



## II-VI Workshop 2023

October 30 - November 2, 2023

Embassy Suites by Hilton Chicago Downtown Magnificent Mile, Chicago, IL

### MONDAY, OCTOBER 30, 2023

#### Registration

04:00 PM - 07:00 PM / Ballroom Foyer

#### Tutorial

05:00 PM - 06:15 PM / Ballroom ABCD

Numerical Device Modeling & Simulation of Infrared Detectors: Challenges & Techniques  
Jonathan Schuster, U.S. Army DEVCOM Army Research Laboratory, Adelphi, MD, US

### TUESDAY, OCTOBER 31, 2023

#### Registration

07:30 AM - 06:00 PM / Ballroom Foyer

#### Continental Breakfast

07:30 AM - 09:30 AM / Ballroom Foyer

#### Welcoming Remarks

08:45 AM - 09:00 AM / Ballroom ABCD

#### Plenary Session

09:00 AM - 09:30 AM / Ballroom ABCD

P.1: Naval EO/IR Sensors and Sensor Processing (09:00 AM)  
Ben Conley, US Naval Surface Warfare Center (NSWC), Crane, IN, US

#### Session 1: Industrial Overview I

09:30 AM - 10:30 AM / Ballroom ABCD

- 1.1: **Invited Paper:** HgCdTe Focal Plane Array Production at Teledyne (09:30 AM)  
Michael Carmody, Teledyne Imaging Sensors, Camarillo, CA, US
- 1.2: **Invited Paper** (10:00 AM)  
Jason Graham, Raytheon Vision Systems, Goleta, CA, US

#### BREAK (10:30 AM)

#### Session 2: Materials I

10:45 AM - 12:30 PM / Ballroom ABCD

Chair: Tony Almeida, U.S. Army CCDC C5ISR NVESD

- 2.1: **Invited Paper:** Overview of IR Materials for High Density Vertically Integrated Photodiode (HDVIP) (10:45 AM)  
Fikri Aqariden, Leonardo DRS, Bolingbrook, IL, US
- 2.2: Assessment of Activation Annealing Conditions on Arsenic Ion Implanted LWIR HgCdTe FPAs (11:15 AM)  
Burak Asici, ASELSAN Inc., Ankara, Turkey
- 2.3: Variable Temperature and Variable Field Hall Investigation of HgCdTe Thin Films (11:30 AM)  
Alexander Goldstone, Sivananthan Laboratories, Bolingbrook, IL, US
- 2.4: Impact of Anneal on Copper Doping Concentration for Mid-wave and Long-wave Mercury Cadmium Telluride (11:45 AM)  
John Armstrong, Leonardo DRS, Dallas, TX, US
- 2.5: Defects Analysis of MBE Growth of HgCdTe on GaAs, GaSb, CZT Substrates Through Atomistic TNL-EpiGrow Simulator (12:00 PM)  
Praveen Saxena, Tech Next Lab, Lucknow, India
- 2.6: Correlation Between Tobin Factor and RTS Defect in MWIR Spectral Range (12:15 PM)  
Antoine Claret, CEA, Grenoble, France

#### LUNCH (12:30 PM)

#### Session 3: Devices I

01:45 PM - 03:45 PM / Ballroom ABCD

Chair: Dan Lofgreen, Raytheon Vision Systems

- 3.1: **Invited Paper:** Material Considerations for Infrared Avalanche Photodiodes (01:45 PM)  
Christoph Grein, University of Illinois Chicago, Chicago, IL, US

- 3.2: **Excess Noise and Gain by Impact Ionization in Monte Carlo Simulated Infrared Avalanche Photodiode Materials (02:15 PM)**  
*S.Tempel, University of Illinois Chicago, Chicago, IL, US*
- 3.3: **Invited Paper: Gain Characteristics Revisited in Vertical SWIR HgCdTe APDs (02:30 PM)**  
*Johan Rothman, CEA-LETI, Grenoble, France*
- 3.4: **Invited Paper: HgCdTe Avalanche Photodiode Arrays for the Next-Generation Space Lidars (03:00 PM)**  
*Xiaoli Sun, NASA Goddard*
- 3.5: **Student Paper:- Collective Summary of the Extended SWIR (eSWIR) Band: Tradeoffs and Applications (03:30 PM)**  
*Lindsey Wiley, University of Arizona, Tucson, AZ, US*

### **BREAK (03:45 PM)**

### **Session 4: Modeling and Simulation**

**04:00 PM - 05:30 PM / Ballroom ABCD**

**Chair:** *Jonathan Schuster, DEVCOM Army Research Laboratory (ARL)*

- 4.1: **Full Electronic Band Structure Characterization of ZnO Nanorod (04:00 PM)**  
*Praveen Saxena, Tech Next Lab, Lucknow, India*
- 4.2: **Impact of Various Defects on Carrier Mobility in ZnO Thin Films (04:15 PM)**  
*Praveen Saxena, Tech Next Lab, Lucknow, India*
- 4.3: **2D Hexagonal Boron Phosphide for Room Temperature, Hyperspectral Mid-Wavelength Infrared Sensing (04:30 PM)**  
*Rathnayake Mudiyansele Kandededara, University of Illinois Chicago, Chicago, IL, US*
- 4.4: **The Effect of Contact Resistance on Short Wave Infrared Focal Plane Array Noise (04:45 PM)**  
*Eric Piquette, Teledyne Imaging Sensors, Camarillo, CA, US*
- 4.5: **Invited Paper: Optimization of MTF in Planar and Mesa Delineated HgCdTe Devices (05:00 PM)**  
*Chad Fulk, Raytheon, Goleta, CA, US*

### **TABLETOP EXHIBITS/WINE & CHEESE RECEPTION (5:30 – 7:00 PM)**

### **WEDNESDAY, NOVEMBER 1, 2023**

#### **Registration**

**07:30 AM - 04:30 PM / Ballroom Foyer**

#### **Continental Breakfast**

**07:30 AM - 09:30 AM / Ballroom Foyer**

#### **Welcoming Remarks**

**08:45 AM - 09:00 AM / Ballroom ABCD**

#### **Keynote Session**

**09:00 AM - 09:30 AM / Ballroom ABCD**

- K.1: **Low Cost Infrared Detector Research at AFRL (09:00 AM)**  
*Charles Reyner, Air Force Research Laboratory*

#### **Session 5: Industrial Overview II**

**09:30 AM - 10:30 AM / Ballroom ABCD**

- 5.1: **Invited Paper: HOT from SWIR to VLWIR - Latest Progress at AIM on MCT-based Small Pitch Infrared Detector Arrays for Higher Operating Temperatures (09:30 AM)**  
*Heinrich Figgemeier, AIM Infrarot-Module GmbH, Heilbronn, Germany*
- 5.2: **Invited Paper: LYNRED Developments to Address MWIR Detectors Small Pixel Pitches (10:00 AM)**  
*David Billon-Lanfrey, LYNRED, Veurey-Voroize, France*

### **BREAK (10:30 AM)**

#### **Session 6: Superlattice**

**10:45 AM - 12:15 PM / Ballroom ABCD**

**Chair:** *Enrico Belotti, Boston University*

- 6.1: **Invited Paper: Evolution of MWIR Detector Technology at SCD (10:45 AM)**  
*Philip Klipstein, Semiconductor Devices, Haifa, Israel*
- 6.2: **Invited Paper: Antimonide-based Narrow Bandgap Semiconductors for Infrared Technology and Quantum Information Science (11:15 AM)**  
*Binh-Minh Nguyen, HRL Laboratories LLC, Malibu, CA, US*
- 6.3: **Characterization of Lateral and Vertical Electronic Transport in MWIR InAs/GaSb Type-II Superlattices (11:45 AM)**  
*Gilberto Umana-Membreno, The University of Western Australia, Perth, Australia*
- 6.4: **Graphene-based Field-Effect Photodetector with HgCdTe Adsorber (12:00 PM)**  
*Volodymyr Sheremet, Virginia Commonwealth University, Richmond, VA, US*

### **LUNCH (12:15 PM)**

#### **Session 7: Devices II**

**01:45 PM - 03:15 PM / Ballroom ABCD**

**Chair:** Jill Nolde, Naval Research Laboratory

- 7.1: **Electrical Characterization of Top-Illuminated Midwave HgTe Colloidal Quantum Dot Photodiodes (01:45 PM)**  
*John Peterson, The University of Chicago, Chicago, IL, US*
- 7.2: **Hg-Chalcogenide Colloidal Quantum Dots for Mid and Long-wave Infrared, Absorption, Emission, and Detection (02:00 PM)**  
*Philippe Guyot-Stonnest, The University of Chicago, Chicago, IL, US*
- 7.3: **MBE Growth of HgCdTe Hetero-structures for Broad-Spectrum Infrared Sensors (02:15 PM)**  
*Zaheer Ahmad, EPIR Inc., Bolingbrook, IL, US*
- 7.4: **Characterization of Ohmic Metal - Semi-conductor Contacts on MCT for Infrared Detection (02:30 PM)**  
*Elise Frau, Lynred, Veurey-Voroize, France*
- 7.5: **Characterization and Monitoring of Intentional Contamination at Interfaces for HgCdTe HOT Photodiodes (02:45 PM)**  
*Steven Bel, CEA-LETI, Grenoble, France*
- 7.6: **Electrical Properties of the Backside Illuminated Etched Surface of HgCdTe MWIR Detectors and Their Passivation (03:00 PM)**  
*Hugo Rousset, CEA-LETI, Grenoble, France*

**BREAK (03:15 PM)**

### Session 8: Materials II

**03:30 PM - 05:30 PM / Ballroom ABCD**

**Chair:** Joe Burns, Air Force Research Laboratory

- 8.1: **Invited Paper: Current Status and Future Plans for Infrared Research and Development at the University of Western Australia (03:30 PM)**  
*Lorenzo Faraone, The University of Western Australia, Perth, Australia*
- 8.2: **Advanced, High-Throughput, Large-Area MBE HgCdTe Production at RVS (04:00 PM)**  
*Madhusudhana Reddy, Raytheon Vision Systems, Goleta, CA, US*
- 8.3: **Invited Paper: Carrier Recombination Lifetime Mapping Measurements of Semiconductor Wafers Using Optical Pumping and Probing (04:15 PM)**  
*Yong Chang, EPIR Inc., Bolingbrook, IL, US*
- 8.4: **Determination of Lifetime of Minority Carriers in HgCdTe by Electron Beam Induced Current Technique (04:45 PM)**  
*Samantha Bustillos Vasco, CEA-LETI, Grenoble, France*
- 8.5: **Molecular Dynamics Simulation of the Incorporation of Arsenic into CdTe During Vapor Synthesis (05:00 PM)**  
*Anthony Ciani, Sivananthan Laboratories, Inc., Bolingbrook, IL, US*
- 8.6: **Characterization of Junction Depth in n-on-p Structures Formed by RIE-based Type Conversion (05:15 PM)**  
*Gilberto Umana-Membreno, The University of Western Australia, Perth, Australia*

**THURSDAY, NOVEMBER 2, 2023**

### Registration

**08:00 AM - 12:00 PM / Ballroom Foyer**

### Continental Breakfast

**07:30 AM - 09:30 AM / Ballroom Foyer**

### Welcoming Remarks

**08:45 AM - 09:00 AM / Ballroom ABCD**

### Session 9: Industrial Overview III

**09:00 AM - 10:00 AM / Ballroom ABCD**

- 9.1: **Invited Paper: An Industry Perspective on Cooled Sensing – Past, Present and Future (09:00 AM)**  
*Brett Breazzeale, Leonardo DRS, Dallas, TX, US*
- 9.2: **Invited Paper: IR Detector Development at Leonardo, UK (09:30 AM)**  
*James Wilson, Leonardo, UK, Southampton, United Kingdom*

**BREAK (10:00 AM)**

### Session 10: Devices III

**10:15 AM - 12:15 PM / Ballroom ABCD**

**Chair:** Fikri Aqariden, DRS Electro-Optical & Infrared Systems (EOIS)

- 10.1: **Invited Paper: When Does Detector Pitch Matter in Infrared System Performance? (10:15 AM)**  
*Ron Driggers, University of Arizona, Tucson, AZ, US*
- 10.2: **Invited Paper: The Army's Vision for Vision: The Future of Military EOIR Sensing (10:45 AM)**  
*Jason Zeibel, US Army C5ISR Center, Adelphi MD, US*
- 10.3: **HgCdTe HDVIP Focal Plane Arrays with In-Situ Passivation Grown by Molecular Beam Epitaxy (11:15 AM)**  
*John Armstrong, Leonardo DRS, Dallas, TX, US*
- 10.4: **Studies of Excess Dark Currents in HgCdTe-based Long Wavelength Infrared Photovoltaic Detectors (11:30 AM)**  
*Borzoyeh Shojaei, Teledyne Imaging Sensors, Camarillo, CA, US*
- 10.5: **iSWIR Vision Systems PbS QOD FPAs: Progress on Reliability, Performance, and Laser Designation Demonstration (11:45 AM)**  
*J.A. Hilton, SWIR Vision Systems, Durham NC, US*
- 10.6: **Characterization of LWIR (100) and (111) HgCdTe Heterostructures for HOT Infrared Detectors (12:00 PM)**  
*Krzysztof Murawski, Institute of Applied Physics, Military University of Technology, Warsaw, Poland*

**LUNCH (12:15 PM)**

## **Session 11: Materials III**

**01:30 PM - 04:00 PM / Ballroom ABCD**

**Chair:** Priyalal Wijewarnasuriya, Teledyne Imaging Sensors

- 11.1: **Invited Paper:** MWIR HgCdTe Sensor Arrays on GaAs Substrates Grown by MBE (01:30 PM)  
*Oguz Altun, ASELSAN Inc., Ankara, Turkey*
- 11.2: **(211) CdZnTe Substrate Production at RVS (02:00 PM)**  
*Kelly Jones, Raytheon Vision Systems, Goleta, CA, US*
- 11.3: **Invited Paper:** Returning to MBE Model Systems for Investigation of Arsenic Doping in CdTe Photovoltaics (02:15 PM)  
*Eric Colegrove, National Renewable Energy Laboratory (NREL), Golden, CO, US*
- 11.4: **Considerations in Realizing Large Format, Small Pixel Infrared Focal Plane Arrays (02:45 PM)**  
*Sushant Sonde, EPIR Inc., Bolingbrook, IL, US*
- 11.5: **Addressing Challenges in Thermo-mechanical Stress Optimization in Large Format, Small Pixel IRFPAs Integration. (03:00 PM)**  
*Sushant Sonde, EPIR Inc., Bolingbrook, IL, US*
- 11.6: **Metrological Pixel Spatial Response Measurement of Cooled Infrared Focal Plane Arrays (03:15 PM)**  
*Edouard Huard de Verneuil, ONERA FRANCE, Palaiseau, France*
- 11.7: **Invited Paper:** Analysis of HgCdTe/CdZnTe Defects (03:30 PM)  
*J. David Benson, U.S. Army Combat Capabilities Development Command (DEVCOM) C5ISR Center, Ft. Belvoir, VA, US*

**CASSELMAN/SPICER BEST STUDENT PAPER AWARD (04:00 PM)**