

According to an aspect of the present invention, there is provided a method for producing a hybrid substrate comprising the steps of:

furnishing an SOI substrate which is obtained by
5 stacking a first silicon oxide layer and a silicon active layer in this order on a silicon substrate such that a terrace portion not including the silicon active layer is left on an outer peripheral portion of the silicon substrate surface,
forming a second silicon oxide layer on the silicon
10 active layer surface of the SOI substrate,

prior to bonding the SOI substrate to a support
substrate made of sapphire having a different coefficient of thermal expansion from the SOI substrate, subjecting the surface of the SOI substrate and/or the support substrate to
15 be bonded to activation treatment,

bonding the SOI substrate to the support substrate at a
higher temperature than room temperature and at a lower
temperature than 250°C, with the second silicon oxide layer
interposed therebetween, to form a bonded substrate,

20 subjecting the bonded substrate to a combination of a consolidation heat treatment for increasing the bond strength between the SOI substrate and the support substrate and a grinding/thinning treatment of thinning the silicon substrate by grinding, the combination being repeated at least twice
25 under the conditions that the temperature of the first consolidation heat treatment is equal to or higher than the bonding temperature, the silicon substrate after the first grinding/thinning treatment has a thickness of 130 μm at the thinnest, the temperature of the final consolidation heat
30 treatment is 200°C to less than 250°C, the silicon substrate after the final grinding/thinning treatment has a thickness of 60 μm at the thinnest,

etching away the thinned silicon substrate until the first silicon oxide layer is exposed, and

35 etching away the bare first silicon oxide film,
yielding a hybrid substrate in which the silicon active layer is disposed on the support substrate via the silicon oxide layer.

CLAIMS:

1. A method for producing a hybrid substrate comprising the steps of:

5 furnishing an SOI substrate which is obtained by stacking a first silicon oxide layer and a silicon active layer in this order on a silicon substrate such that a terrace portion not including the silicon active layer is left on an outer peripheral portion of the silicon substrate surface,

10 forming a second silicon oxide layer on the silicon active layer surface of the SOI substrate,

 prior to bonding the SOI substrate to a support substrate made of sapphire having a different coefficient of thermal expansion from the SOI substrate, subjecting the surface of the SOI substrate and/or the support substrate to be bonded to
15 activation treatment,

 bonding the SOI substrate to the support substrate at a higher temperature than room temperature and at a lower temperature than 250°C, with the second silicon oxide layer
20 interposed therebetween, to form a bonded substrate,

 subjecting the bonded substrate to a combination of a consolidation heat treatment for increasing the bond strength between the SOI substrate and the support substrate and a grinding/thinning treatment of thinning the silicon substrate
25 by grinding, the combination being repeated at least twice under the conditions that the temperature of the first consolidation heat treatment is equal to or higher than the bonding temperature, the silicon substrate after the first grinding/thinning treatment has a thickness of 130 μm at the
30 thinnest, the temperature of the final consolidation heat treatment is 200°C to less than 250°C, the silicon substrate after the final grinding/thinning treatment has a thickness of 60 μm at the thinnest,

 etching away the thinned silicon substrate until the first
35 silicon oxide layer is exposed, and

8. The method for producing a hybrid substrate of any one of claims 1 to 7 wherein the terrace portion has a width of 1 mm to 3 mm.

5 9. The method for producing a hybrid substrate of any one of claims 1 to 8 wherein the silicon active layer in the SOI substrate is free of vacancy defects and suffers no oxidation-induced stacking faults upon thermal oxidation.

10 ~~10. The method for producing a hybrid substrate of any one of claims 1 to 9 wherein the support substrate is made of quartz glass, borosilicate glass or sapphire.~~

15 ~~11~~10. The method for producing a hybrid substrate of any one of claims 1 to ~~10~~9, further comprising the step of subjecting the support substrate to heat treatment in a reducing atmosphere, prior to the step of bonding the SOI substrate to the support substrate.

20 ~~12~~11. The method for producing a hybrid substrate of any one of claims 1 to ~~11~~10 wherein the support substrate is thinned such that the surface of the support substrate to be bonded to the SOI substrate includes an outer peripheral region of predetermined width which is depressed relative to a central
25 portion.

~~13~~12. A hybrid substrate produced by the method of any one of claims 1 to ~~12~~11, having the silicon active layer disposed on the support substrate via the silicon oxide layer.