

## **SWIR DETECTOR TECHNOLOGY**

### Abstract:

Shortwave Infrared (SWIR) imaging has attracted much attention over the past decades due to its unique imaging properties in a “niche” spectral band relative to visible and thermal. Many machine vision applications such as sorting and inspection have emerged in addition to long distance surveillance and night vision applications. Many different detector technologies have been utilized to image in SWIR wavelengths; mercury cadmium telluride (MCT), InGaAs PDAs lattice matched to InP substrates, and technologies that process the detector material directly on Silicon readout integrated circuits such as Colloidal Quantum Dots(CQD), Germanium (Ge), Silicon-Germanium (SiGe) or “black” Silicon.

Among these technologies, InGaAs based SWIR imaging is thought to be the highest performance SWIR imager due to its relatively low dark current ( $I_d$ ) at room temperature, and mature planar-type photodiode design that was developed for telecommunication applications in the early 1980’s. In this presentation, a short introduction to SWIR imaging will be given, followed by a description of the fundamentals of a compound photodiode structure and then show how it can be tailored for high-speed and imaging applications. The second part of the presentation will describe how SWIR detector and readout technology has evolved over the years.

### bio:

#### Bora M. Onat, Ph.D., MBA

Bora M. Onat is currently CEO and Owner of Bora Technologies LLC, a NJ based small business. He founded the company in March 2014, to provide consulting services to industry on III-V based semiconductor laser and detector manufacturing

Bora M. Onat graduated with a Ph.D. degree in Electrical Engineering from Boston University in May of 1998 focusing on solid state devices and photonics. He joined Lucent Technologies Inc. and became the lead designer of 7 different production photodiodes for telecom applications. He joined Infinera, Inc in July 2002, where he lead the design and processing of unique planar lightwave circuits. Dr. Onat joined Sensors Unlimited (now a division of UTC) in Jan. 2004, where his responsibilities included management of epitaxial growth facility and R&D program management of multiple contracts. While working at Sensors Unlimited, he also obtained an MBA degree from Temple University, Fox School of Business, in August 2007. Dr. Onat also served as Technical Program Manager at Princeton Lightwave Inc. from November 2007 till November 2013, where his responsibilities included R&D program management of contracts in addition to wafer and chip fabrication operations management. He has published almost thirty publications including technical journals, conference papers, a book chapter and has four awarded US patents. He is also a Sr. Member IEEE and was a program committee member for IEEE Photonics Society Conference for 2008-2014.