

Abstract to be submitted for a poster at the 7th *International Workshop on Mechanisms of Vacuum Arcs* (MeVARC) , San Juan Puerto Rico, May 20-24 2018

Title:

Field emission from Pt thin films with disorder

Authors:

Ezra Bussmann, Morgann Berg, David Scrymgeour, Michael Brumbach, Taisuke Ohta, Sean Smith, Harold Hjalmarson, Peter Schultz, Paul Clem, Matthew Hopkins, Chris Moore

Sandia National Laboratories, Albuquerque NM, 87185, USA

Abstract:

We investigate how nanoscale surface and bulk disorder on metal thin films influences electron emission (field/photo) and, ultimately, vacuum arc initiation. As a prototypical metal surface, we characterize polycrystalline Pt films that include grain boundaries, dislocations, crystal tilts, roughness, adsorbed gas (H₂O), and thin dielectric layers. Using a toolset including scanning tunneling microscopy (STM), photoelectron emission microscopy (PEEM), and ultraviolet photoemission spectroscopy (UPS), we measure local work functions over length scales ranging from mesoscopic (~10 μ m) to Angstrom scale (<1 nm). Local work functions of clean Pt(111) crystal approach 6eV. Defects and coatings diminish the work function to values approaching 5 eV. We connect our findings with values in a variety of prior works.

This work is funded by Sandia Laboratory Directed R&D (LDRD) program and performed, in part, at the Center for Integrated Nanotechnologies, a U.S. Department of Energy (DOE) Office of Science User Facility. Sandia National Laboratories is managed and operated by National Technology and Engineering Solutions of Sandia, LLC., a subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA-0003525.