

CLAIMS

1. A method of growing a group III nitride crystal structure comprising:
providing a silicon substrate (12); forming a first mask (10) on the substrate,
5 the mask having a plurality of apertures (14) through it arranged in a 2D array
each exposing a respective area of the silicon substrate; etching the silicon
exposed by each of the apertures to form a respective recess (16) having a
plurality of facets (18, 20, 22, 24); depositing a second mask over the areas
between the recesses and over some of the facets of each recess leaving at least
10 one of the facets of each recess exposed; and growing group III nitride on the
exposed facets and then over the substrate to form a continuous layer.
2. A method according to claim 1 wherein the etching is performed using
anisotropic wet etching.
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3. A method according to claim 1 or claim 2 wherein each of the facets of
each of the recesses is substantially triangular or trapezoidal.
4. A method according to any foregoing claim wherein each recess tapers to
20 a point at its bottom.
5. A method according to any foregoing claim wherein only one facet in
each recess is left exposed for the growth of group III nitride thereon.
- 25 6. A method according to any foregoing claim wherein each recess has a (1-
11) facet which is left exposed for growth of group III nitride thereon.
7. A method according to any foregoing claim wherein the group III nitride
grows initially as (0001) group III nitride on the (1-11) silicon facet of each
30 recess, and the group III nitride then grows out of the recesses and merges to
form a single layer of (11-22) group III nitride.

8. A method according to any foregoing claim wherein a buffer layer is deposited on the exposed facets prior to the growth of group III nitride.

9. A method according to any foregoing claim wherein the apertures are
5 arranged in a regular array.

10. A method according to any foregoing claim wherein the group III nitride is GaN, AlGa_N, InGa_N, or AlN.

10 11. A template comprising a silicon substrate with a layer of group III nitride on the substrate, wherein the substrate has a 2D array of recesses formed in it each having a plurality of facets, the areas between the recesses and some of the facets having a mask thereon, and at least one of the facets in each recess having the group III nitride grown onto it, and the group III nitride forming a
15 continuous layer covering the array of recesses.

12. A template according to claim 11 wherein each of the facets of each of the recesses is substantially triangular such that each recess tapers to a point at its bottom.

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13. A template according to claim 11 or claim 12 wherein only one facet in each recess has the group III nitride grown on it.

14. A template according to any of claims 11 to 13 wherein each recess has a
25 (1-11) facet with group III nitride grown thereon.

15. A template according to any of claims 11 to 14 wherein the group III nitride is GaN.

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