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Behavior of Excited Oxygen Atoms in Rare gas mixture O_2 Surface Wave Excited Plasma KEIGO TAKEDA, SEIGO TAKASHIMA, MASARU HORI, Nagoya University — Excited oxygen atom ($O(^1D_2)$) 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 $O(^1D_2)$ atom is the most reactive species in all species in the oxygen-based plasma. Therefore, it is strongly required to investigate the behaviors of $O(^1D_2)$ atom in the oxygen-based plasmas, the quantitative information of $O(^1D_2)$ atom have never been clear, because the convenient light sources for absorption spectroscopic techniques of $O(^1D_2)$ 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 $O(^1D_2)$ atom in the rare gas mixture O_2 surface wave excited oxygen plasma (SWP) by using VUVLAS with tunable VUV laser. The absolute densities of $O(^1D_2)$ atom in the O_2/Ar and O_2/Kr SWPs were evaluated as a function of various plasma conditions. From these results, the O_2/Ar SWP has a potential to realize the high $O(^1D_2)$ atom density compared with the O_2/Kr SWP and the density in the O_2/Ar SWP was the maximum around 2×10^{12} cm^{-3} at the high Ar flow rate ratio and low pressure.

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