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Plasma treatment of onychomycosis ZILAN XIONG, University of California at Berkeley, Berkeley, CA 94720, USA, JEFF ROE, TIM GRAMMER, DeviceFarm, Newark, CA 94560, USA, YEON-HO HIM, Chonbuk National University, 561-756, Korea, DAVID B. GRAVES, University of California at Berkeley, Berkeley, CA 94720, USA, GRAVES LAB, DEPARTMENT OF CHEMICAL AND BIOMOLECULAR ENGINEERING, UNIVERSITY OF CALIFORNIA, BERKELEY TEAM, DEVICEFARM, NEWARK, CA 94560, USA COLLABORATION —
Onychomycosis or fungal infection of the toenail or fingernail is a common affliction. Approximately 10% of the world's adult population is estimated to suffer from onychomycosis. Current treatment options such as topical creams, oral drugs, or laser treatments are generally limited by a variety of problems. We present results for an alternative onychomycosis treatment scheme using atmospheric pressure cold air plasmas. Using thinned cow hoof as a model nail material, we tested the ability of various plasma sources to act through the model nail to eradicate either bacteria or fungus deposited on the opposite side. Following 20 minute exposure to a surface microdischarge (SMD) device operating in room air, we observed a $\sim$ 2 log reduction of E. coli. A similar result was obtained against T. rubrum after 45 min plasma treatment. NOx species concentration penetrating through the model nail as well as uptake into the nail were measured as a function of nail thickness. We propose that these plasma-generated species, or perhaps their reaction products, are responsible for at least part of the observed anti-microbial effect. We also explore the use of ultraviolet light acting in synergy with plasma-generated chemical species.

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