

Abstract Submitted
for the GEC08 Meeting of
The American Physical Society

Imminent Glow Discharges in Air at Atmospheric Pressure Using Nanosecond Repetitively Pulsed Discharges¹ DAVID PAI, DEANNA LACOSTE, CHRISTOPHE LAUX, Laboratoire EM2C, CNRS UPR288, Ecole Centrale Paris — Many applications for atmospheric pressure air plasmas require non-thermal large-volume low-power plasmas with high chemical reactivity at low gas temperature. The Nanosecond Repetitively Pulsed (NRP) method can generate such plasmas for power budgets much lower than those of traditional generation methods. A diffuse non-thermal plasma regime in air at atmospheric pressure from 300-1000 K has been generated using the NRP method. The discharge develops through an initial streamer, followed by a return wave of potential redistribution. In addition, it is an “imminent” glow discharge, because the field is switched off before ion-electron emission occurs. Thus, the cathode fall of a glow discharge is not formed. Furthermore, at a given gas temperature, there is a minimum gap distance required for the existence of the diffuse regime. This is a result of the non-uniform electric field generated by the pin-pin geometry, creating strongly ionizing regions near the electrodes and a weakly ionizing region between the electrodes, which can inhibit the diffuse-to-filamentary regime transition. As the gas temperature is decreased, the field in the strongly ionizing regions must be increased to maintain sufficient ionization, and the gap distance must be increased for the weakly ionizing region to remain a buffer against the transition.

¹This work was supported by the Agence Nationale de la Recherche IPER project.

David Pai

Date submitted: 17 Jun 2008

Electronic form version 1.4