

ETCHING METHOD AND PLASMA PROCESSING SYSTEM

ABSTRACT

To reduce feature failures in etching, an etching method implementable with a plasma processing apparatus including a chamber includes (a) placing a substrate including a silicon-containing film and a mask on the film on a substrate support in the chamber, and (b) etching the silicon-containing film. Step (b) includes (b-1) etching the silicon-containing film using plasma generated from a first process gas, and (b-2) etching the silicon-containing film using plasma generated from a second process gas. The first process gas contains a hydrogen fluoride gas and a reaction control gas to control a reaction between hydrogen fluoride and the silicon-containing film, and contains, as the reaction control gas, at least one of a reaction accelerator gas to accelerate the reaction or a reaction inhibitor gas to inhibit the reaction. The second process gas contains a hydrogen fluoride gas, and contains at least one of a reaction accelerator gas to accelerate the reaction or a reaction inhibitor gas to inhibit the reaction, or contains no reaction control gas. The reaction accelerator gas in the second process gas has a lower partial pressure than that in the first process gas. The reaction inhibitor gas in the second process gas has a higher partial pressure than that in the first process gas.

Fig. 2