

Abstract Submitted  
for the GEC10 Meeting of  
The American Physical Society

**Measurement of the Density Distribution of the Non-emissive Ar Metastable State in a 2f-CCP by Using OES with a Pair of Emission Lines** KAZUKI TAKAHASHI, TOMIHITO OHBA, Keio University, TETSUYA TATSUMI, TAKASHI YAGISAWA, TOSHIAKI MAKABE, Keio University — Two-frequency capacitively coupled plasma (2f-CCP) has been widely used for SiO<sub>2</sub> etching processes in industry. The argon gas plays an important role in 2f-CCP, not only to dilute fluorocarbon gas which is reactive for SiO<sub>2</sub> etching, but to sustain plasma partly by a stepwise excitation through a metastable state. Non-emissive argon metastable has been measured conventionally by using a method with external light sources, such as laser absorption spectroscopy (LAS) and laser-induced fluorescence (LIF). When a pair of short- and long-lived excited states is coupled with upper resonant state, it will be possible to determine the density of long-lived lower state from OES of the upper state. We measure the spatial distribution of metastable Ar(1s<sub>5</sub>) density in a 2f-CCP in pure Ar by OES aided with CT technique. Our method is validated by the comparison between Ar(1s<sub>5</sub>) density measured by OES and LAS. The majority of the metastable production is observed at the region close to the edge of electrodes, resulting in the radial nonuniformity of the density distribution of Ar(1s<sub>5</sub>).

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Date submitted: 11 Jun 2010

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