CLAIMS

1. A method for manufacturing a substrate for group-III nitride epitaxial growth comprising steps of:

preparing a core consisting of nitride ceramic;

obtaining a supporting substrate by depositing an encapsulating layer so as to wrap the core, the encapsulating layer having a thickness of between 0.05 μm and 1.5 μm, inclusive;

depositing a planarizing layer on an upper surface of the support substrate, the planarizing layer having a thickness of between 0.5 μm and 3.0 μm, inclusive; and

providing a seed crystal layer consisting of a single crystal with a thickness of more than 0.04 μm and less than 0.10 μm on the upper surface of the planarizing layer, wherein the deposition method for the encapsulating layer can be selected from conventional deposition methods such as MOCVD, atmospheric pressure CVD, LPCVD and sputtering,

wherein the step of providing the seed crystal layer includes the steps of:

preparing a single crystal substrate of a group III nitride, one surface of the single crystal substrate being an ion implantation surface;

forming a peeling position in the single crystal substrate by performing ion implantation from the ion implantation surface;

obtaining a bonded substrate by bonding the ion implantation surface and the planarizing layer; and

separating the bonded substrate into the seed crystal layer

and a remaining section of the single crystal substrate at the peeling position,
wherein SiO_2 is deposited on the ion implantation surface of the single crystal substrate before ion implantation.

2. The method for manufacturing a substrate for group-III nitride epitaxial growth according to claim 1, wherein the method further comprises a step of depositing a stress adjusting layer on a bottom surface of the supporting substrate.

3. The method for manufacturing a substrate for group-III nitride epitaxial growth according to claim 1 or 2, wherein the encapsulating layer is deposited by using an LPCVD method.

4. The method for manufacturing a substrate for group-III nitride epitaxial growth according to any one of claims 1 to 3, wherein the planarizing layer is deposited by using any one of a plasma CVD method, an LPCVD method, and a low-pressure MOCVD method.

5. The method for manufacturing a substrate for group III nitride epitaxial growth according to claim 1, wherein, in the step of preparing the single crystal substrate, aluminium nitride, aluminium gallium nitride or gallium nitride epitaxially grown on a sapphire substrate by MOCVD or HVPE is fabricated as the single crystal substrate.

6. The method for manufacturing a substrate for group III nitride epitaxial growth according to claim 5, wherein, in the step of preparing the single crystal substrate, the single crystal

substrate may be obtained by bonding small-diameter single crystals made by epitaxial growth of aluminium nitride or aluminium gallium nitride by MOCVD or HVPE using a small-diameter aluminium nitride single crystal fabricated by the sublimation method or an aluminium nitride substrate fabricated by the sublimation method as a base.

7. The method for manufacturing a group III nitride epitaxial growth according to claim 1, wherein, in the step of preparing the single crystal substrate, the single crystal substrate is obtained by bonding small-diameter single crystals of 2 to 4 inches (5.08 cm to 10.16 cm) made by epitaxial growth of aluminium nitride or aluminium gallium nitride by MOCVD or HVPE using a small-diameter gallium nitride single crystal obtained by growing gallium nitride crystal in liquid ammonia or Na flux as a base.

8. The method for manufacturing a group III nitride epitaxial growth according to any one of claims 5 to 7, wherein, in the step of forming the peeling position, the peeling position is formed within the epitaxial layer grown by epitaxial growth.

9. The method for manufacturing a substrate for group-III nitride epitaxial growth according to any one of claims 5 to 8, wherein the remaining section of the single crystal substrate is reused as the base substrate for epitaxial growth.

10. The method for manufacturing a substrate for group-III nitride epitaxial growth according to any one of claims 1, and 5 to 9, wherein the remaining section of the single crystal

substrate is reused as a single crystal substrate in production of a further different group III nitride composite substrate.

11. The method for manufacturing a substrate for group-III nitride epitaxial growth according to any one of claims 1 to 10, wherein the core is aluminum nitride ceramic.

12. The method for manufacturing a substrate for group-III nitride epitaxial growth according to any one of claims 1 to 11, wherein the encapsulating layer contains silicon nitride.

13. The method for manufacturing a substrate for group-III nitride epitaxial growth according to any one of claims 1 to 12, wherein the planarizing layer contains any one of silicon oxide, silicon oxynitride, and aluminum arsenide.

14. The method for manufacturing a substrate for group-III nitride epitaxial growth according to any one of claims 1 to 13, wherein the seed crystal layer is Si<111>, SiC, sapphire, aluminum nitride, or aluminum gallium nitride.

15. The method for manufacturing a substrate for group-III nitride epitaxial growth according to claim 2, wherein the stress adjusting layer includes, at least, silicon.