Behavior of Excited Oxygen Atoms in Rare gas mixture O₂ Surface Wave Excited Plasma KEIGO TAKEDA, SEIGO TAKASHIMA, MASARU HORI, Nagoya University — Excited oxygen atom (O(^1D₂)) has attracted very much on the oxygen-based plasma processes, such as plasma oxidation, surface cleaning, resist ashing, etc. Since it is supposed that the O(^1D₂) atom is the most reactive species in all species in the oxygen-based plasma. Therefore, it is strongly required to investigate the behaviors of O(^1D₂) atom in the oxygen-based plasmas, the quantitative information of O(^1D₂) atom have never been clear, because the convenient light sources for absorption spectroscopic techniques of O(^1D₂) atoms have not developed. The vacuum ultraviolet laser absorption spectroscopy (VUVLAS) has a great potential to measure the atomic radicals in the process plasmas. Therefore, in this study, we have measured the absolute density of O(^1D₂) atom in the rare gas mixture O₂ surface wave excited oxygen plasma (SWP) by using VUVLAS with tunable VUV laser. The absolute densities of O(^1D₂) atom in the O₂/Ar and O₂/Kr SWPs were evaluated as a function of various plasma conditions. From these results, the O₂/Ar SWP has a potential to realize the high O(^1D₂) atom density compared with the O₂/Kr SWP and the density in the O₂/Ar SWP was the maximum around 2×10^{12} cm⁻³ at the high Ar flow rate ratio and low pressure.

Keigo Takeda
Nagoya University

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