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2018 IEEE Research and Applications of Photonics In Defense Conference (RAPID)

Welcome to the
2018 IEEE Research and Applications of Photonics
In Defense Conference (RAPID)
22 - 24 August 2018
Hilton Sandestin Beach Golf Resort & Spa
Mirimar Beach, FL, USA

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S. Jamilan (*Michigan Technological University*)
G. Semouchkin (*Michigan Technological University*)
E. Semouchkina (*Michigan Technological University*)

ThD3.6: Characterizing Meta-Lens Performance as a Function of Refractive Index (Page 167)

Elyas Bayati (*University of Washington*)
Alan Zhan (*University of Washington*)
Shane Colburn (*University of Washington*)
Arka Majumdar (*University of Washington*)

ThD4: Optical Metasurfaces and Applications — 1:30 pm–3:30 pm — Coral Ballroom D

ThD4.1: Ultrathin Dielectric Metasurfaces for Manipulating Visible Light (Page NA)

Daniel Lopez (*Argonne National Laboratory*)
Haogang Cai (*Argonne National Laboratory*)
David Czaplewski (*Argonne National Laboratory*)
Karim Ogando (*Argonne National Laboratory*)
Alex Martinson (*Argonne National Laboratory*)
David Gosztola (*Argonne National Laboratory*)
Liliana Stan (*Argonne National Laboratory*)

ThD4.2: Unique Properties of 3D Infrared Metamaterials (Page NA)

D. Bruce Burckel (*Sandia National Laboratories*)

ThD4.3: Plasmonic Metamaterials 2.0: New Applications for Metasurfaces & 4D Photonics (Page NA)

Vladimir Shalaev (*Purdue University*)

ThD4.4: Thermally Tunable Far-Infrared Metasurfaces Enabled by Ge₂Sb₂Te₅ Phase-Change Material (Page 171)

Riad Yahiaoui (*Howard University*)
Joshua A. Burrow (*University of Dayton*)
Gary Sevison (*University of Dayton*)
Andrew Sarangan (*University of Dayton*)
Jay Mathews (*University of Dayton*)
Imad Agha (*University of Dayton*)
Augustine M. Urbas (*Air Force Research Laboratory*)
Thomas A. Searles (*Howard University*)

ThD4.5: Fourier-Transform Pulse Shaping with Metasurfaces (Page 175)

Shawn Divitt (*National Institute of Standards and Technology & University of Maryland*)
Wenqi Zhu (*National Institute of Standards and Technology & University of Maryland*)
Cheng Zhang (*National Institute of Standards and Technology & University of Maryland*)
Henri J. Lezec (*National Institute of Standards and Technology*)
Amit Agrawal (*National Institute of Standards and Technology & University of Maryland*)

ThD5: Dynamic Control of Self-assembled Plasmonic Nanostructures — 3:30 pm–5:30 pm — Coral Ballroom D

ThD5.1: Interface of Physics and Biomedicine: The Next Big Thing is at the Nanoscale (Page NA)

Giuseppe Strangi (*Case Western University*)

ThD5.2: Third Order Nonlinear Optics in Self-Assembled Gold Metasurfaces (Page NA)

Anderson Gomes (*Universidade Federal de Pernambuco*)

ThD5.3: Ultrafast Optical Pulses for Characterising and Shaping Nanomaterials (Page NA)

Ventsislav Valev (*Univeristy of Bath*)

ThD5.4: Tunable Optical Properties of Polymer-Grafted Gold Nanoparticle Assemblies (Page NA)

Kyoungweon Park (*Air Force Research Laboratory*)
Jason Streit (*Air Force Research Laboratory*)
Andrew Tibbits (*Air Force Research Laboratory*)
Dhriti Nepal (*Air Force Research Laboratory*)
Richard Vaia (*Air Force Research Laboratory*)

ThD5.5: Emerging Materials for Dynamic Photonics (Page NA)

Marina Leite (*University of Maryland*)

ThD5.6: Nonreciprocal Nanophotonics with Dielectric and Plasmonic Metasurfaces (Page NA)

Jennifer Dionne (*Stanford University*)

Track 5: Photonics for Defense Systems (PDS)

ThE1: Photonics for Defense Systems — 8:00 am–8:30 am — Heron

ThE1.1: Photonics for Defense Systems - Opening Remarks (Page NA)

Dalma Novak (*Pharad, LLC*)
Rod Waterhouse (*Pharad, LLC*)

ThE2: EO/IR/LADAR — 8:30 am–10:30 am — Heron

ThE2.1: Advanced Infrared Target Acquisition Systems (Page NA)

Ronald Driggers (*University of Central Florida*)

ThE2.2: LIDAR Development at NASA Langley Research Center for Vehicle Navigation and Landing in GPS Denied Environments (Page 177)

Diego F. Pierrottet (*Coherent Applications, Inc.*)
Farzin Amzajerjian (*NASA Langley Research Center*)
Glenn D. Hines (*NASA Langley Research Center*)
Bruce W. Barnes (*NASA Langley Research Center*)
Larry B. Petway (*NASA Langley Research Center*)
John M. Carson III (*NASA Johnson Space Center*)

ThE2.3: Single-Pulse Mueller Matrix Polarimeter Laboratory Demonstration (Page 181)

Christian Keyser (*Air Force Research Laboratory*)
Khanh Nguyen (*Torch Technologies*)
Arielle Adams (*Engility Corp.*)
Richard Martin (*Air Force Institute of Technology*)

ThE2.4: Increased Spectral Sampling with Temporally Multiplexed Raman Waveform LADAR (Page 185)

Luke Ausley (*Air Force Research Laboratory*)

Christian Keyser (*Air Force Research Laboratory*)
Richard Martin (*Air Force Institute of Technology*)

ThE2.5: MEMS-Based Low SWaP Solutions for Multi/Hyperspectral Infrared Sensing and Imaging (Page 189)

Jorge Silva (*University of Western Australia*)
Hemendra Kala (*University of Western Australia*)
Dhirendra Kumar Tripathi (*University of Western Australia*)
K. K. M. B. Dilusha Silva (*University of Western Australia*)
Mariusz Martyniuk (*University of Western Australia*)
Adrian Keating (*University of Western Australia*)
Gino Putrino (*University of Western Australia*)
Lorenzo Faraone (*University of Western Australia*)

ThE2.6: Optical Transmittance and Reflectance of Lanthanum Nickellate at Telecommunication Frequencies (Page 193)

Todd Schumann (*University of Florida*)
Jacob Neff (*University of Florida*)
Shayla Breedlove (*University of Florida*)
Henry Zmuda (*University of Florida*)
Yong-Kyu Yoon (*University of Florida*)
David Look (*Air Force Research Laboratory*)
Kevin Leedy (*Air Force Research Laboratory*)
Monica Allen (*Air Force Research Laboratory*)
Jeffery Allen (*Air Force Research Lab*)

ThE3: Instrumentation and Control for Test and Evaluation — 10:30 am–12:30 pm — Heron

ThE3.1: What Causes Disagreement Between Models and Measurements of Imaging System Performance? (Page NA)

Daniel LeMaster (*Air Force Research Laboratory*)

ThE3.2: Miniature Fiber Laser Microphones with Graphene Diaphragms (Page 197)

Shaolin Liao (*Argonne National Laboratory & Illinois Institute of Technology*)
Thomas Wong (*Illinois Institute of Technology*)
Zi Wang (*Illinois Institute of Technology*)
Rong Wang (*Illinois Institute of Technology*)
Elwin Clutter (*Illinois Institute of Technology*)
Hual-Te Chien (*Argonne National Laboratory*)

ThE3.3: End to End Testing of IRLED Projectors (Page 201)

Peyman Barakhshan (*University of Delaware*)
Miguel Hernandez (*University of Delaware*)
Kassem Nabha (*University of Delaware*)
Casey Campbell (*University of Delaware*)
Jeffrey Volz (*University of Delaware*)
Aaron Landwehr (*University of Delaware*)
Rebekah Houser (*University of Delaware*)
Fouad Kiamilev (*University of Delaware*)
Russell J. Ricker (*University of Iowa*)
Sydney Provence (*University of Iowa*)
John P. Princeas (*University of Iowa*)
Thomas F. Boggess (*University of Iowa*)

ThE3.4: Counter Directional Optical Network Using Ribbon Fiber (Page 205)

John Mazurowski (*Pennsylvania State University*)

ThE3.5: Analysis of Multibeam WDM-FSO System in Various Weather Conditions (Page N/A)

Achintya Murali (*Vellore Institute of Technology*)
Prabu K (*Vellore Institute of Technology*)

ThE3.6: Toward a Packetized Display Protocol Architecture for IRLED Projector Systems (Page 211)

Aaron Landwehr (*University of Delaware*)
Andrea Waite (*University of Delaware*)
Tyler Browning (*University of Delaware*)
Christopher Jackson (*University of Delaware*)
Rebekah Houser (*University of Delaware*)
Hamzah Ahmed (*University of Delaware*)
Fouad Kiamilev (*University of Delaware*)

ThE3.7: Compact Ultra-Low-Noise Photonic Microwave Synthesizer (Page 215)

Michele Giunta (*Menlo Systems GmbH & Max-Planck-Institut für Quantenoptik*)
Maurice Lessing (*Menlo Systems GmbH*)
Wolfgang Hänsel (*Menlo Systems GmbH*)
Matthias Lezius (*Menlo Systems GmbH*)
Marc Fischer (*Menlo Systems GmbH*)
Ronald Holzwarth (*Menlo Systems GmbH*)
Jason Reeves (*Menlo Systems Inc.*)
Xiaopeng Xie (*Observatoire de Paris*)
Yann Le Coq (*Observatoire de Paris*)
Giorgio Santarelli (*Université de Bordeaux 1*)

ThE4: Enabling Tools for Testing Rapidly Evolving EO/IR Systems — 1:30 pm–3:30 pm — Heron

ThE4.1: Cyber Physical Systems T&E (Page 219)

Michael Deis (*Ohio University*)

ThE4.2: Future Needs in Photonics: A T&E Perspective (Page NA)

Andreas Keipert

ThE4.3: Free-Space RF Confined Guiding with Laser Filaments (Page NA)

Shermineh Rostami (*Florida Institute of Technology*)

ThE4.4: Metal-Assisted Chemical Etching of β -Ga₂O₃ and Textured MSM Photodetectors with Enhanced Responsivity (Page NA)

Xiuling Li (*University of Illinois*)

ThE4.5: Modular System Architecture as a Foundation for Rapid IRSP Development (Page 221)

Rebekah Houser (*University of Delaware*)
Hamzah Ahmed (*University of Delaware*)
Kassem Nabha (*University of Delaware*)
Fouad Kiamilev (*University of Delaware*)

ThE4.6: Improved MWIR LED Arrays on Si Substrates for Scene Projectors (Page 225)

S. R. Bank (*University of Texas at Austin*)
K. M. McNicholas (*University of Texas at Austin*)
R. H. El-Jaroudi (*University of Texas at Austin*)
A. K. Rockwell (*University of Texas at Austin*)
T. Golding (*Amethyst Research Inc.*)
R. Droopad (*Amethyst Research Inc.*)
J. Shao (*Amethyst Research Inc.*)
W. K. Jamison (*Amethyst Research Inc.*)
G. Wicks (*Amethyst Research Inc.*)
G. Savich (*Amethyst Research Inc.*)

ThE4.7: Modular Carrier Board and Package for Infrared LED Arrays (Page 227)

Tianne L. Lassiter (*University of Delaware*)
Jonathan Dickason (*University of Delaware*)
Garrett A. Ejzak (*University of Delaware*)
Zackary Marks (*University of Delaware*)
Andrea Waite (*University of Delaware*)
Fouad E. Kiamilev (*University of Delaware*)

ThE5: Displays, Holography and Projection — 3:30 pm–5:30 pm — Heron

ThE5.1: Improved Quantum Efficiency in AlGaInSb/InAs Superlattices for Mid-Infrared Optoelectronics (Page 231)

John Princas (*University of Iowa*)
Cassandra Bogh (*University of Iowa*)
Aaron Muhowski (*University of Iowa*)
Katrina Schrock (*University of Iowa*)
Andrew Muellerleile (*University of Iowa*)
Jonathon Olesberg (*University of Iowa*)
Michael Flatté (*University of Iowa*)

ThE5.2: Light Emitting Arrays for High Temperature Scene Projection (Page NA)

Michael MacDougal (*Attollo Engineering, LLC*)
Jon Geske (*Attollo Engineering, LLC*)
Arkadiy Lyakh (*University of Central Florida*)
Pedro Figueiredo (*University of Central Florida*)

ThE5.3: Quantum Dots for Multi-Band Infrared Scene Projector (Page 235)

Zhitao Kang (*Georgia Tech Research Institute*)
J. Christopher James (*Georgia Tech Research Institute*)
Brent Wagner (*Georgia Tech Research Institute*)
Zhiqun Lin (*Georgia Tech Research Institute*)
Young Jun Yoon (*Georgia Tech Research Institute*)
Cheng-Hsin Lu (*Georgia Tech Research Institute*)
Yajing Chang (*Georgia Tech Research Institute*)
Hisham Menkara (*PhosphorTech Corporation*)
Christopher Summers (*PhosphorTech Corporation*)

ThE5.4: Infrared Scene Projector Based on Vertically Aligned Carbon Nanotubes (Page NA)

Raul Fainchtein (*Johns Hopkins University*)

ThE5.5: Improving Density and Efficiency of Infrared Projectors (Page 239)

Miguel Hernandez (*University of Delaware*)
Edwid Koerperick (*Firefly Photonics*)
Peyman Barakhshan (*University of Delaware*)
Garrett Ejzak (*University of Delaware*)
Kassem Nabha (*University of Delaware*)
John Princas (*Firefly Photonics*)
Fouad Kiamilev (*University of Delaware*)

ThF2: Tutorial I — 9:00 am–11:00 am — Theater

ThF2.1: Tutorial for IEEE-RAPID 2018 on Quantum Cascade Lasers (QCL), Quantum Cascade Detectors (QCD), and Quantum Cascade Laser Detectors (QCLD) (Page NA)

Aaron M. Andrews (*Technische Universität Wien*)

ThF2.2: Packaging Photonics & Electronics for Harsh Mechanical Environments (Page NA)

Jacob Dodson (*Air Force Research Laboratory*)

ThF4: Tutorial II — 2:00 pm–4:00 pm — Theater

ThF4.1: Support Opportunities in Defense R&D (Page NA)

Jason Foley (*EOARD (European Office of Aerospace R&D)*)

ThF4.2: Work Life Balance (Page NA)

Janet Wolfson (*Air Force Research Laboratory*)

Track 6: Human State Measurement and Biosensing (HMB)

FA1: Human State Measurement and Biosensing — 8:00 am–8:30 am — Coral Ballroom A

FA1.1: Wearable Technologies for Human Performance and Health (Page 243)

Rajesh R. Naik (*Air Force Research Laboratory*)

FA2: Biosensing Methods — 8:30 am–10:30 am — Coral Ballroom

FA2.1: Nanophotonic Biosensor Platforms for Ultrasensitive and Multiplex Analysis at the Point-of-Care (Page NA)

Laura Lechuga (*Catalan Institute of Nanoscience and Nanotechnology*)

FA2.2: Exploiting Biology-Inspired Electrochemical Sensing in the Measurement and Control of Specific Molecular Targets Directly in the Living Body (Page NA)

Netz Arroyo (*Johns Hopkins University School of Medicine*)

FA2.3: Factors in Biomarker Sensor Development for Human Performance and Protection (Page NA)

Steve Kim (*Air Force Research Laboratory*)
Michael Brothers (*Air Force Research Laboratory*)
Yen Ngo (*Air Force Research Laboratory*)
Ahmad Islam (*Materials & Manufacturing Directorate*)
Trung Do (*Air Force Research Laboratory*)

Ari Nicolini (*Materials & Manufacturing Directorate*)
Jorge L. Chavez (*Air Force Research Laboratory*)
Jennifer Martin (*Air Force Research Laboratory*)
Claude Grigsby (*Air Force Research Laboratory*)
Benji Maruyama (*Materials & Manufacturing Directorate*)
Lawrence Drummy (*Materials & Manufacturing Directorate*)
Rajesh Naik (*Air Force Research Laboratory*)

FA2.4: Carbon Nanostructures Hybrids for Multiplexed Sensing and Single-Molecule Investigations (Page NA)

Matteo Palma (*Queen Mary University of London*)

FA3: Materials and Devices for Biosensing — 10:30 am–12:30 pm — Coral Ballroom A

FA3.1: Sensing Electronics on Ultra-Thin Nanocellulose Sheets (Page 245)

Jonathan D. Yuen
Scott A. Walper
Dan Zabetakis
Michael A. Daniele
David A. Stenger
Banahalli R. Ratna

FA3.2: Pathogen Sensing and Identification Using a Smartphone (Page NA)

Brian Cunningham (*University of Illinois at Urbana-Champaign*)
Rashid Bashir (*University of Illinois at Urbana-Champaign*)
David Hirschberg (*University of Washington at Tacoma*)
Fu Sun (*University of Illinois at Urbana-Champaign*)
Akid Omob (*University of Illinois at Urbana-Champaign*)
David Nash (*private veterinary practice*)

FA3.3: Electronic Terahertz Wave Gas Spectroscopy Systems (Page N/A)

Aniket Tekawade (*Rensselaer Polytechnic Institute*)
Tim E. Rice (*Rensselaer Polytechnic Institute*)
Matthew A. Oehlschlaeger (*Rensselaer Polytechnic Institute*)
Muhammad Waleed Mansha (*Rensselaer Polytechnic Institute*)
Kefei Wu (*Rensselaer Polytechnic Institute*)
Mona M. Hella (*Rensselaer Polytechnic Institute*)
Yueliang Lu (*Rensselaer Polytechnic Institute*)
Aparna Gupta (*Rensselaer Polytechnic Institute*)
Ingrid Wilke (*Rensselaer Polytechnic Institute*)

FA3.4: Neuropeptide Y Binding Dynamics Quantified with Nanophotonic Resonant Sensors (Page 251)

Kyu Lee (*University of Texas at Arlington*)
Robert Magnusson (*University of Texas at Arlington*)
Brett R. Wenner (*Air Force Research Laboratory*)
Jeffery W. Allen (*Air Force Research Laboratory*)
Monica S. Allen (*Air Force Research Laboratory*)

FA3.5: Interdigitated Micro Electrode Array Dielectrophoretic System for Label-Free Multi-Parameter-Based Cell Detection (Page 255)

Vidura Jayasooriya (*North Dakota State University*)
Dharmakeerthi Nawarathna (*North Dakota State University*)

FA3.6: Performance of Nanoscale UV Light Sources vs. Thin Film LEDs (Page 259)

Babak Nikoobakht (*National Institutes of Standards and Technology*)
Robin Hansen (*National Institutes of Standards and Technology*)
Yueqin Zong (*National Institutes of Standards and Technology*)

FA4: Human State Measurement — 1:30 pm–3:30 pm — Coral Ballroom A

FA4.1: Cognitive State Change Detection through Multispectral Sensing (Page NA)

Anil Raj (*Florida Institute for Human and Machine Cognition*)

FA4.2: Towards Army Relevant Sensing with Integrated Molecularly Imprinted Polymer Photonic (IMIPP) Devices (Page 261)

Mikella E. Farrell (*US Army Research Lab*)
Ellen L. Holthoff (*US Army Research Lab*)
Justin R. Bickford (*US Army Research Lab*)
Pak S. Cho (*US Army Research Lab*)
Matthew B. Coppock (*US Army Research Lab*)
Paul M. Pellegrino (*US Army Research Lab*)

FA4.3: Optofluidic and Electrochemical Nanoslits for Rapid Measurement of Receptor Binding to Neuropeptides (Page 265)

Nathan S. Swami (*University of Virginia*)
Walter B. Varhue (*University of Virginia*)
Chiafu Chou (*Academia Sinica*)

FA4.4: High Throughput and Low-Cost Detection of Short Nucleic Acid Biomarkers in Serum Using Dielectrophoretic Biosensor (Page 267)

Logeeshan Velmanickam (*North Dakota State University*)
Ivan T. Lima Jr. (*North Dakota State University*)
Dharmakeerthi Nawarathna (*North Dakota State University*)

FA4.5: Plasmonic Sensing of Neuropeptide Y and Orexin A with Gold Nanoparticles on Flexible Plastic Substrates (Page NA)

Rejeana Cary (*University of Cincinnati*)
Jamison Reifsteck (*University of Cincinnati*)
Ian Bruzas (*University of Cincinnati*)
Jorge Chavez Benavides (*USAF AFMC 711 HPW/RHXBC*)
Laura Sagle (*University of Cincinnati*)

FA4.6: Wide Subwavelength Grating Waveguide Sensitivity (Page 271)

Justin Bickford (*US Army Research Laboratory*)
Pak S. Cho (*General Technical Services, LLC*)
Mikella E. Farrell (*US Army Research Laboratory*)
Ellen L. Holthoff (*US Army Research Laboratory*)
Matthew B. Coppock (*US Army Research Laboratory*)
Paul M. Pellegrino (*US Army Research Laboratory*)

FA5: Human Analyst Augmentation — 3:30 pm–5:30 pm — Coral Ballroom A

FA5.1: A Human-in-the-Loop Monitoring via a Hybrid Brain-Computer Interface Based on Electroencephalography and Functional Transcranial Doppler Ultrasound (Page N/A)

Ervin Sejdic (*University of Pittsburgh*)
Aya Khalaf (*University of Pittsburgh*)
Murat Akcakaya (*University of Pittsburgh*)

FA5.2: Ongoing Research in Operational Telemedicine at the Tactical Edge (Page 277)

Thomas R. Bigott (*Telemedicine and Advanced Technology Research Center (TATRC)*)

FA5.3: Biosensor for Pancreatic Cancer Biomarker Based on Dielectrophoresis and Image Processing (Page 281)

Fleming Dackson Gudagunti (*North Dakota State University*)
Logeeshan Velmanickam (*North Dakota State University*)
Dharmakeerthi Nawarathna (*North Dakota State University*)
Ivan T. Lima Jr. (*North Dakota State University*)

FA5.4: Metrics for Comparison of Polarimetric and Thermal Target to Background Contrast (Page 419)

David Chenault (*Polaris Sensor Technologies, Inc.*)
A. Hagewood (*Polaris Sensor Technologies, Inc.*)
M. Roche (*Polaris Sensor Technologies, Inc.*)
J. Vaden (*Polaris Sensor Technologies, Inc.*)

Track 7: Optical Imaging and Sensing Technology (OIST)

FB1: Optical Imaging and Sensing Technology Semiconductor Materials and Quantum Nanoscience — 8:00 am–8:30 am — Coral Ballroom B

FB1.1: Air Force S&T Directions in Optical Imaging and Sensing Technology (Page NA)

Michael Eismann (*Air Force Research Laboratory*)

FB2: Spectral, Polarimetric, and Multimodal Imaging — 8:30 am–10:30 am — Coral Ballroom B

FB2.1: Advances in Hyperspectral Sensors and Phenomenology for Army Applications (Page NA)

Jason Zeibel (*Night Vision and Electronic Sensors Directorate*)

FB2.2: IR Polarization for Natural Clutter Suppression (Page 283)

Francis Pantuso (*Night Vision and Electronic Sensors Directorate*)
Collin Bright (*Night Vision and Electronic Sensors Directorate*)
Richard Harr (*Night Vision and Electronic Sensors Directorate*)
Michael Polcha (*Night Vision and Electronic Sensors Directorate*)
Aaron LaPointe (*Night Vision and Electronic Sensors Directorate*)

FB2.3: IR Polarimetry: Sensors and Applications (Page N/A)

David Chenault (*Polaris Sensor Technologies, Inc.*)

FB2.4: Modulated Polarimeters for Space Situational Awareness (Page NA)

Scott Tyo (*University of New South Wales*)
Andrey Alenin (*University of New South Wales*)
Israel Vaughn (*University of New South Wales*)
Jiawei Song (*University of New South Wales*)

FB2.5: Photonics Research at the Naval Research Laboratory (Page NA)

Craig Hoffman (*National Research Laboratory*)

FB3: Blast/Shock Wave Imaging and Spectroscopic Techniques — 10:30 am–12:30 pm — Coral Ballroom B

FB3.1: Prompt Optical Spectral Signatures of High Explosives (Page NA)

Nick Glumac (*University of Illinois*)

FB3.2: Laser-Based Diagnostics for Measuring Gas-Phase Temperature and Species (Page NA)

James Gord (*Air Force Research Laboratory/RQTC*)

FB3.3: Recent Developments Using Background Oriented Schlieren with a Plenoptic Camera (Page 287)

Jenna N. Klemkowsky (*Auburn University*)
Christopher J. Clifford (*Auburn University*)
Brian S. Thurow (*Auburn University*)
William M. Kunzler (*Sandia National Laboratories*)
Daniel R. Guildenbecher (*Sandia National Laboratories*)

FB3.4: MHz-Rate Measurements of Time-Resolved Species Concentrations in Shock Heated Chemical Weapon Simulants (Page 291)

Sneha Neupane (*University of Central Florida*)
Samuel Barak (*University of Central Florida*)
Erik Ninnemann (*University of Central Florida*)
Zachary Loparo (*University of Central Florida*)
Owen Pryor (*University of Central Florida*)
Subith Vasu (*University of Central Florida*)

FB3.5: Shocks Sensing by Fiber Bragg Gratings and a 100 MHz Dynamic Dispersive Interrogator (Page 295)

Y. Barbarin (*CEA DAM*)
A. Lefrançois (*CEA DAM*)
B. Rougier (*CEA DAM*)
F. Sinatti (*CEA DAM*)
O. Lassalle (*CEA DAM*)
A. Osmont (*CEA DAM*)
J. Luc (*CEA DAM*)

FB3.6: KHz-MHz Rate Laser-Based Tracking of Particles and Product Gases for Multiphase Blast Fields (Page 299)

Daniel Lauriola (*Purdue University*)
Mateo Gomez (*Purdue University*)
Mikhail N. Slipchenko (*Purdue University*)
Steven F. Son (*Purdue University*)
Terrence R. Meyer (*Purdue University*)
Sukesh Roy (*Spectral Energies, LLC*)
James R. Gord (*Air Force Research Laboratory*)

FB4: Terahertz Photonics — 1:30 pm–3:30 pm — Coral Ballroom B

FB4.1: Room-Temperature THz Quantum Cascade Laser Sources Based on Intra-Cavity Difference-Frequency Mixing with Improved Outcoupling Efficiency (Page NA)

Mikhail Belkin (*University of Texas*)

FB4.2: Harnessing Light-Metasurface Interactions for Enabling Technologies (Page NA)

Abul Azad (*Los Alamos National Laboratory*)

FB4.3: Advanced THz Plasmonic Devices (Page NA)

Nezih Pala (*Florida International University*)

FB4.4: Hybrid Graphene/Semiconductor Technology for Terahertz Communications (Page NA)

Josep Miquel Jornet (*University at Buffalo*)

FB5: Target Detection and Pattern Recognition — 3:30 pm–5:30 pm — Coral Ballroom B

FB5.1: Designing Empirical Lab Experiments for SAR-ATR (Page 303)

Michael A. Saville (*Wright State University*)

Jacob D. Compaleo (*Wright State University*)

Heather L. Judd (*Wright State University*)

Paul Sotirelis (*Air Force Research Laboratory*)

FB5.2: Doppler-Only Imaging (Page NA)

Margaret Cheney (*Colorado State University*)

FB5.3: Forward-Looking InSAR Processing for Moving Target Imaging (Page 307)

Matthew J. Burfeindt (*Air Force Research Laboratory*)

FB5.4: k-Space Tomography for Spatial-Spectral Mapping (Page 311)

Conor J. Ryan (*University of Delaware*)

Dylan D. Ross (*University of Delaware*)

Janusz Murakowski (*University of Delaware*)

Garrett J. Schneider (*University of Delaware*)

Dennis W. Prather (*University of Delaware*)

Christopher A. Scheutz (*Phase Sensitive Innovations, Inc.*)

FB5.5: Deep Learning for Compressive Infrared and Hyperspectral Machine Vision (Page 315)

J. Chen (*Rice University*)

Y. Xu (*Rice University*)

L. Liyang (*Rice University*)

K. F. Kelly (*Rice University*)

FB5.6: Analytical BER Performance of a LDPC Coded OFDM FSO with Optical Intensity Modulation and a Direct Detection Receiver (Page N/A)

Bobby Barua (*Bangladesh University of Engineering and Technology*)

S. P. Majumder (*Bangladesh University of Engineering and Technology*)

Track 8: Bioinspired and Bioprincipic Technologies (BBT)

FC1: Bioinspired and Bioprincipic Technologies — 8:00 am–8:30 am — Coral Ballroom C

FC1.1: Why Should Engineers Be Interested in Vision in Animals, Especially Arthropods? (Page NA)

Ric Wehling (*Air Force Research Laboratory*)

FC2: Bioinspired Optical Technologies — 8:30 am–10:30 am — Coral Ballroom C

FC2.1: Bioinspired Micro-Optics and Applications to Imaging Polarimetry (Page 323)

Stanley Pau (*University of Arizona*)

FC2.2: Dynamic Materials Inspired by Cephalopods (Page NA)

Alon Gorodetsky (*University of California, Irvine*)

FC2.3: Biomimicry of Insect Eyes and Wings (Page NA)

Doekele Stavenga (*University of Groningen*)

FC2.4: The Biophotonics of Open-Ocean Animals: Anti-Reflective Coatings, Super-Black Skins, and Transparent Interiors (Page NA)

Sonke Johnsen (*Duke University*)

FC3: Bioinspired Sensors — 10:30 am–12:30 pm — Coral Ballroom C

FC3.1: Bio-Inspired Mechanosensors (Page NA)

Miao Yu (*University of Maryland*)

FC3.2: Infrared Biologically-Inspired Imaging Sensors - A Review (Page NA)

Mark Massie (*Raytheon Vision Systems*)

FC3.3: Bioinspired Sensors for Underwater Geolocalization (Page 325)

Viktor Gruev (*University of Illinois at Urbana-Champaign*)

Missael Garcia (*University of Illinois at Urbana-Champaign*)

Sam Powell (*University of Illinois at Urbana-Champaign*)

Nan Cui (*University of Illinois at Urbana-Champaign*)

Tyler Davis (*University of Illinois at Urbana-Champaign*)

FC3.4: Local Motion Sensor, Curvace Artificial Compound Eye and M2APIX Retina: From Sensors Design to Robotics Application (Page NA)

Franck Ruffier (*CNRS - Aix Marseille University (ISM - Biorobotics)*)

FC4: Biobased Signal and Information Processing I — 1:30 pm–3:30 pm — Coral Ballroom C

FC4.1: TBD (Page NA)

Pamela Abshire (*University of Maryland*)

FC4.2: Visual Guidance of Polarotactic Horseflies (Page 327)

Gregor Belušič (*University of Ljubljana*)

Marko Ilić (*University of Ljubljana*)

Andrej Meglič (*University of Ljubljana*)

Martin F. Wehling (*Air Force Research Laboratory*)

FC4.3: Gaussian-Based Filters for Elementary Motion Detection Delay Element (Page 329)

Geoffrey Brooks (*Florida State University Panama City*)

FC4.4: Spatially-Variant Photonic Crystals and Possible Applications (Page 333)

Noel P. Martinez (*University of Texas at El Paso*)
Manuel Martinez (*University of Texas at El Paso*)
Jimmy E. Tuma (*Air Force Research Laboratory*)
Joshua K. Lentz (*Air Force Research Laboratory*)
Stephen M. Kuebler (*University of Central Florida*)
Raymond C. Rumpf (*University of Texas at El Paso*)

FC4.5: Novel Bio-Inspired Infrared Imager with On Chip Object Computation (Page 337)

P. McCarley (*Air Force Research Laboratory*)

J. Caulfield (*Cyan Systems*)

FC4.6: Diamond Meta-Surfaces for High Power Laser Applications (Page 339)

Alexander Muhr (*Element Six Technologies US Corp.*)

Daniel Twitchen (*Element Six Technologies US Corp.*)

Henk de Wit (*Element Six Technologies US Corp.*)

FC5: Biobased Signal and Information Processing II — 3:30 pm–5:30 pm — Coral Ballroom C

FC5.1: A Dynamically-Positioned, Time-Domain Winner-Take-All Circuit for Spike-Based Path Planning (Page NA)

Timmer Horiuchi, (*University of Maryland*)

FC5.2: Nearest Neighbor Anomaly Detector for Passively Augmented LADAR (Page 423)

J. Brown

R. Roberts

C. Welsh

C. Keyser

C. Saludez

FC5.3: Neuromorphic Computing with Mixed Analog-Digital Chips (Page NA)

Kwabena Boahen (*Stanford University*)

Track 9: Novel Phenomena and New Materials for Advanced Photonics (NPNMAP)

FD1: Novel Phenomena and New Materials for Advanced Photonics — 8:00 am–8:30 am — Coral Ballroom D

FD1.1: Nano-Optical Phenomena in Quantum Materials (Page NA)

Dmitri Basov (*Columbia University*)

FD2: Quantum Sensing and Spintronics — 8:30 am–10:30 am — Coral Ballroom D

FD2.1: Local Manipulation and Characterization of Spin and Magnetization Dynamics (Page NA)

P. Chris Hammel (*Ohio State University*)

Vidya Bhallamudi (*Indian Institute Technology Madras*)

Shane White (*Ohio State University*)

William Ruane (*Ohio State University*)

Carola Purser (*Ohio State University*)

Brendan McCullian (*Ohio State University*)

Chris Wolfe (*Ohio State University*)

FD2.2: Single Photon Detection Using Chromophores and Nitrogen Vacancies in Diamond (Page 343)

N. J. Harmon (*University of Iowa*)

FD2.3: Plasmonic Structure Integrated Superconducting Nanowire Single-Photon Detectors for Transferring Specific Quantum Information (Page 345)

M. Csete (*University of Szeged*)

A. Szenes (*University of Szeged*)

B. Tóth (*University of Szeged*)

G. Szabó (*University of Szeged*)

B. Bánhelyi (*University of Szeged*)

T. Csendes (*University of Szeged*)

FD2.4: SiV Diamond Color Center Fluorescence Improvement via Silica-Silver Core-Shell Nanoresonators (Page 349)

M. Csete (*University of Szeged*)

A. Szenes (*University of Szeged*)

D. Vass (*University of Szeged*)

G. Szabó (*University of Szeged*)

B. Bánhelyi (*University of Szeged*)

T. Csendes (*University of Szeged*)

FD2.5: Electronic Structure and Quantum Optics of Carbon Nanotube Defects (Page N/A)

Han Htoon (*Los Alamos National Laboratory*)

FD2.6: Strong Photon Antibunching in Weakly Nonlinear Two-Dimensional Exciton-Polaritons (Page 355)

Albert Ryou (*University of Washington*)

David Rosser (*University of Washington*)

Abhi Saxena (*Indian Institute of Technology*)

Taylor Fryett (*University of Washington*)

Arka Majumdar (*University of Washington*)

FD3: Two-Dimensional Materials — 10:30 am–12:30 pm — Coral Ballroom D

FD3.1: 2D Semiconductor Quantum Optoelectronics (Page NA)

Xiaodong Xu (*University of Washington*)

FD3.2: Next Generation Photonics Based on 2D Materials (Page 359)

Michal Lipson (*Columbia University*)

FD3.3: Nanoimaging and Nano-FTIR of Muscovite Mica (Page 361)

Alireza Fali (*University of Georgia*)

Sampath Gamage (*Linköping University*)

Marquez Howard (*University of Georgia*)

Kirill Bolotin (*Free University of Berlin*)

Yohannes Abate (*University of Georgia*)

FD3.4: Optical Nano-Imaging of 2D Transition Metal Dichalcogenides (Page 363)

Sharad Ambardar (*University of South Florida*)

Dmitri V. Voronine (*University of South Florida*)

FD3.5: Compressive Hyperspectral Microscopy of Nanomaterials (Page 367)

Y. Xu (*Rice University*)

J. Chen (*Rice University*)
L. Liyang (*Rice University*)
K. F. Kelly (*Rice University*)

FD4: Topological Insulators and Photonics — 1:30 pm–3:30 pm — Coral Ballroom D

FD4.1: Quantum Inspired Integrated Photonics (Page NA)

Liang Feng (*University of Pennsylvania*)

FD4.2: Topological Light Sources (Page NA)

Boubacar Kante (*University of California, San Diego*)

FD4.3: Hyperspectral Time-Domain Terahertz Nano Imaging (Page 371)

N. Aghamiri (*University of Georgia*)

F. Huth (*Neaspec GmbH*)

A. Huber (*Neaspec GmbH*)

R. Hillenbrand (*CIC nanoGUNE and UPV/EHU & Basque Foundation of Science*)

Y. Abate (*University of Georgia*)

FD4.4: Resonant Ultrathin Infrared Detectors Enabling High Quantum Efficiency (Page 373)

David W. Peters (*Sandia National Laboratories*)

Jin K. Kim (*Sandia National Laboratories*)

Paul Davids (*Sandia National Laboratories*)

Anna Tauke-Pedretti (*Sandia National Laboratories*)

Paul S. Davids (*Sandia National Laboratories*)

Michael D. Goldflam (*Sandia National Labs*)

Michael B. Sinclair (*Sandia National Laboratories*)

Joel R. Wendt (*Sandia National Laboratories*)

Larry K. Warne (*Sandia National Laboratories*)

Salvatore Campione (*Sandia National Laboratories*)

Aaron J. Pung (*Sandia National Laboratories*)

Michael G. Wood (*Sandia National Laboratories*)

Evan M. Anderson (*Sandia National Laboratories*)

Patrick S. Finnegan (*Sandia National Laboratories*)

Charles R. Alford (*Sandia National Laboratories*)

Phillip H. Weiner (*Sandia National Laboratories*)

Torben R. Fortune (*Sandia National Laboratories*)

Wesley T. Coon (*Sandia National Laboratories*)

Samuel D. Hawkins (*Sandia National Laboratories*)

FD4.5: Near-Field Photocurrent Mapping of MoS₂-Based Device at Nanoscale (Page 377)

Rugang Geng (*University of Georgia*)

Yohannes Abate (*University of Georgia*)

FD4.6: 2D Material Printing for Cavity Integration (Page 379)

Xiaochen Ge (*University of Texas at Arlington*)

Zhonghe Liu (*University of Texas at Arlington*)

Weidong Zhou (*University of Texas at Arlington*)

FD5: Modeling and Simulation for Advanced Photonics — 3:30 pm–5:30 pm — Coral Ballroom D

FD5.1: Wave Propagation in Time-Modulated Metamaterials (Page NA)

Andrea Alu (*CUNY Advanced Science Research Center*)

FD5.2: Optics of Hybrid Nanomaterials: From Collective Resonances to Nonlinear Spectroscopy (Page NA)

Maxim Sukharev (*Arizona State University*)

FD5.3: Optical Response of Two-Dimensional Nanostructures by Theoretical Prediction (Page NA)

Ruth Pachter (*Air Force Research Laboratory*)

Jie Jiang (*Air Force Research Laboratory*)

FD5.4: To Etch or Not To Etch (Page 381)

Simeon Trendafilov (*Air Force Research Laboratory*)

Monica Allen (*Air Force Research Laboratory*)

Jeffery Allen (*Air Force Research Laboratory*)

Young Jun Yoon (*Georgia Institute of Technology*)

Yihuang Chen (*Georgia Institute of Technology*)

Cynthia Rivaldo Gomez (*Georgia Institute of Technology*)

Zhiqun Lin (*Georgia Institute of Technology*)

FD5.5: Enhanced Quantum Efficiency and Reduction of Reflection for MSM Photodetectors with Nano-Structured Surface (Page 385)

Ekaterina Ponizovskaya-Devine (*UC Davis*)

Hilal Cansizoglu (*UC Davis*)

Yan Gao (*UC Davis*)

Cesar Perez (*UC Davis*)

Toshishige Yamada (*UC Davis*)

Aly F. Elrefaie (*UC Davis*)

M. Saif Islam (*UC Davis*)

Shih-Yuan Wang (*UC Davis*)

Track 10: Advanced Nanophotonics Platforms (ANP)

FE1: Advanced Nanophotonics Platforms — 8:00 am–8:30 am — Heron

FE1.1: Opening Remarks (Page NA)

Alexandra Boltasseva

FE2: Ultrafast and Nonlinear Nanophotonics — 8:30 am–10:30 am — Heron

FE2.1: Topologically-Engineered Flat-Surface Metamaterials for the Far- & Near-Field Nanophotonics (Page NA)

Svetlana V. Boriskina (*Massachusetts Institute of Technology*)

FE2.2: Ultrafast All-Optical Modulation of Light with Hot-Carrier Plasmonics (Page NA)

Wenshan Cai (*Georgia Institute of Technology*)

FE2.3: Infrared and Active Photonics Using Nanoantennas and Metasurfaces (Page NA)

Otto Muskens (*University of Southampton*)

FE2.4: Plasmonically-Coupled Nanowire Sensors (Page NA)
Diana Huffaker (*Cardiff University*)

FE3: High Refractive Index Enabled Nanophotonics — 10:30 am–12:30 pm — Heron

FE3.1: Resonant Semiconductor Nanostructures for Optoelectronics (Page NA)
Mark Brongersma (*Stanford University*)

FE3.2: Dynamic All-Dielectric Metasurfaces (Page NA)
Jason Valentine (*Vanderbilt University*)

FE3.3: Ultrawide Thermal Tuning of Semiconductor Metasurface Resonators (Page NA)
Tomer Lewi (*Bar Ilan University*)

FE3.4: Electromagnetic Responses from Planar Arrays of Dielectric Nano-Disks at Overlapping Dipolar Resonances (Page 387)
N. Gandji (*Michigan Technological University*)
G. Semouchkin (*Michigan Technological University*)
E. Semouchkina (*Michigan Technological University*)

FE3.5: Achromatic Subwavelength Grating Micro Lens for Linear Polarized Incidence (Page 391)
Mao Ye (*University of Michigan-Dearborn*)
Vishva Ray (*University of Michigan*)
Yasha Yi (*University of Michigan-Dearborn*)

FE4: Emerging Material Platforms for Plasmonics — 1:30 pm–3:30 pm — Heron

FE4.1: Novel Silicon-Compatible Plasmonic Materials (Page 395)
Luca Dal Negro (*Boston University*)

FE4.2: Topological Insulator Thin Films as Terahertz Plasmonic Materials (Page 397)
Theresa Ginley (*University of Delaware*)
Yong Wang (*University of Delaware*)
Zhengtianye Wang (*University of Delaware*)
Stephanie Law (*University of Delaware*)

FE4.3: Synthesis and Characterizations of Plasmonic Nanoparticles: Large Plain Au and Au/TiO₂ (Page 401)
Young Jun Yoon (*Georgia Institute of Technology*)
Yihuang Chen (*Georgia Institute of Technology*)
Cynthia Rivaldo Gomez (*Georgia Institute of Technology*)
Monica Allen (*Air Force Research Laboratory*)
Jeffrey Allen (*Air Force Research Laboratory*)
Zhiqun Lin (*Georgia Institute of Technology*)
Stephanie Law (*University of Delaware*)

FE4.5: Improving Transfer Efficiency of Molecular Photonic Wires on DNA Scaffolds (Page 409)
Sebastián A. Díaz (*US Naval Research Laboratory*)
William P. Klein (*US Naval Research Laboratory*)
Sean M. Oliver (*George Mason University*)
David A. Hastman (*US Naval Research Laboratory & University of Maryland*)
Susan Buckhout-White (*US Naval Research Laboratory*)
Mario G. Ancona (*US Naval Research Laboratory*)
Paul D. Cunningham (*US Naval Research Laboratory*)
Joseph S. Melinger (*US Naval Research Laboratory*)
Patrick M. Vora (*George Mason University*)
Igor L. Medintz (*US Naval Research Laboratory*)

FE4.6: New Materials and Designs for Nano- & Topo-Photonics (Page NA)
Vladimir Shalaev (*Purdue University*)

FE5: Active Plasmonics and Nanophotonics — 3:30 pm–5:30 pm — Heron

FE5.1: Nanoplasmonics: How to Avoid the Loss (Page NA)
Jacob Khurgin (*Johns Hopkins University*)

FE5.2: Highly Efficient Excitation of Plasmons across (Molecular) Tunneling Junctions (Page NA)
Christian Nijhuis (*National University of Singapore*)

FE5.3: Electrical Driving of Plasmonic Optical Antennas (Page 413)
Ali Mojibpour (*Rice University*)
Palash Bharadwaj (*Rice University*)

FE5.4: Monolithic Doped-Semiconductor Platform for Optical Devices in the Infrared (Page 415)
Raymond Wambold (*University of Wisconsin - Madison*)
Jad Salman (*University of Wisconsin - Madison*)
Martin Hafermann (*Friedrich Schiller University Jena*)
Jura Rensberg (*Friedrich Schiller University Jena*)
Chenghao Wan (*University of Wisconsin - Madison*)
Bradley S. Gundlach (*University of Wisconsin - Madison*)
Carsten Ronning (*Friedrich Schiller University Jena*)
Mikhail A. Kats (*University of Wisconsin - Madison*)

FE5.5: Surface Plasmon Polariton Laser Based on a Metallic Trench Fabry-Perot Resonator (Page NA)
Henri Lezec (*National Institute of Standards and Technology*)

FF2: Tutorial III — 9:00 am–11:00 am — Theater

FF2.1: Physics and Technology of Photonic Infrared Detectors (Page NA)
Sanjay Krishna (*Ohio State University*)

FF2.2: Principles and Applications of Resonant Metasurfaces (Page NA)
Robert Magnusson (*University of Texas - Arlington*)

FF4: Tutorial IV — 2:00 pm–4:00 pm — Theater

FF4.1: STEM Session: Why We Need STEM, What We Get Wrong, How Do We Fix It (Page N/A)
Brian Mitchell (*Air Force Research Laboratory*)

FF4.2: Helium Droplet Mediated Cluster Assembly as a Tool to Probe the Limits of Energy Storage in Metastable Nanomaterials (Page NA)
Claron Ridge (*Air Force Research Laboratory/RWME*)

Additional Paper

Impact of Interface Quality on the Strength of Volume Plasmon Polaritons in Semiconductor Hyperbolic Metamaterials (Page 405)

Patrick Sohr (*University of Delaware*)

Dongxia Wei (*University of Delaware*)

Stephanie Law (*University of Delaware*)