

CLAIMS:

1. A substrate holder for use in a lithographic apparatus and configured to support a substrate, the substrate holder comprising:
- 5 a main body having a main body surface;
a plurality of burls projecting from the main body surface and each having a distal end surface which substantially conforms to a support plane and is configured for supporting the substrate; and
an edge seal projecting from the main body surface and extending around the plurality of
- 10 burls so as to restrict gas flow when a substrate is held by the substrate holder; wherein:
the edge seal is spaced apart from the plurality of burls so as to define a gap between the edge seals and the plurality of burls, the gap having a gap width that is greater than or equal to about 75% of a pitch of the plurality of burls;
the plurality of burls comprises a first group of burls and a second group of burls, the second
- 15 group of burls surrounding the first group of burls; and
wherein the stiffness in the direction perpendicular to the support plane per unit area of the second group of burls is greater than or equal to about 150% of the stiffness in the direction perpendicular to the support plane per unit area of the first group of burls.
- 20 2. The substrate holder according to claim 1, wherein the gap width is greater than or equal to about 80% of the pitch of the plurality of burls, or greater than or equal to about 90% of the pitch of the plurality of burls, desirably about 100% of the pitch of the plurality of burls.
3. The substrate holder according to claim 1 or 2, wherein the gap width is less than or equal to
- 25 about 125% of the pitch of the plurality of burls.
4. The substrate holder according to claim 1, 2 or 3, wherein the stiffness in the direction perpendicular to the support plane per unit area of the second group of burls is greater than or equal to about 160% of the stiffness in the direction perpendicular to the support plane per unit area of the first
- 30 group of burls, desirably greater than about 180% the stiffness in the direction perpendicular to the support plane per unit area of the first group of burls.
5. The substrate holder according to claim 1, 2, 3 or 4, wherein the stiffness in the direction perpendicular to the support plane per unit area of the second group of burls is less than or equal to
- 35 about 200% of the stiffness in the direction perpendicular to the support plane per unit area of the first group of burls.

6. The substrate holder according to any of the preceding claims, wherein the stiffness in the direction perpendicular to the support plane of each of the burls of the second group of burls is greater than the average stiffness in the direction perpendicular to the support plane of the burls of the first group.
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7. The substrate holder according to any of the preceding claims, wherein the density of the second group of burls is greater than the density of the first group of burls.
8. The substrate holder according to any of the preceding claims, wherein each of the second
- 10 group of burls has a cross-sectional area in a plane parallel to the support plane that is larger than the cross-section of the first group of burls.
9. The substrate holder according to any of the preceding claims, wherein the second group of burls and at least some of the first group of burls are arranged in concentric rings of which the second
- 15 group forms an outermost.
10. The substrate holder according to claim 9, wherein the pitch is the spacing between the second group of burls and the outermost ring of burls amongst the first group of burls.
- 20 11. The lithographic apparatus for applying a pattern to a substrate, the apparatus comprising the substrate holder according to any of the preceding claims.
12. A device manufacturing method comprising:
- holding a substrate on the substrate holder according to any of claims 1-10 by reducing the
- 25 pressure between the main body surface and the substrate; and
- applying a pattern to the substrate.