CLAIMS

1. An article fabrication system, comprising:

a chamber configured to hold an immersion liquid;

a divider comprising a through opening, dividing the chamber into at least one first portion and at least one second portion, the divider comprising an article frame and a gasket located between the divider and the frame;

an immersion liquid hydraulic system comprising at least one control valve and at least one bidirectional immersion liquid pump, wherein the immersion liquid hydraulic system is configured to:

allow equalization of the pressure between the at least one first portion and the at least one second portion; and

adjust volume or pressure of the immersion liquid in the at least one first portion;

a curable liquid provision unit comprising curable liquid reservoir, configured to provide curable liquid to the article frame; and

a controller configured to:

control the immersion liquid hydraulic system to equalize the pressure between the first and second portions;

control the immersion liquid hydraulic system to block a flow between the first and second portions;

control the curable liquid provision unit to provide the curable liquid to the article frame; and

control the immersion liquid hydraulic system to either increase or decrease the amount or pressure of the immersion liquid in the first portion.

2. The article fabrication system of claim 1, wherein the immersion liquid hydraulic system further comprises:

the at least one control valve is a pressure control valve fluidically connected between the at least one first portion and the at least one second portion and configured to allow equalization of the pressure between the at least one first portion and the at least one second portion,

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and wherein the at least one bidirectional pump is in fluid connection with the first portion configured to control the volume or the pressure of the immersion liquid in the at least one first portion.

3. The article fabrication system of claim 2, wherein the immersion liquid hydraulic system comprises two bidirectional pumps in fluid connection with the first portion, wherein a first of the two bidirectional pumps is configured to provide a solvent solution and a second of the two bidirectional pumps is configured to provide at least one solute solution, and wherein the controller is configured to control the first and second bidirectional pumps to provide the solvent and the solute at a predetermined ratio to form the immersion liquid.
4. The article fabrication system of claim 3, further comprising a first mixer for mixing the solvent solution and the solute solution prior to the provision of the immersion liquid into the first portion.
5. The article fabrication system of claim 3, further comprising a second mixer for mixing the solvent solution and the solute solution inside the chamber.
6. The article fabrication system according to any one of claims 3 to 5, wherein the solvent solution has a density smaller than the density of the curable liquid and wherein the solute solution has a density higher than the density of the curable liquid.
7. The article fabrication system according to any one of claims 1 to 6,

   wherein the bidirectional pressure control valve is in fluid connection with the first portion, the second portion, and the at least one bidirectional pump.
8. The article fabrication system of any one of claims 1 to 7, wherein the curable liquid provision unit further comprises:

   a port configured to provide curable liquid from the curable liquid reservoir to the article frame; and

   at least one curable liquid bidirectional pump in fluid connection with the port and the curable liquid reservoir.
9. The article fabrication system of any one of claims 1 to 8, wherein the divider further comprises

   a dividing plate having the through opening; and

   a frame holder sealingly securing the gasket and the frame to the dividing ring.

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10. The article fabrication system of any one of claims 1 to 9, further comprising at least one imaging device configured to capture light transmitted through or reflected from the curable liquid.
11. The article fabrication system of claim 10, wherein the at least one imaging device is at least one of, a camera and a wavefront sensor.
12. The article fabrication system of claim 10 or claim 11, the controller is configured to:
receive an image from the at least one imaging device; and
control at least one of, the curable liquid provision unit, the immersion liquid hydraulic system, and the at least one light source, based on the image.
13. The article fabrication system of any one of claims 1 to 12, further comprising:
at least one light source configured to illuminate the article.
14. The article fabrication system of claim13, wherein the at least one light source is located at at least one of: end of the first portion opposite to the article frame, or end of the second portion opposite to the article frame, on a wall of the first portion or a wall of the second portion, and outside the closed chamber wherein the closed chamber comprises at least one transparent window located between the light source and the article.
15. The article fabrication system of claim 13 or claim 14, wherein the controller is further configured to control the at least one light source to provide light to the curable liquid.
16. The article fabrication system of any one of claims 13 to 15, wherein the light source comprises at least one of, an array of light-emitting-diodes (LEDs), gas-discharge lamps and incandescent light bulbs.
17. The optical article fabrication system of any one of claims 13 to 16, further comprising a diffuser configured to diffuse the light over the article.
18. The article fabrication system according to any one of claims 1 to 17, further comprising a pressure sensor in fluid connection with the at least one first portion, and wherein the controller is configured to control the immersion liquid hydraulic system based also on pressure measurements received from the pressure sensor.
19. The article fabrication system according to any one of claims 1 to 18, wherein the curable liquid and said immersion liquid are immiscible.

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20. The article fabrication system according to any one of claims 1 to 19, wherein the density ρ_{im} of the immersion liquid varies from the density of the curable liquid ρ by less than 15 %
21. The article fabrication system according to any one of claims 1 to 20, wherein the article is a curved article.
22. The article fabrication system according to any one of claims 1 to 21, wherein the article is an optical article and the curable liquid is at least partially transparent.
23. The article fabrication system according to any one of claims 1 to 22, wherein the article is a mold for optical fabrication.
24. A kit for article fabrication comprising:
    the article fabrication system according to any one of claims 1 to 23;
    the immersion liquid; and
    the curing liquid.
25. A method of fabricating an article, comprising:
    providing an immersion liquid to at least one first portion and at least one second portion of a chamber divided by a divider;
    opening a valve between the at least one first and at least one second portions;
    providing a curable liquid to an article frame included in the divider;
    closing the valve;
    adjusting a volume or pressure of the immersion liquid in the at least one first portion using a pump, to control a curvature of the article; and
    curing the curable liquid to form the article.
26. The method of claim 25, further comprising receiving measurements of pressure of the immersion liquid in the at least one first portion, and
    wherein adjusting the volume or the pressure of the immersion liquid in the first portion is done based on the pressure measurements and required characteristics of the article.
27. The method of claim 25 or claim 26, wherein curing the curable liquid comprises adjusting the volume or the pressure of the immersion liquid in the at least one first portion during curing.
28. The method of claim 27, wherein adjusting comprises one of: passively releasing access immersion liquid if the pressure in the first portion exceeds a predetermined threshold,

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and actively operating the pump to adjust the volume or the pressure of the immersion liquid in the at least one first portion.

29. The method according to any one of claims 25 to 28, wherein the article is a curved article.
30. The method according to any one of claims 25 to 29, wherein the article is an optical article and the curable liquid is at least partially transparent.
31. The method according to any one of claims 25 to 30, wherein the article is a mold for optical fabrication.

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