Claims

1. A method (100) for forming an electronically conductive through-wafer-via through a substrate (210, 410) by a chemical vapour deposition in a reactor,

the substrate comprises a hole (226, 420) in the substrate, the method comprising

adjusting (140) a deposition temperature between 605°C-800°C and a deposition pressure below 0,27 mbar in a process chamber of the reactor, and

depositing (150) one or more polycrystalline silicon layers (230a, 230b, 230c) inside the hole by using a silicon source gas comprising SiH_4 or SiH_2Cl_2, and a dopant gas comprising BCl_3 for forming the electrically conductive via through the substrate.

2. The method of claim 1, wherein the dopant gas comprises a mixture of BCl_3 and another gas comprising He, Ar, N_2, or H_2.

3. The method of any of the preceding claims, wherein the method comprises depositing the one or more polycrystalline silicon layers on the substrate in the adjusted deposition temperature and the deposition pressure between 0,21 mbar-0,23 mbar by using SiH_4 as a silicon source gas.

4. The method of any of the preceding claims, wherein the reactor is a horizontal hot-wall reactor, and at least one polycrystalline silicon layer is deposited in the deposition temperature between 605°C-650°C and at least one polycrystalline silicon layer is deposited in the deposition temperature between 650°C-750°C.

5. The method of any of claims 1-3, wherein the reactor is a vertical reactor and at least one polycrystalline silicon layer is deposited in the deposition temperature between 605°C-650°C and at least one polycrystalline silicon layer is deposited in the deposition temperature between 650°C-750°C.

6. The method of any of the preceding claims, wherein the substrate further comprises a protrusion extending from a surface of the substrate, and the one or more polycrystalline silicon layers are deposited on the protrusion.

7. The method of any of the preceding claims, wherein the substrate comprises at least an insulating surface layer.

8. A semiconductor structure (200) comprising

a substrate (210, 410), which comprises a hole (226, 420) in the substrate, and

one or more polycrystalline silicon layers (230a, 230b, 230c) inside the hole, and

wherein the structure is provided by the method of any of claims 1-7.

9. An apparatus (500) comprising

a semiconductor structure (200) comprising

a substrate (210, 410), which comprises a hole (226, 420) in the substrate, and

one or more polycrystalline silicon layers (230a, 230b, 230c) inside the hole, and

wherein the structure is provided by the method of any claims 1-7.

Claims

1. A method (100) for forming an electrically conductive via through a substrate (210, 410) by a chemical vapour deposition in a reactor,
the substrate comprises a hole (226, 420) in the substrate,
the method comprising
adjusting (140) a deposition temperature between 605°C-800°C and a deposition pressure below 0,27 mbar in a process chamber of the reactor, and
depositing (150) one or more polycrystalline silicon layers (230a, 230b, 230c) inside the hole by using a silicon source gas comprising SiH_4 or SiH_2Cl_2, and a dopant gas comprising BCl_3 so that the one or more polycrystalline silicon layers are directly on a surface of the hole in order to form the electrically conductive via through the substrate.

2. The method of claim 1, wherein the dopant gas comprises a mixture of BCl_3 and another gas comprising He, Ar, N_2, or H_2.

3. The method of any of the preceding claims, wherein the method comprises depositing the one or more polycrystalline silicon layers on the substrate in the adjusted deposition temperature and the deposition pressure between 0,21 mbar-0,23 mbar by using SiH_4 as a silicon source gas.

4. The method of any of the preceding claims, wherein the reactor is a horizontal hot-wall reactor, and at least one polycrystalline silicon layer is deposited in the deposition temperature between 605°C-650°C and at least one polycrystalline silicon layer is deposited in the deposition temperature between 650°C-750°C.

5. The method of any of claims 1-3, wherein the reactor is a vertical reactor and at least one polycrystalline silicon layer is deposited in the deposition temperature between 605°C-650°C and at least one polycrystalline silicon layer is deposited in the deposition temperature between 650°C-750°C.

6. The method of any of the preceding claims, wherein the substrate further comprises a protrusion extending from a surface of the substrate, and the one or more polycrystalline silicon layers are deposited on the protrusion.

7. The method of any of the preceding claims, wherein the substrate comprises at least an insulating surface layer.

8. A semiconductor structure (200) comprising
a substrate (210, 410),
a hole (226, 420) in the substrate, and
one or more polycrystalline silicon layers (230a, 230b, 230c) inside the hole,
wherein the one or more polycrystalline silicon layers originate from a silicon source gas comprising SiH_4 or SiH_2Cl_2, and a dopant gas comprising BCl_3,
wherein the one or more polycrystalline silicon layers are directly on a surface of the hole,
wherein the one or more polycrystalline silicon layers form an electrically conductive via through the substrate, and
wherein the structure is provided by the method of any of claims 1-7.

9. An apparatus (500) comprising
a semiconductor structure (200) comprising
a substrate (210, 410),
a hole (226, 420) in the substrate, and
one or more polycrystalline silicon layers (230a, 230b, 230c) inside the hole,
wherein the one or more polycrystalline silicon layers originate from a silicon source gas comprising SiH_4 or SiH_2Cl_2, and a dopant gas comprising BCl_3,
wherein the one or more polycrystalline silicon layers are directly on a surface of the hole,
wherein the one or more polycrystalline silicon layers form an electrically conductive via through the substrate, and
wherein the structure is provided by the method of any of claims 1-7.