

# FINAL CALL FOR PAPERS

The 2016 U.S. WORKSHOP on the PHYSICS and  
CHEMISTRY of II-VI MATERIALS

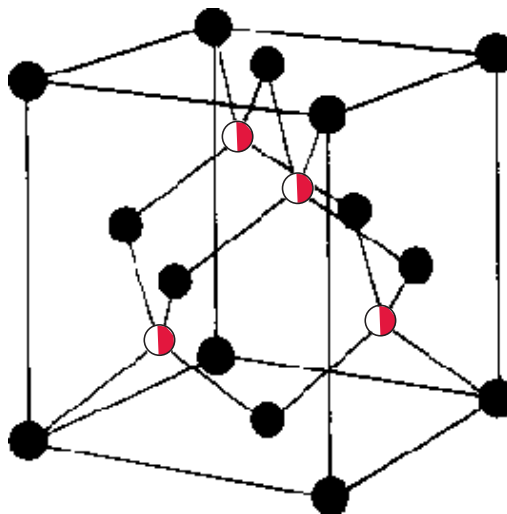
October 17–20, 2016  
Sheraton Inner Harbor Hotel  
Baltimore, Maryland

## II-VI Detector Materials

- IR
- UV
- Gamma-Ray
- X-Ray
- Photovoltaic
- CdZnTe
- HgCdTe
- ZnO
- ZnS
- History of IR Detectors

## Special Sessions

- Superlattices: II-VI and III-As/Sb
  - II-VI-Based Solar Cells
- Alternatives to CdZnTe Substrates
  - HgCdTe Avalanche Photodiodes
- X-Ray and Gamma-Ray Detectors
  - Surfaces and Interfaces
  - ZnO Materials and Devices
    - Defects and Doping
    - Surface Passivation



## **Participating Agencies**

*U.S. Army RDECOM CERDEC Night Vision  
& Electronic Sensors Directorate*

*U.S. Army Research Laboratory*

*U.S. Army SMDC*

*U.S. Navy Electro-Optics Center  
Penn State University*

*Office of Naval Research*

*Air Force Research Laboratory*

*Army Research Office*

*The Minerals, Metals & Materials Society*

**Endorsed by**

*The American Physical Society*

<http://www.ii-viworkshop.org>

## 2016 II-VI WORKSHOP

### Purpose

The purpose of this Workshop is to bring together the industrial, governmental, and academic communities that work with II-VI materials. These II-VI materials are critical in a wide range of detector technologies operating in the infrared, ultraviolet, x-ray, and gamma-ray regions of the spectrum, as well as broad-band devices such as solar cells. They include HgCdTe, ZnSe, ZnO, ZnS, and CdTe, as well as other II-VI semiconductors and alloys. Spectrometers, imagers, and other sophisticated systems exploiting various properties of these materials are finding applications in many fields, including national security, homeland security, medicine, industrial process monitoring, basic science, astronomy, energy production, and more. The Workshop aims at advancing the understanding of the basic physics and chemistry of these materials, and thereby contributes to the continual improvement of these system capabilities. The 2016 Workshop is the 35th in a series that began in 1981.

### Areas of Interest

Areas covered include a broad range of disciplines and materials properties. Included are materials growth and characterization, materials engineering, intrinsic and extrinsic defects and dopants, surface chemistry, fabrication processes, electrical properties and modeling, charge transport, noise sources, optical properties, photorefraction, electro-optical and magneto-optical properties, as well as the interaction among all these.

### Workshop Format

The Workshop program will consist of about 60 oral presentations and, on occasion, a Poster Session. Invited and contributed papers with a common theme will be grouped for presentation.

To provide ample time for discussion, there are scheduled morning and afternoon breaks. Lunch will be provided, affording additional discussion time. To further promote informal discussion and interaction, the first day will conclude with a wine and cheese reception accompanied by tabletop displays from commercial vendors displaying products and services of interest to the Workshop community.

Authors of accepted papers are encouraged to submit full-length manuscripts, which will be peer reviewed and published as part of the Workshop proceedings in a Special Issue of the *Journal of Electronic Materials*.

Student participation is strongly encouraged. An award recognizing the best student paper will be presented at the conclusion of the Workshop. Funding exists to support student travel to the Workshop. Some student financial assistance is available for conference attendees presenting papers.

### **Selected Focus Topics**

- Emerging Infrared Detector Technologies
- Multi-Band Detectors
- Near-Room-Temperature IR Devices
- HgCdTe Avalanche Photodiodes
- Material Growth and Modeling
- Substrates for HgCdTe, CdZnTe, and Alternatives
- Structural Characterization
- Doping Issues in HgCdTe
- Radiation Detectors
- Solar Cells
- Integration of 6.1-Å II-VI and III-V Materials
- IR Applications of Plasmonics and Metamaterial

### **Keynote Address**

This year's Keynote Speaker will be **Dr. Larry Schuette**, Director of Research, Office of Naval Research, who will speak on "Naval S&T: The Innovation Engine"

### **Invited Speakers Will Include**

**Nicolas Baier**, CEA-LETI

**Dave Benson**, NVESD

"Impact of CdZnTe Substrates on MBE HgCdTe Deposition"

**Chad Fulk**, Raytheon

"Epitaxial HgCdTe on Silicon and CdZnTe Substrates: A Performance Comparison"

**Chris Grein**, University of Illinois, Chicago

"Simulation of MBE Semiconductor Film Growth"

**Don Lee**, Teledyne

"HgCdTe: A Vision for the Near Future"

**Chris Maxey**, Selex

"MOVPE HgCdTe Materials and Device Technology"

**Gang Xiong**, First Solar

**Shengbai Zhang**, Rensselaer Polytechnic Institute

"Chalcogenide Perovskites: An Emerging Class of Ionic Semiconductors for Photovoltaics"

**Yong Zhang**, Arizona State University

"CdTe/MgCdTe Double Heterostructures and Solar Cells with a  $V_{oc}$  greater than 1 V and an efficiency of 18%"

**Peter Capper**, ex-Selex

"MCT – A UK Retrospective: Reminiscences of a Crystal Grower"

**Philip Klipstein**, SCD

"Development and Production of Array Barrier Detectors at SCD"

## GENERAL TOPICS

The scope of the Workshop includes the basic physics and chemistry of all II-VI materials and their applications. Materials of interest include HgCdTe, HgCdSe, ZnSe, ZnO, CdTe, and CdZnTe. Issues in the following critical areas are of interest:

- **X-Ray & Gamma-Ray Radiation Detectors**
- **Radiation Effects in HgCdTe**
- **II-VI-Based Solar Cells**
- **Materials Growth and Characterization**
  - Control of composition, carrier concentration, and lifetime
  - Modeling of growth and processing
  - Equilibrium and non-equilibrium growth
- **Physics of Failure**
  - Characterization, particularly non-destructive
  - Effect on electrical and optical properties
- **P-Doping Issues in II-VI Semiconductors**
  - Impurities
  - Diffusion
  - Activation and segregation
- **Dislocations**
  - Generation Mechanisms
  - Properties
  - Kinetics
  - Characterization
  - Mitigation
- **Surfaces and Interfaces**
- **Etching, Passivation, and Metallization**
- **Modeling and Simulation**
- **Material Properties**
  - Growth and processing
  - Device physics
  - Characterization of materials
  - Electrical, optical, and microstructural characterization
- **ZnO and ZnS Materials and Devices**
- **Magnetic Semiconductors**
- **2D Materials**
- **Quantum Dots**

## CALL FOR PAPERS

Papers describing significant advances in the state of the art of scientific results and understanding in the Workshop issues are solicited. Experimental results or theoretical results addressing experiments are encouraged. Emphasis should be on new fundamental physics and chemistry of materials for detector applications. Abstracts must contain results to be considered.

Papers will be selected on the basis of (1) originality, (2) significance of results, (3) quality and completeness of the research, and (4) breadth of interest.

Extended abstracts of all accepted papers will be published in the *Book of Extended Abstracts*, which will be distributed at the Workshop. Submitted full-length manuscripts, after peer review, will be published in the *Journal of Electronic Materials*.

## TUTORIAL

This year, the II-VI Workshop will feature a tutorial on Monday, October 17. The tutorial will be given by Roger DeWames of NVESD, who will address ***“Topics in Heterojunction Photodiode Physics with Applications in Infrared Imaging”*** and Herbert Schaake of EPIR Technologies, who will address ***“Modeling the Role of Point Defect Diffusion in Diode Formation, Impurity Activation, and Tellurium Precipitation in HgCdTe.”*** The tutorial welcomes all interested and registered U.S. II-VI workshop participants. The workshop committee particularly encourages graduate students, post-docs, and junior researchers to attend the tutorial and explore the topics in detail and tap into the experience of and network with the well-established researchers. More information about the tutorials such as registration, time, and location will be posted on the II-VI Workshop Web site and also distributed via e-mail in following weeks.

## WORKSHOP WEB SITE

(<http://www.ii-viworkshop.org>)

The Workshop Web page has the latest information on the Workshop and is updated as information becomes available.

## ABSTRACTS

1. Abstracts, suitable for publication, should clearly indicate the following:
  - a. original aspects of research
  - b. objective and approach of work
  - c. previous publications or presentations
  - d. experimental data
  - e. scientific implications of results
2. One-page abstracts should be double spaced on a single 8½ × 11-in. sheet of paper. One (1) additional page of supporting figures will be accepted and is encouraged. The title, author(s), and affiliation(s) must be included.
3. A complete mailing address (phone, fax, and e-mail) of the presenter must be included.
4. Abstracts to be considered as student papers must be identified as such, and the name of the advisor must also be included.

**5. Abstracts are to be submitted on or before June 10, 2016 to:**

<http://www.sheridanprinting.com/pcm/iivi/iivi.cfm>

*Electronic abstract submission is required, and should be submitted as Microsoft Word files or as PDF files.*

6. Foreign authors requiring a visa are encouraged to submit their abstracts as early as possible. Special consideration will be made to ensure that an early application for a visa can be made.
  7. Authors of accepted papers will be notified by June 30, 2016. Authors of accepted papers are requested to submit a revised abstract, not to exceed four pages, for inclusion in the *Book of Extended Abstracts* by August 26, 2016.
  8. Full-length papers for publication in the Workshops Proceedings in a Special issue of the *Journal of Electronics Materials* must be submitted electronically by using the link on the Workshop's Web page (<http://www.ii-viworkshop.org>).
- Authors can submit manuscripts from **September 21 through October 30, 2016.**

## 2016 WORKSHOP CALENDAR

Deadline for Submission of Abstracts	June 10, 2016
Notification of Accepts/Rejects	June 30, 2016
Deadline for Late-News Abstracts	July 15, 2016
Deadline for Extended Abstracts	August 26, 2016
Hotel Reservation Deadline	September 23, 2016
Workshop Registration Deadline	September 30, 2016
JEM Paper Submission Deadline	September 21 – October 30, 2016
2016 II-VI Workshop	October 17–20, 2016

## **WORKSHOP ORGANIZATION**

### **CO-CHAIRS**

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### **PROGRAM COMMITTEE**

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## **WORKSHOP PARTICULARS**

### **Location and Date**

The 2016 II-VI Workshop will be held on October 17–20, 2016 at the Sheraton Inner Harbor Hotel, 300 S Charles St, Baltimore, MD.

### **Registration**

The Workshop Registration Form will be available in June 2016. Registration fees have not yet been determined, so please check the Workshop Web site periodically for updates.

The early-bird discount deadline for Workshop registration is September 30, 2016.

### **Hotel Reservations**

A block of rooms has been reserved at the Sheraton Inner Harbor Hotel at special Workshop rates. A limited number of rooms will be available to Government employees and university staff/students with proper identification. More information on making hotel reservations will be available on the Workshop Web site in the coming months. Please check the Web site frequently for Updates. Reservations received after the cut-off date of September 23 will be subject to availability.

### **Student Financial Assistance**

To help defray the cost of attending the Workshop, full-time students presenting papers will receive partial support. This support must be requested in advance of the Workshop.