

WHAT IS CLAIMED IS:

1. A method of manufacturing a semiconductor device, the method comprising:

forming a stacked structure, the stacked structure comprising first material layers and second material layers that are alternately stacked in a vertical direction;

forming an isolation insulating layer passing through at least one of the first material layers and at least one of the second material layers;

forming channel structures passing through the stacked structure;

forming holes and a slit passing through the stacked structure, wherein the slit is spaced apart from the isolation insulating layer with the channel structures interposed between the isolation insulating layer and the slit, and wherein the holes are arranged between the slit and the isolation insulating layer;

and

forming material patterns that replace the second material layers through the holes and the slit.

2. The method of claim 1, wherein the holes include first holes, the first holes being arranged next to each other in a first horizontal direction crossing the vertical direction, and second holes, the second holes being arranged next to each other in the

first horizontal direction, and

wherein the channel structures are arranged between the first holes and the second holes.

5 3. The method of claim 2, wherein the first holes and the second holes are arranged in a zigzag pattern.

10 4. The method of claim 2, ~~further comprising forming slits passing through the stacked structure and~~ wherein the slit extends ~~extending~~ in a second horizontal direction, crossing the vertical direction,

~~wherein, in the forming of the material patterns, the second material layers are replaced by the material patterns through the slits,~~ and

15 wherein the material patterns surround the channel structures.

20 5. The method of claim 4, wherein the second horizontal direction crosses the first horizontal direction.

20 6. The method of claim 4, wherein the slits ~~s~~ extend s between the first holes and between the second holes.

7. The method of claim 4, ~~further comprising forming~~

~~isolation insulating layers~~ wherein the isolation insulating layer extends~~ing~~ in the second horizontal direction in the stacked structure,~~each of the isolation insulating layers passing through at least one of the first material layers and at least one of the~~
5 ~~second material layers.~~

8. A method of manufacturing a semiconductor device, the method comprising:

forming a stacked structure, the stacked structure
10 comprising first material layers and second material layers that are alternately stacked in a vertical direction;

forming isolation insulating layers passing through at least one of the first material layers and at least one of the second material layers;

15 forming channel structures passing through the stacked structure;

forming first holes arranged next to each other in a first horizontal direction crossing the vertical direction, and second holes arranged next to each other in the first horizontal direction
20 and slits extending in a second horizontal direction crossing the vertical direction, wherein the first holes, the second holes and the slits pass through the stacked structure, wherein the channel structures are arranged between the first holes and the second holes, ~~The method of claim 7,~~ wherein at least one of the

isolation insulating layers is arranged between the slits adjacent to each other in the first horizontal direction, and wherein the first holes and the second holes are arranged between the slits and the isolation insulating layer adjacent to each other in the first horizontal direction and between the isolation insulating layers adjacent to each other in the first horizontal direction; and forming material patterns that replace the second material layers through the first holes, the second holes and the slits.

9. The method of claim 87, wherein the channel structures comprise:

first channel structures abutting each of the isolation insulating layers and being arranged next to each other in the second horizontal direction; and

second channel structures abutting each of the slits and arranged next to each other in the second horizontal direction.

10. The method of claim 87, wherein the channel structures are arranged in at least two columns between the isolation insulating layers adjacent to each other, and

the channel structures are arranged in at least two columns between the slits and the isolation insulating layers adjacent to the slits.

11. The method of claim 1, further comprising forming a vertical structure in each of the holes,

wherein the vertical structure comprises:

5 a sidewall insulating layer covering a sidewall of each of the holes; and

a conductive material formed in each of the holes, opened by the sidewall insulating layer.

10 12. The method of claim 1, further comprising forming a vertical structure in each of the holes,

wherein the vertical structure includes an insulating material, completely filling each of the holes.

15 13. The method of claim 1, further comprising forming a vertical structure in each of the holes,

wherein the vertical structure includes a protruding portion, extending between the first material layers adjacent to each other.

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~~14. A semiconductor device, comprising:
interlayer insulating layers and conductive patterns that
are alternately stacked in a vertical direction;
first holes arranged in a first horizontal direction crossing~~

~~the vertical direction and passing through the interlayer insulating layers and the conductive patterns;~~

~~second holes arranged in the first horizontal direction and passing through the interlayer insulating layers and the conductive patterns;~~

~~channel structures that are arranged between the first holes and the second holes, the channel structures passing through the interlayer insulating layers and the conductive patterns; and~~

~~vertical structures filling the first holes and the second holes and the vertical structures including protruding portions that protrude toward the adjacent conductive patterns.~~

~~15. The semiconductor device of claim 14, wherein the first holes and the second holes are arranged in a zigzag pattern.~~

~~16. A semiconductor device, comprising:
interlayer insulating layers and conductive patterns that are alternately stacked in a vertical direction;~~

~~first holes arranged in a first horizontal direction crossing the vertical direction and passing through the interlayer insulating layers and the conductive patterns;~~

~~second holes arranged in the first horizontal direction and passing through the interlayer insulating layers and the~~

~~conductive patterns;~~

~~channel structures that are arranged between the first holes and the second holes, the channel structures passing through the interlayer insulating layers and the conductive patterns;~~

~~a sidewall insulating layer covering a sidewall of each of the first and second holes; and~~

~~a conductive contact pillar filling each of the first and second holes and formed on the sidewall insulating layer.~~

~~17. The semiconductor device of claim 16, wherein the first holes and the second holes are arranged in a zigzag pattern.~~