Abstract Submitted
for the GEC13 Meeting of
The American Physical Society

Study and Control of Various Corona Modes in an Atmospheric Pressure Weakly Ionized Plasma Reactor Using a Current Sensor Characterized by a Broad Frequency Band ROKIBUL ISLAM, PATRICK PEDROW, WILLIAM LEKOBOU, KARL ENGLUND, Washington State University — A broad band current sensor is being used to monitor the various phenomena (primary streamers, secondary streamers, back corona, etc.) associated with an atmospheric pressure needle-array-to-grounded-screen corona discharge. The reactor consists of a PVC tube and the needle array consists of nickel coated steel electrodes with radius of curvature about $50\mu m$. The grounded screen is made from stainless steel mesh and applied voltage has a frequency of 60 Hz with an RMS value ranging from 0 to 10kV. The voltage sensor is a resistive divider and the current sensor is a viewing resistor with value 50Ω. The feed gas stream is presently (argon + acetylene) or (argon + oxygen) with the argon acting as carrier gas and the acetylene and oxygen acting as precursor gases. Voltage and current are captured with a LeCroy 9350AL 500MHz oscilloscope and analyzed with Matlab using digital signal processing algorithms. The goals of the research are 1) to measure reactor electrical power on a real time basis; 2) to provide real time control of the applied voltage and thus avoid spark conditions; and 3) to identify the various corona modes present in the reactor. Processing of substrates takes place downstream from the grounded screen, outside of the harsh corona discharge environment.

Rokibul Islam
Washington State University

Date submitted: 14 Jun 2013 Electronic form version 1.4