CLAIMS

1. An apparatus for imprint lithography comprising:

    a fluid dispense system having fluid dispense ports;

    a stage, wherein the stage, the fluid dispense ports, or a combination of the stage and fluid dispense ports is adapted to move a substrate and the fluid dispense ports relative to each other; and

    a logic element configured to:

        transmit information to dispense a formable material onto a surface of the substrate by the fluid dispense system having fluid dispense ports during a first pass to form a first fluid droplet pattern for a first part of an imprint field of the substrate, wherein the substrate and the fluid dispense ports move relative to each other along a translating axis;

        transmit information to offset the substrate and the fluid dispense ports relative to each other ; and

        transmit information to dispense the formable material onto the substrate by the fluid dispense system during a second pass to form a second fluid droplet pattern for a second part of the imprint field,

        wherein the first fluid droplet pattern provides for dispensing fluid droplets of the formable material lying along a plurality of lines, wherein lines of the plurality of lines are spaced apart from one another at a pitch, and

        wherein offsetting is along a plane parallel to the surface of the substrate in a direction of the pitch for an offset distance that is a non-integer multiple of the pitch.

2. The apparatus of claim 1, wherein the information to offset the substrate and the fluid dispense ports relative to each other does not include information to offset the substrate and the fluid dispense ports in the translating axis.

3. The apparatus of claim 1, wherein the information to offset the substrate and the fluid dispense ports relative to each other further comprises information to offset the substrate and the fluid dispense ports relative to each other in the translating axis.

4. The apparatus of claim 3, wherein:

the fluid dispense system is further configured to dispense fluid droplets of the formable material at a preset frequency to achieve spaced-apart droplets on the substrate at a preset minimum pitch as the substrate and the fluid dispense ports move relative to each other at a preset speed along the translating axis;

the information to dispense the formable material during the first pass, the second pass, or each of the first and second passes comprises particular information to dispense the formable material such that the fluid droplet pitch in the translating axis is the preset minimum pitch or an integer multiple of the preset minimum pitch; and

the information to offset the substrate and the fluid dispense ports relative to each other comprises particular information in which in the translating axis, offset the substrate and the fluid dispense ports relative to each other is performed for a translating offset distance that is a non-integer multiple of the preset minimum pitch.

5. The apparatus of any one of claims 1 to 4, wherein:

the fluid dispense ports are configured to dispense fluid droplets at a corresponding pitch along a line that is substantially perpendicular to the translating axis; and

the information to offset the substrate and the fluid dispense ports relative to each other is performed for an offset distance that is a non-integer multiple of the corresponding pitch.

6. The apparatus of any one of claims 1 to 4, wherein:

the information to dispense the formable material onto the substrate during the first pass comprises information to dispense fluid droplets of the formable material along a Y1 line of a drop edge exclusion; and

the information to dispense the formable material onto the substrate during the second pass comprises information to dispense fluid droplets of the formable material along a Y2 line of the drop edge exclusion.

7. A method of generating a fluid droplet pattern for an imprint lithography process, the method comprising:

during a first pass, dispensing a formable material onto a surface of a substrate by a fluid dispense system having fluid dispense ports to form a first substrate fluid droplet

pattern for a first part of an imprint field of the substrate, wherein the substrate and the fluid dispense ports move relative to each other along a translating axis;

offsetting the substrate and the fluid dispense ports relative to each other; and

during a second pass, dispensing the formable material onto the surface of the substrate by the fluid dispense system to form a second substrate fluid droplet pattern for a second part of the imprint field, wherein offsetting the fluid dispense ports and substrate relative to each other is performed between the first pass and the second pass;

wherein:

the first substrate fluid droplet pattern has fluid droplets of the formable material lying along a plurality of lines, wherein lines of the plurality of lines are spaced apart from one another at a pitch, and

the offsetting is along a plane parallel to the surface of the substrate in a direction of the pitch for an offset distance that is a non-integer multiple of the pitch.

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8. The method of claim 7, wherein:

the fluid dispense ports are configured to dispense fluid droplets at a corresponding pitch along a line that is substantially perpendicular to the translating axis; and

offsetting the substrate and the fluid dispense ports relative to each other comprises offsetting the substrate and the fluid dispense ports relative to each other for an offset distance that is a non-integer multiple of the corresponding pitch.

9. The method of claim 7, wherein:

the fluid dispense system dispenses fluid droplets in a column lying along a line, the fluid dispense system further configured to dispense the fluid droplets of the formable material at a preset frequency to achieve spaced-apart droplets on a substrate at a preset minimum pitch as the substrate and the fluid dispense ports move relative to each other at a preset speed along the translating axis;

determining a virtual fluid droplet pattern includes:

determining a preset-defined fluid droplet pattern for dispensing the formable material onto the substrate, the preset-defined fluid droplet pattern based on at least a pattern of an imprint lithography template, and wherein the preset-

defined fluid droplet pattern is representative of fluid droplets spaced apart on the substrate at the preset minimum pitch or an integer multiple thereof as the substrate and the fluid dispense ports are moved relative to each other at the preset speed along the translating axis; and

determining an adjusted fluid droplet pattern based on the preset-defined fluid droplet pattern, wherein the adjusted fluid droplet pattern is representative of fluid droplets spaced apart at a non-integer multiple of the preset minimum pitch, and the adjusted fluid droplet pattern is the virtual fluid droplet pattern;

determining an adjusted speed of the substrate and the fluid dispense ports relative to each other to generate the adjusted fluid droplet pattern formed during the first and second passes, wherein the adjusted speed is different than the preset speed during the first pass, the second pass, or each of the first and second passes; and

during the first pass, the second pass, or each of the first and second passes, moving the substrate and the fluid dispense ports relative to each other at the adjusted speed along the translating axis, and dispensing the formable material through the fluid dispense ports at the preset frequency.

10. A method of manufacturing an article, the method comprising:

providing a fluid dispense system having fluid dispense ports;

during a first pass, dispensing a formable material onto a surface of a substrate by a fluid dispense system having fluid dispense ports to form a first substrate fluid droplet pattern for a first part of an imprint field of the substrate, wherein the substrate and the fluid dispense ports move relative to each other along a translating axis;

offsetting the substrate and the fluid dispense ports relative to each other after dispensing the formable material during the first pass;

during a second pass, dispensing the formable material onto the surface of the substrate by the fluid dispense system to form a second substrate fluid droplet pattern for a second part of the imprint field, wherein offsetting the fluid dispense ports and substrate relative to each other is performed between the first pass and the second pass; wherein:

the first substrate fluid droplet pattern has fluid droplets of the formable material lying along a plurality of lines, wherein lines of the plurality of lines are spaced apart from one another at a pitch, and

offsetting is along a plane parallel to the surface of the substrate in a direction of the pitch for an offset distance that is a non-integer multiple of the pitch;

contacting the formable material with a template having a surface; and

curing the formable material to form a layer corresponding to the surface of the template.