CLAIMS:

1. A pick-up chuck for handling a substrate, comprising a chuck body defining:

a support surface;

a gas relay aperture for transmitting a gas, the gas relay aperture being located at a central region of the chuck body and surrounded by the support surface;

a vacuum aperture portion at least partially surrounding the support surface configured in use to generate a vacuum force to pick up the substrate, and a flow of the gas through the gas relay aperture onto the support surface towards the vacuum aperture portion; and

a gas bearing structure located between the gas relay aperture and the vacuum aperture portion, arranged on the support surface and shaped to provide a gas bearing between the substrate and the support surface utilizing the flow of the gas from the gas relay aperture to the vacuum aperture portion.

2. The pick-up chuck of claim 1, wherein the gas bearing structure protrudes from the support surface and defines at least one of a planar and curved leading edge facing towards the gas relay aperture.

3. The pick-up chuck of claim 2, wherein the gas bearing structure defines at least one of a planar and curved trailing edge facing towards the vacuum aperture portion.

4. The pick-up chuck of claim 3, wherein the gas bearing structure defines a flat gas bearing surface extending between the leading edge and the trailing edge.

5. The pick-up chuck of claim 3, wherein the trailing edge is positioned proximate the vacuum aperture portion.

6. The pick-up chuck of claim 1, wherein the gas bearing structure is configured in use to space the substrate away from the support surface.

7. The pick-up chuck of claim 1, wherein the gas relay aperture is configured to supply the gas to flow over the support surface.

8. The pick-up chuck of claim 1, wherein the gas relay aperture and the gas bearing structure are separated by an inner support surface region extending between the gas relay aperture and the gas bearing structure, the gas bearing structure being raised with respect to the inner support surface region.

9. The pick-up chuck of claim 1, wherein the gas bearing structure comprises an annular structure and the vacuum aperture portion includes a plurality of vacuum holes distributed along an annular section of the chuck body.

10. The pick-up chuck of claim 1, wherein the chuck body defines a substrate support shaped to protrude from the support surface and at least partially surrounding the vacuum aperture portion.

11. The pick-up chuck of claim 10, wherein the substrate support is shaped and positioned to contact a non-operational area along a periphery of the substrate.

12. The pick-up chuck of claim 11, wherein the substrate support comprises an annular structure.

13. The pick-up chuck of claim 11, wherein the substrate support is dimensioned to protrude from the support surface by a distance greater than the gas bearing structure.

14. The pick-up chuck of claim 1, wherein the gas relay aperture comprises a flow restrictor configured to limit the flow of the gas.

15. The pick-up chuck of claim 14, wherein the flow restrictor comprises a porous material through which the gas is permeable.

16. The pick-up chuck of claim 1, further comprising a pump coupled with the vacuum aperture portion and configured to draw the gas through the gas relay aperture, across the support surface, over the gas bearing surface and through the vacuum aperture portion.

17. The pick-up chuck of claim 1, wherein the gas relay aperture is in fluid communication with ambient air.

18. A method for handling a substrate comprising:

providing a pick-up chuck for handling a substrate comprising a chuck body defining a support surface, a gas relay aperture located at a central region of the chuck body and surrounded by the support surface, a vacuum aperture portion at least partially surrounding the support surface and a gas bearing structure located between the gas relay aperture and the vacuum aperture portion, arranged on the support

surface and shaped to provide a gas bearing between the substrate and the support surface;

generating a vacuum force using the vacuum aperture portion to draw a gas through the gas relay aperture, onto the support surface from the gas relay aperture to the vacuum aperture portion which flows over the gas bearing structure to provide the gas bearing between the substrate and the support surface; and

picking up the substrate.