CLAIMS

1. A method for forming a silicon germanium layer, comprising:

depositing a seed silicon germanium layer over a substrate using plasma enhanced chemical vapor deposition (PECVD), wherein the substrate has a first temperature that is less than 450 degrees Celsius during processing, wherein the PECVD for depositing the seed silicon germanium layer has an RF power between about 300 W and about 600 W; and

depositing a bulk silicon germanium layer directly on the seed silicon germanium layer using PECVD, wherein the substrate has a second temperature that is less than 450 degrees Celsius during processing, wherein the PECVD for depositing the bulk silicon germanium layer has an RF power between about 600 W and about 800 W.

2. The method of claim 1, wherein the substrate includes a complementary metal-oxide semiconductor (CMOS) structure and the seed silicon germanium layer is deposited over the CMOS structure.

3. The method of claim 1, wherein the PECVD for depositing the seed silicon germanium layer has a process pressure between about 3 Torr and about 4.2 Torr.

4. The method of claim 1, wherein the PECVD for depositing the bulk silicon germanium layer has a process pressure between about 3 Torr and about 4.2 Torr.

5. The method of claim 1, further comprising flowing a gas mixture during the depositing of the seed silicon germanium layer, wherein the gas mixture comprises a silicon containing gas, a germanium containing gas, a boron containing gas and a hydrogen gas.

6. The method of claim 5, wherein the silicon containing gas is silane.

7. The method of claim 5, wherein the germanium containing gas is germane.

8. The method of claim 5, wherein the boron containing gas is diborane.

9. The method of claim 5, wherein the silicon containing gas has a flow rate between about 0.064 sccm/cm^2 and 0.085 sccm/cm^2.

10. The method of claim 5, wherein the germanium containing gas has a flow rate between about 0.354 sccm/cm^2 and about 0.476 sccm/cm^2.

11. The method of claim 5, wherein the boron containing gas has a flow rate between about 0.064 sccm/cm^2 and about 0.085 sccm/cm^2.

12. The method of claim 5, wherein the hydrogen gas has a flow rate between about 5.941 sccm/cm^2 and about 7.779 sccm/cm^2.

13. A method for forming a silicon germanium layer, comprising:

depositing a seed silicon germanium layer over a substrate using plasma enhanced chemical vapor deposition (PECVD), wherein the substrate has a first temperature that is less than 450 degrees Celsius during processing, wherein the PECVD for depositing the seed silicon germanium layer has an RF power between about 300 W and about 600 W; and

depositing a bulk silicon germanium layer directly on the seed silicon germanium layer using PECVD, wherein the substrate has a second temperature that is less than 450 degrees Celsius and a gas mixture is introduced during the depositing of the bulk silicon germanium layer, and wherein the gas mixture comprises a silicon containing gas, a germanium containing gas, a boron containing gas and a hydrogen gas, and wherein the PECVD for depositing the bulk silicon germanium layer has an RF power between about 600 W and about 800 W.

14. The method of claim 13, wherein the silicon containing gas has a flow rate between about 0.141 sccm and about 0.282 sccm/cm^2.

15. The method of claim 13, wherein the germanium containing gas has a flow rate between about 1.160 sccm/cm^2 to about 1.414 sccm/cm^2.

16. The method of claim 13, wherein the boron containing gas has a flow rate between about 0.113 sccm/cm^2 and about 0.212 sccm/cm^2.

17. The method of claim 13, wherein the hydrogen gas has a flow rate between about 6.365 sccm/cm^2 and about 7.779 sccm/cm^2.

18. The method of claim 13, wherein the silicon containing gas is silane.