

Abstract Submitted  
for the GEC13 Meeting of  
The American Physical Society

**Measurement of electric fields in a helium micro-hollow cathode discharge by forbidden transitions** SHINICHI NAMBA, DAISUKE MAKI, KEN TAKIYAMA, Graduate School of Engineering, Hiroshima University — Micro-hollow cathode discharges operated at high pressure has been attracting a great deal of interest for various application, such as, excimer light sources, medical/biological fields and microchemical reactor. In the plasmas, the electric ( $E$ ) field in the sheath region plays an important role to generate and sustain the plasmas. In order to determine the  $E$  field in the He microplasma, the emissions of allowed (He I 2P-4D: 492.19 nm) and forbidden (2P-4F: 492.06 nm) lines were observed. The cathode and anode were both made of brass, and ceramic disks were used to electrically insulate the electrodes. The cathode disk had inner hole diameter of 1.0 mm (length: 2.0 mm). The gas with a flow rate was 1.0 L/min. The discharge was operated at voltages of 250 V, currents of 8 mA and gas pressures up to 100 kPa. The plasmas in the cathode opening were observed using a visible spectrometer. The forbidden line associated with the level mixing of upper levels was observed in the cathode surface, indicating that the high  $E$  field was formed. As the intensity ratio of forbidden to the allowed lines is a function of the  $E$  field which is calculated by perturbation theory, we derived the field strength of 18 kV/cm at 1.0 mm cathode surface.

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Date submitted: 13 Jun 2013

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