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Impact of Surface Flashover on Coated Ceramics RICKY TANG, LAURA BIEDERMANN, JOSEPH HOWARD, RONALD GOEKE, CHERRELLE THOMAS, PAUL CLEM, Sandia National Laboratories — Machinable ceramics are frequently used to provide high-voltage insulation in vacuum and low-pressure applications, and surface flashover of these insulators can be detrimental. To increase the voltage hold-off strength, often a semi-conductive coating is utilized to decrease the secondary electron emission (SEE) yield of the material and increase the charge bleed-off time constant, thereby reducing charge build-up on the ceramic surface leading to breakdown. In our experiments, hold-off strengths of cylindrical ceramic samples are measured in a nearly-uniform electric field as a function of coating formulation and background gas pressure and composition. The different formulation alters the surface chemistry of the resulting material. The samples are modified to produce a preferential direction of flashover in a repeated location to enable imaging of the flashover process, as well as investigating the spectral composition of the resulting plasma using a photodiode detector. Additionally, a preferential breakdown location allows microscopy surface analysis of “as-received” and “pulsed” samples by comparing the coated surface before and after flashover under various background conditions. Sandia National Laboratories is a multimission laboratory managed and operated by National Technology and Engineering Solutions of Sandia LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy National Nuclear Security Administration under contract DE-NA0003525.

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