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Characterization of the Basic Operational Properties of the Capillary Plasma Electrode (CPE) Discharge JOSE LOPEZ, WEIDONG ZHU, St Peters College, MARGARET FIGUS, Merck & Co. Inc., KURT BECKER, Polytechnic University — Various approaches have been pursued to create stable atmospheric pressure discharges by extending the lifetime of the diffuse phase of the discharge to hundreds of microseconds. Previous research showed that the stability of the diffuse mode is dependent on the frequency (in the kHz range), gas type, power, mode of the excitation, and geometrical confinement. The Capillary Plasma Electrode (CPE) discharge is able to produce stable atmospheric pressure nonequilibrium plasmas. The CPE is similar in design to a barrier-electrode discharge, but has perforated dielectrics. This configuration, aside from exhibiting a diffuse mode of operation, also exhibits the so-called "capillary jet" mode, in which the capillaries "turn on" and a bright plasma jet emerges from the capillaries. The capillary jets from adjacent capillaries overlap so that the discharge appears uniform when the electrode contains an array of holes. There appears to be a threshold frequency for the capillary jet formation, which is strongly dependent on the L/D ratio of the capillaries, where D is the diameter of a capillary and L its length. This current work explores these modes of operation of the CPE by characterizing the electrical and optical emission properties of this discharge.

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