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Dielectric-directed surface flashover under atmospheric conditions.[1] PAUL CLEM, LAURA BIEDERMANN, CHRIS MOORE, Sandia National Laboratories, ELECTRICAL SCIENCES TEAM — High-voltage arc formation near a dielectric material is a complex process by which surface charging, secondary electron emission, and photoelectron emission modify the local electric field to determine the arc path and breakdown threshold. Strong electric field enhancement at the triple-point junction of dielectric, metal, and atmosphere may act to generate initiating electrons to seed prompt formation of streamers. This study investigates the dielectric role in influencing voltage breakdown threshold and reproducibility under high voltage conditions with and without external ultraviolet stimulation. We investigate effects of varying dielectric permittivity, and whether and how field emission at triple points can minimize variance in atmospheric breakdown behavior. Using a low-inductance test-stand, 200 micron dielectric granules were placed on a planar brass electrode in dry air at 600-Torr, opposite rounded brass rod electrodes which defined 0.25mm to 1-mm gaps. Polarity-dependent breakdown measurements (V, I) and images were collected as a function of granule permittivity and voltage polarity. We will discuss data and models of how dielectric material properties impact surface charging, electron emission, and ionization, thereby directing the flashover path.

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