

Abstract Submitted  
for the GEC09 Meeting of  
The American Physical Society

**Investigations of plasma bullets formed in a non-thermal plasma jet in air** JULIEN JARRIGE, ERDINC KARAKAS, ASMA BEGUM, MOUNIR LAROUSSE, Laser & Plasma Engineering Institute, Old Dominion University — Recent studies have shown that low temperature atmospheric pressure plasma jets are formed by the propagation of small plasma bullets traveling at very high velocities in ambient air. However, the propagation mechanisms are still not well understood. In this paper we report experimental investigations of plasma bullets dynamics. The plasma jet was generated by a dielectric barrier discharge reactor fed with pure Helium. The discharge was driven by high voltage (4-10 kV) short rise time (nanoseconds) pulses at frequencies up to 10 kHz. ICCD camera was used to determine the evolution of the velocity during the different propagation stages of the plasma bullet. Optical Emission Spectroscopy (OES) of the different reactive species ( $N_2^*$ ,  $N_2^+$ ,  $He^*$ ) show that the bullet is ring shaped. The active species are mainly formed at the interface between He flow and ambient air. Fluid dynamics simulation was used to study the influence of He flow rate on propagation characteristics, and the results were compared to experimental data. It was found that the HV pulse width and the mole ratio of air in the He flow plays a major role in the extinction of the bullet.

Julien Jarrige  
Laser & Plasma Engineering Institute, Old Dominion University

Date submitted: 12 Jun 2009

Electronic form version 1.4