CLAIMS

1. A coating liquid for forming a metal oxide film, comprising:

an indium compound;

at least one selected from the group consisting of a calcium compound, a strontium compound, and a barium compound;

at least one selected from the group consisting of a compound containing a metal a maximum positive value of an oxidation number of which is IV, a compound containing a metal a maximum positive value of an oxidation number of which is V, and a compound containing a metal a maximum positive value of an oxidation number of which is VI; and

an organic solvent.

2. The coating liquid for forming a metal oxide film according to claim 1, wherein the compound containing a metal a maximum positive value of an oxidation number of which is IV is at least one selected from the group consisting of a germanium compound, a tin compound, a titanium compound, a zirconium compound, and a hafnium compound.

3. The coating liquid for forming a metal oxide film according to claim 1 or 2, wherein the compound containing a metal a maximum positive value of an oxidation number of which is V is at least one selected from the group consisting of a vanadium

compound, a niobium compound, a tantalum compound, and an antimony compound.

4. The coating liquid for forming a metal oxide film according to any one of claims 1 to 3, wherein the compound containing a metal a maximum positive value of an oxidation number of which is VI is a molybdenum compound, or a tungsten compound, or both thereof.

5. The coating liquid for forming a metal oxide film according to any one of claims 1 to 4, wherein a number (A) of indium atoms of the indium compound, and a total number (B) of calcium atoms of the calcium compound, strontium atoms of the strontium compound, and barium atoms of the barium compound satisfy the following formula (1):

$$0.04 \leq [B/A] \leq 0.5 \qquad \text{Formula (1).}$$

6. The coating liquid for forming a metal oxide film according to any one of claims 1 to 4, wherein a number (A) of indium atoms of the indium compound, and a total number (C) of metal atoms of the compound containing a metal a maximum positive value of an oxidation number of which is IV, the compound containing a metal a maximum positive value of an oxidation number of which is V, and the compound containing a metal a maximum positive value of an oxidation number of which is VI satisfy the following

formula (2):

$$0.0001 \leq [C/A] \leq 0.1 \qquad \text{Formula (2).}$$

7. The coating liquid for forming a metal oxide film according to any one of claims 1 to 6, wherein the indium compound is at least one selected from the group consisting of indium nitrate, indium sulfate, and indium chloride.

8. The coating liquid for forming a metal oxide film according to any one of claims 1 to 7, wherein the calcium compound is at least one selected from the group consisting of calcium nitrate, calcium sulfate, and calcium chloride, the strontium compound is at least one selected from the group consisting of strontium nitrate, strontium sulfate, and strontium chloride, and the barium compound is barium bistetrahydrofurfuryloxide.

9. The coating liquid for forming a metal oxide film according to any one of claims 1 to 8, wherein the organic solvent is glycol ether, or diol, or both thereof.

10. A coating liquid for forming a metal oxide film, comprising:
an indium compound;
at least one selected from the group consisting of a magnesium compound, a calcium compound, a strontium compound, and a barium compound;

at least one selected from the group consisting of a compound containing a metal a maximum positive value of an oxidation number of which is IV, a compound containing a metal a maximum positive value of an oxidation number of which is V, and a compound containing a metal a maximum positive value of an oxidation number of which is VI; and

an organic solvent,

wherein the compound containing a metal a maximum positive value of an oxidation number of which is IV is at least one selected from the group consisting of a germanium compound, a titanium compound, a zirconium compound, and a hafnium compound.

11. A metal oxide film, obtained by a method comprising:

applying the coating liquid for forming a metal oxide film according to any one of claims 1 to 10 onto a base to be coated; and

drying, followed by baking.

12. A field-effect transistor, comprising:

a gate electrode configured to apply gate voltage;

a source electrode and a drain electrode, which are configured to extract electric current;

an active layer, which is formed between the source electrode and the drain electrode, and is formed of oxide

semiconductor; and

a gate insulating layer formed between the gate electrode, and the active layer,

wherein the oxide semiconductor is oxide semiconductor formed by applying the coating liquid for forming a metal oxide film according to claims 1 to 10.

13. A method for forming a field-effect transistor, comprising:

forming a gate electrode on a base;

forming a gate insulating layer on the gate electrode;

forming a source electrode and a drain electrode on the gate insulating layer with a space between the source electrode and the drain electrode;

forming an active layer formed of oxide semiconductor on an area of the gate insulating layer, which is a channel region between the source electrode and the drain electrode,

wherein the forming the active layer is applying the coating liquid for forming a metal oxide film according to any one of claims 1 to 10 on the gate insulating layer to form the active layer formed of the oxide semiconductor.

14. A method for producing a field-effect transistor, comprising:

forming a source electrode and a drain electrode on a base with a space between the source electrode and the drain

electrode;

forming an active layer formed of oxide semiconductor on an area of the base, which is a channel region between the source electrode and the drain electrode;

forming a gate insulating layer on the active layer; and

forming a gate electrode on the gate insulating layer,

wherein the forming the active layer is applying the coating liquid for forming a metal oxide film according to any one of claims 1 to 10 on the base to form the active layer formed of the oxide semiconductor.

CLAIMS

1. A coating liquid for forming a metal oxide film, comprising:

an indium compound;

at least one selected from the group consisting of a calcium compound, a strontium compound, and a barium compound;

at least one selected from the group consisting of a compound containing a metal a maximum positive value of an oxidation number of which is IV, a compound containing a metal a maximum positive value of an oxidation number of which is V, and a compound containing a metal a maximum positive value of an oxidation number of which is VI; and

an organic solvent.

2. The coating liquid for forming a metal oxide film according to claim 1, wherein the compound containing a metal a maximum positive value of an oxidation number of which is IV is at least one selected from the group consisting of a germanium compound, a tin compound, a titanium compound, a zirconium compound, and a hafnium compound.

3. The coating liquid for forming a metal oxide film according to claim 1 or 2, wherein the compound containing a metal a maximum positive value of an oxidation number of which is V is at least one selected from the group consisting of a vanadium compound, a niobium compound, a tantalum compound, and an antimony compound.

4. The coating liquid for forming a metal oxide film according

to any one of claims 1 to 3, wherein the compound containing a metal a maximum positive value of an oxidation number of which is VI is a molybdenum compound, or a tungsten compound, or both thereof.

5. The coating liquid for forming a metal oxide film according to any one of claims 1 to 4, wherein a number (A) of indium atoms of the indium compound, and a total number (B) of calcium atoms of the calcium compound, strontium atoms of the strontium compound, and barium atoms of the barium compound satisfy the following formula (1):

$$0.04 \leq [B/A] \leq 0.5 \qquad \text{Formula (1).}$$

6. The coating liquid for forming a metal oxide film according to any one of claims 1 to 4, wherein a number (A) of indium atoms of the indium compound, and a total number (C) of metal atoms of the compound containing a metal a maximum positive value of an oxidation number of which is IV, the compound containing a metal a maximum positive value of an oxidation number of which is V, and the compound containing a metal a maximum positive value of an oxidation number of which is VI satisfy the following formula (2):

$$0.0001 \leq [C/A] \leq 0.1 \qquad \text{Formula (2).}$$

7. The coating liquid for forming a metal oxide film according to any one of claims 1 to 6, wherein the indium compound is at least one selected from the group consisting of indium nitrate, indium sulfate, and indium chloride.

8. The coating liquid for forming a metal oxide film according to any one of claims 1 to 7, wherein the calcium compound is at least one selected from the group consisting of calcium nitrate, calcium sulfate, and calcium chloride, the strontium compound is at least one selected from the group consisting of strontium nitrate, strontium sulfate, and strontium chloride, and the barium compound is barium bistetrahydrofurfuryloxide.

9. The coating liquid for forming a metal oxide film according to any one of claims 1 to 8, wherein the organic solvent is glycol ether, or diol, or both thereof.

10. A coating liquid for forming a metal oxide film, comprising:

an indium compound;

at least one selected from the group consisting of a magnesium compound, a calcium compound, a strontium compound, and a barium compound;

at least one selected from the group consisting of a compound containing a metal a maximum positive value of an oxidation number of which is IV, a compound containing a metal a maximum positive value of an oxidation number of which is V, and a compound containing a metal a maximum positive value of an oxidation number of which is VI; and

an organic solvent,

wherein the compound containing a metal a maximum positive value of an oxidation number of which is IV is at least one selected from the group consisting of a zirconium compound and a

hafnium compound.

11. A metal oxide film, obtained by a method comprising:

applying the coating liquid for forming a metal oxide film according to any one of claims 1 to 10 onto a base to be coated; and

drying, followed by baking.

12. A field-effect transistor, comprising:

a gate electrode configured to apply gate voltage;

a source electrode and a drain electrode, which are configured to extract electric current;

an active layer, which is formed between the source electrode and the drain electrode, and is formed of oxide semiconductor; and

a gate insulating layer formed between the gate electrode, and the active layer,

wherein the oxide semiconductor is oxide semiconductor formed by applying the coating liquid for forming a metal oxide film according to claims 1 to 10.

13. A method for forming a field-effect transistor, comprising:

forming a gate electrode on a base;

forming a gate insulating layer on the gate electrode;

forming a source electrode and a drain electrode on the gate insulating layer with a space between the source electrode and the drain electrode;

forming an active layer formed of oxide semiconductor on

an area of the gate insulating layer, which is a channel region between the source electrode and the drain electrode,

wherein the forming the active layer is applying the coating liquid for forming a metal oxide film according to any one of claims 1 to 10 on the gate insulating layer to form the active layer formed of the oxide semiconductor.

14. A method for producing a field-effect transistor, comprising:

forming a source electrode and a drain electrode on a base with a space between the source electrode and the drain electrode;

forming an active layer formed of oxide semiconductor on an area of the base, which is a channel region between the source electrode and the drain electrode;

forming a gate insulating layer on the active layer; and

forming a gate electrode on the gate insulating layer,

wherein the forming the active layer is applying the coating liquid for forming a metal oxide film according to any one of claims 1 to 10 on the base to form the active layer formed of the oxide semiconductor.