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Precise plasma process control based on combinatorial plasma etching MAKOTO SEKINE, TOSHIYA SUZUKI, KEIGO TAKEDA, HIROKI KONDO, KENJI ISHIKAWA, Nagoya University, YUICHI SETSUHARA, Osaka University, MASAHARU SHIRATANI, Kyusyu University, MASARU HORI, Nagoya University — For the realization of super-fine plasma etching process, fluctuations of plasma parameters such as densities of radicals, ions and electrons is required to be minimized. In particular, conditions of inner surface of reactor wall can significantly influence on the radical density in subsequent plasma process owing to outgas consisting of deposited reaction products and adsorbed species from the previous process on the wall. To investigate variety of gaseous radical densities for H_2/N_2 plasma when inner wall condition was changed by the previous process, we analyzed the radical densities using vacuum ultraviolet absorption spectroscopy (VUVAS). It was clearly confirmed that the radical densities in 100-MHz capacitively coupled plasma (CCP) of H_2/N_2were temporally changed subsequently after different kind of conditions for H_2/N_2 plasma, O_2 plasma, and air exposure. We clarified how and what kind of etched products or process gases adsorbed on inner wall surface during the previous process and what species desorbed from the wall into bulk plasmas. Then we are trying to establish a precise process control systematically based on the plasma nano-science database that is constructing using the combinatorial plasma etching approach [1].

[1] C. Moon, et al., Applied Physics Express 2 (2009) 096001.

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