unsaturated bond.

[0003a] In another aspect, the present disclosure provides an etching processing apparatus comprising a processing chamber; a substrate support provided inside the processing chamber to hold a substrate; and a controller for controlling an etching process applied to the substrate, wherein the controller performs a process including (a) providing the substrate on the substrate support inside a chamber, the substrate including a first region having a multilayer film in which a silicon oxide film and a silicon nitride film are alternately stacked and a second region having a monolayer silicon oxide film, and (b) etching the substrate with plasma generated from a first processing gas that includes a hydrofluorocarbon gas, and the controller controls the etching process such that the hydrofluorocarbon gas includes a first hydrofluorocarbon gas represented by CxHyFz (x represents an integer of 2 or more, and y and z represent an integer of 1 or more) and having an unsaturated bond.

[0004] According to the present disclosure, an etching shape having a high aspect ratio can be appropriately formed.

[0005] The foregoing summary is illustrative only and is not intended to be in any way limiting. In addition to the illustrative aspects, embodiments, and features described above, further aspects, embodiments, and features will become apparent by reference to the drawings and the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIG. 1 is a vertical sectional view schematically illustrating an example of a configuration of a plasma processing system.

[0007] FIGS. 2A and 2B are explanatory views illustrating an example of an etching

target layer formed on a surface of a substrate.

[0008] FIG. 3 is a flow chart illustrating main steps of a plasma processing according to an embodiment.

[0009] FIG. 4 is an explanatory view illustrating an example of a structural formula of a $C_3H_2F_4$ gas.

[0010] FIG. 5 is an explanatory view illustrating an example of an etching process result according to an example.

[0011] FIG. 6 is an explanatory view illustrating an example of an etching process result according to an example.

[0012] FIG. 7 is an explanatory view illustrating an example of an etching process result according to an example.

[0013] FIG. 8 is an explanatory view illustrating an example of an etching process