CLAIMS

What is claimed is:

1. A semiconductor device comprising:

a substrate;

a tensile layer overlying a major surface of the substrate;

a compressive layer overlying the major surface; and

an intermediate layer between the tensile layer and the compressive layer, and in contact with both the tensile layer and the compressive layer;

wherein the tensile layer and the compressive layer both impart forces onto the substrate, to thereby keep the substrate from bowing.

2. The semiconductor device of claim 1, wherein the intermediate layer is thinner than the compressive layer and the tensile layer.

3. The semiconductor device of claim 1, wherein the intermediate layer is an oxidized surface of the compressive layer or the tensile layer.

4. The semiconductor device of claim 1, wherein the tensile layer is closer than the compressive layer to the substrate.

5. The semiconductor device of claim 1,

wherein the tensile layer is a silicon nitride layer; and

wherein the compressive layer is a silicon oxide layer.

6. The semiconductor device of claim 5,

wherein the intermediate layer is a silicon oxy-nitride layer.

7. The semiconductor device of claim 1, wherein a tensile force of the tensile layer balances out a compressive force of the compressive layer.

8. A method of making a semiconductor device, the method comprising:

depositing a tensile layer overlying a major face of a substrate of the device; and

depositing a compressive layer overlying the major face;

wherein the tensile layer and the compressive layer both impart forces onto the substrate, to thereby keep the substrate from bowing; and

wherein the depositing of the tensile layer or the depositing of the compressive layer includes depositing directly on the major surface of the substrate.

9. The method of claim 8, wherein depositing the tensile layer occurs before the depositing the compressive layer, with the compressive layer deposited overlying the tensile layer.

10. The method of claim 8, further comprising forming an intermediate layer that is between the tensile layer and the compressive layer, wherein after the depositing of the tensile layer and the depositing of the compressive layer the intermediate layer is in contact with both the tensile layer and the compressive layer.

11. The method of claim 10, wherein the intermediate layer is formed after the depositing of the tensile layer, and before the depositing of the compressive layer.

12. The method of claim 11, wherein the intermediate layer is formed by oxidizing a surface of the tensile layer.

13. The method of claim 8, wherein depositing the tensile layer includes depositing silicon nitride.

14. The method of claim 13, wherein depositing the silicon nitride includes depositing the silicon nitride by physical vapor deposition.

15. The method of claim 13, wherein depositing the silicon nitride includes columnar deposition of the silicon nitride.

16. The method of claim 13, wherein forming the intermediate layer includes oxidizing a surface of the silicon nitride, to form silicon oxy-nitride.

17. The method of claim 16, wherein oxidizing includes exposing the surface of the silicon nitride to air.

18. The method of claim 16, wherein depositing the compressive layer includes depositing silicon oxide on the silicon oxy-nitride.

19. The method of claim 18, wherein depositing the silicon oxide includes depositing the silicon oxide by physical vapor deposition.

20. The semiconductor device of claim 1, wherein the tensile layer or the compressive layer is in contact with the major surface of the substrate.

21. The semiconductor device of claim 1, wherein the tensile layer, the intermediate layer, and the compressive layer together form a neutral deflection layer overlying the substrate and in contact with the major surface of the substrate.