CLAIMS

1. A method for manufacturing a semiconductor substrate by forming an insulator film and a semiconductor single crystal layer successively on a surface of a silicon single crystal substrate to manufacture a semiconductor substrate having the semiconductor single crystal layer on the insulator film, the method comprising at least the steps of:

forming a silicon nitride film having an epitaxial relationship with the silicon single crystal substrate on the surface of the silicon single crystal substrate as the insulator film by subjecting the silicon single crystal substrate to a heat treatment under a nitrogen gas-containing atmosphere; and

forming the semiconductor single crystal layer on the silicon nitride film by epitaxial growth, wherein

the silicon nitride film has a film thickness of 2 nm or less, and

a plurality of layers of the silicon nitride film and the semiconductor single crystal layer are formed alternately.

2. The method for manufacturing a semiconductor substrate according to claim 1, wherein the heat treatment under the nitrogen gas-containing atmosphere is performed at a temperature of 800°C or higher.

3. The method for manufacturing a semiconductor substrate according to claim 1 or 2, wherein by using an epitaxial growth apparatus as an apparatus for performing the heat treatment, the silicon nitride film is formed, and then an atmospheric gas inside the

epitaxial growth apparatus is switched to a gas for growing the semiconductor single crystal layer to perform the epitaxial growth.

4. The method for manufacturing a semiconductor substrate according to any one of claims 1 to 3, wherein the semiconductor single crystal layer is one of an Si layer, an SiGe layer, a Ge layer, or a compound semiconductor layer.

5. The method for manufacturing a semiconductor substrate according to claim 4, wherein the semiconductor single crystal layer is an Si layer, and a gas for the epitaxial growth of the Si layer is trichlorosilane.

6. The method for manufacturing a semiconductor substrate according to any one of claims 1 to 5, wherein a silicon single crystal substrate doped with nitrogen or oxygen beforehand is used as the silicon single crystal substrate.

7. The method for manufacturing a semiconductor substrate according to any one of claims 1 to 6, wherein a silicon single crystal substrate having a plane orientation of (111) is used as the silicon single crystal substrate.

8. A semiconductor substrate having an insulator film and a semiconductor single crystal layer on the insulator film on a surface of a silicon single crystal substrate, wherein

the insulator film is a silicon nitride film

having an epitaxial relationship with the silicon single crystal substrate,

the semiconductor single crystal layer is an epitaxial growth layer,

the silicon nitride film has a film thickness of 2 nm or less, and

having a plurality of layers of the silicon nitride film and the semiconductor single crystal layer alternately.

9. The semiconductor substrate according to claim 8, wherein the semiconductor single crystal layer is one of an Si layer, an SiGe layer, a Ge layer, or a compound semiconductor layer.

10. The semiconductor substrate according to any one of claims 8 to 9, wherein the silicon single crystal substrate has a plane orientation of (111).