion liquid is substantially maintained below the optical member, or a contact between the optical member and the immersion liquid is substantially maintained.
6. The immersion exposure apparatus according to any one of claims 1 to 5, wherein the table and the member are provided at the substrate stage such that a relative movement between the table and the member can be executed.
7. The immersion exposure apparatus according to claim 5, wherein the member maintains immersion liquid below the optical member in place of the table so that the table is away from a position below the optical member.
8. The immersion exposure apparatus according to claim 5,

wherein the table and the member are moved with respect to the optical member until the member maintains immersion liquid below the optical member in place of the table.

9. The immersion exposure apparatus according to claim 5,
wherein the table and the member are moved with respect to the optical member so that a boundary of the table and the member passes through a position below the immersion liquid.

10. The immersion exposure apparatus according to claim 9,
wherein the table and the member are moved with respect to the optical member while being arranged in closed state or arranged with a gap therebetween.

11. The immersion exposure apparatus according to claim 5,
wherein the table and the member are moved with respect to the optical member while being arranged in closed state so that immersion liquid is substantially maintained below the optical member.

12. The immersion exposure apparatus according to claim 5,
wherein the table and the member are moved with respect to the optical member while being arranged with a gap therebetween.

13. The immersion exposure apparatus according to claim 12,
wherein the table and the member are moved with respect to the optical member so that the gap passes through a position below the immersion liquid.

14. The immersion exposure apparatus according to claim 5,
wherein the table and the member are moved with respect to the optical member so that edges facing each other of the table and the member pass through a position below the optical member.

15. The immersion exposure apparatus according to claim 5,
wherein the table and the member are substantially simultaneously moved with respect to the optical member.

16. The immersion exposure apparatus according to claim 5,
wherein, during the movement with respect to the optical member, the table and the member form a substantially continuous surface.

17. The immersion exposure apparatus according to any one of claims 1 to 16,
wherein the substrate stage comprises two tables, on each of which substrate is mounted, and including the table, that are alternatively located opposed to the optical member,
wherein the member maintains immersion liquid below the optical member in place of one of the two tables,
and wherein another one of the two tables maintains immersion liquid below the optical member in place of the member.

18. The immersion exposure apparatus according to any one of claims 1 to 17,

wherein a different process than the exposure process for the substrate is executed while the table is away from a position below the optical member and while immersion liquid is maintained below the optical member by use of the member.

19. The immersion exposure apparatus according to claim 18,
wherein the different process comprises a loading process and/or an unloading process for the substrate.

20. The immersion exposure apparatus according to claim 19,
wherein the different process comprises an alignment process for the substrate.

21. The immersion exposure apparatus according to any one of claims 1 to 20, further comprising:
an alignment system that executes an alignment for the substrate,
wherein an alignment for the substrate mounted on the table is executed by the alignment system while the member is located opposed to the optical member.

22. The immersion exposure apparatus according to any one of claims 1 to 21, further comprising:
a replacement system that replaces substrate mounted on the table,
wherein a replacement for substrate mounted on the table is executed by the replacement system while the member is located opposed to the optical member.

23. The immersion exposure apparatus according to claim 22,
wherein substrate mounted on the table is exposed via the optical member and the immersion liquid while the table is located opposed to the optical member,
and wherein a replacement for the exposed substrate mounted on the table is executed by the replacement system while the member is located opposed to the optical member.

24. A device fabricating method comprising:
exposing a workpiece by use of the immersion exposure apparatus of any one of claims 1 to 23; and
developing the exposed workpiece.

25. An immersion exposure method of exposing a substrate with an exposure beam via an optical member, the method comprising:
by use of a substrate stage that has a table on which the substrate is mounted, locating the substrate mounted on the table to be opposed to the optical member;
exposing the substrate mounted on the table with the exposure beam via the optical member and via immersion liquid; and
moving the table and a member, which is different from the table and is provided at the substrate stage, with respect to the optical member by use of the substrate stage in a state in which a surface of the member is in juxtaposition with a surface of the table, which is located opposed to the optical member,
wherein, by the movement, immersion liquid is transferred from the table to the member below the optical member.

26. An immersion exposure method of exposing a substrate with an exposure beam via an optical member, the method comprising:
by use of a substrate stage that has a table on which the substrate is mounted, locating the substrate mounted on the table to be opposed to the optical member;
exposing the substrate mounted on the table with the exposure beam via the optical member and via immersion liquid; and
moving the table and a member, which is different from the table and is provided at the substrate stage, with respect to the optical member by use of the substrate stage so as to transfer from a first state to a second state, the first state in which immersion liquid is maintained between the optical member and the table, the second state in which immersion liquid is maintained between the optical member and the member.
27. The immersion exposure method according to claim 26,
wherein the table and the member are moved with respect to the optical member while being arranged closed to each other.
28. The immersion exposure method according to claim 26,
wherein the table and the member are moved with respect to the optical member in a state in which a surface of the member is arranged in juxtaposition with a surface of the table, which is located opposed to the optical member.
29. The immersion exposure method according to any one of claims 25 to 28,
wherein, in a movement of the table and the member with respect to the optical member, immersion liquid is substantially maintained below the optical member, or a contact between the optical member and the immersion liquid is substantially maintained.
30. The immersion exposure method according to any one of claims 25 to 29,
wherein the table and the member are provided at the substrate stage such that a relative movement between the table and the member can be executed.
31. The immersion exposure method according to claim 29,
wherein the member maintains immersion liquid below the optical member in place of the table so that the table is away from a position below the optical member.
32. The immersion exposure method according to claim 29,
wherein the table and the member are moved with respect to the optical member until the member maintains immersion liquid below the optical member in place of the table.
33. The immersion exposure method according to claim 29,
wherein the table and the member are moved with respect to the optical member so that a boundary of the table and the member passes through a position below the immersion liquid.
34. The immersion exposure method according to claim 33,
wherein the table and the member are moved with respect to the optical member while being arranged in closed state or arranged with a gap therebetween.
35. The immersion exposure method according to claim 29,

wherein the table and the member are moved with respect to the optical member while being arranged in closed state so that immersion liquid is substantially maintained below the optical member.

36. The immersion exposure method according to claim 29,
wherein the table and the member are moved with respect to the optical member while being arranged with a gap therebetween.

37. The immersion exposure method according to claim 36,
wherein the table and the member are moved with respect to the optical member so that the gap passes through a position below the immersion liquid.

38. The immersion exposure method according to claim 29,
wherein the table and the member are moved with respect to the optical member so that edges facing each other of the table and the member pass through a position below the optical member.

39. The immersion exposure method according to claim 29,
wherein the table and the member are substantially simultaneously moved with respect to the optical member.

40. The immersion exposure method according to claim 29,
wherein, during the movement with respect to the optical member, the table and the member form a substantially continuous surface.

41. The immersion exposure method according to any one of claims 25 to 40,
wherein the substrate stage comprises two tables, on each of which substrate is mounted, and including the table, that are alternatively located opposed to the optical member,
wherein the member maintains immersion liquid below the optical member in place of one of the two tables,
and wherein another one of the two tables maintains immersion liquid below the optical member in place of the member.

42. The immersion exposure method according to any one of claims 25 to 41,
wherein a different process than the exposure process for the substrate is executed while the table is away from a position below the optical member and while immersion liquid is maintained below the optical member by use of the member.

43. The immersion exposure method according to claim 42,
wherein the different process comprises a loading process and/or an unloading process for the substrate.

44. The immersion exposure method according to claim 43,
wherein the different process comprises an alignment process for the substrate.

45. The immersion exposure method according to any one of claims 25 to 44,
wherein an alignment for the substrate mounted on the table is executed by an alignment system while the member is located opposed to the optical member.

46. The immersion exposure method according to any one of claims 25 to 45,
wherein a replacement for substrate mounted on the table is executed by a
replacement system while the member is located opposed to the optical member.
47. The immersion exposure method according to claim 46,
wherein substrate mounted on the table is exposed via the optical member and the
immersion liquid while the table is located opposed to the optical member,
and wherein a replacement for the exposed substrate mounted on the table is executed
by the replacement system while the member is located opposed to the optical member.
48. A device fabricating method comprising:
exposing a workpiece by use of the immersion exposure method of any one of claims 25 to
47; and
developing the exposed workpiece.

CLAIMS

1. An immersion exposure apparatus for exposing a substrate with an exposure beam via an optical element and immersion liquid, the apparatus comprising:

a substrate stage comprising:

a table for mounting the substrate, the table being configured to maintain the immersion liquid below the optical element when located opposed to the optical element; and

a member that is configured to maintain the immersion liquid below the optical element when located opposed to the optical element,

wherein the substrate stage is configured such that, when the table is located opposed to the optical element, the table and the member are movable relative to the optical element in a state in which a surface of the table and a surface of the member are arranged adjacent to each other so that the immersion liquid below the optical element is thereby transferred from the table to the member.

2. The immersion exposure apparatus according to claim 1, wherein the table and the member are movable for a transition from a first state to a second state, the first state being a state in which the immersion liquid is maintained in a space between the optical element and the table, the second state being a state in which the immersion liquid is maintained in a space between the optical element and the member, such that the immersion liquid is maintained below the optical element during the transition.

3. The immersion exposure apparatus according to claim 2, wherein the table and the member are arranged to move in unison in the transition.

4. The immersion exposure apparatus according to claim 2, wherein the apparatus is configured such that prior to the transition, the surface of the table and the surface of the member are coplanar.

5. The immersion exposure apparatus according to claim 1, wherein the apparatus is configured such that the adjacent surfaces of the table and of the member form a substantially continuous surface in the movement.

6. The immersion exposure apparatus according to claim 1, wherein the apparatus is configured such that the member remains below the optical element while an operation is performed on the substrate mounted on the table.

7. The immersion exposure apparatus according to claim 6, wherein the operation includes at least one of a substrate exchange operation, an alignment operation, and a measurement operation.

8. The immersion exposure apparatus according to claim 1, wherein the apparatus is configured such that after the exposure of the substrate mounted on the table, the table and the member are moved relative to the optical element.

9. The immersion exposure apparatus according to claim 1, wherein the apparatus is configured such that the member is positioned away from below the optical element during the exposure of the substrate mounted on the table.

10. The immersion exposure apparatus according to claim 1, wherein the apparatus is configured to move the table and the member so that the immersion liquid is maintained below the optical element by one or both of the table and the member.

11. The immersion exposure apparatus according to claim 1, wherein the apparatus is configured such that the table and the member are moved relative to the optical element until the member is below the optical element.

12. A device manufacturing method including a lithography process, wherein in the lithography process, a device pattern is transferred onto a substrate using the immersion exposure apparatus according to claim 1.

13. An immersion exposure method of exposing a substrate with an exposure beam via an optical element and immersion liquid, the method comprising:

moving a table, on which the substrate is mounted, with a substrate stage to locate the substrate to be opposed to the optical element;

exposing the substrate with the exposure beam via the optical element and via the immersion liquid; and

moving the table and a member, which is provided at the substrate stage, with respect to the optical element in a state in which a surface of the table and a surface of the member are arranged adjacent to each other so that the immersion liquid below the optical element is transferred from the table to the member.

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14. The immersion exposure method according to claim 13, wherein the table and the member are arranged to move for a transition from a first state to a second state, the first state being a state in which the immersion liquid is maintained in a space between the optical element and the table, the second state being a state in which the immersion liquid is maintained in a space between the optical element and the member, such that the immersion liquid is maintained below the optical element during the transition.

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15. The immersion exposure method according to claim 14, wherein the table and the member are arranged to move in unison in the transition.

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16. The immersion exposure method according to claim 14, wherein prior to the transition, the surface of the table and the surface of the member are coplanar.

17. The immersion exposure method according to claim 13, wherein the adjacent surfaces of the table and of the member form a substantially continuous surface in the movement.

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18. The immersion exposure method according to claim 13, wherein the member remains below the optical element while an operation is performed on the substrate mounted on the table.

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19. The immersion exposure method according to claim 18, wherein the operation includes at least one of a substrate exchange operation, an alignment operation, and a measurement operation.

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20. The immersion exposure method according to claim 13, wherein after the exposure of the substrate mounted on the table, the table and the member are moved relative to the optical element.

21. The immersion exposure method according to claim 13, wherein the member is positioned away from below the optical element during the exposure of the substrate mounted on the table.

5 22. The immersion exposure method according to claim 13, wherein the table and the member are moved so that the immersion liquid is maintained below the optical element by one or both of the table and the member.

10 23. The immersion exposure method according to claim 13, wherein the table and the member are moved relative to the optical element until the member is below the optical element.

15 24. A device manufacturing method including a lithography process, wherein in the lithography process, a device pattern is transferred onto a substrate using the immersion exposure method according to claim 13.