CLAIMS

1. A substrate processing method, comprising:

generating an etching liquid by adding a silicic acid compound to an alkaline processing liquid; and

etching a polysilicon film formed on a substrate with the etching liquid.

2. The substrate processing method according to Claim 1,

wherein the polysilicon film is provided on an inner surface of a recess formed in a surface of the substrate, and

the etching of the polysilicon film includes etching at least a portion of the polysilicon film provided on the inner surface of the recess.

3. The substrate processing method according to Claim 1 or 2,

wherein the silicic acid compound is colloidal silica.

4. The substrate processing method according to Claim 1 or 2,

wherein the silicic acid compound is at least one of sodium silicate, potassium silicate, or calcium silicate.

5. The substrate processing method according to Claim 1 or 2,

wherein the processing liquid is diluted aqueous ammonia, SC1 (a mixture of aqueous ammonia and aqueous hydrogen peroxide), NC2 (a mixture of an aqueous solution of choline and an aqueous hydrogen peroxide), or TMAH (tetramethylammonium hydroxide).

6. A substrate processing apparatus, comprising:

a processing tub in which an etching processing is performed by immersing a lot, which is composed of one or more substrates, in an etching liquid prepared by adding a silicic acid compound to an alkaline processing liquid;

a processing liquid supply configured to supply the processing liquid to the processing tub; a silicic acid supply configured to supply the silicic acid compound to the processing tub;

a concentration measurer configured to measure a concentration of a component of the etching liquid stored in the processing tub;

a controller configured to control individual components; and

a storage configured to store correlation data representing a correlation between a concentration of the silicic acid compound in the etching liquid in the processing tub and an etching rate of a polysilicon film formed on the substrate.

7. The substrate processing apparatus according to Claim 6,

wherein the controller adjusts an amount of the silicic acid compound supplied to the processing tub based on the correlation data and a composition of the lot scheduled to be subjected to an etching processing.

8. The substrate processing apparatus according to Claim 7,

wherein the controller supplies the silicic acid compound to the processing tub before the etching processing of the lot scheduled to be subjected to the etching processing.

9. The substrate processing apparatus according to Claim 8,

wherein the controller replaces, when it is determined that the concentration of the silicic acid compound in the etching liquid in the processing tub reaches a set threshold value after the etching processing of the lot scheduled to be subjected to the etching processing, at least a portion of the etching liquid in the processing tub before the etching processing of the lot.

10. The substrate processing apparatus according to any one of Claims 7 to 9,

wherein the controller supplies the silicic acid compound to the processing tub during the etching processing of the lot.

11. The substrate processing apparatus according to Claim 10,

wherein the controller replaces, when the concentration of the silicic acid compound in the etching liquid in the processing tub reaches a set threshold value during the etching processing of the lot, at least a portion of the etching liquid in the processing tub during the etching processing of the lot.

12. The substrate processing apparatus according to any one of Claims 7 to 9,

wherein the correlation data include a calibration curve representing the correlation between the concentration of the silicic acid compound in the etching liquid in the processing tub and the etching rate of the polysilicon film formed on the substrate.

13. The substrate processing apparatus according to any one of Claims 7 to 9,

wherein the controller adjusts a time of the etching processing to be performed on the lot, based on the concentration of the silicic acid compound in the processing tub, which is measured by the concentration measurer.

14. The substrate processing apparatus according to any one of Claims 7 to 9,

wherein a concentration sensor of the concentration measurer, which is configured to measure the concentration of the silicic acid compound in the etching liquid in the processing tub, is a microwave plasma atomic emission spectrometer, an inductively coupled plasma optical emission spectrometer, or an inductively coupled plasma mass spectrometer.

15. The substrate processing apparatus according to any one of Claims 7 to 9,

wherein the processing liquid is diluted aqueous ammonia, SC1, NC2, or TMAH.

16. The substrate processing apparatus according to Claim 15,

wherein the controller controls an operation of the processing liquid supply so that a concentration of the processing liquid in the processing tub falls within a set concentration range.

17. The substrate processing apparatus according to any one of Claims 7 to 9,

wherein a temperature of the etching liquid when performing the etching processing of the lot is in a range of 40°C to 80°C.