Abstract Submitted
for the GEC20 Meeting of
The American Physical Society

Information on electric field deduced using a fine particle trapped with laser tweezers in Ar plasma[1] KUNIHIRO KAMATAKI, SAKYO OKUNAGA, KENTARO TOMITA, DAISUKE YAMASHITA, TAKAMASA OKUMURA, NAHO ITAGAKI, KAZUNORI KOGA, MASAHARU SHIRATANI, Kyushu University — High-precision nanofabrication based on plasma processing has been one of the main technology drivers of modern information society[1]. Development of highly sensitive diagnostic methods in process plasmas is imperative for understanding and controlling interactions between the materials and plasma. A diagnostic method using few dust particles in plasma is a possible solution of this problem. We succeed in measuring profile of same electric field intensity in Ar plasma using laser tweezers. Ar plasmas were generated between a powered ring-electrode by applying rf voltage. PMMA particles of 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 was irradiated to it. Because the trapped particle was negatively charged, it can be a high sensitive probe of force of qE. When we move the particle horizontally by laser, the height position of the particle changes due to force balance. Assuming the charge amounts is constant, we deduce information of a profile of same electric field intensity with high resolution of a few m. Moreover, we compare these experimental results with simulation ones. We will discuss details at the conference.
[1] M. Soejima et al., Proc. IEEE-Nano (2016) 671.

[1]Work supported partly by JSPS KAKENHI JP20K00142.

Kunihiro Kamataki
Kyushu University

Date submitted: 12 Jun 2020 Electronic form version 1.4