# NUSOD 2024 – NEW DELHI

# MONDAY SEPTEMBER 23

**9:00–9:20 Welcome address**

**9:20–10:20 Mathematical and Machine learning based methods**

Session chair: Prof. M. Auf der Maur

- **MA02**: Numerical NEGF-based study of Urbach tails in III-V materials and superlattices; A. Kolek, M. Makowiec; Department of Electronics Fundamentals, Rzeszów University of Technology, Rzeszów, Poland
- **MA03**: Effect of mechanical jitter on higher-order incoherent beam combination system; M. Kumar (1), A. Khandelwal (2), S. Azeemuddin (3); (1) International Institute of Information Technology, Hyderabad, India, (2) Indian Institute of Technology, Jodhpur, India, (3) Behrend College, Penn State University, Erie, PA, USA
- **MA04**: Leveraging Machine Learning for Optimization of Internal Quantum Efficiency in Green LED; C. P. Singh, S. Sharma, H. Jain, K. Ghosh; IIT Jammu, India

**10:20–10:50 Coffee break**

**10:50–12:00 Detectors and solar cells I**

Session chair: Prof. A. Kolek

- **MB01**: Perovskite solar cells: Efficiency limits and estimation of recombination parameters from device characteristics; P. R. Nair; Indian Institute of Technology Bombay, Mumbai, India – **(INVITED)**
- **MB02**: Modelling and Performance Analysis of Physical and Electrical Properties of BaZrS3 Chalcogenide Perovskite Solar Cells; D. Gahlawat (1), J. Kaur (1), R. Basu (1), A.K. Sharma (2), U. Rani (3); (1) Department of Electronics and Communication Engineering, National Institute of Technology Delhi, New Delhi, (2) Department of Computer Science and Engineering, National Institute of Technology Delhi, New Delhi, (3) Department of Computer Science and Engineering, Dr. Akhilesh Das Gupta Institute of Professional Studies
- **MB03**: GaAs truncated cone nanowire array-based solar cells with carrier selective contacts; S. sagar, M. Rautela, J. Kumar, A. Kumar, S. Mukhopadhyay; Indian Institute of Technology (Indian School of Mines) Dhanbad, Jharkhand–826004

**12:00–13:00 Lunch break**

**13:00–14:40 Nanostructures I**

Session chair: Prof. P. Nair

- **MC00**: Silicon Photonics technology and applications; B. K. Das; Indian Institute of Technology Madras, India – **(INVITED)**
- **MC01**: Empirical tight-binding parameterizations for accurate heterostructure and alloy calculations; M. Auf der Maur; University of Rome Tor Vergata, Italy – **(INVITED)**
- **MC02**: Magneto-active Metamaterials for 1.5T MRI: An Intelligent Approach to Boost the Signal-to-Noise Ratio of a Scan; J. Gupta (1), R. Bhattacharjee (1), S. Kanagaraj (2), R. Nair (3), D. Sikdar (1); (1) Department of Electronics and Electrical Engineering, Indian Institute of Technology Guwahati, Guwahati 781039, Assam, India, (2) Department of Mechanical

Engineering, Indian Institute of Technology Guwahati, Guwahati 781039, Assam, India, (3) Medirays Corporation, Mumbai 400042, Maharastra, India

- **MC03**: Refractive Index Sensing Using Cylindrical Photonic Metasurfaces; V. Balan(1), D. Ray(2), S. Kanakambaran(1); (1) Department of ECE, IIITDM Kancheepuram, Chennai, Tamil Nadu, India, (2) Department of Electrical Engineering, IIT Kanpur, Kanpur, Uttar Pradesh, India

**14:40-15:00 Coffee break**

**15:00–16:00 Poster preview**

**16:00–16:15 Welcome speeches**

**16:15–18:00 Poster session and welcome reception**

- **MP01**: Device Modeling and Optimization of MEMS based Capacitive Pressure Sensor; P. Yadav (1), R. Siddique (2), S. K. Pandey (3); (1) Acropolis Institute of Technology and Research, (2) Acropolis Institute of Technology and Research, (3) Indian Institute of Technology Patna
- **MP02**: Numerical Simulation of Copper Bismuth Oxide Based Solar Cells Using SCAPS-1D with WO3 as Electron Transport Layer: Nonideal Conditions; M. Panachikkool, T. Pandiyarajan; Department of Sciences, Indian Institute of Information Technology Design and Manufacturing Kurnool, Kurnool, Andhra Pradesh, 518008, India
- **MP03**: Simulation of multi-valent defects in Perovskite solar cell using SnO2 as buffer layer; S. Kotamraju , B. Havilah, K. Anandan; Department of Electronics and Communication, IIIT Sri city, Andhra Pradesh, India
- **MP04**: Machine-Learning-Enhanced NEGF Solver of Interband Cascade Laser; M. Makowiec (1), A. Kolek (2); (1) Doctoral School of Rzeszow University of Technology, Poland, (2) Rzeszow University of Technology, Poland
- **MP05**: Dark current minimization in type-II superlattice photodetector; P. Kawde, B. Muralidharan; Indian Institute of Technology Bombay, India
- **MP06**: Impact of bottom DBR radius and electric aperture radius on GaN VCSEL operation; R. P. Sarzala, D. Dabrowka, M. Dems; Institute of Physics, Lodz University of Technology, 217/221 Wólczańska St., 93-005 Lodz, Poland
- **MP07**: Optimization of device parameters for CIGS based solar cell using SnO2 as window layer; S. Kotamraju, M. Suresh, K. Anandan; Indian Institute of Information Technology Sri City, Andhra Pradesh, India
- **MP08**: Numerical Investigation on Microfluidic Integrated Side Polished Fiber to Detect Biological Analytes; M.Valliammai (1), J.Mohanraj (1), R. Rishav (1), B. Esakki (2), Lung – Jieh Yang (3), Chua-Chin Wang (4); (1) Department of ECE, Vel Tech Rangarajan Dr. Sagunthala R & D Institute of Science and Technology Chennai, India; (2) Department of Mechanical Engineering, National Institute of Technical Teachers Training and Research Chennai, India; (3) Department of Mechanical Engineering, Tamkang University, Taiwan; (4) Department of Electrical Engineering, National Sun Yat-Sen University, Taiwan
- **MP10**: Study of Heterojunction Dual Gate Vertical TFET Applications in Gas Sensing; K. Nasani, B. Bhowmick, P. D. Pukhrambam; Department of ECE,National Institute of Technology, Silchar, Assam, India
- **MP12**: Polling period and temperature dependence of lithium niobate on tunability of biphoton generation; K. Yadav, B. Viswanathan, P. B. Bisht; Department of physics, Indian Institute of Technology Madras, Chennai, India
- **MP14**: Deep Neural Network for Predicting Supercontinuum Broadening in Chalcogenide Photonic Quasi crystal Fiber; M.Valliammai (1), A. Bakiya (2), J.Mohanraj (3), H. K. Singh (4), S. Addanki (5), R. Rishav (6); (1) Vel Tech Rangarajan Dr. Sagunthala R & D Institute of Science and Technology Chennai, India, (2) Vel Tech Rangarajan Dr.

Sagunthala R & D Institute of Science and Technology Chennai, India, (3) Vel Tech Rangarajan Dr. Sagunthala R & D Institute of Science and Technology Chennai, India, (4) Government Polytechnic, Gaya Bihar, India, (5) Sree Vidyanikethan Engineering College Mohan Babu University Tirupati, India, (6) Vel Tech Rangarajan Dr. Sagunthala R & D Institute of Science and Technology Chennai, India

- **MP15**: Simulation of Few Mode Fiber Modes; N. Gupta(1), Deepak S(2), Nandana M.(2), E. S. Shivaleela(1), T. Srinivas (1); (1) Indian Institute of Science, Bangalore, India (2) Cochin University of Science and Technology Cochin, Kerala, India
- **MP16**: Design and Simulation of Y-shaped Waveguide Based on Silicon 2D Photonic Crystal for Photonic Integrated Circuits; T. Deb, P. D. Pukhrambam, K. Nasani; Department of Electronics and Communication Engineering, National Institute of Technology Silchar, Assam, India 788010
- **MP17**: Simulation of InGaAs Quantum Dot Photonic Cavities for 850 nm Free-Space Optical Communication; C. Dubey ,I. Bashir, S. Manna, S. Das; IIT Delhi, Hauz Khas ,Delhi, India
- **MP18**: Analytical investigation of phase detuning induced transparency in multi-ring cascaded filters; L. Tunesi, A. Carena, V. Curri, P. Bardella; Dipartimento di Elettronica e Telecomunicazioni, Politecnico di Torino, Torino, Italy
- **MP19**: Compact 2×2 Inverse-Designed Beam Splitter for Integrated Silicon Photonics; S. Abdani, W. Vogel, C. Schweikert, G. Rademacher; University of Stuttgart, Germany
- **MP20**: PSO-assisted extraction of VCSEL parameters from L-I and S21 measurements; A. Marchisio, V. Curri, A. Carena, P. Bardella; Dipartimento di Elettronica e Telecomunicazioni, Politecnico di Torino, Torino, Italy
- **MP23**: Light Absorption and Electrical Characteristics of DUV-LED with Dual Superlattice Layer Growth; C. P. Singh, and K. Ghosh; IIT Jammu, India

# TUESDAY SEPTEMBER 24

**9:30-10:30 Laser diodes I**

Session chair: Prof. P. K. Basu

- **TuA02**: Optimizing Temperature Variation in Gallium-Nitride One-Dimensional Laser Array; M. Dems, D. Dąbrówka, R. P. Sarzała; Lodz University of Technology, Lodz, Poland
- **TuA03**: Impact of Carrier Diffusion in Reflectivity Modification for Stable Dual Wavelength Emission in Buried Heterostructure (BH) Laser; S. Pal, A. Khandelwal, N. Bhatia; Department of Electrical Engineering, Indian Institute of Technology Jodhpur, Jodhpur, India
- **TuA04**: Reduced model unifying frequency combs in ring and Fabry-Perot quantum cascade lasers; C. Silvestri (1), M. Brambilla (2), P. Bardella (3), L. L. Columbo (3); (1) University of Queensland, Australia; (2) Politecnico di Bari, Italy; (3) Politecnico di Torino, Italy

**10:30–11:00 Coffee break**

**11:00–12:30 Detectors and solar cells II**

Session chair: Prof. R. Sooraj

- **TuB00**: Scattering processes in GeSn alloys relevant for photonic detectors; P. K. Basu; Institute of Radio Physics and Electronics, University of Calcutta, India – **(INVITED)**
- **TuB02**: Analysis of Cs2TiBr6 Single-Halide Perovskite Solar Cell by introducing IDL; J. Kaur (1), S. Gupta (1), A.K. Sharma (2), R. Basu (3); (1) Department of Electronics and Communication Engineering, National Institute of Technology Delhi, New Delhi, India, (2) Department of Computer Science and Engineering, National Institute of Technology Delhi, New Delhi, India, (3) Department of Electronics and Communication Engineering, National Institute of Technology Delhi, New Delhi, India
- **TuB03**: Numerical study of efficiency enhancement of nanostructured Silicon-Perovskite tandem thin film solar cells.; N. Shrivastava, J. Xavier; SeNSE, Indian Institute of Technology Delhi, India
- **TuB04**: Comprehensive Study and Analysis of (FA)3Bi2I9 based Perovskite Solar Cell; P. K. Singh (1), C. Pathak (1), S. K. Pandey (2); (1) Rustam Ji Institute of Technology, Tekanpur, Gwalior, India, (2) Indian Institute of Technology Patna, Bihar, India

**12:30–13:30 Lunch break**

**13:30–14:50 Integrated Devices and Systems I**

Session chair: Prof. M. Dems

- **TuC01**: Freestanding HEMT Inspired GaN based Optical Pressure Sensor With Grating Coupler; N. Nallusamy (1), R. Singhal (1), S. K. Sharma (2), D. S. Rawal (2); (1) Optical Communication Lab, EEE, BITS Pilani, Pilani, India (2) Solid State Physical Labaratory, DRDO, Delhi, India
- **TuC02**: Silicon-Based Multimode Interference (MMI) Switch Utilizing Carrier Injection based Electro-Optic Effect; Krishnanunni R. A., and S. Ravindran; Indian Institute of Space Science & Technology, India
- **TuC04**: Highly Sensitive Bimetallic Graphene-Based SPR Biosensor for Blood Plasma Detection; T. Deb (1), P. D. Pukhrambam (1), A. Panda (2); (1) Department of Electronics and Communication Engineering, National Institute of Technology, Silchar, 788010, Assam, India, (2) Department of Electronics and Communication Engineering, CMR Institute of Technology, Bengaluru 560037, India

**14:50–15:20 Coffee break**

**15:20–16:00 LEDs**

Session chair: Dr. R. Basu

- **TuD02**: Investigating the Impact of Quantum Barriers on the Ideality Factor of InGaN/GaN Multi-quantum-well Light Emitting Diodes; A. Das, D. Mehta, S. Dandge, S. Chatterjee, A. Laha; IIT Bombay, India
- **TuD03**: GaN Free Graded Hole Source Layer Terminated Stucture for Efficient AlGaN-based UV-C LED; B. Choubey, K. Ghosh; IIT Jammu, India

**16:00–17:30 Workshop session**

Advance semiconductor simulation and modelling using nextnano TCAD software; S. Pundir, MAXIM DESIGN SYSTEMS, India

# WEDNESDAY SEPTEMBER 25

**9:00–10:30 Nanostructures II**

Session chair: Dr. R. Nandi

- **WA01**: Modeling and simulation of type-II superlattice absorbers: from semi-classical to quantum; B. Muralidharan; Department of Electrical Engineering, Indian Institute of Technology Bombay, Powai, Mumbai-400076, India – **(INVITED)**
- **WA02**: Improving SNR of 1.5T MRI using Flexible Magnetic Metasurfaces based on Rectangular Windings; J. Gupta (1), R. Bhattacharjee (1), S. Kanagaraj (2), R. Nair (3), D. Sikdar (1); (1) Department of Electronics and Electrical Engineering, Indian Institute of Technology Guwahati, Guwahati 781039, Assam, India, (2 Department of Mechanical Engineering, Indian Institute of Technology Guwahati, Guwahati 781039, Assam, India, (3) Medirays Corporation, Mumbai 400042, Maharastra, India
- **WA03**: Temperature and strain effects on polarization of light emitted by AlGaN bulk layers and quantum wells; D. A. Ivanov, S. Yu. Karpov; Soft-Impact Ltd., Russia
- **WA04**: Interdigitated Metasurfaces for Enabling Homogeneously Boosted Magnetic Fields during 1.5T MRI Scans; T. S. Konda, J. Gupta, A. B. Dey, R. Bhattacharjee, D. Sikdar; Department of Electronics and Electrical Engineering, Indian Institute of Technology Guwahati, Guwahati 781039, Assam, India

**10:30–11:00 Coffee break**

**11:00–12:30 Integrated devices and systems II**

Session chair: Prof. D. Ivanov

- **WB01**: Photonic Integrated Circuit Design Flow in 45 nm SOI GF Fotonix™ Platform; R. Nandi (1), P. Priyadarshini (1), C. Hedges (2), F. Pavlik (2), M. Rakowski (3); (1) GLOBAL FOUNDRIES Engineering Private Limited, Manyata Tech Park, Bangalore-560045, India, (2) GLOBAL FOUNDRIES, 1000 River St., Essex Junction, VT 05452, USA, (3) GLOBAL FOUNDRIES Inc, 400 Stone Break Rd Extension, Malta, NY 12020, USA – **(INVITED)**
- **WB02**: Analysing the sensitivity of a photosensor based on MoS2 TFET for visible light detection; J. Talukdar and B. Muralidharan; Dept. of Electrical engineering Indian Institute of Technology Bombay Mumbai, India
- **WB03**: Nonlinear Analysis of HEMT Inspired GaN Optical Waveguide under Thermal Stress; N. Nallusamy (1), R. Singhal(1), S. K. Sharma(2), D. S. Rawal(2); (1) Optical Communication Lab, EEE, BITS Pilani Campus, India (2) SSPL, DRDO, Delhi, India

- **WB04**: O+E+S+C Ultra Broadband Hybrid Optical Fiber Amplifier; K. Sarma, Md. M. Khan; Department of Electronics and Communication Engineering, Indian Institute of Information Technology Guwahati, Guwahati –781015, Assam, India

**12:30-13:30 Lunch Break**

**14:00-19:00 Guided city tour**

**From 19:00 Conference dinner**

# THURSDAY SEPTEMBER 26

**9:30–10:50 Photonic crystals**

Session chair: Prof. S. Schulz

- **ThA01**: Zak phase of a 1D topological photonic crystal by Finite-Difference Time-Domain simulation; H. Choi(1), M. Scherrer(2), S. Kim(2), S. Seo(1), K. Moselund(2), C.-W. Lee(3); (1) Sejong University, Korea; (2) PSI, Switzerland; (3) Hanbat University, Korea
- **ThA02**: Design and Analysis of 2D Photonic Crystal-Based Biosensor for Cancerous Cell Detection; S. Kumar , M. Sen; Indian Institute of Technology (Indian School of Mines) Dhanbad, 826004, Jharkhand, India
- **ThA03**: Improving the Efficiency of Top-emitting AlGaN Nanowire Photonic Crystal Laser by Structural Modification; D. Gupta, T. A. Nilsen, B.-O. Fimland, H. Weman; Department of Electronic Systems, Norwegian University of Science and Technology, 7491 Trondheim, Norway
- **ThA04**: Design and Performance Investigation of Compact and Fast Metaphotonics All-Optical Digital OR Gate; N. Kumar (1), Md. M. Khan (1), R. K. Sonkar (2); (1) Department of Electronics and Communication Engineering, Indian Institute of Information Technology Guwahati, Guwahati–781015, Assam, India, (2) Department of Electronics and Electrical Engineering, Indian Institute of Technology Guwahati, Guwahati–781039, Assam, India

**10:50–11:20 Coffee break**

**11:20–12:30 Novel materials**

Session chair: Prof. F. D. Bello

- **ThB01**: Electronic structure of boron containing III-N alloys: Opportunities and challenges for future optoelectronic devices; S. Schulz; Tyndall National Institute, Cork, Ireland – **(INVITED)**
- **ThB02**: Establishing composition dependent k·p parameters for (Al,Ga)N alloys; A.K. Singh (1) , A. Gomez-Iglesias (2) , S. Schulz (1, 3); (1) Tyndall National Institute, University College Cork, Lee Maltings, Dyke Parade, Cork T12 R5CP, Ireland, (2) ams-OSRAM International GmbH, Regensburg, Germany, (3) School of Physics, University College Cork, Cork T12 YN60, Ireland
- **ThB04**: Optimisation of Nano Urchin geometry for the generation of hot electrons for sensing: A computational study; S. Banerjee, J. Xavier; IIT Delhi, India

**12:30–13:30 Lunch break**

**13:30–14:30 Laser diodes II**

Session chair: Prof. J. Xavier

- **ThC01**: Investigation of a Double-Intra-Cavity VCSEL at cryogenic temperatures; B. Namvar, H. Virtanen, P. Rajala, T. Uusitalo, M. Guina, J. Viheriälä; Engineering and Natural Sciences, Tampere University, Tampere, Finland
- **ThC03**: System Modelling, Numerical Simulations and Experimental Validation of High Capacity FSO Data Transmission in DWDM Communication Employing Optical Frequency Comb; N. Rajaram (1), M. Avazpour (2), L. Barry (2), K. Hinzer (1), T. Hall (1), A. Atieh (1, 3); (1) University of Ottawa, Canada, (2) Dublin City University, Ireland, (3) Optiwave System Inc, Canada

**14:30–14:50 Coffee break**

**14:50 –16:10 Detectors III and single photon emission**

- **ThD01**: Dynamic Emission Characteristics of Single-Photons and Photon Pairs from Color Centers Tuned by Thermally Induced Strain Fields; F. D. Bello (1), S. Asgarnezhadzorgabad (1), Zahra Jalali-mola (1), D. D. A. Clarke (1), O. Hess (1, 2); (1) School of Physics and CRANN, Trinity College Dublin, Ireland, (2) Center for Advanced Materials and Bioengineering Research (AMBER), Trinity College Dublin, Ireland – **(INVITED)**
- **ThD02**: Analysis of herladed single photon decoy state protocol using single photon detectors for quantum secure imaging; S. Vernekar, J. Xavier; Indian Institute of Technology Delhi, India

**16:10–16:20 Presentation of NUSOD 2025**