

CLAIMS

What is claimed is:

1. A method comprising:
 - for each patterned wafer of at least two patterned wafers:
 - performing chemical processes on a surface of the patterned wafer to prepare the surface of the patterned wafer to add specific chemical functionality to the surface;
 - singulating the wafer into individual dies, wherein each individual die comprises an active area of a given flow cell;
 - orienting each die on a temporary substrate, wherein the orienting creates spaces between each individual die; and
 - molding a material over the spaces such that a top surface of the molded material is contiguous with a portion of the top surface of each active area to create a hybrid wafer comprised of glass and molded material; and
 - bonding a first hybrid wafer formed from a first patterned wafer of the at least two patterned wafers to a second hybrid wafer formed from a second patterned wafer of the at least two patterned wafers, wherein the bonding couples the top surface of the molded material of the first hybrid wafer to the top surface of the molded material of the second hybrid wafer, forming a bonded wafer stack.
2. The method of claim 1, wherein the two or more patterned wafers are selected from the group consisting of: circular wafers and non-circular panels.
3. The method of any of claims 1 or 2, wherein the two or more patterned wafers comprise glass.
4. The method of any of claims 1-3, wherein the singulating comprises perforating the patterned wafer utilizing a technique selected from the group consisting of: laser dicing the

patterned wafer, saw dicing the patterned wafer, and scribe and break processing the patterned wafer.

5. The method of claim 4, wherein the technique comprises laser dicing and the laser dicing comprises:

laser dicing the patterned wafer to create perforations between the dies; and

separating the patterned wafer into the dies at those perforations.

6. The method of any of claims 1-5, wherein the orienting is accomplished by utilizing a pick and place process.

7. The method of any of claims 1-6, wherein the bonding comprises utilizing a double-sided adhesive, wherein a thickness of the double sided adhesive creates a space between the top surface of the molded material of the first hybrid wafer and the top surface of the molded material of the second hybrid wafer, for a fluidic channel.

8. The method of any of claims 1-7, further comprising:

dicing the bonded wafer stack to form at least one flow cell.

9. The method of claim 8, wherein the molding further comprises drilling holes in the molded material as fluidic inlets and outlets for the at least one flow cell.

10. The method of any of claims 1-9, wherein the material utilized in the molding comprises plastic.

11. The method of any of claims 1-10, wherein molding the material over the spaces comprises overmolding the material on the temporary substrate and curing the material.

12. The method of any of claims 8-11, wherein each flow cell of the at least one flow cell comprises between 1 to 6 active areas.

13. The method of any of claims 1-12, wherein performing the chemical processes comprises coating the patterned wafer with one or more functional layers.

14. The method of any of claims 1-12 wherein performing the chemical processes comprises:

treating the surface of the patterned wafer;
coating the surface of the patterned wafer with a hydrogel; and
polishing the surface of the patterned wafer.

15. The method of any of claims 1-14, wherein the temporary substrate comprises an adhesive.

16. The method of any of claims 1-15, wherein singulating the wafer into the individual dies comprises:

singulating the wafer into an initial set of singulated dies; and
singulating each die of the initial set of singulated dies into one or more pieces,
wherein the one or more pieces of each die of the initial set of singulated dies comprise the individual dies.

17. A method comprising:

for each patterned wafer of at least two patterned wafers:
singulating the wafer into individual dies, wherein each die comprises an active area of a given flow cell; and
orienting each individual die on a temporary substrate, wherein the orienting creates spaces between each individual die; and
molding a material over the spaces such that a top surface of the molded material is contiguous with a portion of the top surface of each active area to create a hybrid wafer comprised of glass and molded material; and
performing chemical processes on a surface of the hybrid wafer to add specific chemical functionality to the surface; and

bonding a first hybrid wafer formed from a first patterned wafer of the at least two patterned wafers to a second hybrid wafer formed from a second patterned wafer of the at least two patterned wafers, wherein the bonding couples the top surface of the molded material of the first hybrid wafer to the top surface of the molded material of the second hybrid wafer, forming a bonded wafer stack.

18. The method of claim 17, wherein the two or more patterned wafers are selected from the group consisting of: circular wafers and non-circular panels.

19. The method of any of claims 17 or 18, wherein the two or more patterned wafers comprise glass.

20. The method of any of claims 17-19, wherein the singulating comprises perforating the patterned wafer utilizing a technique selected from the group consisting of: laser dicing the patterned wafer, saw dicing the patterned wafer, and scribe and break processing the patterned wafer.

21. The method of claim 20, wherein the technique comprises laser dicing and the laser dicing comprises:

laser dicing the patterned wafer to create perforations between the dies; and

separating the patterned wafer into the dies at those perforations.

22. The method of any of claims 17-21, wherein the orienting is accomplished by utilizing a pick and place process.

23. The method of any of claims 17-22, wherein the bonding comprises utilizing a double-sided adhesive, wherein a thickness of the double sided adhesive creates a space between the top surface of the molded material of the first wafer stack and the top surface of the molded material of the second wafer stack, for a fluidic channel.

24. The method of any of claims 17-23, further comprising:

dicing the bonded wafer stack to form at least one flow cell.

25. The method of claim 24, wherein the molding further comprises drilling holes in the molded material as fluidic inlets and outlets for the at least one flow cell.

26. The method of any of claims 17-25, wherein the material utilized in the molding comprises plastic.

27. The method of any of claims 17-26, wherein molding the material over the spaces comprises overmolding the material on the temporary substrate and curing the material.

28. The method of any of claims 24-27, wherein each flow cell of the at least one flow cell comprises between 1 to 6 active areas.

29. The method of any of claims 17-28, wherein performing the chemical processes comprises coating the patterned wafer with one or more functional layers.

30. The method of any of claims 17-28, wherein performing the chemical processes comprises:

treating the surface of the patterned wafer;

coating the surface of the patterned wafer with a hydrogel; and

polishing the surface of the patterned wafer.

31. The method of any of claims 17-30, wherein the temporary substrate comprises an adhesive.

32. The method of any of claims 17-31, wherein singulating the wafer into the individual dies comprises:

singulating the wafer into an initial set of singulated dies; and

singulating each die of the initial set of singulated dies into one or more pieces, wherein the one or more pieces of each die of the initial set of singulated dies comprise the individual dies.

33. A method comprising:

dicing a patterned wafer into dies comprising active surfaces;

singulating the dies based on perforations created by the dicing;

assembling each die into a flow cell, the assembling comprising:

picking and placing the die into an injection molded flow channel formed in a molded flow cell bottom; and

covering a top surface of molded flow cell bottom with a molded flow cell lid.

34. The method of claim 33, the die comprising imaging glass.

35. The method of any of claims 33-34, further comprising:

performing chemical processes on a surface of the patterned wafer to prepare the surface of the patterned wafer to add specific chemical functionality to the surface.

36. The method of any of claims 33-35, further comprising:

securing the die into the molded flow channel.

37. The method of claim 36, wherein the securing is accomplished utilizing a fastener selected from the group consisting of: an epoxy and a heat stake.

38. The method of any of claims 33-37, wherein dicing the patterned wafer into the dies comprising the active surfaces comprises:

dicing the wafer into an initial set of singulated dies; and dicing each die of the initial set of singulated dies into one or more pieces, wherein the one or more pieces of each die of the initial set of singulated dies comprise the active surfaces.