

Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Interaction of atmospheric pressure plasmas with dry and wet wounded skin¹ NATALIA BABAEVA, MARK KUSHNER, University of Michigan — Non-equilibrium plasmas in direct contact with living tissue can produce therapeutic effects. Dielectric barrier discharge (DBD) devices used for this purpose contain the powered electrode while the tissue being treated is usually the floating electrode. The plasma produces beneficial effects through: (i) electric fields, (ii) production of radicals and charged species, (iii) photons and (iv) energetic ions impinging onto wounds and tissue surfaces. Using a 2-d plasma hydrodynamics model, we discuss the interaction of DBD filaments with human skin. We model the propagation of the streamer across the gap, its intersection with skin, the charging of cell surfaces and the generation of conduction and displacement currents, and electric fields in the cells. The cellular structure in the first few mm of human skin is incorporated into the computational mesh with permittivity and conductivity to represent the electrical properties of the intra- and inter-cell structures. In this talk, we concentrate on the effects of plasmas on open wounds which are either dry or filled with blood serum. We will discuss the penetration of electric fields through the blood serum and into the underlying cells, including the possible interactions with blood platelets, and the distribution of ion energies onto the liquid and cellular surfaces.

¹Work supported by DOE Office of Fusion Energy Sciences.

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Date submitted: 15 Jul 2010

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