

The Semiconductor Programme – Slides from Cohort Building & Networking, at Wales Tech Week and Photonex

Dr Paul Huggett

Knowledge Transfer Manager – Electronics and Semiconductors, InnovateUK KTN
paul.huggett@iuk.ktn-uk.org

Dr Sven Knowles

Knowledge Transfer Manager - Industrial Technologies, InnovateUK KTN
sven.knowles@iuk.ktn-uk.org

Wales Tech Week:
17th October 2023

SPIE Photonex:
26th October 2023

SEMIconductors CR&D Call

This will invest up to **£12 million** in innovation projects to **assist the improvement and scale up for semiconductor manufacture within the UK.**

This call is due to open 4th December 2023 with a briefing event on the 5th December 2023.

This £12million CR&D competition following on ideas and the scope of the Scale-up Feasibility competition to initiate larger scale projects of up to 12-month duration looking to

- establish innovations and new manufacturing techniques across the semiconductor supply chain,
- encourage new collaborations across different areas of the industry, and
- develop closer ties with academia and industry

For more details on the Scope and to REGISTER for the Briefing:

<https://iuk.ktn-uk.org/events/semiconductors-manufacture-scaleup-crd-12m-competition-launch-and-briefing/>



**Slides that were Presented at
Wales Tech Week (17 Oct 2023)
and
Photonex (26 Oct 2023)**

SEMIconductors Pitch Cohort & Networking Building

This is for Organisations already involved in the SEMIconductors programme and those interested in joining the next SEMIconductors call.

At end of 2023 there will be a further up to £12million competition following on ideas from the Scale-up Feasibility competition to initiate 12-month duration projects.

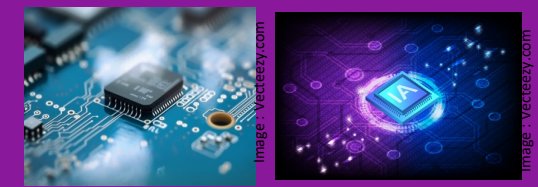
The Cohort and Networking events at Wales Tech Week (17 Oct 2023) and SPIE Photonex (26 Oct 2023) were for the semiconductor community, existing project participants, and organisations who are interested in the upcoming SEMIconductors CR&D competition.

The following organisations presented their pitches in person.

The following pitch slides have been authorised by the organisations to be shared after the event to promote their collaboration ideas and requirements.

Organisations who Presented Slides at Wales Tech Week (17 Oct 2023) and SPIE Photonex (26 Oct 2023)

AI Space Design	Oxford Lasers
Arm Ltd	Paragraf Ltd
Batten & Allen	Quantum Science Ltd
Bay Photonics	Quinas Technology Ltd
Clas-Sic	University of Glasgow - James Watt School of Engineering
Compound Semiconductor Centre Ltd	Rigpa.ai
CSA Catapult	Rydon Technology Ltd
Cornerstone	University of Glasgow
CScconnected	See-Science Ltd
University of Edinburgh - Scottish Microelectronics Centre	Sivers Photonics
EMU Technology	SpaceForge
HSSMI	Surrey Ion Beam Centre
Uni of Glasgow - Adv Semi Materials & Devices Group	University of Glasgow - James Watt Nanofabrication Centre
IMAPS-UK	Tetrivis Ltd
Infinitesima	UKESF
KuasaSemi Ltd	University of Bristol & TherMap Solutions
Lancaster University, ULTRARAM™	University of Southampton
Loughborough Surface Analysis Ltd	University of Strathclyde
Nascent Semiconductor Ltd	Wave Photonics
National Epitaxy Facility	XCAM
Newcastle University	Xi Engineering
Northumbria University	ZiNIR Ltd
	Department of Business and Trade



Wales Tech Week

Our Company: AI Space Design (SME)

- Specializes in power management IP designs using AI
- Cost-efficient and faster time to market IP solutions
- Focused on EV and space markets.

Team:



Satish Vangara
CEO
Chip design (15+)



Sneha Katab
CTO
IT and AI (10+)



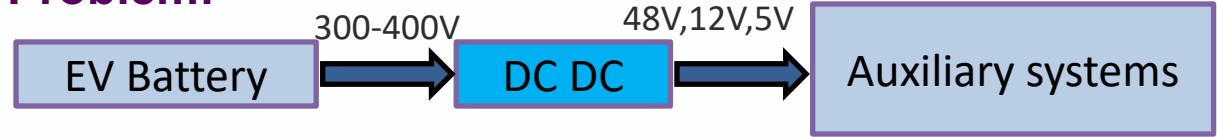
Vikas Sharma
Advisor
Business executive (25+)

Contact Details

Name: Satish Vangara Email: info@aispacedesigns.com Ph: +44 7876528073
Can this Slide be shared after event: Yes

1. Project Idea: High Efficiency DC DC converter Voltage conversion losses = 2X Renewable energy

Problem:



Low efficient DC DC converters can cause:

- Energy wastage
- Reduce driving range on a single charge
- Shortening battery life span

Solution: By Amalgamating the

Advanced multi level architecture



Compound semiconductors

High efficient and area effective DC DC for EV market

2. The solutions we offer:

- High efficiency DC-DC converters for EV market
- Easily customizable power management IPs

3. The partners and services we are seeking:

- Compound semiconductor manufacturers
- Design tools
- Chip packaging
- Testing facilities

Wales Tech Week

• **About your Company**

- Arm is everywhere technology matters (200+ billion chips in everything from sensors, to smartphones, to servers). It is headquartered in Cambridge, with a global footprint and partner eco-system.

• **Contact Details**

- **Name:** Becky Ellis, Robert Iannello
- **Email:** education@arm.com
- **Phone:** Becky (07341 564281) Robert (07387 260968)
- **Can this Slide be shared after event:** Yes

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- Leverage Arm's unique convening power (including the Semiconductor Education Alliance and a strategic partnership with Taiwan) to position the UK as a leader in semiconductor industry skills and training (for both teaching and research).
- Our global posture allows us to foster genuinely international communities of practice, such as SoC Labs and Edu Labs, advantaging the UK at the centre.

2. The services or solutions you can offer

- Educational interventions from us and a wide array of Arm's eco-system partners
- Zero cost provision of commercially-proven semiconductor IP
- Marketing support
- Networking/ introductions
- Early-stage community of practice initiatives, with growing momentum

3. The partners/services you are seeking

- Academic institutions (teaching & research)
To provide and receive upskilling services
- Industrial partners in the wider eco-system
To provide unique value-add offers
- Trade bodies/ networking organisations/ aggregators
To raise awareness and boost the communities of practice
- Policy makers
To ensure tight alignment with the UK Semiconductor Strategy.

Wales Tech Week

• **About your Company**

- Batten & Allen (an SME) specialises in the stamping, plating and assembly of high precision parts to customers in the electronics, automotive, medical and industrial markets.
- With an unrivalled focus on engineering reliability, we insist on providing a responsive and efficient service by having a true understanding of our customers' needs.
- With a world class quality management system supported by the very latest tooling, measurement and production technology, we ensure that your required accuracy is always met.

• **Contact Details**

- **Name:** Ian Mackinnon
- **Email:** imackinnon@batten-allen.co.uk
- **Phone:** +44 1285 655220
- **Can this Slide be shared after event:** Yes

2. The services or solutions you can offer

- At Batten & Allen, we specialize in delivering a comprehensive range of services tailored to the unique needs of the electronics, automotive, medical, and industrial industries. Our services encompass:
 - **1. Stamping:**
 - Precision stamping of intricate parts, ensuring consistency and accuracy.
 - **2. Plating:**
 - A wide array of plating finishes, catering to diverse industrial applications.
 - **3. Assembly:**
 - Expert assembly of components, ensuring seamless integration and functionality.

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

1. **Custom Semiconductor Lead Frames:**
Objective: Design and manufacture precision-stamped lead frames for semiconductor devices, ensuring optimal electrical and thermal performance.
2. **High-Performance Heat Sinks for Electronic Components:**
Objective: Develop and produce advanced heat sinks using precision stamping and plating for effective thermal management in semiconductor applications.
3. **RF Connectors for Communication Systems:**
Objective: Supply custom-plated connectors optimized for high-frequency communication systems, addressing the specific needs of the semiconductor industry.
4. **Semiconductor Wafer Handling Solutions:**
Objective: Create specialized stamped and plated components for wafer handling systems, contributing to the efficiency and reliability of semiconductor manufacturing processes.
5. **Customized IC (Integrated Circuit) Packaging Solutions:**
Objective: Collaborate on the development of precision-stamped and plated components for customized IC packaging, enhancing performance and reliability.

3. The partners/services you are seeking

1. **Electronic Device Manufacturers:**
Why: Collaboration with companies that design and produce electronic devices, where your precision-stamped components play a crucial role.
2. **Automotive OEMs (Original Equipment Manufacturers):**
Why: Partnerships with automotive manufacturers for the supply of precision parts used in vehicles, contributing to safety and performance.
3. **Connectivity Solutions Providers:**
Why: Work with companies specializing in connectivity solutions, providing custom-plated connectors for electronic systems.
4. **Green Technology Companies:**
Why: Partner with companies in the green technology sector, supplying components for electric vehicles, renewable energy systems, and energy-efficient technologies.
5. **Research and Development Institutions:**
Why: Explore partnerships with R&D institutions to stay at the forefront of technology and contribute to cutting-edge developments.
6. **Contract Manufacturers:**
Why: Partner with contract manufacturers who may require your services for the production of specific components in their projects.

Wales Tech Week

• About your Company

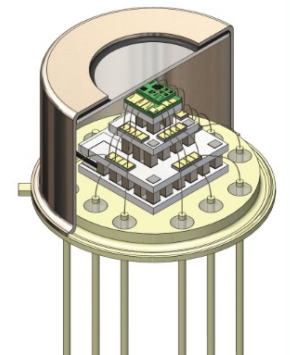
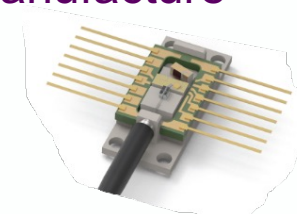
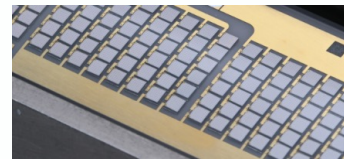
- Bay Photonics
- Experts in semiconductor photonic packaging (PICs)
- SME, 31 people, facility in Torbay

• Contact Details

- Andrew Robertson, CTO
- andrew.robertson@bayphotonics.com
- 0776 988 2657
- Can this Slide be shared after event: Yes

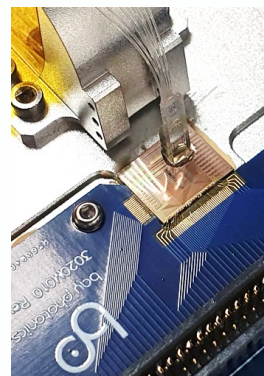
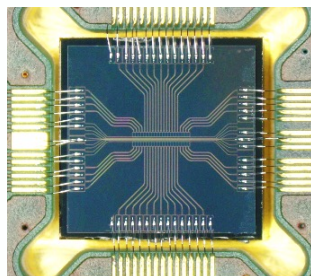
1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- Providing innovators with low volume advanced semiconductor and silicon photonics packaging solutions
- Advanced packaging solutions designed for volume manufacture



2. The services or solutions you can offer

- Electrical, optical, thermal and mechanical interconnectivity, hermetic sealing
- Single fibre attach
- Fibre array attach



3. The partners/services you are seeking

- Bay Photonics has history of providing packaging for photonic integrated circuits and advanced silicon photonics, application areas include;
 - Quantum & AI
 - Telecoms/datacoms
 - Wearable devices & lab on a chip
 - LIDAR
 - Remote sensing
- Application agnostic but typically photon friendly!

Photonex

About your Company

- David Clark, Chief Technology Officer
- The UK's only commercial Silicon Carbide wafer fab
- Based near Edinburgh, Scotland
- Medium sized enterprise (70 employees)

Contact Details

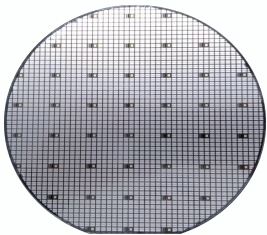
- Name: David Clark
- Email: david.clark@clas-sic.com
- Phone: +44 (0)7741 904922
- Can this Slide be shared after event: Yes

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- Different voltage class development
 - Voltages higher than 3300V?
 - Voltages between 1200V-1700V or 1700V-3300V
- Improved device performance to reduce device size/cost
 - For example, gate oxide
- Custom device fabrication/integration for advanced application
- etc

2. The services or solutions you can offer

- Pure play wafer fabrication
- SiC MOSFET and Diode



Available SiC Process Design Kits
650-2500V JBS/MPS Diode PDK
1200V MOSFET PDK
1700V MOSFET Alpha PDK
3300V MOSFET Alpha PDK



- Other devices and voltages possible

3. The partners/services you are seeking

This could include some of:

- Fabless semiconductor designers
- Device packaging into suitable packages – eg TO-247
- Analysis house
- User with high voltage/high current application requirement
- etc



Wales Tech Week

- **About your Company**

- Compound Semiconductor Centre Ltd
- Wafer & device fabrication for prototyping
- SME

- **Contact Details**

- **Name:** Phillip Cornish
- **Email:** cornishp@cardiff.ac.uk
- **Phone:** +44 (0)29 225 10181
- **Can this Slide be shared after event:** Yes

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- Open to discuss project ideas that include the use of photonics (lasers, sensors and detectors etc.) in automotive, energy, healthcare, space, telecommunications industries etc.
- Our challenge is to improve manufacturing processes (front & back-end), wafer and device fabrication as part of the proposed project

2. The services or solutions you can offer

- Device manufacture, front & back-end processes, wafer and device fabrication, PDK development
- Fabrication – operations & sustainability

3. The partners/services you are seeking

- Companies with an interesting project idea and complementary capabilities, including those working in advanced packaging, hybrid, heterogeneous, SoC, SiP, and assembly & test

Wales Tech Week & Photonex

- **About CSA Catapult**

- The CSA Catapult, a not-for-profit RTO, is a centre of excellence that is home to state-of-the-art equipment that specialises in the measurement, characterisation, integration, and validation of compound semiconductor technology (wafer, device/sub-module, applications)

- **Contact Details**

- **Name:** Jerome Perrier / Mark Goossens
- **Email:** jerome.perrier@csa.catapult.org.uk / mark.goossens@csa.catapult.org.uk
- **Can this Slide be shared after event:** Yes

- **2. The services or solutions you can offer**

- Power Electronics – Design, Device characterization and testing
- Packaging – Design, thermal analysis, additive manufacturing and packaging prototype line
- Photonics & RF– Design, test and validation services for Photonics and RF devices/components

Neutral RTO and supply chain broker available for wider signposting for consortia if required.

- **1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address**

- Enabling services for the wider semiconductor industry in a range of sectors and fields with our Innovation Centre Labs.
- De-risking technology and accelerating adoption of semiconductor technology by the UK supply chain.

- **3. The partners/services you are seeking**

Partners from wafers to application end-users across all sectors for the benefit of UK Plc



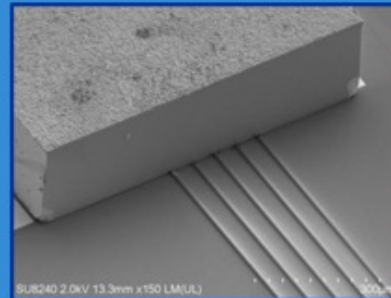
Photonex Can this Slide be shared after event: Yes

- License free, open-source silicon photonics foundry
- Deep-UV + e-beam 8" lithography for prototyping and scaling to higher volumes
- Multiple platforms for visible, telecom and mid-IR wavelengths
- Fabrication service provider (MPW or bespoke batches)

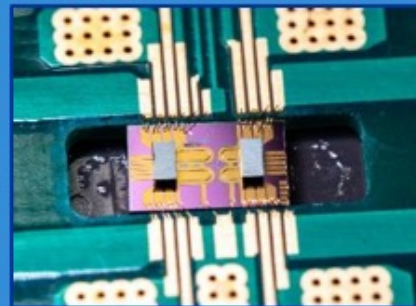
cornerstone@soton.ac.uk

www.cornerstone.sotonfab.co.uk

www.linkedin.com/company/cornerstonesp



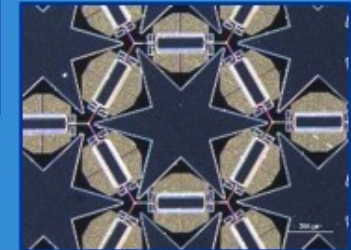
Pick-and-place of light sources



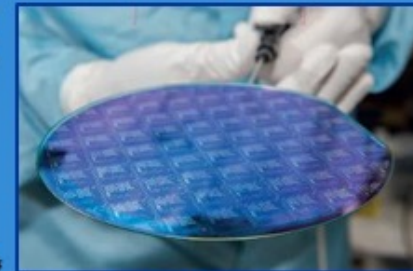
Flip-chip + wire bonding



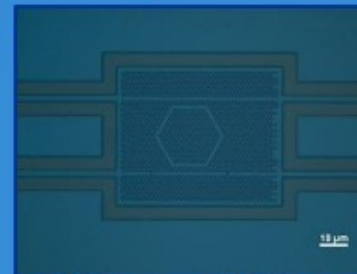
Ge-on-Si



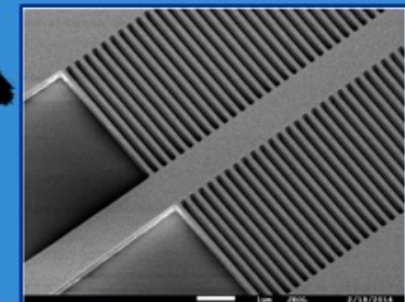
Multiple SOI platforms



DUV lithography service



Silicon nitride



Suspended Si



Wales Tech Week

- **About your Company**

- Chris Meadows
- Compound semiconductors
- Membership organisation/RTO

- **Contact Details**

- **Name:** Chris Meadows
- **Email:** chrismeadows@cconnected.com
- **Phone:** +44 77 3336 8930
- **Can this Slide be shared after event:** Yes

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- Building robust supply chain activity around compound semiconductors
- Creating outreach and delivering skills activities

2. The services or solutions you can offer

- Connecting with the South Wales based compound semiconductor community

3. The partners/services you are seeking



Photonex

- **About your Company**
 - Scottish Microelectronics Centre
 - Micro/nano fabrication solutions
 - Research organisation
- **Contact Details**
 - **Name: Prof Themis Prodromakis**
 - **Email: t.prodromakis@ed.ac.uk**
 - **Phone: 0131 650 7447**
 - **Can this Slide be shared after event: Yes**

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

Address the skills shortage in topical areas such as:

- Semiconductor fabrication processing
- Semiconductor theory at appropriate levels
- Fabrication tool knowledge
- Semiconductor device design and modelling

2. The services or solutions you can offer

Develop and offer appropriate teaching material and training to Schools, Colleges, apprentices and Univ. in:

- Micro/nano-fabrication techniques
- Theory of Semiconductor materials and devices
- Equipment Theory
- Design and modelling

3. The partners/services you are seeking

Interested in working with stakeholders that can benefit and/or co-develop offered solutions such as:

- Semiconductor design/manufacturing companies
- Colleges
- Other Universities

Photonex**• About your Company**

- HSSMI - A sustainable manufacturing consultancy (SME)
- Focused on helping manufacturers to scale up production, enhance productivity and enable circularity
- Experts in Automotive and Aero, with focus on EV

• Contact Details

- **Name:** David Stewart
- **Email:** david.stewart@hssmi.org
- **Phone:** 07776235642
- **Can this Slide be shared after event:** Yes

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- The global scale up of electric vehicles will create exponential demand for the supply of Semiconductors.
- Global auto OEMs are establishing strategic relationships to jointly setup new production facilities to feed future demand
- As demand and production grows, so too will consumption and the opportunity for materials recovery
- The UK risks being left behind if it doesn't develop the manufacturing capability / capacity and robust, circular supply chains
- The idea behind this project is to define a production and supply chain blueprint for high volume manufacturing and materials recovery

2. The services or solutions you can offer

- Manufacturing Strategy
- High volume factory design
- Digital twin development
- Industrial engineering
- LCA / carbon impact assessment and development of low carbon solutions
- Advanced logistics and supply chain modelling / development
- Bid writing / management (part of project)

3. The partners/services you are seeking

Ambitious semiconductor OEMs looking to scale up production and establish sustainable, resilient supply chains



Wales Tech Week

• **About your Company**

- IMAPS-UK
- Microelectronics Assembly & Packaging
- Trade Organisation (A charitable institution)

• **Contact Details**

- **Name:** Andy Longford
- **Email:** andy.longford@imaps.org.uk
- **Phone:** 07710 209640
- **Can this Slide be shared after event:** Yes

2. The services or solutions you can offer

- *IMAPS-UK supports the Semiconductor packaging and assembly industry by developing and supplying a range of technology based webinars, training courses, workshops and conferences.*
- *As an organisation it provides a regular meeting place enabling networking and generation of business across industry, Academia and RTO's within the UK and beyond*
- *It is a recognised source of technical knowledge*

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- Developing a “smart” web based technical training course in Microelectronics Assembly.

To enable:

- Delivery of microelectronics learning content in a Video Audio style of small “Bites” of information
- A “smart” methodology for on-line dissemination
- Creation of a web based assessment process
- Establishment of an Industry approved qualification

3. The partners/services you are seeking

- We are seeking to develop a consortia of organisations offering training capabilities both practical and theoretical, to support microelectronics design and manufacturing.
- The consortia to include RTOs, Academia and industry, with capabilities to support the development of a “Learning Material” format to suit a variety of delivery process options.

Wales Tech Week

• About your Company

Infinitesima is an instrument manufacturer SME that has developed a fundamentally different atomic force 3D surface measurement technique, the Rapid Probe Microscope (RPM), delivering picometer precision and speeds >10x faster than those achieved by conventional Atomic Force Microscopes (AFM).

• Contact Details

- Name: Dr. Aurélien Trichet
- Email: aurelien.trichet@infinitesima.com
- Phone: 07502 207014
- Can this Slide be shared after event: Yes



1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- We are developing a new generation of rapid probe microscope with multiple probes scanned simultaneously.
- Our innovation aims to increase wafer analysis throughput and/or the inspection area that our 3D characterisation technique can address.
- This innovation would unlock market opportunity at the wafer inspection stage for **chemical mechanical polishing and extreme UV photoresist analysis**.

2. The services or solutions you can offer

Infinitesima can offer:

- High-throughput 3D characterisation of wafers and semiconductor structures
- Large-scale stitching of 3D scans, up to 5mm x 5mm scale
- Develop defect analysis and use case specific to new semiconductor device designs
- Expertise in 3D characterisation of semiconductor wafers

3. The partners/services you are seeking

We are facing challenges linked to:

- Semiconductors metrology
- Complex instrument design (optics, mechanics, electronics, fast control system)
- Non-standard probe manufacturing.

We are also seeking partners that can help developing **application use case** for our next generation of instruments:

- For example, a semiconductor fabrication facility with a need for large scale/high-throughput characterisation platform.

Wales Tech Week

- **About your Company**

- KuasaSemi Ltd
- Semiconductor Device Design Software (TCAD)
- Start-up

- **Contact Details**

- **Name:** David Mawby
- **Email:** david.mawby@kuasasemi.com
- **Phone** +44 (0)7961 283881
- **Can this Slide be shared after event:** Yes

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- We are looking to address the lack of affordable and easy to use tools for semiconductor device design.
- Specifically, we are looking to support the development of WBG material devices used in Renewable energy generation, smart grids and more electrified transport.

2. The services or solutions you can offer

- Technology Computer Aided Design (TCAD) software for semiconductor device design.
- The software can be used to simulate and analyse the behavior of semiconductor devices, enabling engineers to understand and optimise their performance.
- Simulation Types:
 - Process simulation
 - Device simulation
 - Circuit simulation

3. The partners/services you are seeking

- Companies & Universities
- Early adopters – trial
- Prove the validity of our software
- Customer-led design
- Provide feedback

Wales Tech Week

- **Lancaster University, Physics Department**
 - A research group within a world-leading department
 - Researching **ULTRARAM™** computer memory
 - We are a research organisation
- **Contact Details**
 - **Name:** Serdar Tekin on behalf of Prof Manus Hayne
 - **Email:** m.hayne@lancaster.ac.uk
 - **Phone:** +441524593279
 - **Can this Slide be shared after event:** Yes

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- **ULTRARAM™** is a revolutionary quantum-powered universal memory.
- It combines energy-efficiency, speed, retention and endurance into a single memory.
- Challenge: **ULTRARAM™** development is at a crucial stage – transitioning from R&D to commercialisation.
- The next stage of this journey is scalable epitaxy.

2. The services or solutions you can offer

- Memory design and simulation
- Molecular beam epitaxy (up to 3”) and recipe design
- XRD and XRR characterisation
- Clean room with standard fabrication tools including:
 - ALD, thermal evaporation, DC/RF sputter, PECVD, ICP, wet etching, RIE, RTA, profilometer, photolithography, direct laser writer and e-beam lithography
- Basic memory testing

3. The partners/services you are seeking

- We are seeking a **Commercial Epitaxy Partner** with:
- 6” and/or 8” MOCVD capability
 - R&D experience integrating III-Vs onto Si substrates
 - Epitaxy of GaSb, In(Ga)As and AlSb
 - A route towards volume production of **ULTRARAM™**

Wales Tech Week

- **About your Company**

- Loughborough Surface Analysis Ltd
- Primarily SIMS analysis of semiconductors
- We are an SME (actually a micro-business)

- **Contact Details**

- **Name:** Mike Petty
- **Email:** m.petty@LSALtd.co.uk
- **Phone:** 01509 260779 / 07767 390227
- **Can this Slide be shared after event:** Yes

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- Using our fleet of Cameca SIMS instruments, including two state-of-the-art Cameca 7f-AutoSIMS machines, we can bring to a project a SIMS capability that is unique amongst contract analysis laboratories in Europe.

2. The services or solutions you can offer

- Semiconductor materials analysis
- Dopant quantification and profiling
- Contaminant identification and quantification
- Layer structure determination
- Surface contaminants
- Packaging issues
- Delamination
- Wire-bonding issues
- Solder dewetting

3. The partners/services you are seeking

- We are seeking to join consortia developing new materials, processes and/or devices that require a materials analysis capability, especially SIMS.



Photonex

- **About your Company**

- Nascent Semiconductor Limited, an SME
- Fabless Semiconductor company specializing in high performance compound semiconductor technology

- **Contact Details**

- **Name:** Nigel McLean
- **Email:** Nigel@nascentsemi.com
- **Phone:** 07960 914948
- **Can this Slide be shared after event:** Yes

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- Creation of a fully sovereign supply chain to facilitate high performance compound semiconductor devices
- Validation of open source (non ITAR) EDA tools for high performance compound semiconductor devices within the power, RF and photonic sectors
- Demonstrate full supply chain for low volume pre-production prototyping and identify route to large scale manufacture within the UK

2. The services or solutions you can offer

- Semiconductor design capability
- Open Source EDA Tool creation
- Physics based modelling of semiconductor parameters
- Process flow development
- Parametric data collection and analysis

3. The partners/services you are seeking

- RF / Photonic / Power device specialists
- Compound Semiconductor Foundries
- Advanced Packaging
- End users of the components to ensure market pull

Photonex

- **About your Company**

- Newcastle University
- Research

- **Contact Details**

- **Name:** Professor Anthony O'Neill
- **Email:** anthony.oneill@ncl.ac.uk
- **Phone:** 0191 2087328
- **Can this Slide be shared after event:** Yes

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- Improving SiC MOSFETs with novel gate stack design
- Improvements of 10x in mobility and other I-V characteristics
- Improvements in reliability and reduced Vt instability

2. The services or solutions you can offer

- Design / fabrication / characterization of semiconductor devices.
- Special expertise in Si and SiC MOSFETs

3. The partners/services you are seeking

- Research collaboration
- Commercial and/or
- Academic



Photonex

- **About your Company**

- Northumbria University
- Higher Education
- Research organisation

- **Contact Details**

- **Name:** Professor Neil S. Beattie
- **Email:** neil.beattie@northumbria.ac.uk
- **Phone:** 0191 227 4592
- **Can this Slide be shared after event:** Yes

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- Innovative implementation of photovoltaics in the built environment and beyond
=> significant increase in use of available surface area
- Advanced photovoltaic concepts for space applications
=> power beaming, power sources
- Eco-design of next generation products
=> integrated product life-cycle assessment

2. The services or solutions you can offer

- Expertise and laboratory facilities
- Thin film deposition and materials characterisation
(<https://hosting.northumbria.ac.uk/tf-fab/>)
- Complete PV device fabrication and testing
- Life-cycle assessment (+ innovation)
- High skills training (STEM, CPD, bespoke e.g. professional skills for Gen Z)

3. The partners/services you are seeking

- New product innovation in semiconductors
- Specific relevance to photovoltaics, optoelectronics
- Partners requiring skills development for semiconductor supply chains and beyond



Wales Tech Week

- **Oxford Lasers**
 - Laser Micro-machining & Imaging – tools & services
 - SME
- **Contact Details**
 - **Name:** Martyn Knowles, CEO
 - **Email:** martyn.knowles@oxfordlasers.com
 - **Phone:** 01235 810088
 - **Can this Slide be shared after event:** Yes

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- Laser micromachining in Semiconductor processing
- Laser micromachining in Semiconductor Test
- Laser Trimming of precision analogue ICs
- Laser Trimming (electrical or mechanical) of MEMs
- Advanced probe cards

2. The services or solutions you can offer

- Laser micro-machining tools & services
- Supplier of laser drilled guide plates for probecards
- Laser trimming tools for precision analogue ICs
- High Speed Imaging instrumentation for spray analysis (particle size, shape and velocity)

3. Partners we are seeking

- Probecard manufacturers
- Manufacturers of precision analogue ICs needing trimming
- MEMS designers/manufacturers needing trimming

**Wales Tech Week**

- **About your Company**

- Paragraf Ltd
- Graphene Electronics
- SME – Scale-up manufacturing organisation

- **Contact Details**

- **Name:** Tony Pearce
- **Email:** t.pearce@paragraf.com
- **Phone:** 07884 515777
- **Can this Slide be shared after event:** Yes

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- Paragraf is scaling up its manufacturing capability as the world's only 2D material production fab facility.
- Graphene Hall Sensors being the first product to market, Paragraf is building capacity in Cambridgeshire to manufacture graphene electronics in volume.
- Cleanroom construction is underway, tools are being installed and skilled workforce needs to be added.

2. The services or solutions you can offer

- The semiconductor industry will need to adopt more advanced 2D materials to achieve future performance and power efficiency demands.
- Paragraf is the only company in the world able to manufacture 2D electronic materials and devices at scale to meet these manufacturing challenges.
- Project partnership with Paragraf will give unique early access to qualification within this process line.

3. The partners/services you are seeking

- Product development partners to bring next generation devices utilising 2D materials to market.
- Equipment development partners to enable qualification of manufacturing tools at scale.
- Skills and development support to train the skills required to support growth in 2D electronics manufacturing.

Photonex

- **Quantum Science Ltd**
 - Quantum dot sensor technology
 - SME
- **Contact Details**
 - **Name:** Stuart Stubbs
 - **Email:** sstubbs@qscis.com
 - **Phone:** 01925 807980
 - **Can this Slide be shared after event:** Yes

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address
Solution

- Novel SWIR quantum dot sensor technology for machine vision applications
- Capable of detecting light from visible (400 nm) to SWIR (2400 nm)

Challenge

- Integration of quantum dot photodiode structures with read out integrated circuits
- Wafer scale process development for photodiode integration

2. The services or solutions you can offer

- Short wave infrared sensitive nanomaterials supply
- Quantum dot photodiode stack development
- Custom wavelength development for specific applications

3. The partners/services you are seeking

- Semiconductor design and process expertise
- Photodetector and image sensor design and fabrication expertise
- Image sensor supply chain partners – Semicon makers, end users etc.

Wales Tech Week and Photonex

- **Quinas Technology Limited**
 - A spinout from Lancaster University
 - Commercialising **ULTRARAM**[™] computer memory
 - We are an SME
- **Contact Details**

• James Ashforth-Pook	Peter Hodgson
• jamesap@quinas.tech	p.hodgson@quinas.tech
• +447775578880	+441524595249
• Can this Slide be shared after event: Yes	

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- **ULTRARAM**[™] is a revolutionary quantum-powered universal memory.
- It combines energy-efficiency, speed, retention and endurance into a single memory.
- Challenge: **ULTRARAM**[™] development is at a crucial stage – transitioning from R&D to commercialisation.
- The next stage of this journey is scalable epitaxy.

2. The services or solutions you can offer

- Decades of innovation experience in semiconductors
- Global leverage/partners: US, IN, TW, JP, KR, EU.
- Strategic customers access in Silicon Valley
- Unique route into \$160bn pa market where UK has no presence
- Vision to leverage new use-cases for: AI & ML, HPC, MilAero, Automotove, IoT & Smart, Edge Compute etc.
- **ULTRARAM** is an Award winning technology poised to revolutionize the Memory domain from the UK

3. The partners/services you are seeking

- We are seeking a **Commercial Epitaxy Partner** with:
 - 6” and/or 8” MOCVD capability
 - R&D experience integrating III-Vs onto Si substrates
 - Epitaxy of GaSb, In(Ga)As and AlSb
 - A route towards volume production of **ULTRARAM**[™]

Photonex

• **About IndiPiX**

- Pioneering monolithic room-temp. MWIR imager
- CO₂, butane imaging demonstrated
- Small (4x4) to larger (64x64) imagers made

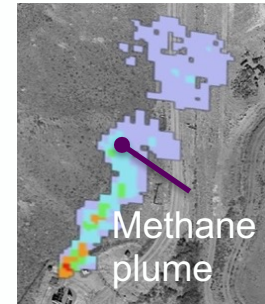
• **Contact Details**

- Name: Vincenzo Pusino
- Email: Vincenzo.Pusino@glasgow.ac.uk
- Phone: +44(0)7519803673
- Can this Slide be shared after event: Yes



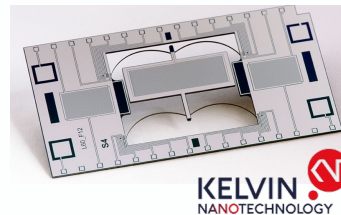
1. Project Idea: IndiPiX - Monolithic MWIR camera

- Offer a one-chip solution to open up mid-wave infrared (MWIR) imaging applications outside defense:
 - Environment (crop monitoring)
 - Chemical analysis (material sorting)
 - Net-zero (hydrocarbon imaging)



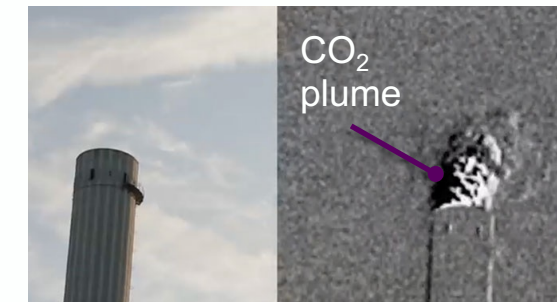
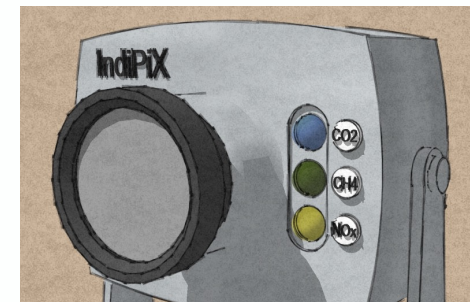
2. The services or solutions you can offer

- Single-chip mid-Wave Infrared imagers
- Design/epitaxy/fab of III-V optoelectronic devices



3. The partners/services you are seeking

- Collaborations to:
 - Explore routes to market for IndiPiX
 - Field trials of the technology





Rigpa Ltd

Creativity is Intrinsic

Pitch Deck for Cohort Event

SEMIconductors

Photonex

- **About your Company**

- Rigpa.ai – next-gen AI chip accelerating future AI
- Mike Huang, CEO, Rigpa Ltd (Ex-AMD, Broadcom)
- SME

- **Contact Details**

- Name: Mike Huang
- Email: mike.huang@rigpa.ai
- Phone: 07411967936
- Can this Slide be shared after the event: Yes

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- Ultra-low-power, high performance and low-cost next-gen neuromorphic AI chip to accelerate future AI applications

2. The services or solutions you can offer

- Next-gen neuromorphic AI solution including but not limited to sensor design, algorithm design, hardware and software development
- System integration
- Domain expertise in computer vision, IOT and medical applications

3. The partners/services you are seeking

- Supplier chain (edge devices, AI applications etc)
- Solution provider
- Distributor
- OEM

Wales Tech Week

• **About your Company**

- Rydon Technology Ltd Est 1987
- Sales/Consultancy to Semiconductor Packaging Ind
- An SME/Micro business

• **Contact Details**

- **Name:** Mark Kenny
- **Email:** mark@rydontechnology.com
- **Phone:** 01803 526939/07801966505
- **Can this Slide be shared after event:** Yes

2. The services or solutions you can offer

- Advance Semiconductor Package Design expertise.
- Semiconductor Assembly Process specialism.
Dicing/Sort/Die Attach/ Flip Chip/Wire bond/Molding/
Trim and Form/Ball attach etc
- Network of state of the art equipment and materials
manufacturers
- International supply chain knowledge
- Training and educational services in the manufacture
of Semiconductors.

**1. Project Idea - What is the solution you are
proposing / What is the Challenge you wish to address**

- Heterogeneous Packaging. Chiplets, 2.3D/2.5D/3D
packaging solutions
- Plastic Packaging QFN/BGA etc. MEMS packaging
- Power Modules and Packaging
- Training programs for Semiconductor Packaging
- Organic Substrate capabilities in the UK

3. The partners/services you are seeking

- Organisation that want to investigate adding Advanced
Semiconductor Packaging to their capability
- Organisations that want to train and develop Advanced
Packaging methods.
- Organisations that want to establish Power Package
capability.
- Organisations that are interested in the success of UK
Semiconductor manufacturing especially in Advanced
Packaging

STEM Ambassadors

A STEM Ambassador is a volunteer from a STEM-related field who helps to inspire young people about STEM subjects and careers. They support learning by showing the real world applications of STEM, and illuminate careers by providing information on roles and pathways into industry.

Contact Details

www.see-science.co.uk

Hayley Pincott

Hayley.pincott@see-science.co.uk
02920 344727

Louise Thomas

Louise.Thomas@see-science.co.uk
02920 344727

Can this Slide be shared after event: Yes

2. The services or solutions you can offer

- Information regarding STEM Ambassador scheme
- FREE registrations & DBS check
- How to register online for free [here](#)
- <https://www.stem.org.uk/user/register>
- Then complete online induction (inc. safeguarding)
- Followed by a FREE DBS check

1. Project Idea

- We are looking for new STEM Ambassadors to engage and enthuse students in all things STEM.
- Encourage students to take up STEM subjects at school.
- Introduce STEM careers and pathways.
- Future proof the workforce.

3. The partners/services you are seeking

We are looking for new STEM Ambassadors who come from various disciplines and backgrounds, such as engineering, science, maths, design, and technology. We are dedicated to improving young people's lives through the power of STEM and believe great STEM education builds knowledge and skills that are vital for everyone.

By going into schools to promote STEM the benefits to the STEM Ambassador include:

- Improve transferable skills: communication, planning, organisation, team management, working under pressure & adaptability.
- Include activities for CPD.
- Increase awareness of your profession, future proofing the workforce.

Photonex

- **About your Company**
 - University of Glasgow
 - Mm-wave InP/GaAs/GaN devices&integrated circuits
 - Research org
- **Contact Details**
 - Name: Professor Chong Li
 - Email: chong.li@glasgow.ac.uk
 - Phone: 0141 330 4626
 - Can this Slide be shared after event: Yes

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- Future comms, RADAR, sensing etc require mm-wave solutions
- Quantum computing systems require better low noise electronics solution and next G also require mm-wave solutions
- UK has no InP or GaAs MMIC facility
- **UK's first MMIC capability for high frequency i.e. >110 GHz and low temp applications**

2. The services or solutions you can offer

- Sub-50 nm T-gate process
- MMIC process and PDKs
- Material design & physics-based device modelling
- On-chip test capabilities including active load pull up to 1.1 THz, passive noise parameter measurement system (2 GHz - 50 GHz); S-parameter (Room temp up to 1.1 THz; 4K up to 40 GHz)

3. The partners/services you are seeking

- Epi growth
- Packaging
- noise figure test
- Circuit design and optimization
- Module development
- System integration

Photonex

- **Sivers Photonics**

- www.sivers-semiconductors.com/sivers-photonics/
- Volume production of photonic devices
- SME with photonics branch based in Scotland

- **Contact Details**

- **Name:** Dr. Horacio Cantu
- **Email:** Horacio.cantu@sivers-photonics
- **Phone:** 0169 8722072
- **Can this Slide be shared after event:** Yes

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- Improving reliability of photonic sources life-time to a single digit FIT by improving device fabrication technology. Deep technical knowledge of optical strength of semiconductor materials, design of experiments and physical model of optical damage mechanisms. Stress tests implementation and acceleration models to obtain fast qualification of photonic devices for industrial applications (3 months)

2. The services or solutions you can offer

- Reliability test equipment: ACC stress tests, APC stress tests for photonic devices. Environmental chamber for humidity, non-hermetic stress tests
- Data collection and analysis: LI, IV data plots and automated monitoring of parametric changes during accelerated tests. Documentation and reports.
- Reliability models: Fitting of acceleration data to degradation models (Arrhenius, Eyring)
- Calculation of FITs, Ea, B, lifetime, from statistics

3. The partners/services you are seeking

- In-depth knowledge of photonics device design parameters and device physics
- Knowledge of light emitting surfaces and composition analysis to increase optical strength
- Design of experiments for a rapid evaluation of a device optical strength
- Expertise for generation, evaluation, and interpretation of failure analysis data (SEM, STEM, EL)
- Interest in competitive industrial applications

Photonex

About Surrey Ion Beam Centre

- UK National Ion Beam Centre
- Ion implantation and Ion Beam Analysis
- A facility funded by UKRI-EPSCRC

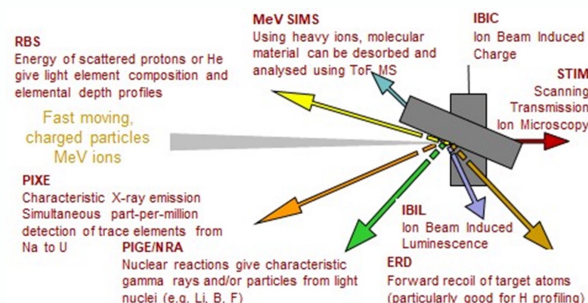
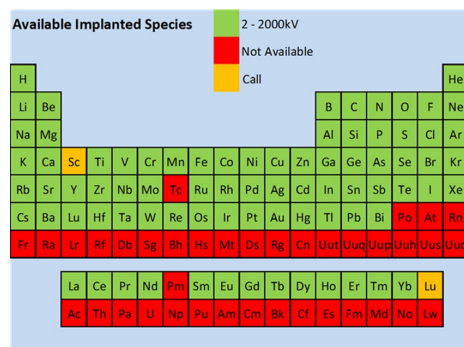
Contact Details

- Name: Nianhua Peng
- Email: n.peng@surrey.ac.uk
- Phone: 07480575509
- Can this Slide be shared after event: Yes

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- Collaboration on research and development on new materials, new devices and new processes
- Flexible but small volume commercial device fabrication capability
- Training opportunities

2. The services or solutions you can offer



3. The partners/services you are seeking

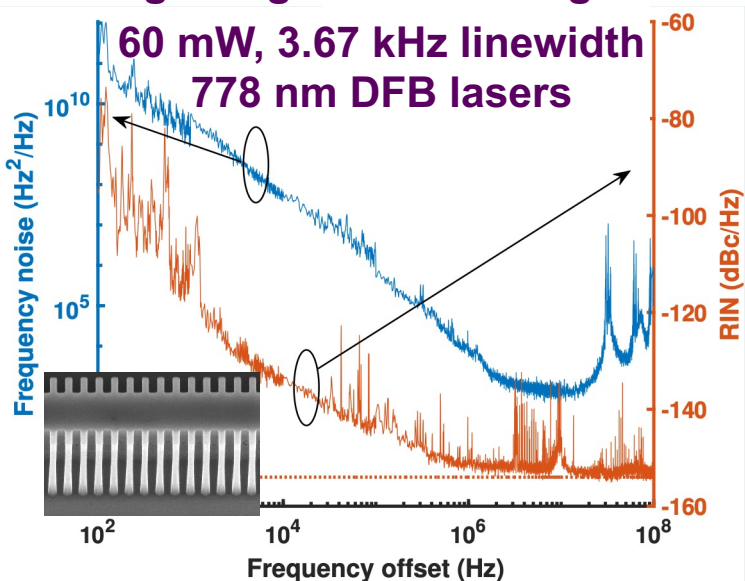
- Potential R&D specialists
- Business partners

Photonex

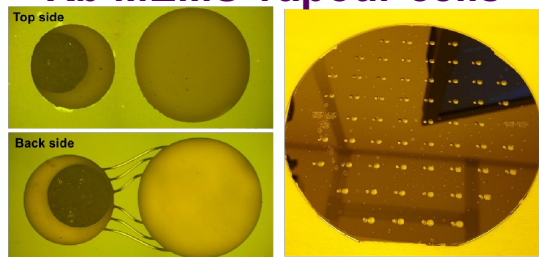
- University of Glasgow, James Watt Nanofabrication Centre
- Prof Douglas J Paul, Royal Academy of Engineering Chair in Emerging Technologies
- E-mail: Douglas.Paul@glasgow.ac.uk
 Tel:- 0141 330 5219
- Slides can be shared

- Project Idea: UK Atomic Clock & Quantum Sensor Supply Chain
- New UK PNT strategy aims to develop UK Sovereign atomic clock supply chain
- £300M pa clock market in 2017 expected to grow significantly with new UK & US policies
- >£30M addressable market pa for UK clocks, further >£50M in magnetometers & sensors

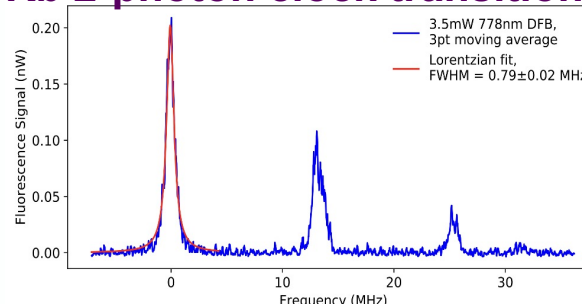
Offering designs & knowledge:-



Rb MEMS vapour cells



Rb 2-photon clock transitions



Looking for partners in:-

1. GaAs/AlGaAs epitaxial wafer supplier
2. GaAs DFB laser foundry
3. Photonics packaging company

Already have partners for:-

4. Atomic clock system integrator
5. MEMS foundry including wafer bonding
6. Si₃N₄ Photonics foundry

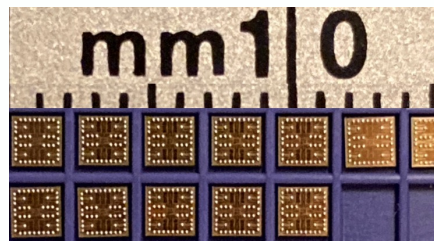
Wales Tech Week

- **About your Company**

- We are Tetrivis LTD, an Analogue, Mixed-Signal, RF & mm-Wave Semiconductor IP and IC Design House
- Tetrivis is an SME based in Basingstoke, UK

- **Contact Details**

- Name: Jide ADENIRAN
- Email: jide@tetrivis.com
- Phone: 01256-643-743
- Can this Slide be shared after event: Yes



1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- We have prototype Tx and Rx Phased-Array RFICs for Simultaneous access to Ku & Ka Satellite Bands
- This will greatly lower the cost of Satellite Consumer Premises Equipment (CPE), thus truly democratizing Global Internet Access
- Our next challenge is to take these Phased-Array Tx and Rx RFICs to mass-production

2. The services or solutions you can offer

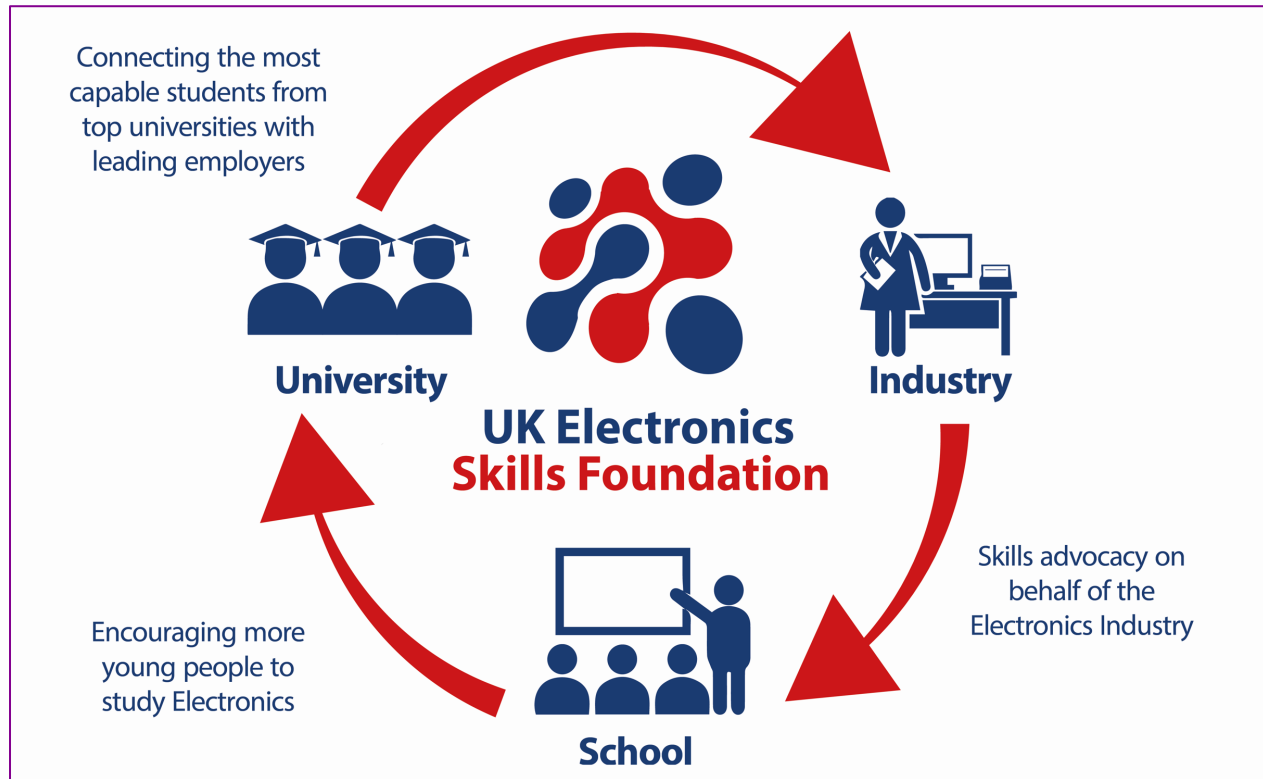
- Analogue, Mixed-Signal, RF and mm-Wave Semiconductor Building Blocks Design Services
- Turn-key Analogue, Mixed-Signal, RF and mm-Wave Integrated Circuits Design
- Analogue, Mixed-Signal, RF and mm-Wave Semiconductor Intellectual Property Development
- Consumer Electronics Product Development

3. The partners/services you are seeking

- Investors to help take the RFICs to mass-production
- Satellite Broadband CPE Manufacturers
- GEO/MEO/LEO-Sat Satellite Companies
- Baseband IC Development Companies



Tackling the Skills Shortage in the Semiconductor Industry



Stewart Edmondson
stewart.edmondson@ukesf.org
07894 899544

Founded in 2010, the **UKESF** is the **only STEM organisation in the UK solely focused on Electronics.**

We have supported more than **800 schools** across the UK. We have partnerships with **28 leading universities** and a Scholarship Scheme for undergraduates.

More than **750 students** have participated in the Scholarship Scheme, which **prepares undergraduates for industry and provides a valuable skills pipeline** to UK organisations.

In 2022, the Scheme received external recognition and won a **Princess Royal Training Award.**

Photonex

About your Company

- Everyone knows UoS but there are significant semiconductor-activities that may not be widely known as outlined below
- **Contact Details**
 - Name: Derek Boyd
 - Email: derek.boyd@strath.ac.uk
 - Phone: 07876 886 539
 - Can this Slide be shared after event: Yes

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- We can provide access to specialist equipment and highly-skilled researchers in these topic areas

2. The services or solutions you can offer

- We can support project R&D
- silicon-photonics integration
- Prototype device packaging
- Optical and electron-beam spectroscopies and imaging
- Photovoltaics
- Accelerated life testing
- Failure Analysis
- Advanced Power Electronics Packaging (coming in 24/25)

3. The partners/services you are seeking

- Strathclyde is highly-g geared for projects with industrial partners
- There's a broad range of engagement mechanisms

Photonex

- **About your Company**

- Wave Photonics
- Design for integrated photonics components
- SME

- **Contact Details**

- **Name:** Matthew Anderson
- **Email:** matthew.anderson@wavephotonics.com
- **Can this Slide be shared after event:** Yes

1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address

- Interested to look at new photonics fabrication processes.
- If you have a fabrication capability on a new material with applications for photonics, we could partner to develop and help enable it.

2. The services or solutions you can offer

- We are developing component libraries for integrated photonics across multiple materials, platforms and wavelengths.
- We can offer some training sessions on PIC layout using a popular open-source tool.

3. The partners/services you are seeking

- Partners who are looking to develop PICs, fabrication processes working away from the telecom wavelengths.



Wales Tech Week

- **About your Company**

- Supplier of unique imaging system
- 20+ years of supply of high-end imaging systems
- SME

- **Contact Details**

- **Name:** Dr. James Endicott
- **Email:** james.Endicott@xcam.co.uk
- **Phone:** 01604 673 700
- **Can this Slide be shared after event:** Yes

- **2. The services or solutions you can offer**

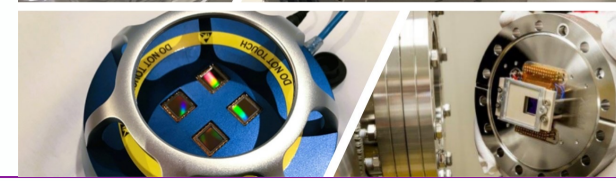
- Extremely low outgassing, semiconductor clean camera solutions
- Vacuum compatible monitoring and metrology in the visible, extreme ultraviolet and soft X-ray
- Bespoke systems with rapid development and delivery
- Novel contamination control through particle fall out detection

- **1. Project Idea - What is the solution you are proposing / What is the Challenge you wish to address**

- XCAM supplies into the semiconductor manufacturing industry
- We seek to expand our supply into UK companies manufacturing, developing or integrating semiconductors

- **3. The partners/services you are seeking**

- We seek engagement with R&D organisations (academic and industrial), manufacturers and semiconductor integrators requiring metrology or monitoring solutions that XCAM can supply.





Pitch Deck for Cohort Event

SEMIconductors



SPIE Photonex 2023

• About our Company

- **ZiNIR Ltd**
- Technical Consultancy specialising in semiconductor photonics devices and systems
- SME, established 2003

• Contact Details

- **Name:** Dominic Duffy / Stephen Sweeney
- **Email:** info@zinir.com
- **Phone:** +44 7792 198169
- **Can this Slide be shared after event:** Yes

2. The services or solutions we can offer

- **Epilayer and device design and modelling**, e.g. lasers, SOAs, photodetectors, photovoltaics
- **Design optimization: faster, higher power/efficiency, narrow linewidth, high-temperature operation**
- Photonic system design
- Feasibility studies – assess the **practicality** and **viability** of specific design solutions
- Testing, analysis, and project management services

1. Project Idea - What is the solution we are proposing / What is the Challenge we wish to address

- We address the challenges and **opportunities** in **developing** and **refining** semiconductor and photonic devices and systems
- Very experienced in providing cutting-edge solutions for **semiconductor epilayer design, photonic** and **quantum** devices, as well as heterogeneous and monolithic **integration (e.g. on silicon)**.

3. The partners/services we are seeking

- **Telecoms** through to **Sensing** technology firms
- Engagement with **space-related** technologies
- **Semiconductor Foundries**
- **SMEs** and **businesses of all sizes** seeking to bring game-changing products to market

Department of Business & Trade support

How we support UK companies

DBT:

- For general information about Trade support:
<https://www.great.gov.uk/>
- (General info on export training, markets, advice etc)
- For Export Control information:
<https://www.gov.uk/guidance/uk-strategic-export-controls>
- For UK Export Finance: <https://www.great.gov.uk/get-finance/>
- For intellectual property:
<https://www.gov.uk/government/organisations/intellectual-property-office>



Department for
Business & Trade

The DBT Technology team:

- Manages pavilions at key events
Eg. Mobile World Congress, Websummit
- Takes missions to events
eg SEMICON S Korea, PHOTONICS WEST.
- Helps connects buyers to UK suppliers
- Look books and Directories

For tech team newsletter and info:

techexports@businessandtrade.gov.uk

Department of Business & Trade

Trade Mission to
SEMICON Korea
currently recruiting for
companies

<https://eu.eventscloud.com/website/12683/>



Trade Mission to SEMICON Korea 2024

Join the Department for Business and Trade on the first UK trade mission to SEMICON Korea
(29 January - 2 February 2024)

Organised by SEMI, SEMICON Korea offers a comprehensive networking and business development opportunity for companies across the semiconductor ecosystem. To support relevant UK companies in making the most of this opportunity, the Department for Business and Trade is recruiting a delegation of around eight high-quality companies with experience of selling into the semiconductor industry.

Categories of particular interest are:

- Equipment
- Materials
- Sub-systems
- Parts
- Software for semiconductor manufacturing

As well as gaining access to the trade show itself, companies that join DBT's delegation will benefit from bespoke business matching opportunities, curated meetings with key players in the Korean semiconductor industry to discuss industry trends and partnership opportunities, and exclusive networking events.

Please note that while all activities are provided free of charge, participants will need to fund their own travel, accommodation, and subsistence for the duration of the trade mission.

How to join the delegation

To apply for a place on this trade mission, please submit your application below. Applications close on **Sunday 5 November** at 23:00 GMT. You will be informed of the outcome of your application shortly after this deadline.

If you have any questions, please email keziah.morley@businessandtrade.gov.uk.



Department for
Business & Trade



Dr Iain S Mauchline
Innovation Lead - Electronics, Sensors, Photonics and Robotics, InnovateUK
Iain.Mauchline@iuk.ukri.org

Thank you