Abstract Submitted
for the GEC08 Meeting of
The American Physical Society

Mass spectrometry of radicals created in plasma needle discharge
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— We present diagnostics of the properties of a plasma needle operating at atmospheric pressure. Our configuration has additional grounded copper ring placed near the tip of the needle. Generated plasma has a larger volume and lower ignition powers with the ring. This configuration is convenient both for treatment of samples and for mass spectroscopy. Our measurements were performed on a standard size plasma needle that we originally used for the treatment of plant cells. Similar work of Stoffels et al. has been done on the 'robust' version of the plasma needle that generates an elongated jet of 4 mm length and consumes higher powers. After some efforts we were able to make plasma needle to operate for conditions similar to those used during the treatments of biological samples. Hiden HPR60 mass analyzer was used to obtain the mass spectra. Plasma mode transition was observed for higher values of power transmitted to plasma. Concentrations of N, O, NO, NO_2 and O_3 were measured. We have also measured spatial profiles of emission and voltage and current waveforms by derivative probes placed close to the tip of the needle.

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Date submitted: 09 Jun 2008 Electronic form version 1.4