Claims

[Claim 1]

A semiconductor device comprising:

a stacked body including a first electrode layer and a second electrode layer provided to be electrically insulated from the first electrode layer in a stacking direction;

at least two first insulating layers provided in the stacked body to range from an upper end of the stacked body to a lower end of the stacked body, and extending in a first direction intersecting the stacking direction;

a second insulating layer extending in the first direction, provided in the stacked body between nearest two layers, a third insulating layer and a fourth insulating layer, of the at least two first insulating layers, and dividing the second electrode layer in a third direction intersecting the stacking direction and the first direction;

a plurality of first column-shaped portions extending in the stacking direction through the stacked body and arranged in at least four rows each extending in the first direction between the second insulating layer and the third insulating layer; and

a plurality of second column-shaped portions extending in the stacking direction through the stacked body and arranged in at least four rows each extending in the first direction between the second insulating layer and the fourth insulating layer,

wherein a length in the first direction of the second insulating layer is longer than a length in the first direction of the second electrode layer and shorter than a length in the first direction of the first electrode layer.

[Claim 2]

The device according to claim 1, wherein

the first electrode layer is a word line, and

the second electrode layer is a selection gate layer.

[Claim 3]

The device according to claim 2, wherein the word line is a dummy word line.

[Claim 4]

The device according to claim 1, wherein

the plurality of first column-shaped portions each includes:

a semiconductor body extending in the stacking direction; and

a charge storage portion provided between the semiconductor body and the first electrode layer, and

the plurality of second column-shaped portions each includes:

a semiconductor body extending in the stacking direction; and

a charge storage portion provided between the semiconductor body and the first electrode layer.

[Claim 5]

A semiconductor device comprising:

a stacked body including a first electrode layer, a second electrode layer, and a third electrode layer, the second electrode layer provided to be electrically insulated from the first electrode layer in a stacking direction, the third electrode layer interposed between the second electrode layer and the first electrode layer in the stacking direction and provided to be electrically insulated from the second electrode layer;

at least two first insulating layers provided in the stacked body to range from an upper end of the stacked body to a lower end of the stacked body, and extending in a first direction intersecting the stacking direction;

a second insulating layer extending in the first direction, the second insulating layer provided in the stacked body between a third insulating layer and a fourth insulating layer neighboring each other among the at least two first insulating layers, and dividing the second electrode layer in a third direction intersecting the stacking direction and the first direction;

a plurality of first column-shaped portions extending in the stacking direction through the stacked body and arranged in at least four rows each extending in the first direction between the second insulating layer and the third insulating layer;

a plurality of second column-shaped portions extending in the stacking direction through the stacked body and arranged in at least four rows each extending in the first direction between the second insulating layer and the fourth insulating layer; and

an interconnection electrically connecting the first electrode layer and the third electrode layer.

[Claim 6]

The device according to claim 5, wherein

the first electrode layer is a first word line,

the second electrode layer is a selection gate layer, and

the third electrode layer is a second word line.

[Claim 7]

The device according to claim 6, wherein

the first word line is a first dummy word line, and

the second word line is a second dummy word line.

[Claim 8]

The device according to claim 6, wherein the second insulating layer divides the first word line in the third direction.

[Claim 9]

The device according to claim 5, wherein

the plurality of first column-shaped portions each includes:

a semiconductor body extending in the stacking direction; and

a charge storage portion provided between the semiconductor body and the first electrode layer, and

the plurality of second column-shaped portions each includes:

a semiconductor body extending in the stacking direction; and

a charge storage portion provided between the semiconductor body and the first electrode layer.

[Claim 10]

The device according to claim 5, wherein

the interconnection is provided in the stacked body, and

the interconnection is provided below the second insulating layer.

[Claim 11]

The device according to claim 10, further comprising a third column-shaped portion extending in the stacked body in the stacking direction, wherein

the second insulating layer extends in the third column-shaped portion in the stacking direction,

the third column-shaped portion has the same structure as one of the plurality of first column-shaped portions, and

the interconnection is provided along the third column-shaped portion.

[Claim 12]

A semiconductor device, comprising:

a stacked body including a first electrode layer, a second electrode layer provided to be electrically insulated from the first electrode layer in a stacking direction, and a third electrode layer provided to be electrically insulated from the second electrode layer in the stacking direction;

at least two first insulating layers provided in the stacked body to range from an upper end of the stacked body to a lower end of the stacked body, and extending in a first direction intersecting the stacking direction;

a second insulating layer extending in the first direction, the second insulating layer provided in the stacked body between a third insulating layer and a fourth insulating layer neighboring each other among the at least two first insulating layers, and dividing the second electrode layer and the third electrode layer in a third direction intersecting the stacking direction and the first direction;

a plurality of first column-shaped portions extending in the stacking direction through the stacked body and arranged in at least four rows each extending in the first direction between the second insulating layer and the third insulating layer;

a plurality of second column-shaped portions extending in the stacking direction through the stacked body and arranged in at least four rows each extending in the first direction between the second insulating layer and the fourth insulating layer; and

an interconnection electrically connecting the second electrode layer and the third electrode layer.

[Claim 13]

The device according to claim 12, wherein

the first electrode layer is a word line,

the second electrode layer is a first selection gate layer, and

the third electrode layer is a second selection gate layer.

[Claim 14]

The device according to claim 13, wherein the word line is a dummy word line.

[Claim 15]

The device according to claim 12, wherein

the plurality of first column-shaped portions each includes:

a semiconductor body extending in the stacking direction; and

a charge storage portion provided between the semiconductor body and the first electrode layer, and

the plurality of second column-shaped portions each includes:

a semiconductor body extending in the stacking direction; and

a charge storage portion provided between the semiconductor body and the first electrode layer.

[Claim 16]

The device according to claim 12, wherein

the interconnection is provided in the stacked body, and

the interconnection is provided along the second insulating layer.

[Claim 17]

The device according to claim 12, further comprising a fifth insulating layer extending in the first direction, the fifth insulating layer provided in the stacked body between one of the at least two first insulating layers and the second insulating layer, and dividing the second electrode layer and the third electrode layer in the third direction.

[Claim 18]

The device according to claim 1, further comprising:

a first staircase portion provided in a first end region of the stacked body between the at least two first insulating layers; and

a second staircase portion provided in a second end region of the stacked body located on a side opposite to the first end region between the at least two first insulating layers.

[Claim 19]

The device according to claim 18, wherein

the plurality of first column-shaped portions are provided in an intermediate region of the stacked body located between the first end region and the second end region, and

the plurality of second column-shaped portions are provided in the intermediate region of the stacked body.

[Claim 20]

The device according to claim 5, further comprising:

a first staircase portion provided in a first end region of the stacked body between the at least two first insulating layers; and

a second staircase portion provided in a second end region of the stacked body located on a side opposite to the first end region between the at least two first insulating layers.

[Claim 21]

The device according to claim 20, wherein

the plurality of first column-shaped portions are provided in an intermediate region of the stacked body located between the first end region and the second end region, and

the plurality of second column-shaped portions are provided in the intermediate region of the stacked body.

[Claim 22]

The device according to claim 20, wherein

the interconnection is provided outside the stacked body, and

the interconnection is provided above at least one of the first end region and the second end region.

[Claim 23]

The device according to claim 5, wherein the interconnection electrically connecting the first electrode layer and the third electrode layer in the stacked body.

[Claim 24]

The device according to claim 12, further comprising:

a first staircase portion provided in a first end region of the stacked body between the at least two first insulating layers; and

a second staircase portion provided in a second end region of the stacked body located on a side opposite to the first end region between the at least two first insulating layers.

[Claim 25]

The device according to claim 12, wherein the interconnection electrically connecting the second electrode layer and the third electrode layer in the stacked body.