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PIC-DSMC Model For Breakdown In Voids[1] LAURA BIEDERMANN, CHRIS MOORE, CHRISTIAN TURNER, Sandia National Laboratories — High-voltage components such as transformers, gas vacuum switches, wide-bandgap power electronics, and power LEDs may be externally coated with polymer encapsulants to prevent surface flashover and high voltage breakdown. These epoxies and silicon resin encapsulants may be poured into a mold or dispensed as a liquid encapsulant to surround the component. During the thermal/vacuum cure process, potentially-damaging air voids may be introduced in the epoxy from entrapped air or partial delamination. Such microscopic voids can be an initiation point for high-voltage breakdown. We have developed atmospheric air models for breakdown [1] within such atmospheric voids as are found in encapsulated transformers. Plasma development and voltage collapse are simulated using an electrostatic particle-in-cell (PIC) code that models particle-particle collisions using the direct simulation Monte Carlo (DSMC) method. We model the breakdown of $\sim$25-μm voids including surface charging and plasma-surface interactions such as photoemission, sputtering, and SEE. These models show under what conditions (voltage, location) voids can induce high voltage breakdown. [1] C.H. Moore, *et al.*, ICOPS 2016

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Laura Biedermann
Sandia National Laboratories

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