

CLAIMS

1. A semiconductor structure, comprising:

a base; and

a communication portion, the communication portion being located in the base and the communication portion comprising a first connection layer, a second connection layer, and a third connection layer, the second connection layer being located on the first connection layer, and the third connection layer being located on the second connection layer;

wherein a top of the third connection layer is flush with a top of the first connection layer;

wherein the first connection layer, the second connection layer, and the third connection layer comprise different conductive materials, thermal expansion coefficients of the second connection layer and the third connection layer are both less than a thermal expansion coefficient of the first connection layer; wherein a thermal expansion coefficient of the second connection layer is less than a thermal expansion coefficient of the third connection layer.

2. The semiconductor structure according to claim 1, wherein the second connection layer or the third connection layer comprises graphene, and the first connection layer comprises copper.

3. The semiconductor structure according to claim 1, wherein the second connection

layer is located in the first connection layer.

4. The semiconductor structure according to claim 3, wherein the third connection layer is located in the first connection layer.

5. The semiconductor structure according to claim 4, wherein in a direction perpendicular to the base, a projection of the second connection layer coincides with a projection of the third connection layer.

6. The semiconductor structure according to claim 3, wherein in a direction perpendicular to the base, a projection of the first connection layer coincides with a projection of the third connection layer.

7. The semiconductor structure according to claim 3, wherein a bottom of the third connection layer is flush with a top of the second connection layer and a top of the first connection layer.

8. The semiconductor structure according to claim 1, wherein in a direction perpendicular to the base, a projection of the first connection layer, a projection of the second connection layer, and a projection of the third connection layer coincide with each other.

9. The semiconductor structure according to claim 1, wherein the base comprises:

a silicon substrate, a bottom of the second connection layer being lower than an upper surface of the silicon substrate; and

an insulation layer, the insulation layer covering the upper surface of the silicon substrate and covering an outer surface of the communication portion.

10. The semiconductor structure according to claim 9, wherein a functional layer is formed

in the silicon substrate, and the bottom of the second connection layer is lower than a lower surface of the functional layer.

11. The semiconductor structure according to claim 9, wherein a top of the second connection layer is higher than the upper surface of the silicon substrate.

12. The semiconductor structure according to claim 9, wherein a portion of the second connection layer entering the silicon substrate has a depth greater than or equal to 1 μm .

13. The semiconductor structure according to claim 1, wherein the communication portion is a through-silicon via.

14. The semiconductor structure according to claim 1, wherein the second connection layer has a diameter of 200 nm to 10 μm , and the second connection layer has a depth of 1 μm to 20 μm .

15. A semiconductor structure, comprising:

a base; and

a communication portion, the communication portion being located in the base and the communication portion comprising a first connection layer, a second connection layer, and a third connection layer, the second connection layer being located on the first connection layer, and the third connection layer being located on the second connection layer;

wherein a top of the third connection layer is flush with a top of the first connection layer;

wherein the second connection layer and the third connection layer both comprise

graphene, and thermal expansion coefficients of the second connection layer and the third connection layer are both less than a thermal expansion coefficient of the first connection layer; wherein a thermal expansion coefficient of the second connection layer is less than a thermal expansion coefficient of the third connection layer.

16. A method of manufacturing a semiconductor structure, comprising:

providing a matrix; and

forming a communication portion on the matrix, the communication portion comprising a first connection layer, a second connection layer, and a third connection layer, the second connection layer being formed on the first connection layer, and the third connection layer being formed on the second connection layer;

wherein a top of the third connection layer is flush with a top of the first connection layer;

wherein the first connection layer, the second connection layer, and the third connection layer comprise different conductive materials, thermal expansion coefficients of the second connection layer and the third connection layer are both less than a thermal expansion coefficient of the first connection layer; wherein a thermal expansion coefficient of the second connection layer is less than a thermal expansion coefficient of the third connection layer.

17. The method of manufacturing the semiconductor structure according to claim 16, wherein the second connection layer or the third connection layer comprises graphene, and the first

connection layer comprises copper.

18. The method of manufacturing the semiconductor structure according to claim 16 or 17, wherein an opening is formed in the first connection layer, and the second connection layer and the third connection layer are sequentially formed in the opening.

19. The method of manufacturing the semiconductor structure according to claim 16 or 17, wherein the first connection layer, the second connection layer, and the third connection layer are sequentially formed in the matrix;

wherein in a direction perpendicular to the matrix, a projection of the first connection layer, a projection of the second connection layer, and a projection of the third connection layer coincide with each other.