Air Plasma Source for Biomedical Applications J. HENRIQUES, E.
TATAROVA, F.M. DIAS, C.M. FERREIRA, B. GORDIETS, IPFN - IST, 1049-001
LX, PORTUGAL TEAM, LEBEDEV PHYSICAL INSTITUTE OF THE RUSSIAN
ACADEMY OF SCIENCES TEAM — Plasma interactions with living matter are
presently at the frontiers of plasma research and development. Plasmas contain nu-
merous agents that influence biological activity. They provide essentially two types
of biocidal species: reactive species, such as oxygen atoms that lead to lethality
of micro-organisms through erosion, and UV radiation that can damage the DNA
strands. In this work we investigate a surface wave (2.45 GHz) driven discharge
plasma in air, with a small admixture of water vapor, as a source of ground state
$O(^3P)$ oxygen atoms, NO molecules and UV radiation. A theoretical model describ-
ing both the wave driven discharge zone and its flowing afterglow is used to analyze
the performance of this plasma source. The predicted plasma-generated NO(X) and
$O(^3P)$ concentrations and NO($\gamma$) radiation intensity along the source are presented
and discussed as a function of the microwave power and water vapor percentage in
the gas mixture. To validate the theoretical predictions, the relative concentrations
of species have been determined by Mass Spectrometry, Fourier Transform Infrared
Spectroscopy and Optical Spectroscopy. Acknowledgment: This work was funded
by the Portuguese Foundation for Science and Technology, under research contract
PTDC/FIS/108411/2008.

J. Henriques
IST-IPFN

Date submitted: 14 Jul 2011

Electronic form version 1.4