Abstract Submitted
for the GEC19 Meeting of
The American Physical Society

Development of a Sensitive Electric Field Probe in Ar plasmas using Optically Trapped Fine Particles KENTARO TOMITA, Interdisciplinary Graduate School of Engineering Science, Kyushu University,, SAKYO OKUNAGA, KUNIHIRO KAMATAKI, NAHO ITAGAKI, KAZUNORI KOGA, MASAHARU SHIRATANI, Graduate School of Information Science and Electrical Engineering, Kyushu University, KYUSHU UNIV. TEAM — For advanced plasma processing, understandings of plasma-surface interactions are prerequisite. To obtain information about it, we have used optically-trapped fine particles in plasmas using a laser-tweezer technique. Ar plasmas were generated between a powered ring-electrode at the bottom of the reactor at 100 Pa by applying 13.36 MHz voltage. PMMA particles (10 m in diameter) were injected into the plasmas. Some particles were suspended at plasma/sheath boundary by the balance among gravity, ion drag, and electrostatic forces. To trap the particle, a laser ($\lambda = 1064$ nm) was irradiated from the bottom using an objective lens. Because the trapped particle was negatively charged, it can be a probe of electric fields. The trapped particle was moved to the horizontal direction. The particle was well controlled for a certain distance. However, there was a limit for the area where the stable control was possible. The movable area became large when the trapping force was increased. These results can be explained as follows: the electrostatic force to the trapped particle was changed when the particle was moved from the initial position. The trapping was failed when the increase of the electrostatic force overwhelms the trapping force.

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Date submitted: 02 Jun 2019 Electronic form version 1.4