CLAIMS

1. A method for forming a PZT ferroelectric film, wherein the method comprises:

a step of applying a liquid composition for forming a PZT ferroelectric film;

a step of drying the film applied with the liquid composition;

a step of irradiating UV rays onto the dried film at a temperature of 150 to 200°C in an oxygen-containing atmosphere; and

after the application step, the drying step, and the UV irradiation step once, or more times, a step of firing for crystallizing a precursor film of the UV-irradiated ferroelectric film by raising a temperature with a temperature rising rate of 0.5°C/second or higher in an oxygen-containing atmosphere or by raising a temperature with a temperature rising rate of 0.2°C /second or higher in a non-oxygen containing atmosphere, followed by keeping the temperature at 400 to 500°C; and further,

an amount of the liquid composition in each application is set such that thickness of the ferroelectric film be 150 nm or more for each application and ozone is supplied during the UV irradiation.

2. The method for forming the PZT ferroelectric film according to claim 1, wherein an atomic ratio of Pb, Zr, and Ti metals in the liquid composition is Pb:Zr:Ti=100 to 125:20 to 80:80 to 20.

3. The method for forming the PZT ferroelectric film according to claim 1, wherein the liquid composition comprises a precursor of the PZT ferroelectric film, a solvent, and a reaction controlling substance which is polyvinyl pyrrolidone (PVP), polyacrylamide, or polyvinyl acetamide; and an amount of the reaction controlling substance relative to 1 mole of the precursor is in a range of 0.0025 to 0.25 mole.

4. The method for forming the PZT ferroelectric film according to claim 2, wherein the liquid composition comprises a precursor of the PZT ferroelectric film, a solvent, and a reaction controlling substance which is polyvinyl pyrrolidone (PVP), polyacrylamide, or polyvinyl acetamide; and an amount of the reaction controlling substance relative to 1 mole of the precursor is in a range of 0.0025 to 0.25 mole.

5. The method for forming the PZT ferroelectric film according to claim 1, wherein the step of firing for crystallizing a precursor film of the UV-irradiated ferroelectric film is carried out by raising a temperature with a temperature rising rate of 0.5°C/second or higher in an oxygen-containing atmosphere or by raising a temperature with a temperature rising rate of 0.2°C/second or higher in a non-oxygen containing atmosphere, followed by keeping the temperature at 420 to 500°C.

6. The method for forming the PZT ferroelectric film according to claim 1, wherein the step of firing for crystallizing a precursor film of the UV-irradiated ferroelectric film is carried out by raising a temperature with a temperature rising rate of 0.5 to 10°C/second or higher in an oxygen-containing atmosphere or by raising a temperature with a temperature rising rate of 0.2 to 10°C/second or higher in a non-oxygen containing atmosphere, followed by keeping the temperature at 400 to 500°C.