Claims

[Claim 1]

A method for manufacturing a semiconductor device, the method comprising:

(1) preparing a wafer laminate having a laminated structure comprising a first wafer having a circuit forming surface comprising a wiring pattern, a second wafer having a main surface and a back surface opposite to the main surface, and an adhesive layer containing an SiOC-based polymer and provided between the circuit forming surface of the first wafer and the back surface of the second wafer;

(2) forming a hole in the wafer laminate by etching the wafer laminate from the second wafer side via a mask pattern masking a portion of the main surface side of the second wafer, the hole extending through the second wafer and the adhesive layer and reaching a wiring pattern on the first wafer;

(3) forming an insulating film on an inner surface of the hole;

(4) etching away a portion of the insulating film in the hole, the portion being on the wiring pattern;

(5) subjecting the wafer laminate that has undergone the etching away in (4) to a cleaning treatment comprising an oxygen plasma cleaning treatment, an argon sputtering cleaning treatment, and a sulfuric acid cleaning treatment between the oxygen plasma cleaning treatment and the argon sputtering cleaning treatment; and

(6) forming a conductive portion by filling a conductive material into the hole that has undergone the cleaning treatment.

[Claim 2]

The method for manufacturing a semiconductor device according to claim 1, wherein the cleaning treatment comprises an oxygen plasma cleaning treatment and a subsequent argon sputtering cleaning treatment.

[Claim 3]

The method for manufacturing a semiconductor device according to claim 1 or 2, wherein a treatment time of the oxygen plasma cleaning treatment is from 5 to 120 seconds.

[Claim 4]

The method for manufacturing a semiconductor device according to any one of claims 1 to 3, wherein a treatment time of the argon sputtering cleaning treatment is from 0.5 to 5 minutes.

[Claim 5]

The method for manufacturing a semiconductor device according to any one of claims 1 to 4, wherein the adhesive layer is a cured product of an adhesive composition containing a polymerizable group-containing polyorganosilsesquioxane.

[Claim 6]

The method for manufacturing a semiconductor device according to any one of claims 1 to 5, wherein the adhesive layer has a thickness of not greater than 5 μm.

[Claim 7]

The method for manufacturing a semiconductor device according to any one of claims 1 to 6, wherein the second wafer has a thickness of not greater than 20 μm.