SIOE 2025

Semiconductor and Integrated Opto-Electonics Conference

23rd - 25th of April, 2025
Cardiff University

Conference Locations

Location: Centre for Student Life

Address: Park Place, Cathays, Cardiff, CF10 3BB

Parking: On-street pay and display at Park Place and on Museum Avenue (we cannot reimburse costs)

Registration location: Centre for Student life, 4th floor

Oral presentations: Sir Stanley Thomas Lecture Theatre, 2nd floor

Refreshment location: Centre for Student life, 4th floor

Welcome Drinks Reception location: Transitional Research Hub

Address: Maindy Road, Cardiff, Wales, UK, CF24 4HQ

Banquet location: Cardiff Castle,

Address: Castle Street, Cardiff, CF10, 3RB

Programme

Wednesday 23rd April

12:00	Registration 4th floor, Centre for Student Life
14:00	Session 1: Facilities Sir Stanley Thomas Lecture Theatre, Centre for Student Life
15:40	Refreshment Break 4th floor, Centre for Student Life
16:15	Session 2: Materials Development Sir Stanley Thomas Lecture Theatre, Centre for Student Life
17:40	Welcome Drinks Reception Transitional Research Hub – Sponsored by IOP semiconductors, Compound Semiconductor Centre and Photon Design

Thursday 24th April

09:00	Session 3: Emitters and Photonics Sir Stanley Thomas Lecture Theatre, Centre for Student Life
10:30	Refreshment Break 4th floor, Centre for Student Life

11:00	Session 4: Underpinning Integrated Photonics Sir Stanley Thomas Lecture Theatre, Centre for Student Life
12:30	Lunch and Exhibition 4th floor, Centre for Student Life
14:00	Session 5: Integration Sir Stanley Thomas Lecture Theatre, Centre for Student Life
15:30	Refreshment Break 4th floor, Centre for Student Life
16:00	Basic IP Strategy – Intellectual Property Office Sir Stanley Thomas Lecture Theatre, Centre for Student Life
16:30	Rump Session: The path to heterogenous integration Sir Stanley Thomas Lecture Theatre, Centre for Student Life
18:00	Banquet Drinks Reception – Sponsored by Huawei Cardiff Castle
19:15	Conference Banquet – Sponsored by Huawei Cardiff Castle

Friday 25th April

09:15	Session 6: Lasers Sir Stanley Thomas Lecture Theatre, Centre for Student Life
10:30	Refreshments 4th floor, Centre for Student Life

11:00	Session 7: Surface Emitters Sir Stanley Thomas Lecture Theatre, Centre for Student Life
12:00	Lunch and Exhibition 4th floor, Centre for Student Life

Conference closes

Programme, Wednesday 23rd April

Registration

4th floor, Centre for Student Life, 12.00 onwards

Session 1: Facilities

Centre for Student Life, Stanley Thomas Lecture Theatre

14:00	**Cornerstone** *University of Southampton*
14:10	**National Epitaxy Facility** Paul Fry *University of Sheffield*
14:20	**Institute for Compound Semiconductors** Chris Matthews *Cardiff University*
14:30	**Ion Beam Centre** Nianhua Peng *University of Surrey*
14:40	**Compound Semiconductor Centre** Wyn Meredith *CSC Limited*
14:50	**CSA Catapult** Joe Gannicliffe *CSA Catapult*
15:00	**PBIAA** Peter Smowton *Cardiff University*

15:10 **How to get published**

Kate Porter

IOP Publishing

Refreshment break 15:40 – 16:15

4th floor, Centre for Student Life

Session 2: Materials Development

Centre for Student Life, Stanley Thomas Lecture Theatre

16:15 S25_07 **Controllable Branching of Self-Catalysed AlGaAs Nanowires and AlGaAs/GaAs Nanowire Quantum Dots via Molecular Beam Epitaxy**

Giorgos Boras,[1,*] Haotian Zeng,[1,*] Stephen Church,[2] Raghavendra Juluri,[3] Huiwen Deng,[1] Hui Jia,[1] Ziyue Yin,[1] Chong Chen,[1] Anton Velychko,[4] Mingchu Tang,[1] David Mowbray,[4] Ana M. Sanchez,[3] Patrick Parkinson,[2] Huiyun Liu[1]

[1] Department of Electronic and Electrical Engineering, University College London, WC1 E7J, United Kingdom. [2] Department of Physics and Astronomy and the Photon Science Institute, University of Manchester, M13 9PL, United Kingdom. [3] Department of Physics, University of Warwick, Coventry CV4 7AL, United Kingdom.[4] Department of Physics and Astronomy, University of Sheffield, Sheffield S3 7RH, United Kingdom

16:30 S25_13 **High-Operating-Temperature (HOT) MWIR InAs/InAsSb Superlattice Photodetectors Grown by MOCVD**

A. Buyukpinara, Z. Yana, J. Petticrewb, C. H. Tanb, Q. Li

School of Physics and Astronomy, Cardiff University, United Kingdom. Department of Electronic and Electrical Engineering, University of Sheffield, United Kingdom

16.45 S25_09 **GaAs/AlGaAs nanowires as photoelectrodes for solar water splitting**

Fahad Alghamdi

University College London

17:00 S25_22 Inkjet Printed ZnO Narrowband Photodetectors using Charge Collection Narrowing

William Solari Chandra Kant, Renjun Liu, Peter M. Smowton and Bo Hou
School of Physics and Astronomy, Queen's Buildings North Building, Cardiff University, 5 The Parade, Newport Road, Cardiff, CF24 3AA, United Kingdom

17:15 S25_16 Development of printed/deposited electrical contacts for III-V thin-film ELO solar cells

Prabudeva Ramu*, Arto Aho, Riku Isoaho, Antti Tukiainen, Ville Polojärvi, Timo Aho, Teemu Hakkarainen, Jarno Reuna, Jari Lyytikäinen, Roosa Hytönen, Mircea Guina
Optoelectronics Research Centre (ORC), Physics Unit, Tampere University, Finland

Welcome Drinks Reception 17:40

Transitional Research Hub, Maindy Road

Sponsored by IOP Semiconductors, compound Semiconductor Centre and Photon Design

Programme, Thursday 24th April

Session 3: Emitters and Photonics

Centre for Student Life, Stanley Thomas Lecture Theatre

09:00 S25_24 **A Multiscale AI-Spectroscopy Platform for MicroLED Production**

Yingjun Liu,*[a] Miguel Leitão,[a] Harry Lit,[a] Alex Yudin,[a] George Koutsourakis,[b] Filipe Richheimer,[b] Nasim Zarrabi,[b] Kristina Zhang,[c] Susan Duan,[c] Tony Zhang,[c] Sebastian Wood*[b], Peter M. Smowton*[d]

a Poro Technologies Ltd, Evolution Business Park, CB24 9NG, United Kingdom. b Department of University of Cambridge, Electronic & Magnetic Materials Group, National Physical Laboratory, Hampton Road, Teddington, TW11 0LW, United Kingdom. c Faculty of Mathematics, University of Cambridge, Wilberforce Road, Cambridge CB3 0WA, United Kingdom. d School of Physics and Astronomy, Cardiff University, Cardiff CF10 3AT, United Kingdom

09:15 S25_21 **Fully Inkjet-Printed Thin-film Transistors for Colloidal Quantum Dot Active Lighting**

Chandra Kant[1], Sri Datta Aneesh Chodavarapu[1] and Bo Hou[1]

[1] School of Physics and Astronomy, Cardiff University, Cardiff CF24 3AA, United Kingdom. [2]Translational Research Hub, Cardiff University, Cardiff CF24 3AA,

09:30 S25_19 **Phonon Mode Enhancement Induced by Cu-In-Zn-Se Colloidal Quantum Dot–Plasmonic Hybrid Structures**

Serena Nur Erkizan, Peter M. Smowton and Bo Hou

School of Physics and Astronomy, Cardiff University, Cardiff CF24 3AA, United Kingdom

09:45 S25_18 **Integrated Photonics on Silicon Nitride Platform at CSA Catapult**

Eli Ayi-Yovo, Prometheus Das Mahapatra, Ning Zhang, Nicholas Avlonitis

CSA Catapult IMPERIAL PARK, Innovation Centre, Celtic Way, Newport NP10 8BE

10:00 S25_23 **Optimization of photonic crystal cavity geometry for high quality factor modes at different target frequencies**

Amit Nilabh, Nadhia Monim, Wolfgang Langbein, Francesco Masia
School of Biosciences, Cardiff University, Cardiff CF10 3AT, School of Physics and Astronomy, Cardiff University, Cardiff CF10 3AT

10:15 S25_17 **Micro-Transfer Printable Dielectric High Reflectivity Mirrors**

Valentina Rajkumari, Zhi Li, Brendan Roycroft, James O'Callaghan, Brian Corbett
Tyndall National Institute, University College Cork, Lee Maltings, Cork, Ireland

Refreshment break 10:30 – 11:00

4th floor, Centre for Student Life

Session 4: Underpinning Integrated Photonics

Centre for Student Life, Stanley Thomas Lecture Theatre

11:00 S25_05 **Ge shell heteroepitaxy on self-catalysed, reduced diameter GaAs nanowires under droplet manipulation**

Ziyue Yin[1], Haotian Zeng[1], Giorgos Boras[1], Raghavendra R Juluri[2], Huiwen Deng[1], Hui Jia[1], Chong Chen[1], Stephen Church,[3] Anton Velychko,[4] Fahad Alghamdi[1], Mingchu Tang[1], David Mowbray[4], Patrick Parkinson,[3] Ana M Sanchez[2] and Huiyun Liu[1]
1 Department of Electronic and Electrical Engineering, University College London, London WC1E 7JE, United Kingdom. 2 Department of Physics, University of Warwick, Coventry CV4 7AL, United Kingdom. 3 Department of Physics and Astronomy and the Photon Science Institute, University of Manchester, M13 9PL, United Kingdom. 4 Department of Physics and Astronomy, University of Sheffield, Sheffield S3 7RH, United Kingdom

11:15 S25_14 **GeSn/SiGeSn Multi-Quantum Well Heterostructures for Mid-Infrared Lasers**

Walid Belaid [1,*], Omar Concepción [2], Dan Buca [2], Robert Kelsall [1], Zoran Ikonic [1]

[1] School of Electronic and Electrical Engineering, University of Leeds, LS2 9JT Leeds, UK.[2] Peter Grünberg Institute – 9 (PGI-9), Forschungszentrum Jülich, 52428 Jülich, Germany

11:30 S25_26 **Europium monoxide as a magneto-optic material**

M.J de Quidt [1], S.R Giblin [1], D Read [1,2], S Shutts [1,3]

1. School of Physics and Astronomy, Cardiff University, 2. University of California, Santa Barbara, 3. Institute of Compound Semiconductors, Cardiff

11:45 S25_28 **Realisation of On-Chip InAs-QD Mode-Locked Laser for Integrated Photonics**

Fwoziah T. Albeladi, Craig P. Allford, Sara-Jayne Gillgrass, Susanna Power, Noor Albittar, Samuel Shutts, and Peter M. Smowton

School of Physics and Astronomy, Cardiff University, The Parade, Cardiff. CF24 3AA. UK. Physics Department, Faculty of Science, University of Jeddah, Jeddah 21589, Saudi Arabia

12:00 S25_12 **Integrated Optical Frequency Comb Generator for Terahertz Gas Spectroscopy**

Venkatesh Chakravartula, Lalitha Ponnampalam

Department of Electronic and Electrical Engineering, University College London

12:15 S25_15 **Ultrafast Photomodulation Spectroscopy for Wafer Scale Testing of Silicon Photonics**

Idris A. Ajia[1], Sophie Blundell[1,2], Thomas W. Radford[1], David J. Thomson[2] and Otto L. Muskens[1]

1 School of Physics and Astronomy, University of Southampton, Southampton SO17 1BJ, U.K.2 Optoelectronics Research Centre, University of Southampton, Southampton SO17 1BJ, U.K.

Lunch and Exhibition 12:30 – 14:00

4th floor, Centre for Student Life

Session 5: Integration

Centre for Student Life, Stanley Thomas Lecture Theatre

14:00 S25_20 **An Optically Controlled Waveguide Variable Attenuator at W-band**

Yichang Yan*, Yutian Zhang and Martin Cryan
School of Electrical, Electronic and Mechanical Engineering, University of Bristol

14:15 S25_29 **Two-Waveguide Approach for Monolithic Active/Passive Photonic Integration on GaAs.**

Laura Michael[1], Graham Berry[2], Michael Robertson[2], Giovanni F. Cotella[2], Huiyun Liu[3] and Peter M. Smowton[1,4]
(1) School of Physics and Astronomy, Cardiff University, The Parade, Cardiff, CF24 3AA. (2) Ipswich Research Centre, Huawei Technologies Research and Development (UK) Limited, Phoenix House, B55 Adastral Park, Martlesham Heath, Ipswich, IP5 3RE. (3) Department of Electronic and Electrical Engineering, University College London, Torrington Place, London, WC1E 7JE. (4) Institute of Compound Semiconductors (ICS), Cardiff University, Translational Research Hub, Maindy Road, Cardiff, CF24 4HQ

14:30 S25_04 **Monolithically Integrated Hall Effect Circuit Development using InGaAs-AlGaAs-GaAs 2DEG**

Christopher Walsh[1], Mohammadreza Sadeghi[2] and Mohamed Missous[1,2]
[1]Department of Electrical & Electronic Engineering, The University of Manchester Manchester, M13 9PL, United Kingdom. [2]Advanced Hall Sensors Ltd., Manchester, M17 1RW, United Kingdom

14:45 S25_08 **On-Chip Aluminium Nitride Microdisk Resonators as High-Accuracy Photonic Thermometers.**

O.M. Kiely[1,2], D.O. Davies-Armstrong[1,2], J.K. Cannon[1,2], H.B. Ya˘gcı[1,2], J.P. Hadden[1,2], and A.J. Bennett[1,2]
1School of Engineering, Cardiff University, Cardiff CF24 3AA, United Kingdom. 2Translational Research Hub, Maindy Road, Cardiff, CF24 4HQ, UK

15:00 S25_12 **Ultrafast Integration and Pattern Recognition with Photonic-Electronic RTD Spiking Neurons**

María Duque Gijón[1], Joshua Robertson[1], Dylan Black[1], Giovanni Donati[1], Qusay Raghib Ali Al-Taai[2], Ekaterina Malysheva[3], Bruno Romeira[4], Jose Figueiredo[5], Victor Dolores Calzadilla[3], Edward Wasige[2], y Antonio Hurtado[1]
1Institute of Photonics, SUPA Dept. of Physics, University of Strathclyde, Glasgow, UK. 2High Frequency Electronics Group, University of Glasgow, Glasgow, UK. 3Eindhoven Hendrik Casimir Institute, Eindhoven University of Technology, Eindhoven, Netherlands.

4International Iberian Nanotechnology Laboratory, Braga, Portugal. 5LIP and Departamento de Física da Faculdade de Ciências da Universidade de Lisboa, Lisboa, Portugal

15:15 S25_10 **Widely tuneable photonic integrated optical phase lock loop (OPLL) to generate THz wave for atmospheric sensing**

Mahsa Barkabian, Lalitha Ponnampalam

Department of Electronic and Electrical Engineering, University College London, London, WC1E 7JE, United Kingdom

Refreshment break 15:30 – 16:00

4th floor, Centre for Student Life

IP Strategy - Intellectual Property Office – 16:00

Natalie Salkeld

Centre for Student Life, Stanley Thomas Lecture Theatre

Centre for Student Life

Rump Session: The path to heterogenous integration, 16:30

Centre for Student Life, Stanley Thomas Lecture Theatre

Centre for Student Life

Banquet Drinks Reception - Sponsored by Huawei, 18:00

Cardiff Castle

Conference Banquet - Sponsored by Huawei, 19:15 onwards

Cardiff Castle

Programme, Friday 25th April

Session 6: Lasers

Centre for Student Life, Stanley Thomas Lecture Theatre

09:15 S25_27 **Beyond the noise: Finding Laser Thresholds from Noisy Data**

Joseph Francis, Richard Forrest, Peter M. Smowton

School of Physics and Astronomy, Cardiff University, Cardiff CF24 4HQ

09:30 S25_31 **Advancing All-MBE Growth of Quantum Dot Lasers on V-Groove Si**

Makhayeni Mtunzi, Haotian Zeng, Lifeng Bao, Chong Chen, Jae-Seong Park, Yangqian Wang, Huiwen Deng, Yaonan Hou, Jun Li, Mateus G. Masteghin, Richard Beanland, Frederic Gardes, Mingchu Tang, Alwyn Seeds and Huiyun Liu.

Dept of Electronic and Electrical Engineering, UCL London WC1E 7JE, UK, Optoelectronics Research Centre, University of Southampton SO17 1BJ, Dept of Electrical Engineering, Bay Campus, Swansea University, Swansea SA1 8EN, ATI University of Surrey, Guidford, Surrey, GU2 7XH, National Centre for Nano Fabrication and Characterisation, TU Denmark, 2800 Kongens Lyngby, Denmark, Dept of Physics, University of Warwick, Coventry CV4 7AL UK

09:45 S25_11 **Commercial laser spin injection exploiting non-degenerate mode coupling**

Timur Almabetov[1],, Petros Androvitsaneas[1], Zhongze Ren[1], Andrew Young[1], Ruth Oulton[1], and Edmund Harbord[1]*

[1]Quantum Engineering Technology Labs, H. H. Wills Physics Laboratory and School of Electrical, Electronic and Mechanical Engineering, University of Bristol, UK, BS8 1FD

10:00 S25_06 **Indium-flush technique for C-band InAs/InP quantum dots**

Jiajing Yuan[1], Calum Dear[1], Hui Jia[1], Jae-seong Park[1], Huiwen Deng[1], Khalil El Hajraoui[2], Shangfeng Liu[3], Quentin M. Ramasse[2], Qiang Li[3], Mingchu Tang[1], Huiyun Liu[1]*

1. Department of Electronic and Electrical Engineering, University College London, Torrington Place, London WC1E 7JE, United Kingdom 2. SuperSTEM, SciTech Daresbury Science and Innovation Campus, Block J, Keckwick Lane, Daresbury WA4

4AD, United Kingdom 3. School of Physics and Astronomy, Cardiff University, Cardiff CF24 3AA, United Kingdom

10:15 S25_03 **Extraction of the Key Dynamical Features of Electrically-Pumped Semiconductor Nano-laser Arrays**

Yuanlong Fan[1,2], Guojie Zhou[1,2] and K. Alan Shore[3]

Hangzhou Institute of Technology, Xidian University, Hangzhou, 311200, China. [2]School of Optoelectronic Engineering, Xidian University, Xi'an, 71 0071, China. [3]School of Computer Science and Electronic Engineering, Bangor University, Bangor, LL57 1UT, UK

Refreshment break 10:30 – 11:00

4th floor, Centre for Student Life

Session 7: Surface Emitters

Centre for Student Life, Stanley Thomas Lecture Theatre

11:00 S25_01 **Reliability Study of 940 nm VCSELs Using Accelerated Life Testing**

Eamonn J Ahmad (1), N. Avlonitis (1), S.J. Gillgrass (2), C.P. Allford (2), S. Shutts (2), P.M. Smowton (2) J.I. Davies (3)

(1) CSA Catapult, Newport, UK, (2) Future Compound Semiconductor Manufacturing Hub, School of Physics and Astronomy, Cardiff University,(3) IQE plc, Pascal Close, St Mellons, Cardiff

11:15 S25_02 **VCSEL Chaos Bandwidth Enhancement For Information Processing Platforms**

R.Chen [1,2,3] , Q.Cai[5] , P. Guo[4],J. Zhang [1] ,P. Li [1,2,3], K. A.Shore [6],Y.Qin [1,2,3] and Y.Wang[1,2,3]

[1] Institute of Advanced Photonics Technology, School of Information Engineering, Guangdong University of Technology, Guangzhou 510006, China [2] Key Laboratory of Photonic Technology for Integrated Sensing and Communication, Ministry of Education, Guangdong University of Technology, Guangzhou 510006, China. [3] Guangdong Provincial Key Laboratory of Information Photonics Technology, Guangdong University of Technology, Guangzhou 510006, China. [4] Key Laboratory of Advanced Transducers and Intelligent Control System, Ministry of Education, Taiyuan University of Technology, Taiyuan 030024, China. [5] Department of Physics,

Taiyuan Normal University, Taiyuan 030619, China. [6]School of Computer Science and Electronic Engineering, Bangor University, Wales LL57 1UT, U.K.

11.30 S25_33 Multi-Aperture Vertical-Cavity Surface-Emitting Lasers

James Meiklejohn[1], Jack Baker[1], Craig P. Allford[1], Sara Gillgrass[1], Curtis Hentschel[1] , Denise Powell[2], Mohsin Haji[3], Peter M. Smowton[1], Samuel Shutts[1]

1. Optoelectronics Group, Department of Physics, Cardiff University. 2. Compound Semiconductor Centre Ltd., Cardiff. 3. National Physical Laboratory, Teddington

11.45 S25_32 High-Power VCSELs at High Operating Temperatures

J. Baker[1], C. P. Allford[1], C. Hentschel[1], T. Peach[2], J. Meiklejohn, S. Gillgrass[1], B. Amara[1], K. Roberts[3], J. Mitchell[3], H. Ashraf[3], D. Powell[4], S. Shutts[1], P. M. Smowton[1,2]

*1 Advanced Semiconductor Technology Group, Cardiff University, UK.. 2 Institute for Compound Semiconductors, Cardiff University, UK. 3 KLA Corporation (SPTS Division), Newport, UK.*4 Compound Semiconductor Centre, Cardiff, UK

Lunch 12:00

4th floor, Centre for Student Life

Conference closes