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Ferroelectric-driven atmospheric pressure discharges MICHAEL JOHNSON, DAVID GO, University of Notre Dame — Typically, dielectric barrier discharges (DBD) operate through a continuous cycle of charging and discharging a dielectric layer. Ferroelectrics are a subset of dielectrics that are inherently polarized due to their non-centrosymmetric crystal structure. The polarization of a ferroelectric has two or more stable conditions, and the polarization state can be switched by applying an electric field that exceeds the coercive field of the crystal. When the dielectric layer in a DBD is replaced with a ferroelectric, this change in polarization can lead to rapid changes in surface potential and be used to manipulate the charge on its surface. More so, these rapid changes in polarization of the crystal can cause strong electric fields at the surface that can lead to electron emission into the discharge. The coercive field of the ferroelectric allows for the occurrence of this emission to be controlled. Because of this, operating conditions of a ferroelectric barrier discharge can be altered to allow for discharges at lower AC voltages and with greater amounts of control. In this work, we investigate the potential advantages of using ferroelectrics crystals in place of dielectrics in a barrier discharge while investigating the effects of polarization and polarization shifting on the discharge.

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