

Abstract Submitted
for the GEC10 Meeting of
The American Physical Society

Exposure of Plasmid DNA to cold atmospheric pressure plasmas

L.J. COX, K. NIEMI, L.M. GRAHAM, T. GANS, D. GANS, Centre for Plasma Physics, Queens University Belfast, UK — Much interest has developed in the potential of cold atmospheric pressure plasmas in particular for plasma medicine. These plasmas can be of sizes comparable to cell dimensions, allowing for very precise cell specific treatment, minimising damage to surrounding tissue. It is essential to quantify the impact of the plasma on such material. Reactive oxygen species are of particular importance. It is essential to correlate direct plasma parameters and species with effects on bio-materials. A radio-frequency atmospheric pressure plasma jet, operated in helium with a small admixture of O_2 is exposed to pCDNA3.1 plasmid DNA. Single and double strand breaks in DNA are ascertained by gel electrophoresis. Certain plasma species densities are measured quantitatively. Atomic oxygen O densities are measured using diagnostic based modeling, ozone O_3 densities using UV absorption spectroscopy, and singlet delta oxygen $O_2(a\Delta_p)$ densities using infrared emission spectroscopy [1]. These densities are directly correlated with DNA damage. This allows attribution of species to certain types of damage, and gives scope to tune the plasma for desired effects [1] J. S. Sousa these proceedings.

Deborah O'Connell
Centre for Plasma Physics, Queens University Belfast, UK

Date submitted: 11 Jun 2010

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