Claims

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

depositing a seed silicon germanium layer over complementary metal-oxide semiconductor (CMOS) on a substrate using plasma enhanced chemical vapor deposition (PECVD), wherein the substrate has a first predetermined temperature during processing, wherein the PECVD for depositing the seed silicon germanium layer has an RF power between 300 W and 600 W; and

depositing a bulk silicon germanium layer directly on the seed silicon germanium layer using PECVD, wherein the substrate has a second predetermined temperature during processing, wherein the PECVD for depositing the bulk silicon germanium layer has an RF power between 600 W and 800 W.

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

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

4. 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.

5. The method of claim 4, wherein the boron containing gas is diborane.

6. The method of claim 4, wherein the silicon containing gas has a flow rate between 0.064 sccm/cm^2 and 0.085 sccm/cm^2.

7. The method of claim 4, wherein the germanium containing gas has a flow rate between 0.354 sccm/cm^2 and 0.476 sccm/cm^2.

8. The method of claim 4, wherein the boron containing gas has a flow rate between 0.064 sccm/cm^2 and 0.085 sccm/cm^2.

9. The method of claim 4, wherein the hydrogen gas has a flow rate between 5.941 sccm/cm^2 and 7.779 sccm/cm^2.

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

depositing a seed silicon germanium layer over complementary metal-oxide semiconductor (CMOS) on a substrate using plasma enhanced chemical vapor deposition (PECVD), wherein the substrate has a first predetermined temperature during processing, wherein the PECVD for depositing the seed silicon germanium layer has an RF power between 300 W and 600 W; and

depositing a bulk silicon germanium layer directly on the seed silicon germanium layer using PECVD, wherein the substrate has a second predetermined temperature 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 600 W and 800 W.

11. The method of claim 10, wherein the silicon containing gas has a flow rate between 0.141 sccm and 0.282 sccm/cm^2.

12. The method of claim 10, wherein the germanium containing gas has a flow rate between 1.160 sccm/cm^2 to 1.414 sccm/cm^2.

13. The method of claim 10, wherein the boron containing gas has a flow rate between 0.113 sccm/cm^2 and 0.212 sccm/cm^2.

14. The method of claim 10, wherein the hydrogen gas has a flow rate between 6.365 sccm/cm^2 and 7.779 sccm/cm^2.