



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:** A Recap of Nearly 70 Years of HgCdTe Innovation and Production at Raytheon Vision Systems (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: **Student Paper:** 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: **Student Paper:** 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: **Student Paper:** 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: **Student Paper:** 2D Hexagonal Boron Phosphide for Room Temperature, Hyperspectral Mid-Wavelength Infrared Sensing (04:30 PM)
Rathmayake Mudiyansele Kandedegara, 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: **WITHDRAWN Invited Paper:** Optimization of MTF in Planar and Mesa Delineated HgCdTe Devices
Chad Fulk, Raytheon, Goleta, CA

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: **Student Paper:** 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-Sionnest, 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: **Student Paper:** Characterization of Ohmic Metal - Semi-conductor Contacts on MCT for Infrared Detection (02:30 PM)
Elise Frau, Lynred, Veurey-Voroize, France
- 7.5: **Student Paper:** Characterization and Monitoring of Intentional Contamination at Interfaces for HgCdTe HOT Photodiodes (02:45 PM)
Steven Bel, CEA-LETI, Grenoble, France
- 7.6: **Student Paper:** 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: **Student Paper:** 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: **WITHDRAWN** Characterization of Junction Depth in n-on-p Structures Formed by RIE-based Type Conversion
Gilberto Umana-Membreno, 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 Breazeeale, 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 CQD 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)