

CLAIMS

What is claimed is:

1. An apparatus to direct radical species, the apparatus comprising:
a remote-plasma clean (RPC) directional-flow device that is
configured to be coupled between an RPC reactor and a multi-
station process chamber, the RPC directional-flow device
comprising:
a plurality of ramped gas-diversion areas, respective
ones of the plurality of ramped gas-diversion areas
configured to direct at least the radical species
generated by the RPC reactor to a separate one of
a plurality of processing stations within the
multi-station process chamber, a number of the
plurality of ramped gas-diversion areas being at
least equal to a number of the plurality of
processing stations; and
an incoming cleaning-gas diversion hub to receive at
least the radical species from the RPC reactor and
distribute at least the radical species
substantially-uniformly to each of the plurality of
ramped gas-diversion areas.
2. The apparatus of claim 1, wherein the RPC directional-flow device
comprises four ramped gas-diversion areas.
3. The apparatus of claim 1, wherein the RPC directional-flow device
comprises eight ramped gas-diversion areas.

4. The apparatus of claim 1, further comprising an exit-ramp area formed near an outer periphery of the RPC directional-flow device, the exit-ramp area being narrower than the ramped gas-diversion area in which the exit-ramp area is formed.
5. The apparatus of claim 1, further comprising:
a multi-ribbed wall separating each of the ramped gas-diversion areas; and
a channel located between each multi-ribbed wall separating the ramped gas-diversion areas to direct at least the radical species generated by the RPC reactor.
6. The apparatus of claim 1, wherein the incoming cleaning-gas diversion hub is substantially dome-shaped.
7. The apparatus of claim 1, wherein the RPC directional-flow device is positioned to direct at least the radical species above each of multiple gas-distribution showerheads in the multi-station process chamber.
8. The apparatus of claim 1, wherein the RPC directional-flow device is positioned to direct at least the radical species between each of multiple gas-distribution showerheads and respective multiple substrate pedestals in the multi-station process chamber.
9. The apparatus of claim 1, wherein the RPC directional-flow device is positioned to direct at least the radical species below each of multiple substrate pedestals in the multi-station process chamber.

10. A directional-flow device to distribute an incoming-gas flow, the directional-flow device comprising:
a plurality of ramped gas-diversion areas, respective ones of the plurality of ramped gas-diversion areas configured to direct the incoming-gas flow to a separate one of a plurality of processing stations within a multi-station process chamber, a number of the plurality of ramped gas-diversion areas being at least equal to a number of the plurality of processing stations; and
an incoming-gas diversion hub to receive and split the incoming-gas flow substantially-uniformly and distribute the incoming-gas flow to at least each of the plurality of ramped gas-diversion areas.
11. The directional-flow device of claim 10, wherein the directional-flow device comprises four ramped gas-diversion areas.
12. The directional-flow device of claim 10, wherein the directional-flow device comprises eight ramped gas-diversion areas.
13. The directional-flow device of claim 10, wherein the incoming-gas diversion hub is substantially dome-shaped.

14. A remote-plasma clean (RPC) directional-flow device, comprising:
a plurality of ramped gas-diversion areas, respective ones of the plurality of ramped gas-diversion areas being configured to direct at least a radical species generated by an RPC reactor to a separate one of a plurality of processing stations within a multi-station process chamber;
a multi-ribbed wall separating each of the ramped gas-diversion areas, the multi-ribbed wall having a channel located between each multi-ribbed wall separating the ramped gas-diversion areas; and
an incoming cleaning-gas diversion hub to receive at least the radical species from the RPC reactor and distribute at least the radical species substantially-uniformly to each of the plurality of ramped gas-diversion areas.
15. The RPC directional-flow device of claim 14, wherein a number of the plurality of ramped gas-diversion areas is at least equal to a number of the plurality of processing stations.
16. The RPC directional-flow device of claim 14, wherein a number of the channels is at least equal to a number of the plurality of processing stations.
17. The RPC directional-flow device of claim 14, wherein the incoming cleaning-gas diversion hub is substantially dome-shaped.

18. The RPC directional-flow device of claim 14, wherein the RPC directional-flow device is positioned within the multi-station process chamber to direct at least the radical species above each of multiple gas-distribution showerheads in the multi-station process chamber.
19. The RPC directional-flow device of claim 14, wherein the RPC directional-flow device is positioned within the multi-station process chamber to direct at least the radical species between each of multiple gas-distribution showerheads and respective multiple substrate pedestals in the multi-station process chamber.
20. The RPC directional-flow device of claim 14, wherein the RPC directional-flow device is positioned within the multi-station process chamber to direct at least the radical species below each of multiple substrate pedestals in the multi-station process chamber.