WHAT IS CLAIMED IS:

1. A semiconductor device, comprising:

a first transistor which comprises a first gate stack on a substrate; and

a second transistor which comprises a second gate stack on the substrate,

wherein the first gate stack comprises a first ferroelectric material layer disposed on the substrate, a first work function layer disposed on the first ferroelectric material layer and a first upper gate electrode disposed on the first work function layer,

wherein the second gate stack comprises a second ferroelectric material layer disposed on the substrate, a second work function layer disposed on the second ferroelectric material layer and a second upper gate electrode disposed on the second work function layer,

wherein the first work function layer comprises the same material as the second work function layer, and

wherein an effective work function of the first gate stack is different from an effective work function of the second gate stack.

2. The semiconductor device of claim 1, wherein the first ferroelectric material layer comprises the same material as the second ferroelectric material layer, and the first work function layer is thinner than the second work function layer.

3. The semiconductor device of claim 2, wherein the effective work function of the first gate stack is smaller than the effective work function of the second gate stack, and the first work function layer comprises titanium nitride.

4. The semiconductor device of claim 2 or claim 3, further comprising a third transistor which comprises a third gate stack on the substrate,

wherein the third gate stack comprises a third ferroelectric material layer disposed on the substrate, a third work function layer disposed on the third ferroelectric material layer and a third upper gate electrode disposed on the third work function layer, and

wherein the third work function layer comprises the same material as the first work function layer, a thickness of the third work function layer is equal to a thickness of the first work function layer, the first ferroelectric material layer and the third ferroelectric material

layer comprise a metal oxide, the third ferroelectric material layer comprises a work function material, and the first ferroelectric material layer does not comprise the work function material.

5. The semiconductor device of claim 1, wherein a thickness of the first work function layer is equal to a thickness of the second work function layer, the first ferroelectric material layer and the second ferroelectric material layer comprise a metal oxide, the first ferroelectric material layer comprises a work function material, and the second ferroelectric material layer does not comprise the work function material.

6. The semiconductor device of claim 5, wherein the effective work function of the first gate stack is smaller than the effective work function of the second gate stack, the metal oxide comprises hafnium (Hf), and the work function material comprises lanthanum (La), magnesium (Mg) or yttrium (Y).

7. The semiconductor device of claim 5, wherein the effective work function of the first gate stack is greater than the effective work function of the second gate stack, the metal oxide comprises hafnium (Hf), and the work function material comprises aluminum (Al), titanium (Ti) or niobium (Nb).

8. The semiconductor device of any one of claims 5 to 7, further comprising a third transistor which comprises a third gate stack on the substrate,

wherein the third gate stack comprises a third ferroelectric material layer disposed on the substrate, a third work function layer disposed on the third ferroelectric material layer and a third upper gate electrode disposed on the third work function layer, and

wherein the third work function layer comprises the same material as the second work function layer, the third work function layer is thicker than the second work function layer, the third ferroelectric material layer comprises the metal oxide, and the third ferroelectric material layer does not comprise the work function material.

9. The semiconductor device of any one of claims 1 to 8, wherein each of the first transistor and the second transistor is a negative capacitance field-effect transistor (NCFET).

10. A semiconductor device, comprising:

a first transistor which comprises a first gate stack on a substrate; and

a second transistor which comprises a second gate stack on the substrate,

wherein the first gate stack comprises a first ferroelectric material layer disposed on the substrate, a first work function layer contacting the first ferroelectric material layer and a first upper gate electrode disposed on the first work function layer,

wherein the second gate stack comprises a second ferroelectric material layer disposed on the substrate, a second work function layer contacting the second ferroelectric material layer and a second upper gate electrode disposed on the second work function layer,

wherein the first ferroelectric material layer and the second ferroelectric material layer comprise the same material,

wherein a thickness of the first ferroelectric material layer is equal to a thickness of the second ferroelectric material layer, and

wherein an effective work function of the first gate stack is different from an effective work function of the second gate stack.

11. The semiconductor device of claim 10, wherein the first work function layer comprises the same material as the second work function layer, and the first work function layer is thinner than the second work function layer.

12. The semiconductor device of claim 11, wherein the effective work function of the first gate stack is smaller than the effective work function of the second gate stack, and the first work function layer comprises titanium nitride.

13. The semiconductor device of claim 10, wherein the first work function layer comprises a different material from the second work function layer.

14. The semiconductor device of claim 13, wherein the effective work function of the first gate stack is smaller than the effective work function of the second gate stack, the first work function layer comprises titanium carbonitride (TiCN), titanium nitride (TiN)

or tungsten carbonitride (WCN), and the second work function layer comprises platinum (Pt), iridium (Ir), ruthenium (Ru), molybdenum nitride (MoN) or molybdenum (Mo).

15. The semiconductor device of claim 13, wherein the effective work function of the first gate stack is greater than the effective work function of the second gate stack, the first work function layer comprises titanium carbonitride (TiCN), titanium nitride (TiN) or tungsten carbonitride (WCN), and the second work function layer comprises tungsten (W), titanium silicon nitride (TiSiN), titanium aluminum nitride (TiAIN), titanium boron nitride (TiBN) or tantalum nitride (TaN).

16. The semiconductor device of any one of claims 13 to 15, further comprising a third transistor which comprises a third gate stack on the substrate,

wherein the third gate stack comprises a third ferroelectric material layer disposed on the substrate, a third work function layer contacting the third ferroelectric material layer and a third upper gate electrode disposed on the third work function layer, and

wherein the third work function layer comprises the same material as the first work function layer, the third work function layer is thicker than the first work function layer, the third ferroelectric material layer comprises the same material as the first ferroelectric material layer, and a thickness of the third ferroelectric material layer is equal to the thickness of the first ferroelectric material layer.

17. A semiconductor device, comprising:

a first negative capacitance field-effect transistor (NCFET) which comprises a first gate stack on a substrate; and

a second NCFET which comprises a second gate stack on the substrate,

wherein the first gate stack comprises a first interfacial layer disposed on the substrate, a first gate insulating layer disposed on the first interfacial layer, a first work function layer disposed on the first gate insulating layer to contact the first gate insulating layer and a first upper gate electrode disposed on the first work function layer,

wherein the second gate stack comprises a second interfacial layer disposed on the substrate, a second gate insulating layer disposed on the second interfacial layer, a second work function layer disposed on the second gate insulating layer to contact the second gate

insulating layer and a second upper gate electrode disposed on the second work function layer,

wherein a structure of the first gate stack is different from a structure of the second gate stack, and

wherein an effective work function of the first gate stack is different from an effective work function of the second gate stack, and

wherein the first work function layer comprises the same material as the second work function layer, and a thickness of the first work function layer is different from a thickness of the second work function layer.

18. The semiconductor device of claim 17, wherein the first gate insulating layer comprises the same material as the second gate insulating layer, and a thickness of the first gate insulating layer is equal to a thickness of the second gate insulating layer.

19. The semiconductor device of claim 17 or claim 18, wherein the first gate insulating layer comprises the same metal oxide as the second gate insulating layer, the first gate insulating layer comprises a work function material, and the second gate insulating layer does not comprise the work function material.