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**Diagnostics of Oxygen Atoms in Surface Wave Plasma with Vacuum Ultraviolet Laser Absorption Spectroscopy** KEIGO TAKEDA, YOSHIKI KUBOTA, Graduate School of Eng., Nagoya Univ., ANNA SERDYUCHENKO, Institute for Experimental Physics V, Ruhr-Univ. Bochum, SEIGO TAKASHIMA, MASARU HORI, Graduate School of Eng., Nagoya Univ. — Oxygen plasmas have been frequently used for oxidation process of materials, chamber cleaning, etc. In the case of the fabrication of ultra-thin dielectric films such as a gate oxide film, the surface wave excited oxygen plasmas diluted by rare gases was especially focused on realizing a higher oxidation rate and lower leakage current than the conventional plasma oxidation process. However, the detailed knowledge of mechanism of the plasma oxidation process is not obtained due to few powerful measurement techniques of oxygen atoms which are most important in plasma oxidation process. Therefore, in this study, we have carried out the measurement of the absolute oxygen atom density in the Kr dilution surface wave excited oxygen plasma using tunable vacuum ultraviolet laser absorption spectroscopy with the resonance lines of ground state and that of excited state. The densities were evaluated as a function of Kr dilution ratio. The excited oxygen atom density increased with the increase of Kr dilution ratio and had a peak at the high dilution ratio of 97 %. The behaviors of ground state oxygen atoms in the surface wave excited oxygen and Kr mixture plasma were also evaluated.

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