EOP Doctoral Defense

Wednesday, March 20, 2019

FH 580 at 10:00 AM

All are welcome to attend.

SILICON-BASED INFRARED PHOTODETECTORS FOR LOW-COST IMAGING APPLICATIONS

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Abstract

Infrared imaging is a powerful capability that has been technologically driven primarily by the defense industry over the past several decades. As a result, ultra-high-performance infrared imaging arrays with specialized functionality have been developed, but at a relatively high cost. Meanwhile, economy of scale has driven the price of visible complementary metal-oxide-semiconductor (CMOS) image sensors down drastically while simultaneously providing greater on-chip capability and performance. Silicon-based infrared sensors have the potential to leverage modern CMOS advancements and cost, but poor performance has inhibited the widespread adoption of this technology. This work will explore the potential for novel silicon-based infrared sensors that exploit nanoscale structures to provide new methods of photodetection in silicon beyond the bulk bandgap response. Nanostructure fabrication developments and challenges will be presented with the perspective of applying the underlying structure as a platform to detect infrared photons. Proposed solutions include improvement to existing detector technology (Schottky barrier photodiodes) as well as novel detector architectures (silicon quantum walls) that leverage the unique geometry of nanostructured silicon.