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Start-Up Phenomena in a Surface Dielectric Barrier Discharge Device[1] ERIC WOLF, Lehigh University, SOPHIA GERSHMAN, Princeton Plasma Physics Lab — Surface dielectric barrier discharge (DBD) arrays have applications as plasma actuators for airflow control and as sources of reactive species for sterilization, wound healing, and surface treatment. In some cases, e.g. in biological applications, it is desirable to operate such devices at low duty cycles - at or below 30% - in order to reduce gas heating and to increase device longevity. Under these conditions, devices can exhibit start-up phenomena which take place over timescales of seconds. We experiment with a flexible surface DBD device with a ground electrode patterned with millimeter-scale square cavities and separated from the flat high-voltage electrode by a layer of polyimide tape. This device is driven by AC voltage and operates in ambient air. During start-up, this device transitions spontaneously from dark to glow modes, with the timing of these transitions showing a dependence on the temperature of the device and air flows over its surface. These results demonstrate the influence that the surrounding environment can have on the operation of such DBD devices and help to establish suitable operating conditions for applications.

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