

Abstract Submitted
for the GEC08 Meeting of
The American Physical Society

Streamer Discharges in Water and their Application JUERGEN F. KOLB, SHU XIAO, NOAH SCULLY, RAVINDRA P. JOSHI, KARL H. SCHOENBACH, Frank Reidy Research Center for Bioelectrics, Old Dominion University — Electrical discharges in liquids have been widely investigated for transient high voltage insulation and switching applications. Despite extensive efforts, the mechanism of breakdown initiation and formation of streamers are not completely understood, in particular for the application of short, sub-microsecond pulses. Regardless, streamers in water generated under these conditions are an attractive means of water treatment for a variety of applications, such as remediation of chemical and biological pathogens in waste-water, purification of drinking water, the cleaning of algae from freshwater ponds. Radicals, ultraviolet light, high electric fields and shockwaves are all considered as possible mediators of the effects, and all of which are generated in the streamer propagation process. We will present experimental results on the initiation and propagation of streamers in water and discuss the mechanisms. Further selected applications will be presented.

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Date submitted: 12 Jun 2008

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