CLAIMS

~~1. A process for introducing a first gas and a second gas into a reaction chamber of a reactor, the reactor comprising at least one reaction chamber wall and a gas distribution unit for distributing the first gas and the second gas into the reaction chamber, the distribution unit comprising a distributor having a plurality of distribution openings including at least one peripheral opening and at least one central opening, each of the distribution openings having a channel portion and a throttle portion, the distribution unit further comprising an inlet block, an outer annular ring, an inner annular ring concentric to the outer annular ring, a product withdrawal tube concentric to the outer annular ring and inner annular ring and that extends through the distributor and inlet block, the space between the distributor, inlet block, outer annular ring and inner annular ring defining a first gas plenum, the space between the distributor, inlet block, inner annular ring and the product withdrawal tube defining a second gas plenum, the process comprising:~~

~~introducing the first gas into the first gas plenum and through the peripheral openings into the reaction chamber, the first gas passing through the channel portion and throttle portion of the distribution openings; and~~

~~introducing the second gas through the second gas plenum and through the central openings into the reaction chamber, the second gas passing through the channel portion and throttle portion of the distribution openings.~~

~~2. The process of claim 1, wherein the first gas comprises a gas selected from the group consisting of hydrogen, argon, helium and mixtures thereof.~~

~~3. The process of claim 2, wherein the second gas comprises a gas selected from the group consisting of silane, trichlorosilane, and mixtures thereof.~~

~~4. The process of claim 1, wherein the distributor comprises a plurality of cones and each distribution opening has a flare-out portion, the flare-out portion being in fluid communication with the throttle portion of the distribution opening and the cone, the gasses passing through the flare-out portion and cones.~~

~~5. The process of claim 4, wherein the cones that are in fluid communication with the flare-out portion of the peripheral distribution openings open into the reaction chamber.~~

~~6. The process of claim 1, further comprising introducing the first gas into the first gas plenum through a first gas inlet tube in the inlet block.~~

~~7. The process of claim 1, further comprising introducing the second gas into the second gas plenum through a second gas inlet tube in the inlet block.~~

~~8. The process of claim 1, wherein the first gas plenum is radially outward from the central openings.~~

~~9. The process of claim 1, further comprising mixing the first gas and the second gas near the reaction chamber wall.~~

~~10. The process of claim 1, further comprising cooling the distributor to a temperature below which material thermally decomposes from either the first gas or the second gas.~~

~~11. The process of claim 1, wherein the peripheral openings angle toward the central openings from the bottom to the top of the distributor.~~

~~12. The process of claim 1, further comprising distributing the second gas evenly throughout the reaction chamber.~~

~~13. The process of claim 1, further comprising heating the second gas to a temperature above the point at which the second decomposes.~~

~~14~~1. A distributor for distributing a first gas and a second gas into a reaction chamber comprising at least one reaction chamber wall, the distributor comprising:

a plurality of distribution openings including at least one peripheral opening and at least one central opening, each distribution opening having a channel portion, a flare-out portion and a throttle portion disposed between the channel portion and flare-out portion, wherein each flare-out portion has ~~an~~a first axis and each channel portion has a second axis, and the first axis of the flare-out portion of the at least one peripheral opening is parallel to a longitudinal axis of the reaction chamber and the second axis of the channel portion of the at least one peripheral opening extends inward and forms an angle with the longitudinal axis of the reaction chamber.

~~15~~2. The distributor of claim ~~14~~1, wherein the peripheral openings are configured to provide fluid communication with the source of first gas and not the source of second gas.

~~16~~3. The distributor of claim ~~15~~2, wherein the central openings are configured to provide fluid communication with the source of second gas and not the source of first gas.

~~17~~4. The distributor of claim ~~14~~1, further comprising a plurality of cones, the flare-out portion being in fluid communication with the throttle portion of the distribution opening and the cone.

~~18~~5. The distributor of claim ~~14~~1, further comprising a product withdrawal tube extending at least partially through the distributor for the removal of product particles.

~~19~~6. The distributor of claim ~~14~~1, further comprising a cooling channel extending through the distributor to prevent material from depositing on the distribution openings.

~~20~~7. The distributor of claim ~~14~~1, wherein the longitudinal length of the channel is substantially greater than the longitudinal length of the flare-out portion.

~~21~~8. The distributor of claim ~~16~~2, wherein at least a portion of the plurality of peripheral openings extend tangentially to the periphery of an inner surface of the distributor.

~~22~~9. The distributor of claim ~~14~~1, further comprising an annular recess for receiving an annular ring to maintain separation of the first gas and the second gas prior to entering the distributor.

~~23~~10. A fluidized bed reactor system comprising a reaction chamber comprising at least one reaction chamber wall and a distributor for distributing gas into the reaction chamber and comprising a plurality of distribution openings which

provide fluid communication between both a source of a first gas and a source of a second gas and the reaction chamber, each distribution opening having a channel portion, a flare-out portion and a throttle portion disposed between the channel portion and flare-out portion, the plurality of distribution openings comprising a plurality of peripheral openings and a plurality of central openings, wherein the peripheral openings are in fluid communication with the source of first gas and are not in fluid communication with the source of second gas, and wherein the flare-out portions of the peripheral openings are shaped to direct the first gas parallel to a longitudinal axis of the reaction chamber, and the channel portions of the peripheral openings are shaped to direct the first gas inward at an angle to the longitudinal axis.

~~24~~11. The reactor system of claim ~~23~~10, wherein the central openings are in fluid communication with the source of second gas and are not in fluid communication with the source of first gas.

~~25~~12. The reactor system of claim ~~23~~10, wherein the source of first gas is within a first gas plenum and the source of second gas is within a second gas plenum.

~~26~~13. The reactor system of claim ~~25~~12, further comprising an inlet block, an outer annular ring and an inner annular ring concentric to the outer annular ring and wherein the first gas plenum is defined by the space between the distributor, inlet block, outer annular ring and inner annular ring.

~~27~~14. The reactor system of claim ~~26~~13, further comprising a product withdrawal tube concentric to the outer

annular ring and inner annular ring and that extends through the distributor and inlet block and wherein the second gas plenum is defined by the space between the distributor, inlet block, inner annular ring and the product withdrawal tube.

~~28~~15. The reactor system of claim ~~26~~14, wherein the inlet block comprises a first gas channel in fluid communication with the first gas plenum and a second gas channel in fluid communication with the second gas plenum.

~~29~~16. The reactor system of claim ~~23~~10, wherein the distributor comprises a plurality of cones, the flare-out portion being in fluid communication with the throttle portion of the distribution opening and the cone.

~~30~~17. The reactor system of claim ~~29~~16, wherein the cones that are in fluid communication with the flare-out portion of the peripheral distribution openings open into the reaction chamber.

~~31~~18. A gas distribution unit for distributing a first gas and a second gas into a reaction chamber, the distribution unit comprising:

~~a~~the distributor of claim 3~~ for distributing a first gas and a second gas into a reaction chamber comprising at least one reaction chamber wall, the distributor comprising a plurality of distribution openings including at least one peripheral opening and at least one central opening, each distribution opening having a channel portion, a flare-out portion and a throttle portion disposed between the channel portion and flare-out portion, wherein each flare-out portion has an axis, and the axis of the flare-out portion of the at least one peripheral~~

~~opening is parallel to a longitudinal axis of the reaction chamber, wherein the peripheral openings are configured to provide fluid communication with the source of first gas and not the source of second gas~~;

an inlet block;

an outer annular ring;

an inner annular ring concentric to the outer annular ring;

a product withdrawal tube concentric to the outer annular ring and inner annular ring and that extends through the distributor and inlet block, the space between the distributor, inlet block, outer annular ring and inner annular ring defining a first gas plenum, the space between the distributor, inlet block, inner annular ring and the product withdrawal tube defining a second gas plenum, the central openings being configured to provide fluid communication with the source of second gas and not the source of first gas by being in fluid communication with only the second gas plenum and the peripheral openings being configured to provide fluid communication with the source of first gas and not the source of second gas by being in fluid communication with only the first gas plenum.

19. A process for introducing a first gas and a second gas into a reaction chamber of a reactor, the reactor comprising at least one reaction chamber wall and a gas distribution unit for distributing the first gas and the second gas into the reaction chamber, the distribution unit comprising a distributor having a plurality of distribution openings including at least one peripheral opening and at least one central opening, each of the

distribution openings having a channel portion and a throttle portion, the distribution unit further comprising an inlet block, an outer annular ring, an inner annular ring concentric to the outer annular ring, a product withdrawal tube concentric to the outer annular ring and inner annular ring and that extends through the distributor and inlet block, the space between the distributor, inlet block, outer annular ring and inner annular ring defining a first gas plenum, the space between the distributor, inlet block, inner annular ring and the product withdrawal tube defining a second gas plenum, the process comprising:

introducing the first gas into the first gas plenum and through the peripheral openings into the reaction chamber, the first gas passing through the channel portion at an angle with a longitudinal axis of the reaction chamber and through throttle portion of the distribution openings in a direction that is parallel with the longitudinal axis of the reaction chamber; and

introducing the second gas through the second gas plenum and through the central openings into the reaction chamber, the second gas passing through the channel portion and throttle portion of the distribution openings.

20. The process of claim 19, wherein the first gas comprises a gas selected from the group consisting of hydrogen, argon, helium and mixtures thereof.

21. The process of claim 20, wherein the second gas comprises a gas selected from the group consisting of silane, trichlorosilane, and mixtures thereof.

22. The process of claim 19, wherein the distributor comprises a plurality of cones and each distribution opening has

a flare-out portion, the flare-out portion being in fluid communication with the throttle portion of the distribution opening and the cone, the gasses passing through the flare-out portion and cones.

23. The process of claim 22, wherein the cones that are in fluid communication with the flare-out portion of the peripheral distribution openings open into the reaction chamber.

24. The process of claim 19, further comprising introducing the first gas into the first gas plenum through a first gas inlet tube in the inlet block.

25. The process of claim 19, further comprising introducing the second gas into the second gas plenum through a second gas inlet tube in the inlet block.

26. The process of claim 19, wherein the first gas plenum is radially outward from the central openings.

27. The process of claim 19, further comprising mixing the first gas and the second gas adjacent the reaction chamber wall.

28. The process of claim 19, further comprising cooling the distributor to a temperature below which material thermally decomposes from either the first gas or the second gas.

29. The process of claim 19, wherein the central openings are parallel with the longitudinal axis of the reaction chamber from the bottom to the top of the distributor.

30. The process of claim 19, further comprising distributing the second gas evenly throughout the reaction chamber.

31. The process of claim 19, further comprising heating the second gas to a temperature above the point at which the second gas decomposes.