

## THE INTERACTION OF PLASMA FILAMENTS IN DBDs WITH WOUNDED SKIN\*

Natalia Yu. Babaeva and Mark J. Kushner\*\*

*University of Michigan, Electrical Engineering and Computer Science Department, 1301 Beal Ave, Ann Arbor, MI 48109 USA*

Atmospheric pressure air plasmas in direct contact with living tissue has been shown to have therapeutic effects in speeding the recovery of ulcerated skin and wounds. When dielectric barrier discharges (DBDs) are used for wound healing, the plasma device typically contains the powered electrode while the tissue is the counter electrode.<sup>1</sup> The mechanism for wound healing is likely the production of beneficial radicals but may also involve large electric fields applied to or produced in the tissue, and fluxes of energetic species (VUV, ions) onto the tissue.

In this talk, the interaction of DBD plasma filaments in air with wounded skin tissue will be discussed with results from a 2-d plasma hydrodynamics model. The computational domain includes both the air and the human tissue. In the gas phase, Poisson's equation, transport equations for charged and neutral species and radiation transport are addressed. In the tissue, the electric potential and charge transport are solved for. The cellular structure of the skin in the first few mm of the tissue is incorporated into the computational mesh with local permittivities and conductivities to represent the electrical properties of the intra- and inter-cell structures. The wounded skin was represented by cuts into the cellular structure which are then filled with a fluid representing blood-serum.

Results will be discussed for the properties of the plasma filaments and their interaction with the wounded skin. The production of radicals in the vicinity of and inside the wound, and the production of electric fields on and inside the wounded tissue will be discussed. The diffusion of plasma produced radicals and ions into the wound-filling fluid will be described.

1. G. Fridman, et al. Plasma Chem. Plasma Process., **26**, 425–442 (2006).

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\*\* nbabaeva@umich.edu, mjkush@umich.edu