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### MULTILAYER CERAMIC ELECTRONIC COMPONENT

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#### Abstract

A multilayer ceramic electronic component includes a multilayer body including ceramic layers that are laminated, first and second internal electrode layers respectively on the ceramic layers and exposed to first and second end surfaces, first and second external electrodes respectively connected to the first and second internal electrode layers. The first and second external electrodes include a base electrode layer including at least one of Ni, Cr, Cu, or Ti and a plating layer including lower, middle, and upper layer plating layers. A particle diameter of a metal included in the lower layer plating layer is larger than a particle diameter of a metal included in the middle layer plating layer.

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## **Background/Summary**

### **CROSS REFERENCE TO RELATED APPLICATIONS**

[0001] This application claims the benefit of priority to Japanese Patent Application No. 2021-117585 filed on Jul. 16, 2021. The entire contents of this application are hereby incorporated herein by reference.

### **BACKGROUND OF THE INVENTION**

#### **1. Field of the Invention**

[0002] The present invention relates to a multilayer ceramic electronic component, and particularly, to a multilayer ceramic electronic component including an external electrode having a multilayer structure.

#### **2. Description of the Related Art**

[0003] In recent years, along with downsizing and multi-functionalization of electronic devices, there is also an increasing demand for products with a reduced size and an increased capacitance in multilayer ceramic electronic components mounted in the electronic devices.

[0004] A multilayer ceramic capacitor which is such a multilayer ceramic electronic component includes, for example, as described in Japanese Patent Laid-Open No. H8-306580, a ceramic sintered compact in which dielectric ceramics such as barium titanate and internal electrodes are alternately laminated, and a pair of external electrodes formed so as to cover individual end surfaces of the ceramic sintered compact.

[0005] As one of methods for achieving a reduced size and an increased capacitance, for example, there is a technique of forming an external electrode with a plating electrode (Cu plating) as disclosed in Japanese Patent Laid-Open No. 2009-283597. In Japanese Patent Laid-Open No. 2009-283597, a thickness of an external electrode is reduced by forming a plating electrode (Cu plating) directly on an electronic component main body, and an effective area of an internal electrode can be increased by an amount of the reduced thickness of the external electrode by making a ceramic element as large as possible within standard dimensions.

[0006] However, in a case where a plating electrode (Cu plating) is formed on a ceramic element as disclosed in Japanese Patent Laid-Open No. 2009-283597, when a the plating electrode at a portion connected to an internal electrode is reduced, an entry path of moisture from outside is short. This may cause entry of moisture from outside, resulting in a problem of deterioration in moisture resistance.

### **SUMMARY OF THE INVENTION**

[0007] Preferred embodiments of the present invention provide multilayer ceramic electronic components that are each able to reduce or prevent moisture entry from outside while sufficiently maintaining a fixing strength with an internal electrode layer at a connection portion with the internal electrode layer even when an external electrode is a plating layer, and having high moisture resistance reliability.

[0008] A multilayer ceramic electronic component according to a preferred embodiment of the present invention includes a multilayer body including a plurality of ceramic layers that are

laminated, and including a first main surface and a second main surface facing each other in a height direction that is a laminating direction, a first side surface and a second side surface facing each other in a width direction orthogonal or substantially orthogonal to the height direction, and a first end surface and a second end surface facing each other in a length direction orthogonal or substantially orthogonal to the laminating direction and the width direction, a first internal electrode layer on a ceramic layer of the plurality of ceramic layers and exposed to the first end surface, a second internal electrode layer on a ceramic layer of the plurality of ceramic layers and exposed to the second end surface, a first external electrode connected to the first internal electrode layer, and on the first end surface, on a portion of the first main surface, and on a portion of the second main surface, and a second external electrode connected to the second internal electrode layer, and on the second end surface, on a portion of the first main surface, and on a portion of the second main surface. In the multilayer ceramic electronic component, the first external electrode and the second external electrode include a base electrode layer and a plating layer, the base electrode layer is a thin film electrode on at least a portion of the first main surface and a portion of the second main surface and including at least one of Ni, Cr, Cu, or Ti, the plating layer includes a lower layer plating layer exclusively on the first end surface and the second end surface, a middle layer plating layer on the lower layer plating layer, on the first end surface and the second end surface on which the lower layer plating layer is not located, and on the base electrode layer, and an upper layer plating layer on the middle layer plating layer. When a sum of a thickness in the length direction of the lower layer plating layer and a thickness in the length direction of the middle layer plating layer located on the first end surface is defined as X1, a sum of a thickness in the length direction of the lower layer plating layer and a thickness in the length direction of the middle layer plating layer located on the second end surface is defined as X2, a sum of a thickness in the height direction of the base electrode layer and a thickness in the height direction of the middle layer plating layer located on the first main surface is defined as Y1, and a sum of a thickness in the height direction of the base electrode layer and a thickness in the height direction of the middle layer plating layer located on the second main surface is defined as Y2, relationships of  $X1 > Y1$ ,  $X1 > Y2$ ,  $X2 > Y1$ , and  $X2 > Y2$  are satisfied, and a particle diameter of a metal included in the lower layer plating layer is larger than a particle diameter of a metal included in the middle layer plating layer.

[0009] In the preferred embodiment described above, when a sum of a thickness in the length direction of the lower layer plating layer and a thickness in the length direction of the middle layer plating layer located on the first end surface is defined as X1, a sum of a thickness in the length direction of the lower layer plating layer and a thickness in the length direction of the middle layer plating layer located on the second end surface is defined as X2, a sum of a thickness in the height direction of the base electrode layer and a thickness in the height direction of the middle layer plating layer located on the first main surface is defined as Y1, and a sum of a thickness in the height direction of the base electrode layer and a thickness in the height direction of the middle layer plating layer located on the second main surface is defined as Y2, the relationships of  $X1 > Y1$ ,  $X1 > Y2$ ,  $X2 > Y1$ , and  $X2 > Y2$  are satisfied. This makes it possible to reduce a thickness in a thickness direction of the external electrode of the multilayer ceramic electronic component, and thus the multilayer body is able to be made as thick as possible within the standard dimensions, and a degree of freedom in designing an effective area of the internal electrode layer is able to be improved. In addition, since a plating layer having a sufficient thickness can be achieved on both end surface sides of the multilayer body from which the internal electrode layers are extracted, moisture entry from outside is able to be reduced or prevented.

[0010] Further, in the preferred embodiment described above, since a particle diameter of a metal included in the lower layer plating layer is larger than a particle diameter of a metal included in the middle layer plating layer, a particle diameter of the lower layer plating layer on a side closer to the internal electrode layer is large, and thus the number of grain boundaries is able to be reduced as

compared with a case where the particle diameter is small. Therefore, it is possible to reduce a path of moisture entry. This makes it possible to reduce or prevent moisture entry into the multilayer ceramic electronic component.

[0011] Further, the middle layer plating layer including a metal having a particle diameter smaller than that of a metal included in the lower layer plating layer is located on the lower layer plating layer. As a result, since the particle diameter of metal particles of the middle layer plating layer is small, a compressive stress of the middle layer plating layer can be reduced. As a result, even when a thermal stress is applied, it is possible to reduce or prevent a tensile stress applied to a tip end portion of the middle layer plating layer, and it is possible to reduce or prevent an occurrence of cracks in the multilayer body caused by the thermal stress.

[0012] According to preferred embodiments of the present invention, it is possible to provide multilayer ceramic electronic components that are each able to reduce or prevent entry of moisture from outside while sufficiently maintaining a fixing strength with an internal electrode layer at a connection portion with the internal electrode layer even when an external electrode is a plating layer, and having high moisture resistance reliability.

[0013] The above and other elements, features, steps, characteristics and advantages of the present invention will become more apparent from the following detailed description of the preferred embodiments with reference to the attached drawings.

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## Description

### BRIEF DESCRIPTION OF THE DRAWINGS

[0014] FIG. 1 is an external perspective view illustrating a multilayer ceramic capacitor as an example of a multilayer ceramic electronic component according to a first preferred embodiment of the present invention.

[0015] FIG. 2 is a front view illustrating the multilayer ceramic capacitor as an example of the multilayer ceramic electronic component according to the first preferred embodiment of the present invention.

[0016] FIG. 3 is a top view illustrating the multilayer ceramic capacitor as an example of the multilayer ceramic electronic component according to the first preferred embodiment of the present invention.

[0017] FIG. 4 is a cross-sectional view taken along line IV-IV according to FIG. 1.

[0018] FIG. 5 is a cross-sectional view taken along line V-V according to FIG. 1.

[0019] FIG. 6 is a cross-sectional view taken along line IV-IV according to FIG. 1, and is a schematic cross-sectional view for describing a structure of an external electrode of the multilayer ceramic capacitor as an example of the multilayer ceramic electronic component according to the first preferred embodiment of the present invention.

[0020] FIG. 7 is a cross-sectional view taken along line VII-VII according to FIG. 1.

[0021] FIG. 8 is an external perspective view illustrating a multilayer ceramic capacitor as an example of a multilayer ceramic electronic component according to a first modification of the first preferred embodiment of the present invention.

[0022] FIG. 9 is a front view illustrating the multilayer ceramic capacitor as an example of the multilayer ceramic electronic component according to the first modification of the first preferred embodiment of the present invention.

[0023] FIG. 10 is a top view illustrating the multilayer ceramic capacitor as an example of the multilayer ceramic electronic component according to the first modification of the first preferred embodiment of the present invention.

[0024] FIG. 11 is a cross-sectional view taken along line XI-XI according to FIG. 1.

[0025] FIG. 12 is a cross-sectional view taken along line XII-XII according to FIG. 1.

[0026] FIG. **13** is a cross-sectional view taken along line XIII-XIII according to FIG. **1**.  
[0027] FIG. **4** is a central front cross-sectional view illustrating a multilayer ceramic capacitor as an example of a multilayer ceramic electronic component according to a second modification of the first preferred embodiment of the present invention.  
[0028] FIG. **15** is an external perspective view illustrating a multilayer ceramic capacitor as an example of a multilayer ceramic electronic component according to a second preferred embodiment of the present invention.  
[0029] FIG. **16** is a cross-sectional view taken along line XVI-XVI according to FIG. **15**.  
[0030] FIG. **17** is a cross-sectional view taken along line XVII-XVII according to FIG. **15**.  
[0031] FIG. **18** is a cross-sectional view taken along line XVIII-XVIII according to FIG. **15**.  
[0032] FIG. **19** is an exploded perspective view of a multilayer body illustrated in FIG. **15**.  
[0033] FIG. **20A** is a view illustrating a first internal electrode pattern of the multilayer ceramic capacitor illustrated in FIG. **15**.  
[0034] FIG. **20B** is a view illustrating a second internal electrode pattern of the multilayer ceramic capacitor illustrated in FIG. **15**.  
[0035] FIG. **21A** is a schematic cross-sectional view taken along line XXIa-XXIa according to FIG. **18**, and is a schematic cross-sectional view for describing a structure of an external electrode of the multilayer ceramic capacitor as an example of the multilayer ceramic electronic component according to the second preferred embodiment of the present invention.  
[0036] FIG. **21B** is a schematic cross-sectional view taken along line XXIb-XXIb according to FIG. **18**, and is a schematic cross-sectional view for describing a structure of the external electrode of the multilayer ceramic capacitor as an example of the multilayer ceramic electronic component according to the second preferred embodiment of the present invention.  
[0037] FIG. **21C** is a schematic cross-sectional view taken along line XXIc-XXIc according to FIG. **18**, and is a schematic cross-sectional view for describing a structure of the external electrode of the multilayer ceramic capacitor as an example of the multilayer ceramic electronic component according to the second preferred embodiment of the present invention.  
[0038] FIG. **21D** is a schematic cross-sectional view taken along line XXId-XXId according to FIG. **18**, and is a schematic cross-sectional view for describing a structure of the external electrode of the multilayer ceramic capacitor as an example of the multilayer ceramic electronic component according to the second preferred embodiment of the present invention.  
[0039] FIG. **22A** is an external perspective view of a multilayer ceramic capacitor as an example of a multilayer ceramic electronic component according to a modification of the second preferred embodiment of the present invention.  
[0040] FIG. **22B** is a bottom view of the multilayer ceramic capacitor as an example of the multilayer ceramic electronic component according to the modification of the second preferred embodiment of the present invention.  
[0041] FIG. **23** is an external perspective view of the multilayer body of the multilayer ceramic capacitor illustrated in FIG. **15**.  
[0042] FIG. **24** is an external perspective view in which a base electrode layer is formed in the multilayer body illustrated in FIG. **23**.  
[0043] FIG. **25** is an external perspective view in which a plating layer is formed in the multilayer body illustrated in FIG. **24**.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0044] Hereinafter, multilayer ceramic electronic components according to preferred embodiments of the present invention will be described with reference to the drawings.

##### A. First Preferred Embodiment

###### 1. Multilayer Ceramic Capacitor

[0045] A multilayer ceramic capacitor **10** as an example of a multilayer ceramic electronic component according to a first preferred embodiment of the present invention will be described.

FIG. 1 is an external perspective view illustrating a multilayer ceramic capacitor as an example of a multilayer ceramic electronic component according to a first preferred embodiment of the present invention. FIG. 2 is a front view illustrating the multilayer ceramic capacitor as an example of the multilayer ceramic electronic component according to the first preferred embodiment of the present invention. FIG. 3 is a top view illustrating the multilayer ceramic capacitor as an example of the multilayer ceramic electronic component according to the first preferred embodiment of the present invention. FIG. 4 is a cross-sectional view taken along line IV-IV according to FIG. 1. FIG. 5 is a cross-sectional view taken along line V-V according to FIG. 1. FIG. 6 is a cross-sectional view taken along line IV-IV according to FIG. 1, and is a schematic cross-sectional view for describing a structure of an external electrode of the multilayer ceramic capacitor as an example of the multilayer ceramic electronic component according to the first preferred embodiment of the present invention. FIG. 7 is a cross-sectional view taken along line VII-VII according to FIG. 1.

[0046] Multilayer ceramic capacitor **10** includes a multilayer body **12** and an external electrode **24**. Hereinafter, each configuration of multilayer body **12** and external electrode **24** will be described in this order.

[0047] Multilayer body **12** includes a plurality of laminated ceramic layers **14** and a plurality of internal electrode layers **16**. Further, multilayer body **12** includes a first main surface **12a** and a second main surface **12b** facing each other in a height direction  $x$ , a first side surface **12c** and a second side surface **12d** facing each other in a width direction  $y$  orthogonal or substantially orthogonal to height direction  $x$ , and a first end surface **12e** and a second end surface **12f** facing each other in a length direction  $z$  orthogonal or substantially orthogonal to height direction  $x$  and width direction  $y$ . In this multilayer body **12**, corner portions and ridge portions are rounded. The corner portion is a portion where three adjacent surfaces of multilayer body **12** intersect, and the ridge portion is a portion where two adjacent surfaces of multilayer body **12** intersect. In addition, irregularities or the like may be provided on a portion or all of first main surface **12a** and second main surface **12b**, first side surface **12c** and second side surface **12d**, and first end surface **12e** and second end surface **12f**.

[0048] As illustrated in FIGS. 4 and 5, multilayer body **12** includes an effective layer portion **15a** in which a plurality of internal electrode layers **16** face each other in height direction  $x$  connecting first main surface **12a** and second main surface **12b**, a first outer layer portion **15b1** including a plurality of ceramic layers **14** located between first main surface **12a** and internal electrode layer **16** located closest to first main surface **12a**, and a second outer layer portion **15b2** including the plurality of ceramic layers **14** located between second main surface **12b** and internal electrode layer **16** located closest to second main surface **12b**.

[0049] First outer layer portion **15b1** is located on first main surface **12a** side of multilayer body **12**, and includes the plurality of ceramic layers **14** located between first main surface **12a** and internal electrode layer **16** closest to first main surface **12a** and between with the plurality of ceramic layers **14**.

[0050] Second outer layer portion **15b2** is located on second main surface **12b** side of multilayer body **12**, and includes a plurality of ceramic layers **14** located between second main surface **12b** and internal electrode layer **16** closest to second main surface **12b** and between with the plurality of ceramic layers **14**.

[0051] Then, a region sandwiched between first outer layer portion **15b1** and second outer layer portion **15b2** is effective layer portion **15a**. The number of ceramic layers **14** to be laminated is not particularly limited, but is preferably, for example, greater than or equal to 10 and less than or equal to 700, including first outer layer portion **15b1** and second outer layer portion **15b2**. Further, a thickness of ceramic layer **14** is preferably, for example, greater than or equal to about 0.4  $\mu\text{m}$  and less than or equal to about 5.0  $\mu\text{m}$ .

[0052] As a material, ceramic layer **14** can be made of, for example, a dielectric material. As the dielectric material, for example, a dielectric ceramic including  $\text{BaTiO}_{3.3}$ ,  $\text{CaTiO}_{3.3}$ ,

SrTiO<sub>3</sub>, CaZnO<sub>3</sub>, or the like as a main component can be used. In addition, those obtained by adding an accessory component such as, for example, a Mn compound, an Fe compound, a Cr compound, a Co compound, or a Ni compound to these main components may be used.

[0053] Dimensions of multilayer body **12** are not particularly limited, preferably, for example, a dimension in length direction *z* is greater than or equal to about 0.1 mm and less than or equal to about 6.0 mm, a dimension in width direction *y* is greater than or equal to about 0.1 mm and less than or equal to about 6.0 mm, and a dimension in height direction *x* is greater than or equal to about 10.0  $\mu\text{m}$  and less than or equal to about 300.0  $\mu\text{m}$ . In particular, in the present preferred embodiment, an effect is more exerted on multilayer body **12** having a small dimension in height direction *x* of multilayer body **12**. This is because a mechanical strength of multilayer body **12** decreases as multilayer body **12** has a smaller dimension in height direction *x* of multilayer body **12**.

[0054] Further, in particular, a dimension in height direction *x* connecting first main surface **12a** and second main surface **12b** of multilayer body **12** is preferably, for example, less than or equal to about 70  $\mu\text{m}$ .

[0055] As illustrated in FIGS. **4** and **5**, internal electrode layer **16** includes a first internal electrode layer **16a** and a second internal electrode layer **16b**. First internal electrode layer **16a** and second internal electrode layers **16b** are alternately laminated with ceramic layer **14** interposed therebetween.

[0056] First internal electrode layer **16a** is disposed on a surface of ceramic layer **14**. First internal electrode layer **16a** includes a first counter electrode portion **18a** facing second internal electrode layer **16b**, and a first extraction electrode portion **20a** located on one end side of first internal electrode layer **16a** and extending from first counter electrode portion **18a** to first end surface **12e** of multilayer body **12**. An end portion of first extraction electrode portion **20a** extends to first end surface **12e** and exposed.

[0057] A shape of first counter electrode portion **18a** of first internal electrode layer **16a** is not particularly limited, but is preferably, for example, rectangular or substantially rectangular in plan view. However, a corner portion in plan view may be rounded, or a corner portion may be inclined (tapered) in plan view. In addition, a tapered shape in plan view may be used in which an inclination is made in either direction.

[0058] A shape of first extraction electrode portion **20a** of first internal electrode layer **16a** is not particularly limited, but is preferably, or substantially rectangular in plan view. However, a corner portion in plan view may be rounded, or a corner portion may be inclined (tapered) in plan view. In addition, a tapered shape in plan view may be used in which an inclination is made in either direction.

[0059] A width of first counter electrode portion **18a** of first internal electrode layer **16a** and a width of first extraction electrode portion **20a** of first internal electrode layer **16a** may be the same or substantially the same, or either one may have a narrow width.

[0060] Second internal electrode layer **16b** is disposed on a surface of ceramic layer **14** different from ceramic layer **14** on which first internal electrode layer **16a** is disposed. Second internal electrode layer **16b** includes a second counter electrode portion **18b** facing first internal electrode layer **16a**, and a second extraction electrode portion **20b** located on one end side of second internal electrode layer **16b** and extending from second counter electrode portion **18b** to second end surface **12f** of multilayer body **12**. An end portion of second extraction electrode portion **20b** extends to second end surface **12f** and exposed.

[0061] A shape of second counter electrode portion **18b** of second internal electrode layer **16b** is not particularly limited, but is preferably, for example, rectangular or substantially rectangular in plan view. However, a corner portion in plan view may be rounded, or a corner portion may be inclined (tapered) in plan view. In addition, a tapered shape in plan view may be used in which an

inclination is made in either direction.

[0062] A shape of second extraction electrode portion **20b** of second internal electrode layer **16b** is not particularly limited, but is preferably, for example, rectangular or substantially rectangular in plan view. However, a corner portion in plan view may be rounded, or a corner portion may be inclined (tapered) in plan view. In addition, a tapered shape in plan view may be used in which an inclination is made in either direction.

[0063] A width of second counter electrode portion **18b** of second internal electrode layer **16b** and a width of second extraction electrode portion **20b** of second internal electrode layer **16b** may be the same or substantially the same, or either one may have a narrow width.

[0064] Further, as illustrated in FIG. 4, multilayer body **12** includes an end portion (hereinafter, referred to as an “L gap”) **22b** of multilayer body **12** between second end surface **12f** and an end portion of first internal electrode layer **16a** opposite to first extraction electrode portion **20a** and between first end surface **12e** and an end portion of second internal electrode layer **16b** opposite to second extraction electrode portion **20b**.

[0065] As illustrated in FIG. 5, multilayer body **12** includes a side portion (hereinafter, referred to as a “W gap”) **22a** of multilayer body **12** between first side surface **12c** and one end of first counter electrode portion **18a** and second counter electrode portion **18b** in width direction y, and between second side surface **12d** and another end of first counter electrode portion **18a** and second counter electrode portion **18b** in width direction y.

[0066] First internal electrode layer **16a** and second internal electrode layer **16b** can be made by an appropriate conductive material such as, for example, a metal such as Ni, Cu, Ag, Pd, or Au, or an alloy including at least one of these metals, such as an Ag—Pd alloy. Internal electrode layer **16** may further include dielectric particles having the same or substantially the same compositional system as a ceramic included in ceramic layer **14**.

[0067] In a case where a piezoelectric ceramic is used for multilayer body **12**, the multilayer ceramic electronic component defines and functions as a ceramic piezoelectric element **10a**. Specific examples of a piezoelectric ceramic material include, for example, a lead zirconate titanate (PZT)-based ceramic material and the like.

[0068] Further, in a case where a semiconductor ceramic is used for multilayer body **12**, the multilayer ceramic electronic component defines and functions as a thermistor element **10b**. Specific examples of a semiconductor ceramic material include, for example, a spinel-based ceramic material and the like.

[0069] Further, in a case where a magnetic ceramic is used for multilayer body **12**, the multilayer ceramic electronic component defines and functions as an inductor element **10c**. Further, in a case of defining and functioning as the inductor element, the internal electrode layer is a coil-shaped conductor. Specific examples of a magnetic ceramic material include, for example, a zero material and the like.

[0070] That is, the multilayer ceramic electronic component according to the present preferred embodiment can suitably define and function as not only multilayer ceramic capacitor **10** but also as the ceramic piezoelectric element, the thermistor element, or the inductor element by appropriately changing a material and a structure of multilayer body **12**.

[0071] A thickness of internal electrode layer **16**, that is, a thickness of first internal electrode layer **16a** and second internal electrode layer **16b** is preferably, for example, greater than or equal to about 0.2  $\mu\text{m}$  and less than or equal to about 2.0  $\mu\text{m}$ .

[0072] The number of first internal electrode layers **16a** and second internal electrode layers **16b** is preferably, for example, greater than or equal to 10 and less than or equal to 700 in total.

[0073] Internal electrode layer **16** may be provided so as to be parallel or substantially parallel or perpendicular or substantially perpendicular to a surface to be mounted on a mounting substrate, but is more preferably provided so as to be parallel or substantially parallel to the surface to be mounted on the mounting substrate.



[0074] As illustrated in FIGS. 1 to 4, external electrode **24** is disposed on first end surface **12e** side and second end surface **12f** side of multilayer body **12**.

[0075] External electrode **24** includes a base electrode layer **26**, and a plating layer **28** covering base electrode layer **26**.

[0076] External electrode **24** first external includes a electrode **24a** and a second external electrode **24b**.

[0077] First external electrode **24a** is disposed exclusively on first end surface **12e** of multilayer body **12**, on a portion of first main surface **12a**, and on a portion of second main surface **12b**. In this case, first external electrode **24a** is electrically connected to first extraction electrode portion **20a** of first internal electrode layer **16a**. In addition, first external electrode **24a** is not disposed on a portion of first side surface **12c** and a portion of second side surface **12d**, but may extend to some extent.

[0078] Second external electrode **24b** is disposed exclusively on second end surface **12f** of multilayer body **12**, on a portion of first main surface **12a**, and on a portion of second main surface **12b**. In this case, second external electrode **24b** is electrically connected to second extraction electrode portion **20b** of second internal electrode layer **16b**. Further, second external electrode **24b** is not disposed on a portion of first side surface **12c** and a portion of second side surface **12d**, but may extend to some extent.

[0079] In multilayer body **12**, first counter electrode portion **18a** of first internal electrode layer **16a** and second counter electrode portion **18b** of second internal electrode layer **16b** face each other with ceramic layer **14** interposed therebetween, which generates electrostatic capacitance. Therefore, electrostatic capacitance can be obtained between first external electrode **24a** connected with first internal electrode layer **16a** and second external electrode **24b** connected with second internal electrode layer **16b**, and characteristics of the capacitor are obtained.

[0080] Base electrode layer **26** includes a first base electrode layer **26a1**, a second base electrode layer **26a2**, a third base electrode layer **26b1**, and a fourth base electrode layer **26b2**. First base electrode layer **26a1**, second base electrode layer **26a2**, third base electrode layer **26b1**, and fourth base electrode layer **26b2** are thin film layers including a plurality of thin film electrodes, in order to further improve performance.

[0081] First base electrode layer **26a1** covers a portion of first main surface **12a** on first end surface **12e** side of multilayer body **12**. Second base electrode layer **26a2** covers a portion of second main surface **12b** on first end surface **12e** side of multilayer body **12**.

[0082] Further, third base electrode layer **26b1** covers a portion of first main surface **12a** on second end surface **12f** side of multilayer body **12**. Fourth base electrode layer **26b2** covers a portion of second main surface **12b** on second end surface **12f** side of multilayer body **12**.

[0083] Base electrode layer **26** made of the thin film layer is preferably formed by a thin film forming method such as a sputtering method or a vapor deposition method, for example. In particular, base electrode layer **26** made of the thin film layer is preferably, for example, a sputtering electrode formed by a sputtering method. Hereinafter, an electrode formed by the sputtering method will be described.

[0084] When base electrode layer **26** is formed by a sputtering electrode, it is preferable to directly form the sputtering electrode on a portion of first main surface **12a** and a portion of second main surface **12b** of multilayer body **12**.

[0085] Base electrode layer **26** formed by the sputtering electrode includes, for example, at least one selected from Ni, Cr, Cu, Ti, and the like.

[0086] A thickness of the sputtering electrode in height direction x connecting first main surface **12a** and second main surface **12b** is preferably, for example, greater than or equal to about 50 nm and less than or equal to about 400 nm, and more preferably greater than or equal to about 50 nm and less than or equal to about 130 nm.

[0087] Plating layer **28** includes a first plating layer **28a** and a second plating layer **28b**.

[0088] First plating layer **28a** covers first base electrode layer **26a1** and second base electrode layer **26a2**.

[0089] Second plating layer **28b** covers third base electrode layer **26b1** and fourth base electrode layer **26b2**.

[0090] Plating layer **28** includes a plurality of layers.

[0091] Specifically, plating layer **28** includes a lower layer plating layer **30**, a middle layer plating layer **32** covering base electrode layer **26** and lower layer plating layer **30**, and an upper layer plating layer **34** covering middle layer plating layer **32**.

[0092] Lower layer plating layer **30** includes a first lower layer plating layer **30a** and a second lower layer plating layer **30b**.

[0093] First lower layer plating layer **30a** is disposed exclusively on a surface of first end surface **12e** of multilayer body **12** on which no base electrode layer is disposed. More specifically, first lower layer plating layer **30a** is disposed on a surface of multilayer body **12** so as to cover first internal electrode layer **16a** exposed on first end surface **12e**. At this time, first lower layer plating layer **30a** may be disposed so that a portion of the surface of first end surface **12e** is exposed, or may be disposed so as to cover the entire or substantially the entire surface of first end surface **12e**.

[0094] Second lower layer plating layer **30b** is disposed exclusively on a surface of second end surface **12f** of multilayer body **12** on which no base electrode layer is disposed. More specifically, second lower layer plating layer **30b** is disposed on a surface of multilayer body **12** so as to cover second internal electrode layer **16b** exposed on second end surface **12f**. At this time, second lower layer plating layer **30b** may be disposed so that a portion of the surface of second end surface **12f** is exposed, or may be disposed so as to cover the entire or substantially the entire surface of second end surface **12f**.

[0095] Lower layer plating layer **30** preferably includes, for example, at least one selected from Cu, Ni, Sn, Ag, Pd, an Ag—Pd alloy, Au, and the like. Among them, lower layer plating layer **30** is preferably a Cu plating layer. This provides an advantageous effect of reducing or preventing entry of a plating solution when upper layer plating layer **34** is formed.

[0096] A thickness of lower layer plating layer **30** is preferably, for example, greater than or equal to about 2  $\mu\text{m}$  and less than or equal to about 11  $\mu\text{m}$ .

[0097] Middle layer plating layer **32** includes a first middle layer plating layer **32a** and a second middle layer plating layer **32b**.

[0098] First middle layer plating layer **32a** is disposed on a surface of first lower layer plating layer **30a**, a surface of first end surface **12e** on which first lower layer plating layer **30a** is not disposed, and surfaces of first base electrode layer **26a1** and second base electrode layer **26a2**. In a case where first lower layer plating layer **30a** is disposed so as to cover the entire or substantially the entire first end surface **12e**, first middle layer plating layer **32a** is disposed on the surfaces of first lower layer plating layer **30a**, first base electrode layer **26a1**, and second base electrode layer **26a2**.

[0099] Second middle layer plating layer **32b** is disposed on a surface of second lower layer plating layer **30b**, a surface of second end surface **12f** on which second lower layer plating layer **30b** is not disposed, and surfaces of third base electrode layer **26b1** and fourth base electrode layer **26b2**. In a case where second lower layer plating layer **30b** is disposed so as to cover the entire or substantially the entire second end surface **12f**, second middle layer plating layer **32b** is disposed on the surfaces of second lower layer plating layer **30b**, third base electrode layer **26b1**, and fourth base electrode layer **26b2**.

[0100] Middle layer plating layer **32** preferably includes, for example, at least one selected from Cu, Ni, Sn, Ag, Pd, an Ag—Pd alloy, Au, and the like. Among them, middle layer plating layer **32** is preferably a Cu plating layer. This provides an advantageous effect of reducing or preventing entry of a plating solution when upper layer plating layer **34** is formed.

[0101] A thickness of middle layer plating layer **32** is preferably, for example, greater than or equal to about 2  $\mu\text{m}$  and less than or equal to about 11  $\mu\text{m}$ .

[0102] Upper layer plating layer **34** includes a first upper layer plating layer **34a** and a second upper layer plating layer **34b**.

[0103] First upper layer plating layer **34a** is disposed so as to cover first middle layer plating layer **32a**. Specifically, first upper layer plating layer **34a** is disposed on first end surface **12e** on the surface of first middle layer plating layer **32a**, and is provided so as to also reach first main surface **12a** and second main surface **12b** on the surface of first middle layer plating layer **32a**.

[0104] Second upper layer plating layer **34b** is disposed so as to cover second middle layer plating layer **32b**. Specifically, second upper layer plating layer **34b** is disposed on second end surface **12f** on the surface of second middle layer plating layer **32b**, and is provided so as to also reach first main surface **12a** and second main surface **12b** on the surface of second middle layer plating layer **32b**.

[0105] Upper layer plating layer **34** preferably includes a single or a plurality of plating layers.

[0106] Upper layer plating layer **34** preferably includes, for example, at least one selected from Cu, Ni, Sn, Ag, Pd, an Ag—Pd alloy, Au, and the like.

[0107] In the present preferred embodiment, upper layer plating layer **34** has a two-layer structure including an Ni plating layer and an Sn plating layer provided in this order. The Ni plating layer covers a surface of middle layer plating layer **32**, which makes it possible to reduce or prevent erosion of base electrode layer **26** and lower layer plating layer **30** due to solder when multilayer ceramic capacitor **10** is mounted on the mounting substrate. By providing the Sn plating layer, wettability of solder when multilayer ceramic capacitor **10** is mounted on the mounting substrate can be improved, and multilayer ceramic capacitor **10** can be easily mounted.

[0108] A thickness per layer of upper layer plating layer **34** is preferably, for example, greater than or equal to about 2  $\mu\text{m}$  and less than or equal to about 11  $\mu\text{m}$ .

[0109] In the present preferred embodiment, when a sum of a thickness in length direction  $z$  of lower layer plating layer **30** and a thickness in length direction  $z$  of middle layer plating layer **32** located on first end surface **12e** is defined as  $X1$ , a sum of a thickness in length direction  $z$  of lower layer plating layer **30** and a thickness in length direction  $z$  of middle layer plating layer **32** located on second end surface **12f** is defined as  $X2$ , a sum of a thickness in height direction  $x$  of base electrode layer **26** located on first main surface **12a** and a thickness in height direction  $x$  of middle layer plating layer **32** is defined as  $Y1$ , and a sum of a thickness in height direction  $x$  of base electrode layer **26** located on second main surface **12b** and a thickness in height direction  $x$  of middle layer plating layer **32** is defined as  $Y2$ , a relationship of  $X1 > Y1$ ,  $X1 > Y2$ ,  $X2 > Y1$ , and  $X2 > Y2$  is satisfied.

[0110] More specifically, as illustrated in FIG. 6, in first external electrode **24a**, when a sum of a thickness in length direction  $z$  of first lower layer plating layer **30a** and a thickness in length direction  $z$  of first middle layer plating layer **32a** located on first end surface **12e** is defined as  $X1$ , a sum of a thickness in height direction  $x$  of first base electrode layer **26a1** and a thickness in height direction  $x$  of first middle layer plating layer **32a** located on first main surface **12a** is defined as  $Y11$ , and a sum of a thickness in height direction  $x$  of second base electrode layer **26a2** and a thickness in height direction  $x$  of first middle layer plating layer **32a** located on second main surface **12b** is defined as  $Y21$ , a relationship of  $X1 > Y11$  and  $X1 > Y21$  is satisfied. Similarly, in second external electrode **24b**, when a sum

[0111] of a thickness in length direction  $z$  of second lower layer plating layer **30b** and a thickness in length direction  $z$  of second middle layer plating layer **32b** located on second end surface **12f** is defined as  $X2$ , a sum of a thickness in height direction  $x$  of third base electrode layer **26b1** and a thickness in height direction  $x$  of second middle layer plating layer **32b** located on first main surface **12a** is defined as  $Y12$ , and a sum of a thickness in height direction  $x$  of fourth base electrode layer **26b2** and a thickness in height direction  $x$  of second middle layer plating layer **32b** located on second main surface **12b** is  $Y22$ , a relationship of  $X2 > Y12$  and  $X2 > Y22$  is satisfied.

[0112] This makes it possible to reduce a thickness of external electrode **24** with respect to height

direction x of multilayer ceramic capacitor **10**, and thus the multilayer body can be made as thick as possible within the standard dimensions, and a degree of freedom in designing an effective area of internal electrode layers **16** can be improved. In addition, since plating layer **28** having a sufficient thickness can be secured on both end surfaces **12e** and **12f** sides of multilayer body **12** from which internal electrode layers **16** are extracted, moisture entry from outside can be reduced or prevented. [0113] X1, which is a sum of a thickness of first lower layer plating layer **30a** and a thickness of first middle layer plating layer **32a** on first end surface **12e**, is preferably, for example, greater than or equal to about 4  $\mu\text{m}$  and less than or equal to about 12  $\mu\text{m}$ .

[0114] X2, which is a sum of a thickness of second lower layer plating layer **30b** and a thickness of second middle layer plating layer **32b** on second end surface **12f**, is preferably, for example, greater than or equal to about 4  $\mu\text{m}$  and less than or equal to about 12  $\mu\text{m}$ .

[0115] Y11, which is a sum of a thickness of first base electrode layer **26a1** and a thickness of first middle layer plating layer **32a** on first main surface **12a**, and Y12, which is a sum of a thickness of second base electrode layer **26a2** and a thickness of second middle layer plating layer **32b** on first main surface **12a**, are preferably, for example, greater than or equal to about 2  $\mu\text{m}$  and less than or equal to about 10  $\mu\text{m}$ .

[0116] Y21, which is a sum of a thickness of first base electrode layer **26a1** and a thickness of first middle layer plating layer **32a** on second main surface **12b**, and Y22, which is a sum of a thickness of fourth base electrode layer **26b2** and a thickness of second middle layer plating layer **32b** on second main surface **12b**, are preferably, for example, greater than or equal to about 2  $\mu\text{m}$  and less than or equal to about 10  $\mu\text{m}$ .

[0117] Further, a ratio X1/Y11 between X1 and Y11 and a ratio X1/Y21 between X1 and Y21 are preferably, for example, greater than or equal to about 1.5. Similarly, a ratio X2/Y12 between X2 and Y12 and a ratio X2/Y22 between X2 and Y22 are preferably, for example, greater than or equal to about 1.5. This makes it possible to reduce a thickness of external electrode **24** with respect to height direction x of multilayer ceramic capacitor **10**, and thus the multilayer body can be made as thick as possible within the standard dimensions, and a degree of freedom in designing an effective area of internal electrode layers **16** can be improved. In addition, since plating layer **28** having a sufficient thickness can be secured on the end surface side of multilayer body **12** from which internal electrode layer **16** is extracted, moisture entry from outside can be reduced or prevented.

[0118] A thickness in length direction z of lower layer plating layer **30** located on first end surface **12e** and second end surface **12f** is preferably larger than a thickness in length direction z of middle layer plating layer **32** located on first end surface **12e** and second end surface **12f**. As a result, a thickness of lower layer plating layer **30** on a side closer to internal electrode layer **16** can be secured, and moisture entry can be further reduced or prevented.

[0119] Further, in the present preferred embodiment, on first end surface **12e** and second end surface **12f** where internal electrode layers **16** are exposed, a particle diameter of a metal included in lower layer plating layer **30** connected to internal electrode layer **16** is larger than a particle diameter of a metal included in middle layer plating layer **32** disposed on lower layer plating layer **30**. As a result, the particle diameter of lower layer plating layer **30** on a side closer to the internal electrode layer is large, and thus the number of grain boundaries can be reduced as compared with a case where the particle diameter is small, so that a path of moisture entry can be reduced. Therefore, moisture entry can be reduced or prevented.

[0120] Further, on lower layer plating layer **30**, middle layer plating layer **32** including metal having a particle diameter smaller than that of a metal included in lower layer plating layer **30** is disposed. As a result, since the particle diameter of metal particles of middle layer plating layer **32** is small, a compressive stress of middle layer plating layer **32** can be reduced. As a result, even when a thermal stress is applied, it is possible to reduce or prevent a tensile stress applied to a tip end portion of middle layer plating layer **32**, and it is possible to reduce or prevent an occurrence of cracks in multilayer body **12** caused by the thermal stress.

[0121] A particle diameter of the metal included in lower layer plating layer **30** is preferably, for example, greater than or equal to about 2  $\mu\text{m}$  and less than or equal to about 4  $\mu\text{m}$ , and a particle diameter of the metal included in middle layer plating layer **32** is preferably, for example, greater than or equal to about 0.1  $\mu\text{m}$  and less than or equal to about 2  $\mu\text{m}$ . As a result, the particle diameter of lower layer plating layer **30** on a side closer to the internal electrode layer is large, and thus the number of grain boundaries can be reduced as compared with a case where the particle diameter is small, so that a path of moisture entry can be reduced. Therefore, moisture entry into multilayer ceramic capacitor **10** can be reduced or prevented.

[0122] When the particle diameter of the metal included in lower layer plating layer **30** becomes smaller than about 2  $\mu\text{m}$ , the number of paths of moisture increases, which may cause a defect in moisture resistance reliability.

[0123] In addition, when the particle diameter of the metal included in middle layer plating layer **32** becomes larger than about 2  $\mu\text{m}$ , a compressive stress increases, a tensile stress applied to the multilayer body becomes strong, and the multilayer body may be cracked by a thermal stress.

[0124] Note that the particle diameters of lower layer plating layer **30** and middle layer plating layer **32** can be measured by the following non-limiting example of a measurement method.

[0125] That is, first, a cross section of multilayer ceramic capacitor **10** is exposed. Specifically, polishing is performed so as to be parallel or substantially parallel to a side surface until reaching a position of about  $\frac{1}{2}$  W of multilayer ceramic capacitor **10**. Next, lower layer plating layer **30** and middle layer plating layer **32** in predetermined regions in a central portion of first end surface **12e** and a central portion of second end surface **12f** in the polished cross section are measured using an electron microscope. Observation is performed with a magnification at greater than or equal to about 20,000 times at this time. As details of the observation, 10 lines are drawn at equal or substantially equal intervals in height direction (the laminating direction) x of the observed cross section, and a maximum particle diameter of a metal particle diameter on each line is measured for each of lower layer plating layer **30** and middle layer plating layer **32**. Finally, in each of lower layer plating layer **30** and middle layer plating layer **32**, an average value of the maximum particle diameters measured at 10 lines is taken, and the average value is calculated as the particle diameter.

[0126] A dimension in length direction z of multilayer ceramic capacitor **10** including multilayer body **12**, first external electrode **24a**, and second external electrode **24b** is defined as an L dimension, a dimension in height direction x of multilayer ceramic capacitor **10** including multilayer body **12**, first external electrode **24a**, and second external electrode **24b** is defined as a T dimension, and a dimension in width direction y of multilayer ceramic capacitor **10** including multilayer body **12**, first external electrode **24a**, and second external electrode **24b** is defined as a W dimension.

[0127] In dimensions of multilayer ceramic capacitor **10**, it is preferable that the L dimension in length direction z is, for example, greater than or equal to about 0.126 mm and less than or equal to about 60.0 mm, the W dimension in width direction y is greater than or equal to about 0.10 mm and less than or equal to about 6.0 mm, and the T dimension in height direction x is greater than or equal to about 26  $\mu\text{m}$  and less than or equal to about 300.0  $\mu\text{m}$ .

[0128] In multilayer ceramic capacitor **10** illustrated in FIG. 1, when a sum of a thickness in length direction z of lower layer plating layer **30** and a thickness in length direction z of middle layer plating layer **32** located on first end surface **12e** is defined as X1, a sum of a thickness in length direction z of lower layer plating layer **30** and a thickness in length direction z of middle layer plating layer **32** located on second end surface **12f** is defined as X2, a sum of a thickness in height direction x of base electrode layer **26** and a thickness in height direction x of middle layer plating layer **32** located on first main surface **12a** is defined as Y1, and a sum of a thickness in height direction x of base electrode layer **26** and a thickness in height direction x of middle layer plating layer **32** located on second main surface **12b** is defined as Y2, a relationship of  $X1 > Y1$ ,  $X1 > Y2$ ,  $X2 > Y1$ , and  $X2 > Y2$  is satisfied. This makes it possible to reduce a thickness of external electrode

**24** with respect to a thickness direction of multilayer ceramic capacitor **10**, and thus multilayer body **12** can be made as thick as possible within the standard dimensions, and a degree of freedom in designing an effective area of internal electrode layer **16** can be improved. In addition, since plating layer **28** having a sufficient thickness can be secured on end surfaces **12e** and **12f** sides of multilayer body **12** from which internal electrode layers **16** are extracted, moisture entry from outside can be reduced or prevented.

[0129] Further, according to multilayer ceramic capacitor **10** illustrated in FIG. **1**, on first end surface **12e** and second end surface **12f** where internal electrode layers **16** are exposed, a particle diameter of a metal included in lower layer plating layer **30** connected to internal electrode layer **16** is larger than a particle diameter of a metal included in middle layer plating layer **32** disposed on lower layer plating layer **30**. In this way, the particle diameter of lower layer plating layer **30** on a side closer to internal electrode layer **16** is large, and thus the number of grain boundaries can be reduced as compared with a case where the particle diameter is small, so that a path of moisture entry can be reduced. Therefore, moisture entry into multilayer ceramic capacitor **10** can be reduced or prevented.

[0130] Further, on lower layer plating layer **30**, middle layer plating layer **32** including metal having a particle diameter smaller than that of a metal included in lower layer plating layer **30** is disposed. As a result, since the particle diameter of metal particles constituting middle layer plating layer **32** is small, a compressive stress of middle layer plating layer **32** can be reduced. As a result, even when a thermal stress is applied, it is possible to reduce or prevent a tensile stress applied to a tip end portion of middle layer plating layer **32**, and it is possible to reduce or prevent an occurrence of cracks in multilayer body **12** caused by the thermal stress.

[0131] From the above, according to multilayer ceramic capacitor **10** illustrated in FIG. **1**, it is possible to provide multilayer ceramic capacitor **10** capable of reducing or preventing entry of moisture from outside while sufficiently maintaining a strength of fixing with internal electrode layer **16** a connection portion with internal electrode layer **16** even when external electrode **24** is formed by plating layer **28** at, and having high moisture resistance reliability.

[0132] In addition, according to multilayer ceramic capacitor **10** illustrated in FIG. **1**, a crack reducing or preventing effect can also be obtained, and both improvement in moisture resistance reliability and improvement in heat-resistant stress can be achieved.

## 2. Modification of First Preferred Embodiment

[0133] Hereinafter, each modification (a first modification and a second modification) of the multilayer ceramic capacitor, which is the multilayer ceramic electronic component according to the first preferred embodiment, will be described. In addition, for each of these modifications, components corresponding to the components of the above-described preferred embodiment are denoted by the same reference numerals, and a detailed description thereof will be omitted.

### (1) First Modification

[0134] First, a multilayer ceramic capacitor **110**, which is a multilayer ceramic electronic component according to the first modification of the first preferred embodiment, will be described. FIG. **8** is an external perspective view illustrating a multilayer ceramic capacitor as an example of a multilayer ceramic electronic component according to the first modification of the first preferred embodiment of the present invention. FIG. **9** is a front view illustrating the multilayer ceramic capacitor as an example of the multilayer ceramic electronic component according to the first modification of the first preferred embodiment of the present invention. FIG. **10** is a top view illustrating the multilayer ceramic capacitor as an example of the multilayer ceramic electronic component according to the first modification of the first preferred embodiment of the present invention. FIG. **11** is a cross-sectional view taken along line XI-XI according to FIG. **1**. FIG. **12** is a cross-sectional view taken along line XII-XII according to FIG. **1**. FIG. **13** is a cross-sectional view taken along line XIII-XIII according to FIG. **1**.

[0135] As illustrated in FIG. **8**, in multilayer ceramic capacitor **110** according to the first

modification, an external electrode **124** is disposed not only on a first end surface **12e** and a second end surface **12f**, and a first main surface **12a** and a second main surface **12b**, but also on a first side surface **12c** and a second side surface **12d**.

[0136] Further, as illustrated in FIG. **13**, a shape of an extraction electrode portion of internal electrode layer **16** is also different.

[0137] As illustrated in FIGS. **11** and **12**, internal electrode layer **16** includes a first internal electrode layer **16a** and a second internal electrode layer **16b**. First internal electrode layer **16a** and second internal electrode layers **16b** are alternately laminated with a ceramic layer **14** interposed therebetween.

[0138] First internal electrode layer **16a** is disposed on a surface of ceramic layer **14**. First internal electrode layer **16a** includes a first counter electrode portion **18a** facing second internal electrode layer **16b**, and a first extraction electrode portion **20a** located on one end side of first internal electrode layer **16a** and extending from first counter electrode portion **18a** to first end surface **12e** side of multilayer body **12**. Then, as illustrated in FIG. **13**, an end portion of first extraction electrode portion **20a** extends to first end surface **12e**, a portion of first side surface **12c**, and a portion of second side surface **12d**, and is exposed.

[0139] Second internal electrode layer **16b** is disposed on a surface of ceramic layer **14** different from ceramic layer **14** on which first internal electrode layer **16a** is disposed. Second internal electrode layer **16b** includes a second counter electrode portion **18b** facing first internal electrode layer **16a**, and a second extraction electrode portion **20b** located on one end side of second internal electrode layer **16b** and extending from second counter electrode portion **18b** to second end surface **12f** side of multilayer body **12**. Then, as illustrated in FIG. **13**, an end portion of second extraction electrode portion **20b** extends to second end surface **12f**, a portion of first side surface **12c**, and a portion of second side surface **12d**, and is exposed.

[0140] External electrode **124** includes a base electrode layer **26**, and a plating layer **28** covering base electrode layer **26**.

[0141] External electrode **124** includes a first external electrode **124a** and a second external electrode **124b**.

[0142] First external electrode **124a** is disposed on a surface of first end surface **12e** of multilayer body **12**, on a portion of first main surface **12a** and a portion of second main surface **12b**, and on a portion of first side surface **12c** and a portion of second side surface **12d**. In this case, first external electrode **124a** is electrically connected to first extraction electrode portion **20a** of first internal electrode layer **16a**.

[0143] Second external electrode **124b** is disposed on a surface of second end surface **12f** of multilayer body **12**, on a portion of first main surface **12a** and a portion of second main surface **12b**, and on a portion of first side surface **12c** and a portion of second side surface **12d**. In this case, second external electrode **124b** is electrically connected to second extraction electrode portion **20b** of second internal electrode layer **16b**.

[0144] Base electrode layer **26** includes a first base electrode layer **26a1**, a second base electrode layer **26a2**, a third base electrode layer **26b1**, and a fourth base electrode layer **26b2**. First base electrode layer **26a1**, second base electrode layer **26a2**, third base electrode layer **26b1**, and fourth base electrode layer **26b2** are thin film layers including a plurality of thin film electrodes, in order to further improve performance.

[0145] Plating layer **28** includes a first plating layer **28a** and a second plating layer **28b**.

[0146] First plating layer **28a** is disposed so as to cover first base electrode layer **26a1** and second base electrode layer **26a2**.

[0147] Second plating layer **28b** is disposed so as to cover third base electrode layer **26b1** and fourth base electrode layer **26b2**.

[0148] Plating layer **28** includes a plurality of layers.

[0149] Specifically, plating layer **28** includes a lower layer plating layer **30**, a middle layer plating

layer **32** covering base electrode layer **26** and lower layer plating layer **30**, and an upper layer plating layer **34** covering middle layer plating layer **32**.

[0150] Lower layer plating layer **30** includes a first lower layer plating layer **30a** and a second lower layer plating layer **30b**.

[0151] First lower layer plating layer **30a** is disposed exclusively on a surface of first end surface **12e** of multilayer body **12** on which no base electrode layer is disposed, and surfaces of first side surface **12c** and second side surface **12d** so as to extend from first end surface **12e**. More specifically, first lower layer plating layer **30a** is disposed on a surface of multilayer body **12** so as to cover first end surface **12e** and first internal electrode layer **16a** exposed on first side surface **12c** and second side surface **12d**. At this time, first lower layer plating layer **30a** may be disposed so that a portion of the surface of first end surface **12e** is exposed, or may cover the entire or substantially the entire surface of first end surface **12e**.

[0152] Second lower layer plating layer **30b** is disposed exclusively on a surface of second end surface **12f** of multilayer body **12** on which no base electrode layer is disposed and surfaces of first side surface **12c** and second side surface **12d** so as to extend from second end surface **12f**. More specifically, second lower layer plating layer **30b** is disposed on a surface of multilayer body **12** so as to cover second end surface **12f** and second internal electrode layer **16b** exposed on first side surface **12c** and the second side surface **12d**. At this time, second lower layer plating layer **30b** may be disposed so that a portion of the surface of second end surface **12f** is exposed, or may cover the entire or substantially the entire surface of second end surface **12f**.

[0153] Middle layer plating layer **32** includes a first middle layer plating layer **32a** and a second middle layer plating layer **32b**.

[0154] First middle layer plating layer **32a** is disposed on a surface of first lower layer plating layer **30a** to extend from first end surface **12e** to first side surface **12c** and second side surface **12d**, surfaces of first side surface **12c** and second side surface **12d** on which first lower layer plating layer **30a** is not disposed, and surfaces of first base electrode layer **26a1** and second base electrode layer **26a2**.

[0155] Second middle layer plating layer **32b** is disposed on a surface of second lower layer plating layer **30b** to extend from second end surface **12f** to first side surface **12c** and second side surface **12d**, surfaces of first side surface **12c** and second side surface **12d** on which second lower layer plating layer **30b** is not disposed, and surfaces of third base electrode layer **26b1** and fourth base electrode layer **26b2**.

[0156] Upper layer plating layer **34** includes a first upper layer plating layer **34a** and a second upper layer plating layer **34b**.

[0157] First upper layer plating layer **34a** covers first middle layer plating layer **32a**. Specifically, first upper layer plating layer **34a** is disposed on first end surface **12e** on the surface of first middle layer plating layer **32a**, and extends to second main surface **12b** on the surface of first middle layer plating layer **32a**, and extends to first side surface **12c** and second side surface **12d**.

[0158] Second upper layer plating layer **34b** covers second middle layer plating layer **32b**.

Specifically, second upper layer plating layer **34b** is disposed on second end surface **12f** on the surface of second middle layer plating layer **32b**, and is provided so as to also extend to first main surface **12a** and second main surface **12b** of second middle layer plating layer **32b**, and extend to first side surface **12c** and second side surface **12d**.

[0159] Also in multilayer ceramic capacitor **110** according to the first modification, when a sum of a thickness in length direction  $z$  of lower layer plating layer **30** and a thickness in length direction  $z$  of middle layer plating layer **32** located on first end surface **12e** is defined as  $X1$ , a sum of a thickness in length direction  $z$  of lower layer plating layer **30** and a thickness in length direction  $z$  of middle layer plating layer **32** located on second end surface **12f** is defined as  $X2$ , a sum of a thickness in height direction  $x$  of base electrode layer **26** and a thickness in height direction  $x$  of middle layer plating layer **32** located on first main surface **12a** is defined as  $Y1$ , and a sum of a



thickness in height direction  $x$  of base electrode layer **26** and a thickness in height direction  $x$  of middle layer plating layer **32** located on second main surface **12b** is defined as  $Y2$ , a relationship of  $X1 > Y1$ ,  $X1 > Y2$ ,  $X2 > Y1$ , and  $X2 > Y2$  is satisfied.

[0160] Further, as illustrated in FIG. **13**, when a sum of a thickness in width direction  $y$  of lower layer plating layer **30** and a thickness in width direction  $y$  of middle layer plating layer **32** located on first side surface **12c** is defined as  $Z1$ , and a sum of a thickness in width direction  $y$  of lower layer plating layer **30** and a thickness in width direction  $y$  of middle layer plating layer **32** located on second side surface **12d** is defined as  $Z2$ , a relationship of  $X1 > Z1$ ,  $X1 > Z2$ ,  $X2 > Z1$ , and  $X2 > Z2$  is preferably satisfied.

[0161] More specifically, as illustrated in FIG. **13**, in first external electrode **124a**, when a sum of a thickness in width direction  $y$  of first lower layer plating layer **30a** and a thickness in a width direction  $x$  of first middle layer plating layer **32a** located on first side surface **12c** is defined as  $Z11$ , and a sum of a thickness in width direction  $y$  of first lower layer plating layer **30a** and a thickness in width direction  $y$  of first middle layer plating layer **32a** located on second side surface **12d** is defined as  $Z21$ , a relationship of  $1 > Z11$  and  $X1 > Z21$  is preferably satisfied.

[0162] Similarly, in second external electrode **124b**, when a sum of a thickness in width direction  $y$  of second lower layer plating layer **30b** and a thickness in width direction  $y$  of second middle layer plating layer **32b** located on first side surface **12c** is defined as  $Z12$ , and a sum of a thickness in width direction  $y$  of second lower layer plating layer **30b** and a thickness in width direction  $y$  of second middle layer plating layer **32b** located on second side surface **12d** is defined as  $Z22$ , a relationship of  $X2 > Z12$  and  $X2 > Z22$  is preferably satisfied.

[0163] Further, a particle diameter of a metal included in lower layer plating layer **30** is preferably larger than a particle diameter of a metal included in middle layer plating layer **32**.

[0164] According to multilayer ceramic capacitor **110** according to the first modification illustrated in FIG. **8**, advantageous effects the same as or similar to those of multilayer ceramic capacitor **10** in FIG. **1** are obtained.

## (2) Second Modification

[0165] Next, a multilayer ceramic capacitor **210**, which is a multilayer ceramic electronic component according to the second modification, will be described. FIG. **14** is a central front cross-sectional view illustrating a multilayer ceramic capacitor as an example of a multilayer ceramic electronic component according to a second modification of the present preferred embodiment of the present invention.

[0166] Multilayer ceramic capacitor **210** according to the second modification includes an external electrode **224** having an L-shape in cross-sectional view as illustrated in FIG. **14**.

[0167] External electrode **224** includes a first external electrode **224a** and a second external electrode **224b**.

[0168] In multilayer ceramic capacitor **210**, which is a multilayer ceramic electronic component according to the second modification, as illustrated in FIG. **14**, first external electrode **224a** having an L-shape in cross-sectional view is disposed on a surface of a first end surface **12e**, and extends from first end surface **12e** to be disposed on a second main surface **12b**. At this time, first external electrode **224a** may be disposed so as to partially extend to first main surface **12a**.

[0169] Further, in multilayer ceramic capacitor **210**, as illustrated in FIG. **14**, second external electrode **224b** having an L-shape in cross-sectional view is disposed on a surface of a second end surface **12f**, and extends from second end surface **12f** to be disposed on second main surface **12b**. At this time, second external electrode **224b** may be disposed so as to partially extend to first main surface **12a**.

[0170] Therefore, in multilayer ceramic capacitor **210**, a second base electrode layer **26a2** and a fourth base electrode layer **26b2** are disposed on second main surface **12b**.

[0171] Note that first external electrode **224a** may be disposed on the surface of first end surface **12e** and extend from first end surface **12e** to be disposed on first main surface **12a**, and second

external electrode **224b** may be disposed on the surface of second end surface **12f** and extend from second end surface **12f** to be disposed on first main surface **12a**. At this time, first external electrode **224a** may be disposed so as to partially extend to second main surface **12b**, and second external electrode **224b** may be disposed so as to partially extend to second main surface **12b**. In this case, on first main surface **12a**, a first base electrode layer and a third base electrode layer are exclusively disposed.

[0172] Plating layer **28** includes a first plating layer **28a** and a second plating layer **28b**.

[0173] First plating layer **28a** covers second base electrode layer **26a2**.

[0174] Second plating layer **28b** covers fourth base electrode layer **26b2**.

[0175] Plating layer **28** includes a plurality of layers.

[0176] Specifically, plating layer **28** includes a lower layer plating layer **30**, a middle layer plating layer **32** covering base electrode layer **26** and lower layer plating layer **30**, and an upper layer plating layer **34** covering middle layer plating layer **32**.

[0177] Lower layer plating layer **30** includes a first lower layer plating layer **30a** and a second lower layer plating layer **30b**.

[0178] First lower layer plating layer **30a** is disposed exclusively on a surface of first end surface **12e** of multilayer body **12** on which no base electrode layer is disposed. More specifically, first lower layer plating layer **30a** is disposed on a surface of multilayer body **12** so as to cover a first internal electrode layer **16a** exposed on first end surface **12e**. At this time, first lower layer plating layer **30a** may be disposed so that a portion of the surface of first end surface **12e** is exposed, or may cover the entire or substantially the entire surface of first end surface **12e**.

[0179] Second lower layer plating layer **30b** is disposed exclusively on a surface of second end surface **12f** of multilayer body **12** on which no base electrode layer is disposed. More specifically, second lower layer plating layer **30b** is disposed on a surface of multilayer body **12** so as to cover a second internal electrode layer **16b** exposed on second end surface **12f**. At this time, second lower layer plating layer **30b** may be disposed so that a portion of the surface of second end surface **12f** is exposed, or may cover the entire or substantially the entire surface of second end surface **12f**.

[0180] Middle layer plating layer **32** includes a first middle layer plating layer **32a** and a second middle layer plating layer **32b**.

[0181] First middle layer plating layer **32a** is disposed on a surface of first lower layer plating layer **30a**, a surface of first end surface **12e** on which first lower layer plating layer **30a** is not disposed, and a surface of second base electrode layer **26a2**. In a case where first lower layer plating layer **30a** covers the entire or substantially the entire first end surface **12e**, first middle layer plating layer **32a** is disposed on the surfaces of first lower layer plating layer **30a** and second base electrode layer **26a2**.

[0182] Second middle layer plating layer **32b** is disposed on a surface of second lower layer plating layer **30b**, a surface of second end surface **12f** on which second lower layer plating layer **30b** is not disposed, and a surface of fourth base electrode layer **26b2**. In a case where second lower layer plating layer **30b** covers the entire second end surface **12f**, second middle layer plating layer **32b** is disposed on the surfaces of second lower layer plating layer **30b**, and fourth base electrode layer **26b2**.

[0183] Upper layer plating layer **34** includes a first upper layer plating layer **34a** and a second upper layer plating layer **34b**.

[0184] First upper layer plating layer **34a** covers first middle layer plating layer **32a**. Specifically, first upper layer plating layer **34a** is disposed on first end surface **12e** on the surface of first middle layer plating layer **32a**, and is provided so as to also extend to second main surface **12b** on the surface of first middle layer plating layer **32a**.

[0185] Second upper layer plating layer **34b** covers second middle layer plating layer **32b**.

Specifically, second upper layer plating layer **34b** is disposed on second end surface **12f** on the surface of second middle layer plating layer **32b**, and is provided so as to also extend to second

main surface **12b** on the surface of second middle layer plating layer **32b**.

[0186] According to multilayer ceramic capacitor **210** according to the second modification illustrated in FIG. **14**, advantageous effects the same as or similar to those of multilayer ceramic capacitor **10** in FIG. **1** are obtained, and the following advantageous effect is also obtained. That is, since external electrode **224** is not provided on the surface of first main surface **12a**, a thickness of multilayer body **12** can be increased by the absence of the thickness, and electrostatic capacitance per volume of multilayer ceramic capacitor **210** can be improved. In addition, since it is possible to reduce or prevent wetting up of solder on an upper surface (first main surface **12a**) of multilayer ceramic capacitor **210** at a time of mounting, a thickness of multilayer body **12** can be further increased accordingly.

### 3. Method for Manufacturing Multilayer Ceramic Capacitor

[0187] Hereinafter, a non-limiting example of a method for manufacturing a multilayer ceramic capacitor as an example of the multilayer ceramic electronic component according to the first preferred embodiment will be described.

[0188] First, a ceramic green sheet and a conductive paste for internal electrodes are prepared. A dielectric sheet and a conductive paste for internal electrode layers include a binder (for example, a known organic binder) and a solvent (for example, a known organic solvent).

[0189] Next, the conductive paste for internal electrodes is printed on the ceramic green sheet in a predetermined pattern by, for example, screen printing or gravure printing, to form an internal electrode pattern. Specifically, a conductive paste layer is formed by applying a paste made by a conductive material onto the ceramic green sheet by a method such as the above-described printing method. The paste made by the conductive material is, for example, obtained by adding an organic binder and an organic solvent to metal powder. Note that, as for the ceramic green sheet, a ceramic green sheet for outer layers on which no internal electrode pattern is printed is also produced.

[0190] By using these ceramic green sheets on which the internal electrode pattern is formed, a multilayer sheet is produced. That is, by laminating a predetermined number of ceramic green sheets for outer layers on which no internal electrode pattern is formed, alternately laminating, on top of that, a ceramic green sheet on which an internal electrode pattern corresponding to first internal electrode layer **16a** is formed and a ceramic green sheet on which an internal electrode pattern corresponding to second internal electrode layer **16b** is formed, and further laminating, on top of that, a predetermined number of ceramic green sheets for outer layers on which no internal electrode pattern is formed, a multilayer sheet is produced.

[0191] Further, a multilayer block is produced by pressing the multilayer sheet in a laminating direction by, for example, isostatic pressing.

[0192] Subsequently, the multilayer block is cut into a predetermined size, and a multilayer chip is cut out. At this time, corner portions and ridge portions of the multilayer chip may be rounded by, for example, barrel polishing or the like.

[0193] Next, multilayer body **12** is produced by baking the multilayer chip. A baking temperature is preferably, for example, greater than or equal to about 900° C. and less than or equal to about 1400° C., depending on a material of the ceramic or the internal electrode.

[0194] Subsequently, base electrode layer **26** made by a thin film layer is formed on a portion of first main surface **12a** and a portion of second main surface **12b** of multilayer body **12**. Base electrode layer **26** as a thin film layer can be formed by, for example, a sputtering method or the like. In other words, base electrode layer **26** as a thin film layer includes a sputtering electrode. The sputtering electrode can be formed by metal including, for example, at least one selected from Ni, Cr, Cu, Ti, and the like.

[0195] Thereafter, on first end surface **12e** and second end surface **12f** of multilayer body **12**, lower layer plating layer **30** is formed so as to cover a region where internal electrode layer **16** is exposed. Here, for lower layer plating layer **30**, by, for example, electrolytic plating using an electrolytic plating bath to which an additive is added or electroless plating by a substitution reaction, lower

layer plating layer **30** is formed. As the additive used for the electrolytic plating with the electrolytic plating bath, for example, a citric acid-based additive is used. In addition, a thickness of lower layer plating layer **30** and a particle diameter of a metal of lower layer plating layer **30** of a preferred embodiment of the present invention can be formed by changing plating conditions and performing heat treatment after forming lower layer plating layer **30**. The plating conditions are, for example, a bath temperature, a bath ion concentration, and a current density in a case of electrolytic plating. As a condition for the heat treatment, it is preferable to perform the heat treatment in a range of, for example, greater than or equal to about 300° C. and less than or equal to about 900° C. for greater than or equal to about 0.5 hours and less than or equal to about 12 hours.

[0196] Subsequently, middle layer plating layer **32** is formed on lower layer plating layer **30**, on first end surface **12e** and second end surface **12f** on which lower layer plating layer **30** is not disposed, and on base electrode layer **26**. For middle layer plating layer **32**, by, for example electrolytic plating using an electrolytic plating bath to which an additive is added or electroless plating by a substitution reaction, middle layer plating layer **32** is formed. As the additive used for the electrolytic plating with the electrolytic plating bath, for example, a citric acid-based additive is used. As the additive used for the electrolytic plating with the electrolytic plating bath, for example, a citric acid-based additive is used. Further, by changing plating conditions, a thickness of middle layer plating layer **32** and a particle diameter of a metal of middle layer plating layer **32** of the present invention can be formed. The plating conditions are, for example, a bath temperature, a bath ion concentration, and a current density in a case of electrolytic plating.

[0197] Thereafter, upper layer plating layer **34** is formed on a surface of middle layer plating layer **32**. Upper layer plating layer **34** includes, for example, at least one selected from Cu, Ni, Sn, Ag, Pd, an Ag—Pd alloy, Au, and the like, and is formed by a single layer or a plurality of layers. Preferably, for example, upper layer plating layer **34** is formed by two layers by forming an Ni plating layer and an Sn plating layer on the Ni plating layer. As described above, multilayer ceramic capacitor **10** illustrated in FIG. **1** can be manufactured.

[0198] According to the method for manufacturing a multilayer ceramic capacitor according to the present preferred embodiment described above, the multilayer ceramic capacitor according to the present invention having high performance can be manufactured with high quality.

## B. Second Preferred Embodiment

### 1. Multilayer Ceramic Capacitor

[0199] Next, a multilayer ceramic capacitor according to a second preferred embodiment of the present invention will be described. FIG. **15** is an external perspective view illustrating a multilayer ceramic capacitor as an example of a multilayer ceramic electronic component according to a second preferred embodiment of the present invention. FIG. **16** is a cross-sectional view taken along line XVI-XVI according to FIG. **15**. FIG. **17** is a cross-sectional view taken along line XVII-XVII according to FIG. **15**. FIG. **18** is a cross-sectional view taken along line XVIII-XVIII according to FIG. **15**. FIG. **19** is an exploded perspective view of a multilayer body illustrated in FIG. **15**. FIG. **20A** is a view illustrating a first internal electrode pattern of the multilayer ceramic capacitor illustrated in FIG. **15**. FIG. **20B** is a view illustrating a second internal electrode pattern of the multilayer ceramic capacitor illustrated in FIG. **15**. FIG. **21A** is a schematic cross-sectional view taken along line XXIa-XXIa according to FIG. **18**, and is a schematic cross-sectional view for describing a structure of an external electrode of the multilayer ceramic capacitor as an example of the multilayer ceramic electronic component according to the second preferred embodiment of the present invention. FIG. **21B** is a schematic cross-sectional view taken along line XXIb-XXIb according to FIG. **18**, and is a schematic cross-sectional view for describing a structure of the external electrode of the multilayer ceramic capacitor as an example of the multilayer ceramic electronic component according to the second preferred embodiment of the present invention. FIG. **21C** is a schematic cross-sectional view taken along line XXIc-XXIc according to FIG. **18**, and is a schematic cross-sectional view for describing a structure of the external electrode of the multilayer

ceramic capacitor as an example of the multilayer ceramic electronic component according to the second preferred embodiment of the present invention. FIG. 21D is a schematic cross-sectional view taken along line XXId-XXId according to FIG. 18, and is a schematic cross-sectional view for describing a structure of the external electrode of the multilayer ceramic capacitor as an example of the multilayer ceramic electronic component according to the second preferred embodiment of the present invention.

[0200] A multilayer ceramic capacitor **510** includes a multilayer body **512** and external electrodes **524** and **525**.

[0201] Multilayer body **512** includes a plurality of ceramic layers **514** and a plurality of internal electrode layers **516**. Multilayer body **512** includes a first main surface **512a** and a second main surface **512b** facing each other in a height direction *x*, a first side surface **512c** and a second side surface **512d** facing each other in a width direction *y* orthogonal or substantially orthogonal to height direction *x*, and a third side surface **512e** and a fourth side surface **512f** facing each other in a length direction *Z* orthogonal or substantially orthogonal to height direction *x* and width direction *y*. First main surface **512a** and second main surface **512b** individually extend along width direction *y* and length direction *z*. First side surface **512c** and second side surface **512d** individually extend along height direction *x* and a width direction *Z*. Third side surface **512e** and fourth side surface **512f** individually extend along height direction *x* and length direction *y*. Therefore, height direction *x* is a direction connecting first main surface **512a** and second main surface **512b**, width direction *y* is a direction connecting first side surface **512c** and second side surface **512d**, and length direction *z* is a direction connecting third side surface **512e** and fourth side surface **512f**.

[0202] In addition, in multilayer body **512**, corner portions and ridge portions are preferably rounded. The corner portion is a portion where three surfaces of multilayer body **512** intersect, and the ridge portion is a portion where two surfaces of multilayer body **512** intersect.

[0203] As illustrated in FIGS. 16 and 17, in height direction *x* connecting first main surface **512a** and second main surface **512b**, multilayer body **512** includes an effective layer portion **515a** where a plurality of internal electrode layers **516** face each other, a first outer layer portion **515b1** including a plurality of ceramic layers **514** located between first main surface **512a** and internal electrode layer **516** located closest to first main surface **512a**, and a second outer layer portion **515b2** including the plurality of ceramic layers **514** located between second main surface **512b** and internal electrode layer **516** located closest to second main surface **512b**.

[0204] First outer layer portion **515b1** is located on first main surface **512a** side of multilayer body **512**, and includes the plurality of ceramic layers **514** located between first main surface **512a** and internal electrode layer **516** closest to first main surface **512a** and between with the plurality of ceramic layers **514**.

[0205] Second outer layer portion **515b2** is located on second main surface **512b** side of multilayer body **512**, and includes a plurality of ceramic layers **514** located between second main surface **512b** and internal electrode layer **516** closest to second main surface **512b** and located between with the plurality of ceramic layers **514**.

[0206] Then, a region sandwiched between first outer layer portion **515b1** and second outer layer portion **515b2** is effective layer portion **515a**. The number of ceramic layers **514** to be laminated is not particularly limited, but is preferably, for example, greater than or equal to 10 and less than or equal to 700, including first outer layer portion **515b1** and second outer layer portion **515b2**.

Further, a thickness of ceramic layer **514** is preferably, for example, greater than or equal to about 0.4  $\mu\text{m}$  and less than or equal to about 5.0  $\mu\text{m}$ .

[0207] A thickness of first outer layer portion **515b1** and second outer layer portion **515b2** is preferably, for example, greater than or equal to about 3  $\mu\text{m}$  and less than or equal to about 15  $\mu\text{m}$ . A region sandwiched between both outer layer parts **515b1** and **515b2** is effective layer portion **515a**. That is, effective layer portion **515a** is a region where internal electrode layers **516** are laminated.

[0208] Ceramic layer **514** can be made of, for example, a dielectric material. As the dielectric material, for example, a dielectric ceramic including BaTiO<sub>3</sub>, CaTiO<sub>3</sub>, SrTiO<sub>3</sub>, CaZnO<sub>3</sub>, or the like as a main component can be used. In addition, those obtained by adding an accessory component such as, for example, a Mn compound, an Fe compound, a Cr compound, a Co compound, or a Ni compound to these main components may be used.

[0209] Dimensions of multilayer body **512** are not particularly limited, but preferably, for example, the L dimension is greater than or equal to about 0.43 mm and less than or equal to about 0.73 mm and satisfies  $0.85 \leq W/L \leq 1.0$ , and the T dimension is greater than or equal to about 50  $\mu\text{m}$  and less than or equal to about 90  $\mu\text{m}$ .

[0210] As illustrated in FIGS. **16** to **19**, internal electrode layer **516** includes a plurality of first internal electrode layers **516a** and a plurality of second internal electrode layers **516b**. First internal electrode layer **516a** and second internal electrode layers **516b** are alternately laminated with ceramic layer **514** interposed therebetween.

[0211] First internal electrode layer **516a** is disposed on a surface of ceramic layer **514**. In addition, first internal electrode layer **516a** includes a first counter electrode portion **518a** facing first main surface **512a** and second main surface **512b** and facing second internal electrode layer **516b**, and is laminated in a direction connecting first main surface **512a** and second main surface **512b**.

[0212] Further, second internal electrode layer **516b** is disposed on a surface of the ceramic layer **514** different from ceramic layer **514** on which first internal electrode layer **516a** is disposed. Second internal electrode layer **516b** includes a second counter electrode portion **518b** facing first main surface **512a** and second main surface **512b**, and is laminated in a direction connecting first main surface **512a** and second main surface **512b**.

[0213] As illustrated in FIGS. **18** to **20B**, first internal electrode layer **516a** extends to first side surface **512c** and third side surface **512e** of multilayer body **512** by a first extraction electrode portion **520a**, and extends to second side surface **512d** and fourth side surface **512f** of multilayer body **512** by a second extraction electrode portion **520b**. A width of first extraction electrode portion **520a** extending to first side surface **512c** may be equal or substantially equal to a width extending to third side surface **512e**, and a width of second extraction electrode portion **520b** extending to second side surface **512d** may be equal or substantially equal to a width extending to fourth side surface **512f**.

[0214] That is, first extraction electrode portion **520a** extends to third side surface **512e** side of multilayer body **512**, and second extraction electrode portion **520b** extends to fourth side surface **512f** side of multilayer body **512**.

[0215] Second internal electrode layer **516b** extends to first side surface **512c** and fourth side surface **512f** of multilayer body **512** by a third extraction electrode portion **521a**, and extends to second side surface **512d** and third side surface **512e** of multilayer body **512** by a fourth extraction electrode portion **521b**. A width of third extraction electrode portion **521a** extending to first side surface **512c** may be equal or substantially equal to a width extending to fourth side surface **512f**, and a width of fourth extraction electrode portion **521b** extending to second side surface **512d** may be equal or substantially equal to a width extending to third side surface **512e**.

[0216] That is, third extraction electrode portion **521a** extends to fourth side surface **512f** side of multilayer body **512**, and fourth extraction electrode portion **521b** extends to third side surface **512e** side of multilayer body **512**.

[0217] Further, when multilayer ceramic capacitor **510** is viewed from a laminating direction, a straight line connecting first extraction electrode portion **520a** and second extraction electrode portion **520b** in first internal electrode layer **516a** and a straight line connecting third extraction electrode portion **521a** and fourth extraction electrode portion **521b** in second internal electrode layer **516b** preferably intersect each other.

[0218] Further, on side surfaces **512c**, **512d**, **512e**, and **512f** of multilayer body **512**, it is preferable that first extraction electrode portion **520a** of first internal electrode layer **516a** and fourth

extraction electrode portion **521b** of second internal electrode layer **516b** extend to positions facing each other, and second extraction electrode portion **520b** of first internal electrode layer **516a** and third extraction electrode portion **521a** of second internal electrode layer **516b** extend to positions facing each other.

[0219] Further, as illustrated in FIG. **18**, multilayer body **512** includes an end portion (L gap) **522b** of multilayer body **512** between third side surface **512e** and one end in length direction *z* of first counter electrode portion **518a** and between fourth side surface **512f** and another end in length direction *z* of second counter electrode portion **518b**. An average length in width direction *z* of end portion (L gap) **522b** of multilayer body **512** is preferably, for example, greater than or equal to about 10  $\mu\text{m}$  and less than or equal to about 60  $\mu\text{m}$ , more preferably greater than or equal to about 10  $\mu\text{m}$  and less than or equal to about 30  $\mu\text{m}$ , and still more preferably greater than or equal to about 10  $\mu\text{m}$  and less than or equal to about 20  $\mu\text{m}$ .

[0220] Further, as illustrated in FIG. **18**, multilayer body **512** includes a side portion (W gap) **522a** of multilayer body **512** between first side surface **512c** and one end of first counter electrode portion **518a** in width direction *y* and between second side surface **512d** and another end of second counter electrode portion **518b** in width direction *y*. An average length in length direction *y* of side portion (W gap) **522a** of multilayer body **512** is preferably, for example, greater than or equal to about 10  $\mu\text{m}$  and less than or equal to about 60  $\mu\text{m}$ , more preferably greater than or equal to about 10  $\mu\text{m}$  and less than or equal to about 30  $\mu\text{m}$ , and still more preferably greater than or equal to about 10  $\mu\text{m}$  and less than or equal to about 20  $\mu\text{m}$ .

[0221] As a material, internal electrode layer **516** can be made by, for example, a metal such as Ni, Cu, Ag, Pd, or Au, or an alloy including one of these metals, for example, an Ag—Pd alloy. Internal electrode layer **516** may further include dielectric particles having the same or substantially the same compositional system as a ceramic included in ceramic layer **514**. The number of laminated internal electrode layers **516** is preferably, for example, greater than or equal to 20 and less than or equal to 80. An average thickness of internal electrode layer **516** is preferably, for example, greater than or equal to about 0.2  $\mu\text{m}$  and less than or equal to about 2.0  $\mu\text{m}$ .

[0222] As illustrated in FIGS. **15** to **18**, external electrodes **524** and **525** are disposed on multilayer body **512**.

[0223] External electrode **524** includes a base electrode layer **526**, and a plating layer **528** covering base electrode layer **526**.

[0224] External electrode **525** includes a base electrode layer **527** and a plating layer **529** covering base electrode layer **527**.

[0225] External electrode **524** includes a first external electrode **524a** and a second external electrode **524b**.

[0226] First external electrode **524a** covers first extraction electrode portion **520a** on first side surface **512c** and third side surface **512e**, and covers a portion of first main surface **512a** and second main surface **512b**. First external electrode **524a** is electrically connected to first extraction electrode portion **520a** of first internal electrode layer **516a**.

[0227] Further, second external electrode **524b** covers second extraction electrode portion **520b** on second side surface **512d** and fourth side surface **512f**, and covers a portion of first main surface **512a** and second main surface **512b**. Second external electrode **524b** is electrically connected to second extraction electrode portion **520b** of first internal electrode layer **516a**.

[0228] External electrode **525** includes a third external electrode **525a** and a fourth external electrode **525b**.

[0229] Third external electrode **525a** covers third extraction electrode portion **521a** on first side surface **512c** and fourth side surface **512f**, and covers a portion of first main surface **512a** and second main surface **512b**. Third external electrode **525a** is electrically connected to third extraction electrode portion **521a** of second internal electrode layer **516b**.

[0230] Further, fourth external electrode **525b** covers fourth extraction electrode portion **521b** on

second side surface **512d** and third side surface **512e**, and covers a portion of first main surface **512a** and second main surface **512b**. Fourth external electrode **525b** is electrically connected to fourth extraction electrode portion **521b** of second internal electrode layer **516b**.

[0231] In multilayer body **512**, first counter electrode portion **518a** of first internal electrode layer **516a** and second counter electrode portion **518b** of second internal electrode layer **516b** face each other with ceramic layer **514** interposed therebetween, which generates electrostatic capacitance. Therefore, electrostatic capacitance can be obtained between first external electrode **524a** and second external electrode **524b** to which first internal electrode layer **516a** is connected and third external electrode **525a** and fourth external electrode **525b** to which second internal electrode layer **516b** is connected, and characteristics of the capacitor are obtained.

[0232] Base electrode layer **526** includes a first base electrode layer **526a1**, a second base electrode layer **526a2**, a third base electrode layer **526b1**, and a fourth base electrode layer **526b2**. First base electrode layer **526a1**, second base electrode layer **526a2**, third base electrode layer **526b1**, and fourth base electrode layer **526b2** include a thin film layer including a plurality of thin film electrodes, in order to further improve performance.

[0233] First base electrode layer **526a1** covers a portion of first main surface **512a** at a corner portion where first main surface **512a**, first side surface **512c**, and third side surface **512e** intersect.

[0234] Second base electrode layer **526a2** covers a portion of second main surface **512b** at a corner portion where second main surface **512b**, first side surface **512c**, and third side surface **512e** intersect.

[0235] Third base electrode layer **526b1** covers a portion of first main surface **512a** at a corner portion where first main surface **512a**, second side surface **512d**, and fourth side surface **512f** intersect.

[0236] Fourth base electrode layer **526b2** covers a portion of second main surface **512b** at a corner portion where second main surface **512b**, second side surface **512d**, and fourth side surface **512f** intersect.

[0237] Base electrode layer **527** includes a fifth base electrode layer **527a1**, a sixth base electrode layer **527a2**, a seventh base electrode layer **527b1**, and an eighth base electrode layer **527b2**. Fifth base electrode layer **527a1**, sixth base electrode layer **527a2**, seventh base electrode layer **527b1**, and eighth base electrode layer **527b2** include a thin film layer including a plurality of thin film electrodes, in order to further improve performance.

[0238] Fifth base electrode layer **527a1** covers a portion of first main surface **512a** at a corner portion where first main surface **512a**, first side surface **512c**, and fourth side surface **512f** intersect.

[0239] Sixth base electrode layer **527a2** covers a portion of second main surface **512b** at a corner portion where second main surface **512b**, first side surface **512c**, and fourth side surface **512f** intersect.

[0240] Seventh base electrode layer **527b1** covers a portion of first main surface **512a** at a corner portion where first main surface **512a**, second side surface **512d**, and third side surface **512e** intersect.

[0241] Eighth base electrode layer **527b2** covers a portion of second main surface **512b** at a corner portion where second main surface **512b**, second side surface **512d**, and third side surface **512e** intersect.

[0242] Base electrode layers **526** and **527** defined by the thin film layer are preferably formed by a thin film forming method such as, for example, a sputtering method or a vapor deposition method. In particular, base electrode layers **526** and **527** defined by the thin film layer are preferably a sputtering electrode formed by a sputtering method. Hereinafter, an electrode formed by the sputtering method will be described.

[0243] When base electrode layers **526** and **527** are formed with a sputtering electrode, it is preferable to directly form the sputtering electrode on a portion of first main surface **512a** and a portion of second main surface **512b** of multilayer body **512**.



[0244] Base electrode layers **526** and **527** formed by the sputtering electrode include, for example, at least one selected from Ni, Cr, Cu, Ti, and the like.

[0245] A thickness of the sputtering electrode in height direction  $x$  connecting first main surface **512a** and second main surface **512b** is preferably, for example, greater than or equal to about 50 nm and less than or equal to about 400 nm, and preferably greater than or equal to about 50 nm and less than or equal to about 130 nm.

[0246] Plating layer **528** includes a first plating layer **528a** and a second plating layer **528b**.

[0247] First plating layer **528a** covers first base electrode layer **526a1** and second base electrode layer **526a2**.

[0248] Second plating layer **528b** covers third base electrode layer **526b1** and fourth base electrode layer **526b2**.

[0249] Plating layer **529** includes a third plating layer **529a** and a fourth plating layer **529b**.

[0250] Third plating layer **529a** covers fifth base electrode layer **527a1** and sixth base electrode layer **527a2**.

[0251] Fourth plating layer **529b** covers seventh base electrode layer **527b1** and eighth base electrode layer **527b2**.

[0252] Plating layer **528** and plating layer **529** include a plurality of layers.

[0253] Preferably, plating layer **528** includes a lower layer plating layer **530**, a middle layer plating layer **532** covering base electrode layer **526** and lower layer plating layer **530**, and an upper layer plating layer **534** covering middle layer plating layer **532**. Similarly, plating layer **529** includes a lower layer plating layer **531**, a middle layer plating layer **533** covering base electrode layer **527** and lower layer plating layer **531**, and an upper layer plating layer **535** covering middle layer plating layer **533**.

[0254] In plating layer **528**, upper layer plating layer **534** includes, for example, at least one selected from Ni, Sn, Cu, Ag, Pd, an Ag—Pd alloy, Au, and the like. Similarly, in plating layer **529**, upper layer plating layer **535** includes, for example, at least one selected from Ni, Sn, Cu, Ag, Pd, an Ag—Pd alloy, Au, and the like.

[0255] Lower layer plating layer **530** includes a first lower layer plating layer **530a** and a second lower layer plating layer **530b**.

[0256] First lower layer plating layer **530a** is disposed from a portion on third side surface **512e** on first side surface **512c** side to a portion on first side surface **512c** on third side surface **512e** side of multilayer body **512** on which the base electrode layer **526** is not disposed. More specifically, first lower layer plating layer **530a** is disposed on a surface of multilayer body **512** so as to cover first internal electrode layer **516a** exposed on first side surface **512c** and third side surface **512e**.

[0257] Second lower layer plating layer **530b** is disposed from a portion on fourth side surface **512f** on second side surface **512d** side to a portion on second side surface **512d** on fourth side surface **512f** side of multilayer body **512** on which the base electrode layer **526** is not disposed. More specifically, second lower layer plating layer **530b** is disposed on a surface of multilayer body **512** so as to cover first internal electrode layer **516a** exposed on second side surface **512d** and fourth side surface **512f**.

[0258] Lower layer plating layer **531** includes a third lower layer plating layer **531a** and a fourth lower layer plating layer **531b**.

[0259] Third lower layer plating layer **531a** is disposed from a portion on fourth side surface **512f** on first side surface **512c** side to a portion on first side surface **512c** on fourth side surface **512f** side of multilayer body **512** on which the base electrode layer **527** is not disposed. More specifically, third lower layer plating layer **531a** is disposed on a surface of multilayer body **512** so as to cover second internal electrode layer **516b** exposed on first side surface **512c** and fourth side surface **512f**.

[0260] Fourth lower layer plating layer **531b** is disposed from a portion on third side surface **512e** on second side surface **512d** side to a portion on second side surface **512d** on third side surface

**512e** side of multilayer body **512** on which the base electrode layer **527** is not disposed. More specifically, fourth lower layer plating layer **531b** is disposed on a surface of multilayer body **512** so as to cover second internal electrode layer **516b** exposed on second side surface **512d** and third side surface **512e**.

[0261] Lower layer plating layers **530** and **531** preferably include, for example, at least one selected from Cu, Ni, Sn, Ag, Pd, an Ag—Pd alloy, Au, and the like. Among them, lower layer plating layers **530** and **531** are preferably a Cu plating. This provides an advantageous effects of reducing or preventing entry of a plating solution when upper layer plating layers **534** and **535** are formed.

[0262] A thickness of lower layer plating layers **530** and **531** is preferably greater than or equal to about 2  $\mu\text{m}$  and less than or equal to about 11  $\mu\text{m}$ , for example.

[0263] Middle layer plating layer **532** includes a first middle layer plating layer **532a** and a second middle layer plating layer **532b**.

[0264] First middle layer plating layer **532a** is disposed on a surface of first lower layer plating layer **530a**, a portion of surfaces of first side surface **512c** and third side surface **512e** on which first lower layer plating layer **530a** is not disposed, and surfaces of first base electrode layer **526a1** and second base electrode layer **526a2**.

[0265] Second middle layer plating layer **532b** is disposed on a surface of second lower layer plating layer **530b**, a portion of surfaces of second side surface **512d** and fourth side surface **512f** on which second lower layer plating layer **530b** is not disposed, and surfaces of third base electrode layer **526b1** and fourth base electrode layer **526b2**.

[0266] Middle layer plating layer **533** includes a third middle layer plating layer **533a** and a fourth middle layer plating layer **533b**.

[0267] Third middle layer plating layer **533a** is disposed on a surface of third lower layer plating layer **531a**, a portion of surfaces of first side surface **512c** and fourth side surface **512f** on which third lower layer plating layer **531a** is not disposed, and surfaces of fifth base electrode layer **527a1** and sixth base electrode layer **527a2**.

[0268] Fourth middle layer plating layer **533b** is disposed on a surface of fourth lower layer plating layer **531b**, a portion of surfaces of second side surface **512d** and third side surface **512e** on which fourth lower layer plating layer **531b** is not disposed, and surfaces of seventh base electrode layer **527b1** and eighth base electrode layer **527b2**.

[0269] Middle layer plating layers **532** and **533** preferably include, for example, at least one selected from Cu, Ni, Sn, Ag, Pd, an Ag—Pd alloy, Au, and the like. Among them, middle layer plating layers **532** and **533** are preferably a Cu plating. This provides an advantageous effect of reducing or preventing entry of a plating solution when upper layer plating layers **534** and **535** are formed.

[0270] A thickness of middle layer plating layers **532** and **533** is preferably greater than or equal to about 2  $\mu\text{m}$  and less than or equal to about 11  $\mu\text{m}$ , for example.

[0271] Upper layer plating layer **534** includes a first upper layer plating layer **534a** and a second upper layer plating layer **534b**.

[0272] First upper layer plating layer **534a** is disposed so as to cover first middle layer plating layer **532a**. Specifically, first upper layer plating layer **534a** is disposed on first side surface **512c** and third side surface **512e** on the surface of first middle layer plating layer **532a**, and is provided so as to also extend to first main surface **512a** and second main surface **512b** on the surface of first middle layer plating layer **532a**.

[0273] Second upper layer plating layer **534b** covers second middle layer plating layer **532b**. Specifically, second upper layer plating layer **534b** is disposed on second side surface **512d** and fourth side surface **512f** on the surface of second middle layer plating layer **532b**, and is provided so as to also extend to first main surface **512a** and second main surface **512b** on the surface of second middle layer plating layer **532b**.

[0274] Upper layer plating layer **535** includes a third upper layer plating layer **535a** and a fourth upper layer plating layer **535b**.

[0275] Third upper layer plating layer **535a** covers third middle layer plating layer **533a**. Specifically, third upper layer plating layer **535a** is disposed on first side surface **512c** and fourth side surface **512f** on the surface of third middle layer plating layer **533a**, and is provided so as to also extend to first main surface **512a** and second main surface **512b** on the surface of third middle layer plating layer **533a**.

[0276] Fourth upper layer plating layer **535b** covers fourth middle layer plating layer **533b**. Specifically, fourth upper layer plating layer **535b** is disposed on second side surface **512d** and third side surface **512e** on the surface of fourth middle layer plating layer **533b**, and is provided so as to also extend to first main surface **512a** and second main surface **512b** on the surface of fourth middle layer plating layer **533b**.

[0277] In the present preferred embodiment, upper layer plating layers **534** and **535** have a two-layer structure including, for example, an Ni plating layer and an Sn plating layer provided in this order. The Ni plating layer covers surfaces of middle layer plating layers **532** and **533**, which makes it possible to reduce or prevent erosion of base electrode layers **526** and **527** due to solder when multilayer ceramic capacitor **510** is mounted on the mounting substrate. By providing the Sn plating layer, wettability of solder when multilayer ceramic capacitor **510** is mounted on the mounting substrate can be improved, and multilayer ceramic capacitor **510** can be easily mounted.

[0278] A thickness per layer of upper layer plating layers **534** and **535** is preferably, for example, greater than or equal to about 2  $\mu\text{m}$  and less than or equal to about 11  $\mu\text{m}$ .

[0279] In the present preferred embodiment, at least one of, in first external electrode **524a**, a sum of a thickness in width direction y of lower layer plating layer **530** and a thickness in width direction y of middle layer plating layer **532** located on first side surface **512c**, or a sum of a thickness in length direction z of lower layer plating layer **530** and a thickness in length direction z of middle layer plating layer **532** located on third side surface **512e** is defined as X1, at least one of, in second external electrode **524b**, a sum of a thickness in width direction y of lower layer plating layer **530** and a thickness in width direction y of middle layer plating layer **532** located on second side surface **512d**, or a sum of a thickness in length direction z of lower layer plating layer **531** and a thickness in length direction z of middle layer plating layer **532** located on fourth side surface **512f** is defined as X2, at least one of, in third external electrode **525a**, a sum of a thickness in width direction y of lower layer plating layer **531** and a thickness in width direction y of middle layer plating layer **533** located on first side surface **512c**, or a sum of a thickness in length direction z of lower layer plating layer **531** and a thickness in length direction z of middle layer plating layer **533** located on fourth side surface **512f** is defined as X3, at least one of, in fourth external electrode **525b**, a sum of a thickness in width direction y of lower layer plating layer **531** and a thickness in width direction y of middle layer plating layer **533** located on second side surface **512d**, or a sum of a thickness in length direction z of lower layer plating layer **531** and a thickness in length direction z of middle layer plating layer **533** located on third side surface **512e** is defined as X4, a sum of a thickness in height direction x of base electrode layers **526** and **527** and a thickness in height direction x of middle layer plating layers **532** and **533** located on first main surface **512a** in first external electrode **524a** to fourth external electrode **525b** is defined as Y1, and a sum of a thickness in height direction x of base electrode layers **526** and **527** and a thickness in height direction x of middle layer plating layers **532** and **533** located on second main surface **512b** in first external electrode **524a** to fourth external electrode **525b** is defined as Y2, a relationship of  $X1 > Y1$ ,  $X1 > Y2$ ,  $X2 > Y1$ ,  $X2 > Y2$ ,  $X3 > Y1$ ,  $X3 > Y2$ ,  $X4 > Y1$ , and  $X4 > Y2$  is satisfied.

[0280] In the present preferred embodiment, more specifically, as illustrated in FIGS. 21A to 21D, each thickness is configured as follows.

[0281] In first external electrode **524a**, a sum of a thickness in width direction y of first lower layer plating layer **530a** and a thickness in width direction y of first middle layer plating layer **532a**

located on first side surface **512c** is defined as  $X_{11}$ , and a sum of a thickness in length direction  $z$  of first lower layer plating layer **530a** and a thickness in length direction  $z$  of first middle layer plating layer **532a** located on third side surface **512e** is defined as  $X_{31}$ .

[0282] A sum of a thickness in height direction  $x$  of first base electrode layer **526a1** and a thickness in height direction  $x$  of first middle layer plating layer **532a** located on first main surface **512a** is defined as  $Y_{11}$ , and a sum of a thickness in height direction  $x$  of second base electrode layer **526a2** and a thickness in height direction  $x$  of first middle layer plating layer **532a** located on second main surface **512b** is defined as  $Y_{21}$ .

[0283] At this time, a relationship of  $X_{11} > Y_{11}$ ,  $X_{31} > Y_{11}$ ,  $X_{11} > Y_{21}$ , and  $X_{31} > Y_{21}$  is satisfied.

[0284] In second external electrode **524b**, a sum of a thickness in width direction  $y$  of second lower layer plating layer **530b** and a thickness in width direction  $y$  of second middle layer plating layer **532b** located on second side surface **512d** is defined as  $X_{22}$ , and a sum of a thickness in length direction  $z$  of second lower layer plating layer **530b** and a thickness in length direction  $z$  of second middle layer plating layer **532b** located on fourth side surface **512f** is defined as  $X_{42}$ .

[0285] A sum of a thickness in height direction  $x$  of third base electrode layer **526b1** and a thickness in height direction  $x$  of second middle layer plating layer **532b** located on first main surface **512a** is defined as  $Y_{12}$ , and a sum of a thickness in height direction  $x$  of fourth base electrode layer **526b2** and a thickness in height direction  $x$  of second middle layer plating layer **532b** located on second main surface **512b** is defined as  $Y_{22}$ .

[0286] At this time, a relationship of  $X_{22} > Y_{12}$ ,  $X_{42} > Y_{12}$ ,  $X_{22} > Y_{22}$ , and  $X_{42} > Y_{22}$  is satisfied.

[0287] In third external electrode **525a**, a sum of a thickness in width direction  $y$  of third lower layer plating layer **531a** and a thickness in width direction  $y$  of third middle layer plating layer **533a** located on first side surface **512c** is defined as  $X_{13}$ , and a sum of a thickness in length direction  $z$  of third lower layer plating layer **531a** and a thickness in length direction  $z$  of third middle layer plating layer **533a** located on fourth side surface **512f** is defined as  $X_{43}$ .

[0288] A sum of a thickness in height direction  $x$  of fifth base electrode layer **527a1** and a thickness in height direction  $x$  of third middle layer plating layer **533a** located on first main surface **512a** is defined as  $Y_{13}$ , and a sum of a thickness in height direction  $x$  of sixth base electrode layer **527a2** and a thickness in height direction  $x$  of third middle layer plating layer **533a** located on second main surface **512b** is defined as  $Y_{23}$ .

[0289] At this time, a relationship of  $X_{13} > Y_{13}$ ,  $X_{43} > Y_{13}$ ,  $X_{13} > Y_{23}$ , and  $X_{43} > Y_{23}$  is satisfied.

[0290] In fourth external electrode **525b**, a sum of a thickness in width direction  $y$  of fourth lower layer plating layer **531b** and a thickness in width direction  $y$  of fourth middle layer plating layer **533b** located on second side surface **512d** is defined as  $X_{24}$ , and a sum of a thickness in length direction  $z$  of fourth lower layer plating layer **531b** and a thickness in length direction  $z$  of fourth middle layer plating layer **533b** located on third side surface **512e** is defined as  $X_{34}$ .

[0291] A sum of a thickness in height direction  $x$  of seventh base electrode layer **527b1** and a thickness in height direction  $x$  of fourth middle layer plating layer **533b** located on first main surface **512a** is defined as  $Y_{14}$ , and a sum of a thickness in height direction  $x$  of eighth base electrode layer **527b2** and a thickness in height direction  $x$  of fourth middle layer plating layer **533b** located on second main surface **512b** is defined as  $Y_{24}$ .

[0292] At this time, a relationship of  $X_{24} > Y_{14}$ ,  $X_{34} > Y_{14}$ ,  $X_{24} > Y_{24}$ , and  $X_{34} > Y_{24}$  is satisfied.

[0293] This makes it possible to reduce a thickness of external electrodes **524** and **525** with respect to height direction  $x$  of multilayer ceramic capacitor **510**, and thus the multilayer body can be made as thick as possible within the standard dimensions, and a degree of freedom in designing an effective area of internal electrode layer **516** can be improved. In addition, since both plating layers **528** and **529** having a sufficient thickness can be secured on both side surfaces **512e** and **512f** sides of multilayer body **512** from which internal electrode layers **516** are extracted, moisture entry from outside can be reduced or prevented.

[0294]  $X_1$ , which is a sum of a thickness of lower layer plating layer **530** and a thickness of middle

layer plating layer **532** in first external electrode **524a**, is preferably, for example, greater than or equal to about 4  $\mu\text{m}$  and less than or equal to about 12  $\mu\text{m}$ .

[0295] X2, which is a sum of a thickness of lower layer plating layer **530** and a thickness of middle layer plating layer **532** in second external electrode **524b**, is preferably, for example, greater than or equal to about 4  $\mu\text{m}$  and less than or equal to about 12  $\mu\text{m}$ .

[0296] X3, which is a sum of a thickness of lower layer plating layer **531** and a thickness of middle layer plating layer **533** in third external electrode **525a**, is preferably, for example, greater than or equal to about 4  $\mu\text{m}$  and less than or equal to about 12  $\mu\text{m}$ .

[0297] X4, which is a sum of a thickness of lower layer plating layer **531** and a thickness of middle layer plating layer **533** in fourth external electrode **525b**, is preferably, for example, greater than or equal to about 4  $\mu\text{m}$  and less than or equal to about 12  $\mu\text{m}$ .

[0298] Y11, which is a sum of a thickness in height direction x of first base electrode layer **526a1** and a thickness in height direction x of first middle layer plating layer **532a** located on first main surface **512a**, Y12, which is a sum of a thickness in height direction x of third base electrode layer **526b1** and a thickness in height direction x of second middle layer plating layer **532b** located on first main surface **512a**, Y13, which is a sum of a thickness in height direction x of fifth base electrode layer **527a1** and a thickness in height direction x of third middle layer plating layer **533a** located on first main surface **512a**, and Y14, which is a sum of a thickness in height direction x of seventh base electrode layer **527b1** and a thickness in height direction x of fourth middle layer plating layer **533b** located on first main surface **512a**, are preferably, for example, greater than or equal to about 2  $\mu\text{m}$  and less than or equal to about 10  $\mu\text{m}$ .

[0299] Y21, which is a sum of a thickness in height direction x of second base electrode layer **526a2** and a thickness in height direction x of first middle layer plating layer **532a** located on second main surface **512b**, Y22, which is a sum of a thickness in height direction x of fourth base electrode layer **526b2** and a thickness in height direction x of second middle layer plating layer **532b** located on second main surface **512b**, Y23, which is a sum of a thickness in height direction x of sixth base electrode layer **527a2** and a thickness in height direction x of third middle layer plating layer **533a** located on second main surface **512b**, and Y24, which is a sum of a thickness in height direction x of eighth base electrode layer **527b2** and a thickness in height direction x of fourth middle layer plating layer **533b** located on second main surface **512b** are preferably, for example, greater than or equal to about 2  $\mu\text{m}$  and less than or equal to about 10  $\mu\text{m}$ .

[0300] Further, a ratio X1/Y11 between X1 and Y11 and a ratio X1/Y21 between X1 and Y21 are preferably, for example, greater than or equal to about 1.5. A ratio X2/Y12 between X2 and Y12 and a ratio X2/Y22 between X2 and Y22 are preferably, for example, greater than or equal to about 1.5. A ratio X3/Y13 between X3 and Y13 and a ratio X3/Y23 between X3 and Y23 are preferably, for example, greater than or equal to about 1.5. A ratio X4/Y14 between X4 and Y14 and a ratio X4/Y24 between X4 and Y24 are preferably, for example, greater than or equal to about 1.5. This makes it possible to reduce a thickness of external electrodes **524** and **525** with respect to height direction x of multilayer ceramic capacitor **510**, and thus the multilayer body can be made as thick as possible within the standard dimensions, and a degree of freedom in designing an effective area of internal electrode layer **516** can be improved. In addition, since plating layers **528** and **529** having a sufficient thickness can be secured on the end surface side of multilayer body **512** from which internal electrode layer **516** is extracted, moisture entry from outside can be reduced or prevented.

[0301] A thickness in length direction z of lower layer plating layers **530** and **531** located on first side surface **512c** and second side surface **512d** is preferably larger than a thickness in length direction z of middle layer plating layers **532** and **533** located on first side surface **512c** and second side surface **512d**. A thickness in length direction z of lower layer plating layers **530** and **531** located on third side surface **512e** and fourth side surface **512f** is preferably larger than a thickness in length direction z of middle layer plating layers **532** and **533** located on third side surface **512e**

and fourth side surface **512f**. As a result, a thickness of lower layer plating layers **530** and **531** on a side closer to internal electrode layer **516** can be secured, and moisture entry can be further reduced or prevented.

[0302] Further, in the present preferred embodiment, on first side surface **512c** to fourth side surface **512f** where internal electrode layers **516** are exposed, a particle diameter of a metal included in lower layer plating layers **530** and **531** connected to internal electrode layer **516** is larger than a particle diameter of a metal included in middle layer plating layers **532** and **533** disposed on lower layer plating layers **530** and **531**. As a result, the particle diameter of lower layer plating layers **530** and **531** on a side closer to the internal electrode layer is large, and thus the number of grain boundaries can be reduced as compared with a case where the particle diameter is small, so that a path of moisture entry can be reduced. Therefore, moisture entry can be reduced or prevented.

[0303] Further, on lower layer plating layers **530** and **531**, middle layer plating layers **532** and **533** including metal having a particle diameter smaller than that of a metal included in lower layer plating layers **530** and **531** are disposed. As a result, since the particle diameter of metal particles of middle layer plating layers **532** and **533** is small, a compressive stress of middle layer plating layers **532** and **533** can be reduced. As a result, even when a thermal stress is applied, it is possible to reduce or prevent a tensile stress applied to a tip end portion of middle layer plating layers **532** and **533**, and it is possible to reduce or prevent an occurrence of cracks in multilayer body **512** caused by the thermal stress.

[0304] A dimension in length direction *z* of multilayer ceramic capacitor **510** including multilayer body **512** and external electrodes **524** and **525** is defined as an L dimension, a dimension in height direction *x* of multilayer ceramic capacitor **510** including multilayer body **512** and external electrodes **524** and **525** is defined as a T dimension, and a dimension in width direction *y* of multilayer ceramic capacitor **510** including multilayer body **512** and external electrodes **524** and **525** is defined as a W dimension.

[0305] In dimensions of multilayer ceramic capacitor **510**, preferably, for example, the L dimension in length direction *z* is greater than or equal to about 0.45 mm and less than or equal to about 0.75 mm, the T dimension in height direction *x* is greater than or equal to about 70  $\mu\text{m}$  and less than or equal to about 110.0  $\mu\text{m}$ , and the W dimension in width direction *y* is the W dimension satisfying about  $0.85 \leq W/L \leq \text{about } 1.0$ .

[0306] Multilayer ceramic capacitor **510** illustrated in FIG. 15 has advantageous effects the same as or similar to those of multilayer ceramic capacitor **10** described above.

## 2. Modification of Second Preferred Embodiment

[0307] Next, a multilayer ceramic capacitor according to a modification of the second preferred embodiment of the present invention will be described. FIG. 22A is an external perspective view of a multilayer ceramic capacitor as an example of a multilayer ceramic electronic component according to a modification of the second preferred embodiment of the present invention. FIG. 22B is a bottom view of the multilayer ceramic capacitor as an example of the multilayer ceramic electronic component according to the modification of the second preferred embodiment of the present invention. In a multilayer ceramic capacitor **510'** illustrated in FIG. 24, the same or corresponding portions as those of multilayer ceramic capacitor **510** illustrated in FIGS. 15 to 20B are denoted by the same reference numerals, and a description thereof will be omitted.

[0308] Multilayer ceramic capacitor **510'** includes a rectangular or substantially rectangular parallelepiped multilayer body **512** and external electrodes **524'** and **525'**.

[0309] External electrode **524'** includes a first external electrode **524a'** electrically connected to a first extraction electrode portion **520a** of a first internal electrode layer **516a**, and a second external electrode **524b'** electrically connected to second extraction electrode portion **520b**.

[0310] First external electrode **524a'** covers first extraction electrode portion **520a** on a first side surface **512c** and a third side surface **512e**, and covers a portion of a second main surface **512b**.

Further, second external electrode **524b'** covers second extraction electrode portion **520b** on a second side surface **512d** and a fourth side surface **512f**, and covers a portion of second main surface **512b**.

[0311] External electrode **525'** includes a third external electrode **525a'** electrically connected to a third extraction electrode portion **521a** of a second internal electrode layer **516b**, and a fourth external electrode **525b'** electrically connected to a fourth extraction electrode portion **521b**.

[0312] Third external electrode **525a'** covers third extraction electrode portion **521a** on first side surface **512c** and fourth side surface **512f**, and covers a portion of second main surface **512b**.

Further, fourth external electrode **525b'** covers fourth extraction electrode portion **521b** on second side surface **512d** and third side surface **512e**, and covers a portion of second main surface **512b**.

[0313] External electrodes **524'** and **525'** preferably include a base electrode layer and a plating layer in this order from multilayer body **512** side.

[0314] Further, a structure of plating layers **530** and **531** of multilayer ceramic capacitor **510'** according to the present modification is the same or substantially the same as a structure of plating layers **530** and **531** of multilayer ceramic capacitor **510**.

[0315] Multilayer ceramic capacitor **510'** illustrated in FIGS. **22A** and **22B** has advantageous effects the same as or similar to those of multilayer ceramic capacitor **510** described above, and also has the following advantageous effects.

[0316] That is, since external electrodes **524'** and **525'** are not provided on a surface of a first main surface **512a**, a thickness of multilayer body **512** can be increased by the absence of the thickness, and a strength of multilayer ceramic capacitor **510'** can be improved and electrostatic capacitance per volume can be improved. In addition, since it is possible to reduce or prevent wetting up of solder on an upper surface (first main surface **512a**) of multilayer ceramic capacitor **510'** at a time of mounting, a thickness of multilayer body **512** can be further increased accordingly.

### 3. Method for Manufacturing Multilayer Ceramic Capacitor

[0317] Next, a non-limiting example of a method for manufacturing multilayer ceramic capacitors **510** and **510'** will be described.

[0318] First, a ceramic green sheet and a conductive paste for internal electrodes are prepared. The ceramic green sheet and the conductive paste for internal electrodes include a binder (for example, a known organic binder or the like) and a solvent (for example, an organic solvent or the like).

[0319] Next, the conductive paste for internal electrodes is printed on the ceramic green sheet in a predetermined pattern by, for example, screen printing or gravure printing, to form an internal electrode pattern as illustrated in FIGS. **20A** and **20B**. Specifically, a conductive paste layer is formed by applying a paste made by a conductive material onto the ceramic green sheet by a method such as the printing described above. The paste made by the conductive material is, for example, obtained by adding an organic binder and an organic solvent to metal powder. Note that, as for the ceramic green sheet, a ceramic green sheet for outer layers on which no internal electrode pattern is printed is also produced.

[0320] Then, by using these ceramic green sheets on which the internal electrode pattern is formed, a multilayer sheet is produced. That is, by laminating a predetermined number of ceramic green sheets for outer layers on which no internal electrode pattern is formed, alternately laminating, on top of that, a ceramic green sheet on which an internal electrode pattern corresponding to first internal electrode layer **516a** is formed and a ceramic green sheet on which an internal electrode pattern corresponding to second internal electrode layer **516b** is formed, and further laminating, on top of that, a predetermined number of ceramic green sheets on which no internal electrode pattern is formed, a multilayer sheet is produced.

[0321] Subsequently, by pressure-bonding this multilayer sheet in the laminating direction by, for example, isostatic pressing, a multilayer block is produced.

[0322] Further, a multilayer block is produced by pressing the multilayer sheet in a laminating direction by, for example as isostatic pressing.

[0323] Subsequently, the multilayer block is cut into a predetermined size, and a multilayer chip is produced. At this time, corner portions and ridge portions of the multilayer chip may be rounded by barrel polishing or the like.

[0324] Next, by baking the multilayer chip, multilayer body **512** as illustrated in FIG. **25** is produced. A baking temperature is preferably, for example, greater than or equal to about 900° C. and less than or equal to about 1300° C., depending on a material of the ceramic or the internal electrode.

[0325] At this time, as illustrated in FIG. **23**, first extraction electrode portion **520a** of first internal electrode layer **516a** is exposed from first side surface **512c** and third side surface **512e** of multilayer body **512**, and third extraction electrode portion **521a** of second internal electrode layer **516b** is exposed from first side surface **512c** and fourth side surface **512f** of multilayer body **512**. Further, second extraction electrode portion **520b** of first internal electrode layer **516a** is exposed from second side surface **512d** and fourth side surface **512f** of multilayer body **512**, and fourth extraction electrode portion **521b** of second internal electrode layer **516b** is exposed from second side surface **512d** and third side surface **512e** of multilayer body **512**.

[0326] Subsequently, as illustrated in FIG. **24**, base electrode layers **526** and **527** made by a thin film electrode layer are formed on a portion of first main surface **512a** and a portion of second main surface **512b** of multilayer body **512**. Base electrode layers **526** and **527** as a thin film layer can be formed by, for example, a sputtering method or the like. In other words, base electrode layer as a thin film layer includes a sputtering electrode. The sputtering electrode can be formed by metal including, for example, at least one selected from Ni, Cr, Cu, Ti, and the like.

[0327] Note that, in a case where external electrodes **524'** and **525'** are formed in which no external electrode is disposed on first main surface **512a** as in a case of multilayer ceramic capacitor **510'**, base electrode layers **526** and **527** are not formed on first main surface **512a**.

[0328] Thereafter, lower layer plating layers **530** and **531** are formed so as to cover a region where internal electrode layers **516** are exposed on first side surface **512c**, second side surface **512d**, third side surface **512e**, and fourth side surface **512f** of multilayer body **512**. Here, for lower layer plating layers **530** and **531**, by, for example, electrolytic plating using an electrolytic plating bath to which an additive is added or electroless plating by a substitution reaction, lower layer plating layers **530** and **531** are formed. As the additive used for the electrolytic plating with the electrolytic plating bath, for example, a citric acid-based additive is used. In addition, a thickness of lower layer plating layers **530** and **531** and a particle diameter of a metal of lower layer plating layers **530** and **531** of a preferred embodiment of the present invention can be formed by changing plating conditions and performing heat treatment after forming lower layer plating layers **530** and **531**. The plating conditions are, for example, a bath temperature, a bath ion concentration, and a current density in a case of electrolytic plating. As a condition for the heat treatment, it is preferable to perform the heat treatment in, for example, a range of greater than or equal to about 300° C. and less than or equal to about 900° C. for greater than or equal to about 0.5 hours and less than or equal to about 12 hours.

[0329] Subsequently, middle layer plating layers **532** and **533** are formed on lower layer plating layers **530** and **531**, on first side surface **512c**, second side surface **512d**, third side surface **512e**, and fourth side surface **512f** on which lower layer plating layers **530** and **531** are not disposed, and on base electrode layers **526** and **527**. For middle layer plating layers **532** and **533**, by, for example, electrolytic plating using an electrolytic plating bath to which an additive is added or electroless plating by a substitution reaction, middle layer plating layers **532** and **533** are formed. As the additive used for the electrolytic plating with the electrolytic plating bath, for example, a citric acid-based additive is used. As the additive used for the electrolytic plating with the electrolytic plating bath, for example, a citric acid-based additive is used. Further, by changing plating conditions, a thickness of middle layer plating layers **532** and **533** and a particle diameter of a metal of middle layer plating layers **532** and **533** of the present invention can be formed. The plating



conditions are, for example, a bath temperature, a bath ion concentration, and a current density in a case of electrolytic plating.

[0330] Thereafter, upper layer plating layer **534** is formed on a surface of middle layer plating layer **532**, and upper layer plating layer **535** is formed on a surface of middle layer plating layer **533**.

Upper layer plating layers **534** and **535** include, for example, at least one selected from Cu, Ni, Sn, Ag, Pd, an Ag—Pd alloy, Au, and the like, and are formed by a single layer or a plurality of layers. Preferably, upper layer plating layers **534** and **535** are formed by, for example, two layers by forming an Ni plating layer and an Sn plating layer on the Ni plating layer.

[0331] In this way, as illustrated in FIG. **25**, external electrodes **524** and **525** are formed.

[0332] As described above, multilayer ceramic capacitors **510** and **510'** as illustrated in FIG. **16** or FIG. **23** are manufactured.

[0333] Although the multilayer ceramic electronic component having a laterally symmetrical or substantially symmetrical shape in front view has been exclusively illustrated in the above-described preferred embodiments and each modification, the outer shape of the multilayer ceramic electronic component according to preferred embodiments of the present invention can be variously changed in accordance with a target of mounting and in accordance with required performance. Further, preferred embodiments of the present invention also include an appropriate combination of all or a portion of the configurations of the above-described preferred embodiments and each modification.

[0334] That is, various changes can be made regarding a mechanism, a shape, a material, a quantity, a position, an arrangement, and the like for the preferred embodiments and each modification described above without departing from the scope of the technical idea and the object of the present invention, and these are included in the present invention.

[0335] Preferred embodiments of the present invention relate to multilayer ceramic electronic components, and particularly can be used as a multilayer ceramic electronic component including an external electrode having a multilayer structure.

[0336] While preferred embodiments of the present invention have been described above, it is to be understood that variations and modifications will be apparent to those skilled in the art without departing from the scope and spirit of the present invention. The scope of the present invention, therefore, is to be determined solely by the following claims.

## Claims

**1.** A multilayer ceramic electronic component comprising: a multilayer body including a plurality of ceramic layers that are laminated and a plurality of internal electrode layers, the multilayer body including a first main surface and a second main surface facing each other in a height direction, a first side surface and a second side surface facing each other in a width direction orthogonal or substantially orthogonal to the height direction, and a third side surface and a fourth side surface facing each other in a length direction orthogonal or substantially orthogonal to the height direction and the width direction; and a plurality of external electrodes on the first to fourth side surfaces of the multilayer body; wherein the plurality of internal electrode layers include a plurality of first internal electrode layers and a plurality of second internal electrode layers, in which the first internal electrode layers and the plurality of second internal electrode layers are alternately laminated with the ceramic layers interposed therebetween; the first internal electrode layers include a first extraction electrode portion extending to the first side surface and the third side surface, and a second extraction electrode portion extending to one side surface other than a side surface to which the first extraction electrode portion is extended; the second internal electrode layers include a third extraction electrode portion extending to the first side surface and the fourth side surface, and a fourth extraction electrode portion extending to one side surface other than a side surface to which the third extraction electrode portion is extended; the plurality of external

electrodes include a first external electrode connected to the first extraction electrode portion, a second external electrode connected to the second extraction electrode portion, a third external electrode connected to the third extraction electrode portion, and a fourth external electrode connected to the fourth extraction electrode portion; the first external electrode, the second external electrode, the third external electrode, and the fourth external electrode include a base electrode layer and a plating layer; the base electrode layer is located on at least a portion of the first main surface and a portion of the second main surface; the plating layer includes a lower layer plating layer extending from a portion of the third side surface on the first side surface side to a portion of the first side surface on the third side surface side, extending from a portion of the fourth side surface on the second side surface side to a portion of the second side surface on the fourth side surface side, extending from a portion of the fourth side surface on the first side surface side to a portion of the first side surface on the fourth side surface side, and extending from a portion of the third side surface on the second side surface side to a portion of the second side surface on the third side surface side, a middle layer plating layer on the lower layer plating layer, on the first side surface, the second side surface, the third side surface, and the fourth side surface on which the lower layer plating layer is not located, and on the base electrode layer, and an upper layer plating layer on the middle layer plating layer; in the first external electrode, when at least one of a sum of a thickness in a width direction of the lower layer plating layer and a thickness in a width direction of the middle layer plating layer located on the first side surface, or a sum of a thickness in a length direction of the lower layer plating layer and a thickness in a length direction of the middle layer plating layer located on the third side surface is defined as X1; in the second external electrode, at least one of a sum of a thickness in a width direction of the lower layer plating layer and a thickness in a width direction of the middle layer plating layer located on the second side surface, or a sum of a thickness in a length direction of the lower layer plating layer and a thickness in a length direction of the middle layer plating layer located on the fourth side surface is defined as X2; in the third external electrode, at least one of a sum of a thickness in a width direction of the lower layer plating layer and a thickness in a width direction of the middle layer plating layer located on the first side surface, or a sum of a thickness in a length direction of the lower layer plating layer and a thickness in a length direction of the middle layer plating layer located on the fourth side surface is defined as X3; in the fourth external electrode, at least one of a sum of a thickness in a width direction of the lower layer plating layer and a thickness in a width direction of the middle layer plating layer located on the second side surface, or a sum of a thickness in a length direction of the lower layer plating layer and a thickness in a length direction of the middle layer plating layer located on the third side surface is defined as X4; a sum of a thickness in the height direction of the base electrode layer and a thickness in the height direction of the middle layer plating layer located on the first main surface is defined as Y1; a sum of a thickness in the height direction of the base electrode layer and a thickness in the height direction of the middle layer plating layer located on the second main surface is defined as Y2; a relationship of  $X1 > Y1$ ,  $X1 > Y2$ ,  $X2 > Y1$ ,  $X2 > Y2$ ,  $X3 > Y1$ ,  $X3 > Y2$ ,  $X4 > Y1$ , and  $X4 > Y2$  is satisfied; the thickness in a laminating direction of the base electrode layer is larger than a thickness in a laminating direction of the internal electrode; a dimension in the length direction of the multilayer ceramic capacitor is defined as an L dimension, and a dimension in width direction of the multilayer ceramic capacitor is defined as a W dimension; and a relationship of  $0.85 \leq W/L \leq 1.0$  is satisfied.

2. A multilayer ceramic electronic component comprising: a multilayer body including a plurality of ceramic layers that are laminated and a plurality of internal electrode layers, the multilayer body including a first main surface and a second main surface facing each other in a height direction, a first side surface and a second side surface facing each other in a width direction orthogonal or substantially orthogonal to the height direction, and a third side surface and a fourth side surface facing each other in a length direction orthogonal or substantially orthogonal to the height direction and the width direction; and a plurality of external electrodes on the first to fourth side surfaces of

the multilayer body; wherein the plurality of internal electrode layers include a plurality of first internal electrode layers and a plurality of second internal electrode layers, in which the first internal electrode layers and the plurality of second internal electrode layers are alternately laminated with the ceramic layers interposed therebetween; the first internal electrode layers include a first extraction electrode portion extending to the first side surface and the third side surface, and a second extraction electrode portion extending to one side surface other than a side surface to which the first extraction electrode portion is extended; the second internal electrode layers include a third extraction electrode portion extending to the first side surface and the fourth side surface, and a fourth extraction electrode portion extending to one side surface other than a side surface to which the third extraction electrode portion is extended; the plurality of external electrodes include a first external electrode connected to the first extraction electrode portion, a second external electrode connected to the second extraction electrode portion, a third external electrode connected to the third extraction electrode portion, and a fourth external electrode connected to the fourth extraction electrode portion; the first external electrode, the second external electrode, the third external electrode, and the fourth external electrode include a base electrode layer and a plating layer; the base electrode layer is located on at least a portion of the first main surface and a portion of the second main surface; the plating layer includes a lower layer plating layer extending from a portion of the third side surface on the first side surface side to a portion of the first side surface on the third side surface side, extending from a portion of the fourth side surface on the second side surface side to a portion of the second side surface on the fourth side surface side, extending from a portion of the fourth side surface on the first side surface side to a portion of the first side surface on the fourth side surface side, and extending from a portion of the third side surface on the second side surface side to a portion of the second side surface on the third side surface side, a middle layer plating layer on the lower layer plating layer, on the first side surface, the second side surface, the third side surface, and the fourth side surface on which the lower layer plating layer is not located, and on the base electrode layer, and an upper layer plating layer on the middle layer plating layer; in the first external electrode, when at least one of a sum of a thickness in a width direction of the lower layer plating layer and a thickness in a width direction of the middle layer plating layer located on the first side surface, or a sum of a thickness in a length direction of the lower layer plating layer and a thickness in a length direction of the middle layer plating layer located on the third side surface is defined as X1; in the second external electrode, at least one of a sum of a thickness in a width direction of the lower layer plating layer and a thickness in a width direction of the middle layer plating layer located on the second side surface, or a sum of a thickness in a length direction of the lower layer plating layer and a thickness in a length direction of the middle layer plating layer located on the fourth side surface is defined as X2; in the third external electrode, at least one of a sum of a thickness in a width direction of the lower layer plating layer and a thickness in a width direction of the middle layer plating layer located on the first side surface, or a sum of a thickness in a length direction of the lower layer plating layer and a thickness in a length direction of the middle layer plating layer located on the fourth side surface is defined as X3; in the fourth external electrode, at least one of a sum of a thickness in a width direction of the lower layer plating layer and a thickness in a width direction of the middle layer plating layer located on the second side surface, or a sum of a thickness in a length direction of the lower layer plating layer and a thickness in a length direction of the middle layer plating layer located on the third side surface is defined as X4; a sum of a thickness in the height direction of the base electrode layer and a thickness in the height direction of the middle layer plating layer located on the first main surface is defined as Y1; a sum of a thickness in the height direction of the base electrode layer and a thickness in the height direction of the middle layer plating layer located on the second main surface is defined as Y2; a relationship of  $X1 > Y1$ ,  $X1 > Y2$ ,  $X2 > Y1$ ,  $X2 > Y2$ ,  $X3 > Y1$ ,  $X3 > Y2$ ,  $X4 > Y1$ , and  $X4 > Y2$  is satisfied; a dimension in the length direction of the base electrode layer is larger than a dimension in the length direction of the

- first extraction electrode; a dimension in the width direction of the base electrode layer is larger than a dimension in the width direction of the first extraction electrode; a dimension in the length direction of the multilayer ceramic capacitor is defined as an L dimension, and a dimension in width direction of the multilayer ceramic capacitor is defined as a W dimension; and a relationship of  $0.85 \leq W/L \leq 1.0$  is satisfied.
3. The multilayer ceramic electronic component according to claim 1, wherein the base electrode layer is made of a metal including Ni as a main component.
  4. The multilayer ceramic electronic component according to claim 2, wherein the base electrode layer is made of a metal including Ni as a main component.
  5. The multilayer ceramic electronic component according to claim 3, wherein the lower layer plating layer is a Cu plating layer; and the middle layer plating layer is an Ni plating layer.
  6. The multilayer ceramic electronic component according to claim 4, wherein the lower layer plating layer is a Cu plating layer; and the middle layer plating layer is an Ni plating layer.
  7. The multilayer ceramic electronic component according to claim 5, wherein the upper layer plating layer is an Sn plating layer.
  8. The multilayer ceramic electronic component according to claim 6, wherein the upper layer plating layer is an Sn plating layer.
  9. The multilayer ceramic electronic component according to claim 7, wherein a particle diameter of a metal included in the lower layer plating layer is larger than a particle diameter of a metal included in the middle layer plating layer.
  10. The multilayer ceramic electronic component according to claim 8, wherein a particle diameter of a metal included in the lower layer plating layer is larger than a particle diameter of a metal included in the middle layer plating layer.
  11. The multilayer ceramic electronic component according to claim 9, wherein a particle diameter of a metal included in the lower layer plating layer is greater than or equal to about 2  $\mu\text{m}$  and less than or equal to about 4  $\mu\text{m}$ ; and a particle diameter of a metal included in the middle layer plating layer is greater than or equal to about 0.1  $\mu\text{m}$  and less than or equal to about 2  $\mu\text{m}$ .
  12. The multilayer ceramic electronic component according to claim 10, wherein a particle diameter of a metal included in the lower layer plating layer is greater than or equal to about 2  $\mu\text{m}$  and less than or equal to about 4  $\mu\text{m}$ ; and a particle diameter of a metal included in the middle layer plating layer is greater than or equal to about 0.1  $\mu\text{m}$  and less than or equal to about 2  $\mu\text{m}$ .
  13. The multilayer ceramic electronic component according to claim 11, wherein a thickness of the lower layer plating layer located on the first side surface, the second side surface, the third side surface, and the fourth side surface is larger than a thickness of the middle layer plating layer located on the first side surface, the second side surface, the third side surface, and the fourth side surface.
  14. The multilayer ceramic electronic component according to claim 12, wherein a thickness of the lower layer plating layer located on the first side surface, the second side surface, the third side surface, and the fourth side surface is larger than a thickness of the middle layer plating layer located on the first side surface, the second side surface, the third side surface, and the fourth side surface.
  15. The multilayer ceramic electronic component according to claim 13, wherein an L dimension of the multilayer body is greater than or equal to about 0.43 mm and less than or equal to about 0.73 mm.
  16. The multilayer ceramic electronic component according to claim 14, wherein an L dimension of the multilayer body is greater than or equal to about 0.43 mm and less than or equal to about 0.73 mm.
  17. The multilayer ceramic electronic component according to claim 15, wherein a dimension in the height direction of the multilayer body is defined as a T dimension; and the T dimension of the multilayer body is greater than or equal to about 50  $\mu\text{m}$  and less than or equal to about 90  $\mu\text{m}$ .

**18.** The multilayer ceramic electronic component according to claim 16, wherein a dimension in the height direction of the multilayer body is defined as a T dimension; and the T dimension of the multilayer body is greater than or equal to about 50  $\mu\text{m}$  and less than or equal to about 90  $\mu\text{m}$ .

**19.** The multilayer ceramic electronic component according to claim 17, wherein a thickness of the lower layer plating layer is greater than or equal to about 2  $\mu\text{m}$  and less than or equal to about 11  $\mu\text{m}$ , a thickness of the middle layer plating layer is greater than or equal to about 2  $\mu\text{m}$  and less than or equal to about 11  $\mu\text{m}$ , and a thickness of upper layer plating layer is greater than or equal to about 2  $\mu\text{m}$  and less than or equal to about 11  $\mu\text{m}$ .

**20.** The multilayer ceramic electronic component according to claim 18, wherein a thickness of the lower layer plating layer is greater than or equal to about 2  $\mu\text{m}$  and less than or equal to about 11  $\mu\text{m}$ , a thickness of the middle layer plating layer is greater than or equal to about 2  $\mu\text{m}$  and less than or equal to about 11  $\mu\text{m}$ , and a thickness of upper layer plating layer is greater than or equal to about 2  $\mu\text{m}$  and less than or equal to about 11  $\mu\text{m}$ .

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