exposure light. As such a material for the pellicle films, SiC, which is thermally and chemically stable, is more preferable than Si.

[0007]

As a technology related to a manufacturing method for a pellicle including a pellicle film consisting of SiC, a manufacturing method is disclosed in the following Patent Document 2. In this Document, a polycrystal SiC film is formed on a silicon wafer by LPCVD (Low Pressure Chemical Vapor Deposition) method. The polycrystal SiC film is polished to a thickness of 150 nanometers by the CMP (Chemical Mechanical Polishing) method. The silicon wafer is wet etched with an aqueous solution of KOH (potassium hydroxide).

[0008]

The technology of the following Patent Document 2 has a problem in which the pellicle film is easily damaged when the silicon wafer is wet-etched. A technique capable of solving this problem is disclosed in Patent Document 3 below. Patent Document 3 below discloses a method for manufacturing. According to this method, a pellicle film consisting of SiC is formed with a SOI substrate as a foundation. By removing the central part of the SOI substrate, the reverse side of the pellicle film is exposed at the bottom of the recessed part. According to the technology of Patent Document 3 below, by interposing a Si oxide film between the Si substrate and the pellicle film, the tension stress inside the pellicle film can be alleviated, and damage to the pellicle film during manufacturing can be suppressed.

Prior Art Document

Document(s) related to patents

[0009]

[Patent Document1] Japanese published unexamined application No. 2009-116284

[Patent Document2] International publication No. 2014/188710 pamphlet

[Patent Document3] Japanese published unexamined application No. 2018-115094

SUMMARY OF THE INVENTION

[Problems to be resolved by this invention]

[0010]

The technologies of Patent Documents 2 and 3 had a problem of poor quality of the pellicle film.

[0011]

The present invention is to solve the above problem. The object is to provide a pellicle intermediary body, a pellicle, a method for manufacturing a pellicle intermediary body, and a pellicle manufacturing method which can improve the quality of the pellicle film.

SUMMARY

[0012]

According to one aspect of the present disclosure, a pellicle intermediary body comprises: a Si substrate, a Si oxide film formed on a surface of the Si substrate, and a Si layer formed on a surface of the Si oxide film, wherein the Si layer includes a low COP (Crystal Originated Particle) portion which is a part where the number of COPs decreases

as it approaches the surface of the Si layer and is formed in a part constituting the surface of the Si layer.

[0013]

According to another aspect of the present disclosure, a pellicle comprises: a Si substrate with a ring-like planar shape, a Si oxide film which has a ring-like planar shape, formed on a surface of the Si substrate, a Si layer which has a ring-like planar shape, formed on a surface of the Si oxide film, and a SiC film formed on a surface of the Si layer, wherein the Si layer includes a low COP (Crystal Originated Particle) portion which is a part where the number of COPs decreases as it approaches the surface of the Si layer and is formed in a part constituting the surface of the Si layer.

[0014]

According to another aspect of the present disclosure, a method for manufacturing a pellicle intermediary body comprises steps of: preparing a Si layer which includes a low COP (Crystal Originated Particle) portion which is a part where the number of COPs decreases as it approaches a surface and is formed in a part constituting the surface, preparing a first oxide film substrate including a first Si substrate, and a first Si oxide film formed on a surface of the first Si substrate, preparing a second oxide film substrate including a second Si substrate, a second Si oxide film formed on a surface of the second Si substrate, joining the first Si oxide film to the surface of the Si layer, removing a part that constitutes a reverse side of the Si layer after joining the first Si oxide film, joining the second Si oxide film to the reverse side of the Si layer after the part constituting the reverse side of the Si layer is removed, exposing the first Si oxide film by wet etching the first Si substrate under a condition that an etching rate of Si is faster than an etching rate of Si oxide after joining the second Si oxide film, and exposing the surface of the Si layer by removing the first Si oxide film after exposing the first Si oxide film.

[0015]

Preferably, according to the method for manufacturing, the first oxide film substrate containing the first Si substrate and the first Si oxide film formed on the surface and the reverse side of the first Si substrate is prepared, in the step in which the first oxide film substrate is prepared, and the method further comprises a step of exposing the reverse side of the first Si substrate by removing a portion formed on the reverse side of the first Si substrate in the first Si oxide film, after joining the first Si oxide film.

[0016]

Preferably, according to the method for manufacturing, the second oxide film substrate containing the second Si substrate and the second Si oxide film formed on the surface and the reverse side of the second Si substrate is prepared, in the step in which the second oxide film substrate is prepared, and the method further comprises a step of exposing the reverse side of the second Si substrate by removing a portion formed on the reverse side of the second Si substrate in the second Si oxide film, after joining the second Si oxide film.

[0017]

According to another aspect of the present disclosure, a method for manufacturing a pellicle comprises steps of: producing a pellicle intermediary body using the above method, forming a SiC film on a surface of the Si layer, forming a recessed part on the second Si substrate and exposing the second Si oxide film on a bottom of the recessed part, by wet etching the second Si substrate under a condition that an etching rate of Si is faster than an etching rate of Si oxide, and exposing the SiC film on the bottom of the recessed part by wet etching the second Si oxide film and the Si layer that are present at the bottom of the recessed part.