Claims

1. A wafer table structure providing a wafer table surface ~~suitable for handling wafers, portions of wafers, and/or film frames on which wafers or portions thereof~~, the wafer table structure comprising:

a base tray comprising a plurality of first ~~set of~~ exposed upper surfaces, an interior surface, and a ~~set~~ plurality of compartments formed integrally with or attached to the interior surface, the base tray formed of at least one type of material that is gas or fluid impermeable in response to applied negative pressures;

a plurality of ridges that separates individual compartments within the plurality of compartments from each other, wherein the plurality of first exposed upper surfaces of the base tray includes exposed upper surfaces of the plurality of ridges, and wherein each ridge within the plurality of ridges is dimensioned in a manner corresponding to a standard wafer size and/or a standard film frame size;

a single plurality of ejector pin guide members through which a single plurality of ejector pins can travel for handling wafers of multiple standard sizes, wherein each of the single plurality of ejector pin guide members is formed in an innermost ridge within the plurality of ridges, and protrudes into portions of an innermost compartment within the plurality of compartments;

at least one type of compartment material disposed within the ~~set~~ plurality of ~~base tray~~ compartments, the at least one type of compartment material conformable to the ~~set~~ plurality of compartments and hardenable to provide a hardened compartment material in the ~~set~~ plurality of compartments that is gas or fluid permeable in response to applied vacuum forces, and which provides a plurality of second ~~set of~~ exposed upper surfaces; and

a ~~set~~ plurality of openings formed in the interior surface of the base tray, by which the hardened compartment material is exposable to negative pressures or positive pressures,

wherein (a) the plurality of first ~~set of~~ exposed upper surfaces of the base tray and (b) the plurality of second ~~set of~~ exposed upper surfaces of the hardened compartment material are simultaneously machinable by way of a common machining process to provide a planar wafer table surface for carrying wafers and film frames.

wherein the wafer table surface is suitable for handling wafers, portions of wafers, and/or film frames on which wafers or portions thereof are mounted.

2. The wafer table structure of claim 1, wherein the planar wafer table surface excludes grooves and vacuum holes formed therein.

3. The wafer table structure of claim 2, wherein the planar wafer table surface is a very high or ultra-high planar surface that facilitates positioning and maintaining wafer die in or on a single plane, and wherein the planar wafer table surface has a planar uniformity across the planar wafer table surface of less than +/- 100 μm.

4. The wafer table structure of claim 1, wherein a rate at which the plurality of first ~~set of~~ exposed upper surfaces of the base tray is planarized by the common machining process and a rate at which the plurality of second ~~set of~~ exposed upper surfaces of the hardened compartment material is planarized by the common machining process are essentially identical.

5. The wafer table structure of claim 1, wherein:

~~the set of compartments comprises a plurality of compartments, the wafer table structure further comprises a set of ridges that separates individual compartments within the plurality of compartments from each other, and the first set of exposed upper surfaces of the base tray includes exposed upper surfaces of the set of ridges; and~~

the base tray interior surface includes a plurality of inner bottom surfaces, each ridge within the ~~set~~ plurality of ridges borders an inner bottom surface of the base tray, and each ridge within the ~~set~~ plurality of ridges partitions portions of different base tray inner bottom surfaces from each other to define the ~~set~~ plurality of compartments.

6. The wafer table structure of claim 5, wherein the base tray and each ridge within the ~~set~~ plurality of ridges are formed from identical materials.

7. The wafer table structure of claim 5, wherein each ridge within the ~~set~~ plurality of ridges resides at a predetermined distance away from a center of the base tray, and wherein at least a ~~first~~ compartment is surrounded by a ridge.

8. The wafer table structure of claim ~~7~~1, ~~wherein each ridge within the set of ridges and each compartment within the set of compartments is dimensioned in a manner correlated with a standard wafer size and/or a standard film frame size~~wherein the hardened compartment material is exposable to selective application of negative pressures and positive pressures by the plurality of openings.

9. The wafer table structure of claim ~~8~~7, wherein:

(a) the ~~set~~ plurality of compartments includes:

a first compartment containing a first volume of hardened compartment material exposed to a plurality of first ~~set of~~ openings corresponding thereto; and

a second compartment containing a second volume of compartment material exposed to a plurality of second ~~set of~~ openings corresponding thereto, the plurality of second ~~set of~~ openings distinct from the plurality of first ~~set of~~ openings;

and

(b) a first ridge within the ~~set~~ plurality of ridges surrounds the first compartment to thereby separate the first compartment from the second compartment.

10. The wafer table structure of claim 9, wherein negative pressure can be applied to the plurality of first ~~set of~~ openings to securely retain a first wafer or first film frame having a first standard diameter to the planar wafer table surface, and wherein negative pressure can be applied to the plurality of first ~~set of~~ openings and the plurality of second ~~set of~~ openings to securely retain a second wafer or second film frame having a second standard diameter larger than the first standard diameter to the planar wafer table surface.

11. The wafer table structure of claim 10, wherein:

(c) the ~~set~~ plurality of compartments includes a third compartment containing a third volume of hardened compartment material exposed to a plurality of third ~~set of~~ openings

corresponding thereto, the plurality of third ~~set of~~ openings distinct from each of the plurality of first ~~set of~~ openings and the plurality of second ~~set of~~ openings;

and

(d) a second ridge within the ~~set~~ plurality of ridges surrounds the second compartment to thereby separate the second compartment from the third compartment.

12. The wafer table structure of claim 11, wherein negative pressure can be applied to the plurality of first ~~set of~~ openings, the plurality of second ~~set of~~ openings, and the plurality of third ~~set of~~ openings to securely retain a third wafer or a third film frame having a third standard diameter larger than each of the first and second standard diameters to the planar wafer table surface.

13. The wafer table structure according to claim 1, wherein at least one of the base tray and the hardened compartment material comprises a ceramic based material.

14. The wafer table structure of claim 13, wherein the base tray comprises porcelain.

~~15. The wafer table structure of claim 1, further comprising a single set of ejector pin guide members through which a single set of ejector pins can travel for handling wafers of multiple standard sizes.~~

~~16~~15. A method for manufacturing a wafer table structure providing a wafer table surface ~~suitable for handling wafers, portions of wafers, and/or film frames on which wafers or portions thereof~~, the method comprising:

providing a base tray having a plurality of first ~~set of~~ exposed upper surfaces, an interior surface, a ~~set~~ plurality of compartments formed integrally with or attached to the interior surface, and ~~at least one set~~a plurality of openings formed in the interior surface, the base tray formed of at least one type of material that is gas or fluid impermeable in response to applied negative pressures;

providing a plurality of ridges that separates individual compartments within the plurality of compartments from each other, wherein the plurality of first exposed upper surfaces of

the base tray includes exposed upper surfaces of the plurality of ridges, and wherein each ridge within the plurality of ridges is dimensioned in a manner corresponding to a standard wafer size and/or a standard film frame size;

providing a single plurality of ejector pin guide members through which a single plurality of ejector pins can travel for handling wafers of multiple standard sizes, wherein each of the single plurality of ejector pin guide members is formed in an innermost ridge within the plurality of ridges, and protrudes into portions of an innermost compartment within the plurality of compartments;

disposing at least one type of compartment material within the ~~set~~ plurality of base tray compartments, the at least one type of compartment material conformable to the ~~set~~ plurality of compartments;

hardening the at least one type of compartment material to provide a hardened compartment material in the ~~set~~ plurality of compartments that is gas or fluid permeable in response to applied negative pressures or positive pressures, and which provides a plurality of second ~~set of~~ exposed upper surfaces;

and

simultaneously machining the plurality of first ~~set of~~ exposed upper surfaces and the plurality of second ~~set of~~ exposed upper surfaces by way of a common machining process to provide a planar wafer table surface for carrying wafers and film frames on which wafers or portions thereof are mounted,

wherein the wafer table surface is suitable for handling wafers, portions of wafers, and/or film frames on which wafers or portions thereof are mounted.

~~17~~16. The method of claim ~~16~~15, wherein during the simultaneous machining of the plurality of first and second ~~sets of~~ exposed upper surfaces, a rate at which the plurality of first ~~set of~~ exposed upper surfaces of the base tray is planarized by the common machining process and a rate at which the plurality of second ~~set of~~ exposed upper surfaces of the hardened compartment material is planarized by the common machining process are essentially identical.

~~18. The method of claim 16, wherein the set of compartments includes a plurality of compartments, wherein the base tray includes a set of ridges that separates individual~~

~~compartments within the plurality of compartments from each other, and wherein the first set of exposed upper surfaces of the base tray includes exposed upper surfaces of the set of ridges.~~

~~19~~17. The method of claim ~~16~~15, wherein at least one of the base tray and the hardened compartment material comprises a ceramic based material.

~~20~~18. The method of claim ~~16~~15, further comprising:

mounting the wafer table structure to a displaceable wafer table or stage assembly; and

coupling each of the plurality ~~set~~ of openings to a ~~set~~ plurality of lines through which negative pressure or positive pressure can be selectively actuated and applied to wafers or film frames disposed upon the planar wafer table surface.

19. The method of claim 15, wherein the hardened compartment material is exposable to selective application of negative pressures and positive pressures by the plurality of openings.