Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

**Temperature Coefficient of Secondary Electron Emission: A Novel Thermal Metrology** MD. IMRAN KHAN, SEAN DANIEL LUBNER, University of California at Berkeley, DAVID FRANK OGLETREE, ED WONG, Molecular Foundry (Lawrence Berkeley National Laboratory), CHRIS DAMES, University of California at Berkeley — State of the art nanoscale temperature mapping techniques include Scanning Thermal Microscopy (SThM) and optical thermoreflectance, though these have the challenges of requiring sample contact and being diffraction limited, respectively. Near field scanning optical microscopy (NSOM) can beat the diffraction limit but still cannot measure temperature at 10s of nanometer resolution. SEM is well known for topographic imaging but has not been previously used for thermal mapping. Past literature suggested that secondary electron yields might have a small temperature dependence due to electron-phonon scattering and/or temperature dependence of work function. We previously measured the temperature coefficient of secondary electron emission of several group IV and III-V semiconductors and found it to range from around 100 to 1000 ppm/K. Here, we utilize this to map a spatial temperature gradient in an SEM image. We implement a double-heater structure to produce a temperature gradient along the plane of a substrate. The primary electron beam is scanned across the sample's surface while the emitted (secondary plus backscattered) electron current and net absorbed sample currents are simultaneously recorded. The results demonstrate the ability to map a spatial temperature gradient.

Md. Imran Khan
University of California at Berkeley

Date submitted: 06 Nov 2015 Electronic form version 1.4