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Back corona enhanced organic film deposition inside an Atmospheric Pressure Weakly Ionized Plasma reactor ROKIBUL ISLAM, SHUZHENG XIE, KARL ENGLUND, PATRICK PEDROW, Washington State University — A grounded screen with short needle-like protrusions has been designed to generate back corona in an Atmospheric Pressure Weakly Ionized Plasma (APWIP) reactor. The grounded screen with protrusions is placed downstream at a variable gap length from an array of needles that is energized with 60 Hz high voltage. The excitation voltage is in the range 0-10kV RMS and the feed gas mixture consists of argon and acetylene. A Lecroy 9350AL 500 MHz digital oscilloscope is used to monitor the reactor voltage and current using a resistive voltage divider and a current viewing resistor, respectively. The current signal contains many positive and negative current pulses associated with corona discharge. Analysis of the current signal shows asymmetry between positive and negative corona discharge currents. Photographs show substantial back corona generated near the tips of the protrusions situated at the grounded screen. The back corona activates via bond scission acetylene radicals that are transported downstream to form a plasma-polymerized film on a substrate positioned downstream from the grounded screen. The oscillograms will be used to generate corona mode maps that show the nature of the corona discharge as a function of gap spacing, applied voltage and many other reactor parameters.

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