

SUMMARY

[0006] In an aspect, there is provided a method for etching an insulation film of a processing target object that includes a wiring layer, the insulation film formed on the wiring layer, and a mask formed of an organic film on the insulation film, the method comprising: in a first term, periodically switching ON and OFF of at least one of a first non-DC power and a second non-DC power so as to excite a processing gas containing fluorocarbon and supplied into a processing container of a plasma processing apparatus, a frequency of the first non-DC power being higher than that of the second non-DC power; and in a second term subsequent to the first term, setting the first non-DC power to be continuously turned ON so as to excite the processing gas supplied into the processing container, in which, in one cycle consisting of a term where the first non-DC is turned ON and a term where the first non-DC power is turned OFF in the first term, the second term is longer than the term where the first non-DC power is turned ON, wherein the periodically switching ON and OFF of at least one of the first non-DC power and the second non-DC power, and the setting the first non-DC power to be continuously turned ON are alternately repeated. In an embodiment, the present disclosure relates to a method for etching an insulation film of a processing target object. The processing target object includes a wiring layer, the insulation film formed on the wiring layer, and a mask formed of an organic film on the insulation film. The method includes: (a) in a first term, periodically switching ON and OFF of a high frequency power so as to excite a processing gas containing fluorocarbon and supplied into a processing container of a plasma processing apparatus (hereinafter, referred to as “first step”); and (b) in a second term subsequent to the first term, setting the high frequency power to be continuously turned ON so as to excite the processing gas supplied into the

processing container (hereinafter, referred to as “second step”). In one cycle consisting of a term where the high frequency is turned ON and a term where the high frequency power is turned OFF in the first term, the second term is longer than the term where the high frequency power is turned ON. In this method, the first step and the second step are alternately repeated. In an exemplary embodiment, the insulation film is made of silicon oxide, and the wiring layer is made of polycrystalline silicon or tungsten.

[0007] 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

[0008] FIG. 1 is a flow chart illustrating a method for etching an insulation film according to an exemplary embodiment.

WHAT IS CLAIMED IS:

1. A method for etching an insulation film of a processing target object that includes a wiring layer, the insulation film formed on the wiring layer, and a mask formed of an organic film on the insulation film, the method comprising:

in a first term, periodically switching ON and OFF of at least one of a first non-DC power and a second non-DC power so as to excite a processing gas containing fluorocarbon and supplied into a processing container of a plasma processing apparatus, a frequency of the first non-DC power being higher than that of the second non-DC power; and

in a second term subsequent to the first term, setting the first non-DC power to be continuously turned ON so as to excite the processing gas supplied into the processing container, in which, in one cycle consisting of a term where the first non-DC is turned ON and a term where the first non-DC power is turned OFF in the first term, the second term is longer than the term where the first non-DC power is turned ON,

wherein the periodically switching ON and OFF of at least one of the first non-DC power and the second non-DC power, and the setting the first non-DC power to be continuously turned ON are alternately repeated.

2. The method of claim 1, wherein the insulation film is a single film.

3. The method of claim 1, wherein the second term is a long term which is 100 or more times the term where the first non-DC power is turned ON in the one cycle.

4. The method of claim 1, wherein, in the setting the first non-DC power to be continuously turned ON, a dissociation degree of the fluorocarbon is higher than that of

the periodically switching ON and OFF of the first non-DC power.