Claims

1. A coating liquid for forming a metal oxide film, the coating liquid comprising:
a metal source, which is at least one selected from the group consisting of inorganic salts, oxides, hydroxides, metal complexes, and organic acid salts;
at least one alkali selected from the group consisting of organic alkalis and inorganic alkalis; and
a solvent,
wherein the metal source includes:
a Group A element selected from the group consisting of rare earth elements, Bi, Te, and Sb;
a Group B element selected from the group consisting of Mg, Ca, Sr, and Ba; and
a Group C element selected from the group consisting of Ti, Zr, Hf, Al, and Ga.

2. A coating liquid for forming a metal oxide film, the coating liquid comprising:
a metal source, which is at least one selected from the group consisting of inorganic salts, oxides, hydroxides, metal complexes, and organic acid salts;
at least one alkali selected from the group consisting of organic alkalis and inorganic alkalis; and
a solvent,
wherein the metal source includes:
a Group C element selected from the group consisting of Ti, Zr, Hf, Al, and Ga;
a Group D element selected from the group consisting of Zn, Cd, Ga, In, Tl, Sn, and Pb; and
a Group E element selected from the group consisting of Ti, Zr, Hf, Sn, Nb, Ta, Mo, W, and Re.

3. A coating liquid for forming a metal oxide film, the coating liquid comprising:
a metal source, which is at least one selected from the group consisting of inorganic salts, oxides, hydroxides, metal complexes, and organic acid salts;
at least one alkali selected from the group consisting of organic alkalis and inorganic alkalis; and
a solvent,
wherein the metal source includes:
a Group B element selected from the group consisting of Mg, Sr, and Ba.

4. The coating liquid for forming a metal oxide film according to any one of claims 1 to 3, wherein a pH of the coating liquid for forming a metal oxide film is 5 or more.

5. The coating liquid for forming a metal oxide film according to claim 4,
wherein the pH of the coating liquid for forming a metal oxide film is 6 or more but 12 or less.

6. The coating liquid for forming a metal oxide film according to claim 5, wherein the pH of the coating liquid for forming a metal oxide film is 6.5 or more but 11 or less.

7. The coating liquid for forming a metal oxide film according to any one of claims 1 to 6, wherein the alkali includes at least one selected from the group consisting of quaternary ammonium salts and quaternary ammonium hydroxides.

8. The coating liquid for forming a metal oxide film according to any one of claims 1 to 7, wherein the alkali includes aminoalcohol.

9. The coating liquid for forming a metal oxide film according to claim 8, wherein the aminoalcohol includes at least one selected from the group consisting of dialkanolamines and trialkanolamines.

10. The coating liquid for forming a metal oxide film according to any one of claims 1 to 9, wherein the inorganic salt includes at least one selected from the group consisting of nitrates, sulfates, chlorides, carbonates, acetates, and phosphates.

11. The coating liquid for forming a metal oxide film according to any one of claims 1 to 9, wherein the organic acid salt includes at least one selected from the group consisting of carboxylates, phenols, and derivatives thereof.

12. The coating liquid for forming a metal oxide film according to any one of claims 1 to 11, wherein the solvent includes at least one selected from the group consisting of organic acids, organic acid esters, aromatic compounds, diols, glycol ethers, polar aprotic solvents, alkane compounds, alkene compounds, ethers, alcohols, and water.

13. The coating liquid for forming a metal oxide film according to any one of claims 1 to 12, wherein an electron configuration of a metal ion included in the metal source is a closed-shell.

14. The coating liquid for forming a metal oxide film according to any one of claims 1 to 13, wherein the coating liquid for forming a metal oxide film is transparent or light yellow.

15. A method for producing a metal oxide film, the method comprising:
coating the coating liquid for forming a metal oxide film according to any one of claims 1 to 14 on an object to be coated and drying the coating liquid, followed by baking.

16. A method for producing a field-effect transistor including a gate electrode, a gate insulating layer, and an active layer with the coating liquid for forming a metal oxide film according to any one of claims 1 to 14, the method comprising:
at least one of (1), (2), and (3) below:
(1) forming an oxide semiconductor film as the active layer, by coating the coating liquid for forming a metal oxide film as a coating liquid for forming an oxide semiconductor film on the gate insulating layer that is the oxide insulator film;
(2) forming an oxide insulator film as the gate insulating layer, by coating the coating liquid for forming a metal oxide film as a coating liquid for forming an oxide insulator film on the active layer that is the oxide semiconductor film; and
(3) forming an oxide insulator film as an interlayer dielectric, by coating the coating liquid for forming a metal oxide film as a coating liquid for forming an oxide insulator film on the gate insulating layer and the gate electrode.

17. A metal oxide film, which is a baked product of the coating liquid for forming a metal oxide film according to any one of claims 1 to 14.

18. The metal oxide film according to claim 17,
wherein the metal oxide film has no optical absorption band resulting from an electron transition in a visible light region or a near-infrared region.

19. An oxide stacked film comprising:
an oxide film; and
a baked product of the coating liquid for forming a metal oxide film according to any one of claims 1 to 14 on the oxide film.

20. The oxide stacked film according to claim 19,
wherein the oxide stacked film has no optical absorption band resulting from an electron transition in a visible light region or a near-infrared region.

21. A semiconductor element comprising
the metal oxide film according to claim 17 or 18 or the oxide stacked film according to claim 19 or 20.

22. The semiconductor element according to claim 21,
wherein the semiconductor element comprises a diode.

23. A field-effect transistor comprising:

a gate electrode;

a source electrode and a drain electrode;

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

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

wherein the gate insulating layer or the semiconductor film is the metal oxide film according to claim 17 or 18 or the oxide stacked film according to claim 19 or 20.