Abstract Submitted
for the GEC11 Meeting of
The American Physical Society

Effect of the superposition of a dielectric barrier discharge onto a premixed gas burner flame KAZUNORI ZAIMA, NORIHARU TAKADA, Nagoya University, Japan, KOICHI SASAKI, Hokkaido University, Japan — We are investigating combustion control with the help of nonequilibrium plasma. In this work, we examined the effect of dielectric barrier discharge (DBD) on a premixed burner flame with $CH_4/O_2/Ar$ gas mixture. The premixed burner flame was covered with a quartz tube. A copper electrode was attached on the outside of the quartz tube, and it was connected to a high-voltage power supply. DBD inside the quartz tube was obtained between the copper electrode and the grounded nozzle of the burner which was placed at the bottom of the quartz tube. We clearly observed that the flame length was shortened by superposing DBD onto the bottom part of the flame. The shortened flame length indicates the enhancement of the burning velocity. We measured the optical emission spectra from the bottom region of the flame. As a result, we observed clear line emissions from Ar, which were never observed from the flame without DBD. We evaluated the rotational temperatures of OH and CH radicals by spectral fitting. As a result, the rotational temperature of CH was not changed, and the rotational temperature of OH was decreased by the superposition of DBD. According to these results, it is considered that the enhancement of the burning velocity is not caused by gas heating. New reaction pathways are suggested.

Kazunori Zaima
Nagoya University

Date submitted: 14 Jul 2011 Electronic form version 1.4