

Announcing the Final Examination of Rachel N. Evans for the degree of Master of Physics

Date: July 2, 2018

Time: 11:00 a.m.

Room: PSB 445

Dissertation title: Far-Infrared Bands in Plasmonic Metal-Insulator-Metal Absorbers Optimized for Long-Wave Infrared

Abstract:

Metal-insulator-metal (MIM) resonant absorbers comprise a conducting ground plane, a thin dielectric, and thin separated metal top-surface structures. Long-wave infrared (LWIR) fundamental absorptions are experimentally shown to be optimized for a ratio of dielectric thickness to top-structure dimension, $t:L$, of $\sim 1:10$.

The fundamental resonance wavelength is predicted by different analytic standing-wave theories to be $\sim 2nL$, where n is the dielectric refractive index. Thus, for the dielectrics SiO_2 , AlN , and TiO_2 , L values of a few microns give fundamentals in the 8-12 micron LWIR wavelength region. Agreement with theory is better for larger $t:L$. Harmonics at shorter wavelengths are always observed.

We show that there are additional resonances, in the far-infrared 20-50 micron wavelength range, well beyond the predicted fundamental. This may impact selectivity in spectral sensing applications.

Outline of Studies:

Major: Physics

Educational Career:

B. S. Belmont University, 2016

Committee in Charge:

Dr. Robert Peale (Chair)

Dr. Masahiro Ishigami

Dr. Arkadiy A. Lykah (External Committee Member)

Approved for distribution by Dr. Robert Peale, Committee Chair, on June 2, 2018.

The public is welcome to attend.