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Plasma Filaments in Dielectric Barrier Discharges Penetrating into High Aspect Ratio Cracks for Sterilization[1] NATALIA YU. BABAEVA, MARK J. KUSHNER, University of Michigan — The ability of surface-hugging-plasmas, as produced in dielectric barrier discharges (DBDs), to penetrate into crevices, turn corners and navigate geometrical obstructions, is important in plasma-wound healing and sterilization. In this talk, we discuss results from a computational investigation of the plasma filaments produced in an air DBD and impinging on and penetrating into deep, high aspect ratio cracks in the bottom dielectric. The model used in this work, *nonPDPSIM*, is a plasma hydrodynamics model in which continuity, momentum and energy equations are solved for charged and neutral species with solution of Poisson's equation for the electric potential, concurrent with radiation transport. A Monte Carlo simulation is used to obtain ion energy distributions (IEDs) to surfaces. Cracks are 1 mm deep and 3 μm to 250 μm wide (aspect ratios of 333 to 4). We found that when impinging onto the cracked dielectric, the plasma filament conformally spreads over the surface. The conductive plasma transfers the applied potential to the opening of the crack. The width of the crack, w, then determines the penetration of the plasma. If w is large compared to the filament, the penetration is surface hugging. If w is commensurate with the filament, the plasma fills the crack. If the Debye length is about w or larger, there is not significant penetration. For the conditions investigated, penetration occurred for $w >$ 5-6 μm. IEDs onto the surfaces of the trenches produce transient pulses of ions with energies >150 eV.

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