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Correlation of streamer current pulses associated with adjacent high voltage needles in atmospheric pressure cold plasma reactors ERIK WEMLINGER, PATRICK PEDROW, Washington State University — We hypothesize that for a 12 needle array in an atmospheric pressure cold plasma reactor there will be correlation between needle corona current pulses. Guaitella et al. have shown in their surface dielectric barrier discharge that synchronous surface streamers are likely triggered by photodesorbed negative charges with binding energy (at the surface of the dielectric) less than 3.5 eV.¹ The reactor used in our work has two rings of axially aligned needles. The current in each needle is measured with broad band current sensors that respond primarily to free electron drift. Digital signal processing will be used to analyze correlation between streamer current pulses. A 60 Hz 10 kVRMS voltage source produces the streamers and concomitantly the cold plasma. The current pulse correlation will be studied between 1 needle and each of the other 11 needles with the expectation that nearest neighbor needles will have the highest correlation. Understanding correlated streamer current pulses will inform reactor modeling and reactor optimization.

¹O. Guaitella, I. Marinov, A. Rousseau, Applied Physics Letters, 98, 2011.

Erik Wemlinger
Washington State University

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