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Atmospheric Pressure Plasma Propagation through Porous Bone Scaffolding[1] RUNCHU MA, JULIUSZ KRUSZELNICKI, MARK J. KUSHNER, University of Michigan - Ann Arbor — Bone scaffolding in the form of porous dielectric media has been of interest in the medical field for the purpose of tissue regeneration following trauma. Low temperature plasmas can be used to improve cell growth in the scaffolding by surface functionalization through sterilization, increasing hydrophilicity and deposition of non-reactive surfactants. In this study, we investigate the behavior of atmospheric pressure plasmas propagating inside porous media having the topography of bone scaffolding using the plasma hydrodynamic modeling platform, *nonPDPSIM*. A dielectric barrier discharge with a 1 mm gap generates plasma in dry air which then propagates into a dielectric having pores 150 μm diameter, 40 μm openings between pores and 100% interconnectivity. We found that electrons initially propagate into the gaps as Townsend avalanches following the electric field which produces some shadowing. As the plasma develops in the pores, surface charging then leads to formation of Surface Ionization Waves (SIW). As the charging continues, microdischarges form between pores. The initial breakdown process is little unaffected by the alignment of the pore-chains with the applied electric field. However, as this alignment became more orthogonal, SIWs preferentially form on one side of the pore-chain, leading to non-uniform treatment of internal surfaces.

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