**PPPS 2019** 



Contribution ID: 1098

Type: Oral

## Vacuum Outgassing Study of Candidate Materials for Next Generation Pulsed Power and Accelerators: Improving the Boundary Conditions for Molecular Flow Simulations

Friday 28 June 2019 10:30 (15 minutes)

Next generation pulsed power machines and accelerators require a better understanding of the materials used within the vacuum vessels to achieve lower base pressures ( $P \ll 10^{-5} Torr$ ) and reduce the overall contaminant inventory while incorporating various dielectric materials which tend to be unfavorable for UHV applications. By improving the baseline vacuum, it may be possible to delay the onset of impedance collapse, reduce current loss on MA devices, or improve the lifetime of thermionic cathodes, etc. In this study, we examine the vacuum outgassing rate of REXOLITE (cross-linked polystyrene) and Kel-F (polychlorotrifluoroethylene) as candidate materials for vacuum insulators. These values are then incorporated into boundary conditions in our molecular flow simulations using COMSOL and the results are compared to a pulsed power system [1] designed for  $1 \times 10^{-8} Torr$  operations.

[1]. J. Leckbee et. al., "Vacuum Insulator Flashover of Ultra High Vacuum Compatible Insulators", Companion Talk in this Conference (PPPS 2019).

• Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525. SAND2019-2518 A

Authors: SIMPSON, Sean (Sandia National Laboratories); Dr GOEKE, Ronald (Sandia National Laboratories)

**Co-authors:** Mr COOMBES, Kenneth (Sandia National Laboratories); Mrs DEZETTER, Karen (Sandia National Laboratories); Mr JOHNS, Owen (Sandia National Laboratories); LECKBEE, Josh (Sandia National Labs); NIELSEN, Dan (sandia national laboratories); SCEIFORD, Matthew (Sandia National Laboratories)

Presenter: SIMPSON, Sean (Sandia National Laboratories)

Session Classification: 5.5 Insulation and Dielectric Breakdown II

Track Classification: 5.5 Insulation and Dielectric Breakdown