## A publication of the European Project



# BRITISH BIOPHOTONICS





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PHOTONICS PUBLIC PRIVATE PARTNERSHIP

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## OASIS – Open the Access to Life Science Infrastructures for SMEs

The OASIS project aims to improve the links between life science facilities, research projects and product development. The previous large investments in biophotonics are made more accessible to SMEs to allow a competitive advantage in new product development and validation.

Large scale research facilities and technology platforms are usually sets of laboratory equipment that are mainly available to academia and to a certain

extent to industry. It can be very large-scale equipment, unique to a country or a continent as well as technological halls shared by a wide scientific and technological community, which develops competencies in a specific area.

In the field of the life sciences, the management of open access for researchers and world-class research programmes between these facilities is under consolidation through existing programmes like Instruct, EuroBioimaging, Biophotonics Plus and the network of excellence Photonics4Life.

Large companies have established strong collaborations with these facilities. However, there is still room for improving the economic outputs and the involvement of SMEs in order to create more value and jobs from early scientific results.

By February 2015, the OASIS consortium has inventoried and analysed about 120 companies, unmet needs from 14 hospitals and 14 agrifood companies and more than 70 Life Science facilities. Nine workshops are organised at each partners' premise during the life time of the project to

promote exchanges and spread the information and results from the project.

#### Website: <u>http://www.fp7-oasis.eu</u>

Coordination and Support Action (CSA) project from FP7-ICT-2013-11 objective 3.2 Photonics. Grant agreement no: 619230

#### 9 Photonics clusters involved in the project:

Optitec (Marseille, France); CNR – Optoscana (Florence, Italy); PhotonicSweden; OptecBB (Berlin-Brandenburg, Germany); Politecnico di Milano (Italy); SECPhO (Southern European Cluster in Photonics & Optics Association, Barcelona, Spain); Photonics NL (The Netherlands); Photonics Bretagne (Lannion, France) and Swansea University (UK).

Duration: 30 Months (Dec. 2013 to May 2016) Coordination: Katia Mirochnitchenko, OPTITEC, Marseille, France.



Application areas addressed





# **Introduction - British Biophotonics**

United Kingdom has a long tradition in Photonics, Healthcare and the Pharmaceutical sectors, with a large number of employees and high-tech companies involved. About one quarter of the over one thousand UK Photonics companies are involved in the supply chain to Healthcare and Lifescience and several regional and national government (as Scotland and Wales) recognized Photonics as one among other Smart Specialization priorities.

On the other side strong investments have been done to support the Pharmaceutical Industry and nation like Wales promoted independent program to develop the Lifescience sector, with strong financial support to attract investment and companies from abroad.

Biophotonics companies and Research centres directly involved in Biophotonics as well as involved in the supply chain are present in all the four British Nations making this field of extreme importance for the British occupational policies.

However since often Photonics and Lifescience sectors are governed by separated bodies and very often rely on different funding schemes, the interplay between the two sectors has often been not properly supported. In this Brochure, trough the support of the OASIS project, we present a brief overview of the type of companies, facilities and associations involved in this field in UK.

We focussed on small-medium (but sometime even micro) companies to shows how vibrant the British Biophotonics sector is and how different can be the needs of Biothotonics SMEs. Needs vary from necessity of R&D support from an R&D Centre, to the simple requirements of accessing a specific instrument to the necessity of finding end-users or a specific supplaier. Strangely across the full spectrum of interviewed companies, independently from size or product type, there were no need for training.

A final remarks is on how Biophotonics start-ups are quite appropriate for regions in the phase of economy development (for example convergence areas). This is due to the low cost of photonics components while market may offer added value.

A good example of it are small companies successfully operating in the cosmetic area. A few of major larger companies are also listed, particularly when offering logistic support and/or access to equipment to SMEs. A few relevant database are also listed to demonstrate the spread of Biophotonic activities all across UK.

# List of Company, Facilities, Association and Networks described in the Brochure

Company	Websites	Contact	
CoolLED Limited	www.oemillumination.com Liz.Stark@coolled.com		
Cymtec Ltd	www.cymtec.co.uk ron.yandle@cymtec.co.uk		
CyDen Ltd	www.cyden.co.uk	see website	
CottonMoutonDiagnosticsLtd	www.cmdiagnostics.co.uk	cottonmoutondiagnostics@gmail.com	
Invitron Limited	www.invitron.co.uk	info@invitron.com	
Gx Group	www.gxgroup.com	mark.helmich@gxgroup.com	
DySISMedical Ltd	www.dysismedical.com	info@dysismedical.com	
LUX-TSI Limited	www.lcasb.com	info@lcasb.com	
Lightpoint Medical Ltd	www.lightpointmedical.com	online form	
Lein Applied Diagnostics	www.lein-ad.com	ian.cox@lein-ad.com	
Sengenia Ltd	www.sengenia.com	see website	
PolyPhotonix Ltd.	/ww.polyphotonix.com richard@polyphotonix.comi		
Millennium Lasers	www.millenniumlasers.co.uk info@millenniumlasers.co.uk		
Yu-scan Ltd	yu-scan.co.uk	docbones43@gmail.com	
Stratton Technologies Limited	www.strattontechnologies.co.uk	brady@strattontechnologies.co.uk	

Facilities	Websites	Contact
Cardiff Univ. Brain Research Imaging Centre	http://sites.cardiff.ac.uk/cubric	KennedyLC@cardiff.ac.uk
National Physical Laborory	www.npl.co.uk	alex.knight@npl.co.uk
Centre for NanoHealth - Swansea Univ.	www.swansea.ac.uk/nanohealth	m.p.elwin@swansea.ac.uk
The Compound Semiconductor Centre	www.compoundsemiconductorcent	re.com csc@iqep.com
BSI	www.bsigroup.com/en-GB	eu.medicaldevices@bsigroup.com
Central Biotechnology Services	www.cardiff.ac.uk	James.ce2@cf.ac.uk
CARDIFF MEDICENTER	www.cardiffmedicentre.co.uk	enquiries@cardiff.medicenter.co.uk
Astro Cardiff University	www.astro.cardiff.ac.uk/research/cmp	Matt.Griffin@astro.cf.ac.uk
Glyndwr Innovations Ltd	www.glyndwrinnovations.com	inovations@glyndwr.ac.uk

Associations and Networks	Websites	Contact
TechnologyScotland	technologyscotland.scot	stephen.taylor@technologyscotland.scot
Welsh OptoElectronic Forum	www.wof.org.uk	susan.sheridan@wof.org.uk
Enterprise Europe Network	http://een.ec.europa.eu	L.J.Coombes@swansea.ac.uk

# LIST of other relelevant Companies, Research centers, Database and Networks

Company	Websites	Contact
Andor Technology Ltd	www.andor.com	for contact see website
GE Healthcare	www3.gehealthcare.co.uk	online form
Michelson Diagnostics	vivosight.com/about-us	info@vivosight.com
Nikon UK Limited	www.nikoninstruments.com	discover@nikon.co.uk

Research	Host Institution	Websites	Contact
Biophotonics	St Andrews University	www.st-andrews.ac.uk	ma81@st-andrews.ac.uk
Biophotonics	Oxford University	www.photonics.ox.ac.uk	oxfordphotonics@eng.ox.ac.uk.
Centre for Advanced Instrum.	Durham University	www.dur.ac.uk	claire.whitehill@durham.ac.uk
Centre for Biophotonics	University of Strathclyde	www.biophotonics.strath.ac.uk	contact-biophotonics@strath.ac.uk
Centre for Biophotonics	King's College London	www.kcl.ac.uk	dylan.owen@kcl.ac.uk
Photonics & Biophotonics	Cardiff University	www.astro.cf.ac.uk	

Database	Websites	Contact
UK Biological Imaging Facilities *	www.york.ac.uk	joanne.marrison@york.ac.uk
UK PHOTONICS	www.ukphotonics.org	see website

\* includes data on facilities located in: Aberdeen, Bath, Belfast, Birmingham, Brighton, Bristol, Cambridge, Cardiff, Dundee, Durham, Edimburgh, Essex, Glasgow, Leeds, Leicester, Liverpool, London, Manchester, Newcastle, Norwich, Nottingham, Oxford, Pirbright, Reading, Rothamsted, Sheffield, Southampton, Strathclyde, Surrey and York.

UK-wide Networks	Websites	Contact
Bioscience KTN	connect.innovateuk.org/web/biosciencesktn	see website
ESP KTN	connect.innovateuk.org/web/espktn	see website
Innovate UK	connect.innovateuk.org/home	see website

# **Description of British Biophotonics Companies**



Harnessing expertise from multiple disciplines we deliver complete OEM illumination solutions. These include:LED array design and manufacture, techniques such as applying phosphors to produce light at the power and wavelength required. Thermal management producing more stable, longer life solutions that use less power and generate less heat and sound. Optical design presenting the light where you need it. Electronic control systems to give long term precision. Packaging design to meet space constraints, align with your brand etc. Software interfaces integrating fully with your wider system. It's never too early to talk to us.



www.oemillumination.com - Liz Stark



The company is a spin-off of Cardiff University and Exeter University. The company develops Point of Care diagnostic technologies capable of simultaneously detecting multiple disease markers from a single sample for a number of clinical conditions. Our technology is based upon an innovative magneto-optical sensing system that exploits changes in the rotational behaviour of magnetic reporters that either occur naturally as a marker of a disease or are artificially introduced into a sample.

www.cmdiagnostics.co.uk - Chris Allender

# CyDen Ltd

CyDen is the British beauty and health company pioneering light treatments for use at home. With a first class heritage in the field of Light Therapy and unique patented technology, CyDen leads the world in the development of this field. With over 30 years of experience in the field, CyDen's team of experts has pioneered light technology to make iPulse products the safest and most effective in the world. The technology is unique in how it delivers light energy – not only it is better at removing hair than other conventional technologies, but it also has many other exciting and ground breaking uses in both beauty and healthcare. *www.cyden.co.uk* - *Mark Bolt* 





Cymtec specialises in LED Multiplexer, Light Engine and Light Pipe technology. We are able to develop solutions to customers problems working together with them from conception and design right through to the development of commercial, market ready products. In the main our in-depth experience in optics /lasers /mechanics /electronics /software and manufacturing will enable our customers to move forward efficiently in their respective markets and receive high quality product/services in a timely manner, at the right price. <u>http://www.cymtec.co.uk</u> - *Ron Yandle* 





The expertise of the company is in the area of design and development of medical devices, software engineering, and optical engineering. Among other products we provide advanced cervical imaging system..

http://dysismedical.com - Alastair Atkinson





Based in Wales, GX Group is one of the UK's leading technology and innovation companies using a multidisciplinary and holistic approach to deliver products that stand the test of time through our subsidiaries; GX Design Engineers, GX Systems and GX Environmental. Our product design development company, GX Design Engineers uses pioneering technology for product development including product refinement and value engineering. Whilst GX Systems creates bespoke software for industrial control systems including automated retrieval and vehicle tracking. These management systems are used extensively by GX Environmental to offer companies real time monitoring and management of tankered liquid products including clean water and sludge. We specialise in the medical and scientific sector helping to develop a wide range of products from hospital beds to urine analysers. The skills includes electronic hardware and software design, industrial and mechanical engineering plus specialist areas such as optronics and microfluidics.

www.gxgroup.com - Mark Helmich

# Invitron

Invitron is a biotechnology company with specialist expertise in the development and manufacture of high sensitivity invitro diagnostics. Based in Monmouth, UK, we produce diagnostic test kits that are exported to customers throughout the world. Our state-of-the-art 'acridinium ester' chemiluminescence technology has found wide acceptance in research and clinical laboratories across the globe. Diagnostic tests incorporating this technology benefit from very stable reagents with higher sensitivity, better precision and wider working ranges than other assay systems.

<u>www.invitron.co.uk</u> - Andrew Woodhead



Lein Applied Diagnostics is a dynamic technology company pioneering measurement devices and solutions for both the healthcare and industrial markets. Our core technology is based around a low cost scanning confocal system that can make accurate, non-contact positional, multi-layer thickness and refractive index measurements with sub-micron precision. Lein's technology is used in a number of applications including; high resolution metrology, ophthalmic measurements, pharmacokinetics and diabetes care. <u>www.lein-ad.com</u> - *lan Cox* 



# 률 Lightpoint

The company has developed a groundbreaking surgical imaging technology based on Cerenkov Luminescence Imaging (CLI). CLI has the potential to detect cancer in real-time during surgery, and thereby reduce the need for repeat operations.CLI enables optical detection of Positron Emission Tomography (PET) radiopharmaceuticals, combining the advantages of optical imaging (namely, low cost and small form factor) with the power of PET imaging (i.e., high diagnostic performance, and widespread availability of imaging agents).



www.lightpointmedical.com - David Tuch\_



LUX-TSI is a European high growth technology services company focusing on providing independent testing and consultancy services through UKAS/UL accredited laboratories operating quality management systems conforming to ISO IEC 17025. Among many tests for performance, lifetesting and safety, LUX-TSI offers comprehensive photometric tests for lamps, luminaires and LED modules. Many applications including Life Science, Medicine and cosmetics. <u>www.lcasb.com</u> - Gareth Jones



#### MILLENNIUM LASERS

#### MANUFACTURERS OF SEALED CARBON DIOXIDE LASERS

Millennium Lasers is a specialist in the field of laser technology with particular expertise in sealed CO2 laser systems. We manufacture sealed CO2 lasers and reprocess (regas) virtually all other 3rd party sealed CO2 lasers on the market providing a fast, relaible and cost-efective alternative to purchasing a new laser.

Our standard products include CO2 laser tubes, laser power supplies, laser cutting systems and laser marking/engraving systems using galvo/scanner technology - we also supply laser mirrors and lenses and other accessories.

Some new developments and products include Fibre laser marking systems and 3D sub-surface glass engraving systems. We also conduct a range of laser consultancy activities and are currently working with local SME's and large multi-nationals. <u>www.millenniumlasers.co.uk</u> - Paul Mason

## POLYPHOTONIX

PolyPhotonix is a UK biophotonic research company developing light therapy treatments for macular eye disease. In just 5 years PolyPhotonix grew from one employee with an idea, to manufacturing the revolutionary Noctura 400 sleep mask, a phototherapy eye mask that independent health economists working with the NHS estimate could save £1bn a year. Currently the company focuses on the research and development of biophotonic therapeutics and high volume organic light manufacture and process solutions





www.polyphotonix.com - Richard Kirk

Sengenia Ltd is an established, award winning, UK-based SME with nearly a decade of experience helping customers identify the optimal sensing solution for their requirements. On top of this experience Sengenia's founders in turn have decades between them of working to develop novel fibre sensor solutions and extending these into practical project use across a wide range of sectors. As a spin-out from City University London and Queen's University Belfast this expertise is still firmly grounded in research excellence. Sengenia offer a complete range of the latest state-of-the-art sensor reading equipment and sensors, including the extensive Micron Optics product range. This includes OCT Swept Laser.



www.sengenia.com



Stratton Technologies has over 30 years of experience in the fields of photonics and life sciences. We offer a range of high quality instruments & components to academic and industrial users engaged in the fields of photonics, life sciences, microscopy and imaging.

www.strattontechnologies.co.uk - Cris Brady





The company is involved in R&D to manufacture second generation tele-health vital signs data acquisition devices <u>http://yu-scan.co.uk - Ben Bacon</u>

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# **Description of Life Science Infrastructures & Facilitys**

# bsi

•CBS •

BSI is the business standards company. BSI provides certifications, training and expertise and evaluates standards. BSI can help to meet regulatory and quality requirements for medical devices.

www.bsigroup.com/en-GB - Charlotte James

CBS provides expertise, training and clinicl trials support. The Center has 16 Staffs members of which 8 are researchers. Services provided: standard evaluations. certifications, Training and Expertise. The overall aim for BSI is to help to meet regulatory and quality requirements for medical devices.

www.cardiff.ac.uk/research/use-our-expertise/access-research-facilities/central-biotechnology-services - Charlotte James

## Cardiff medicentre

Cardiff Medicenter provides Incubator facilities centers for Lifescience Start-upcompanies. We offers several services with links to Cardiff R&D Centres. Business support is available.

www.cardiffmedicentre.co.uk - Mark Davies

## School of Physics and Astronomy

The school brings together scientists with complementary skills, to share knowledge and resources, to provide a focus and direction for the future of our physics research, and provide training for the next generation.

The group, comprising 16 academics and ~28 researchers, operates at the cusp between fundamental physics and development of device concepts though measurements of fundamental optical and electrical processes in organic and inorganic semiconductor and metallic (nano) structures, enabling advances in understanding of light-matter interactions, charge transport, development and verification of theories, development of novel device concepts and high sensitivity photometric and spectroscopic instruments. Group activity can be further subdivided into the research themes of Photonics and Biophotonics, Quantum Materials and Devices, Nanoscale Science and Technology, Theory and Computational Physics and Imaging, Sensors and Instrumentation.

www.astro.cardiff.ac.uk/research/cmp - Matt Griffin

# Centre for NanoHealth

The Centre for NanoHealth (CNH) at Swansea University combines nanotechnology with medical science to provide opportunities to benefit patients, healthcare providers and the healthcare industry. Phase one was supported by a £10M ERDF structural funds. The CNH welcomes collaborations with SMEs, and works with partners upfront to plan the project inputs and deliverables, and formalise commercial/IP agreement. Research areas cover Medecine and Healthcare, Food and water safety, Biology, Cosmetics, Veterinary medicine, Forensic Science, Nano/Micro Technologies. Available equipment is listed at http://www.swansea.ac.uk/engineering/nanohealth/facilities/equipment.

www.swansea.ac.uk/nanohealth - Matt Elwin

## **Cardiff University**

Centre for NanoHealth - Swansea Univ.

Cardiff Medicenter

## **Central Biotechnology Services**

BSI

## The Compound Semiconductor Centre



Founded in 2015, The Compound Semiconductor Centre (CSC) is ajoint venture between IQE plc and Cardiff University to underpin the creation of a unique global capability for emerging 21st century technologies based on Compound Semiconductor materials.CSCs vision is to provide Europe's first prototyping facility dedicated to allowing businesses and academics to demonstrate new technologies based on Compound Semiconductor materials that will be production ready - allowing rapid routes to market entry for entrepreneurs and technology leaders. The Compound Semiconductor Centre offers:

- Collaborative research and innovation services based on the development of novel Compound Semiconductor materials
- Commercial supply of novel and early stage Compound Semiconductor epitaxial materials and structures based on GaAs, InP and GaN based on MOCVD epitaxial growth
- Brokerage to Compound Semiconductor wafer/chip fabrication and packaging services The Centre has a particular focus in the areas of:
- Opto-electronic components for telecoms, healthcare and consumer applications
- High performance Near and SWIR detector applications based on InP/InGaAs
- GaN on Silicon structures for high performance RF and Power electronics applications
- GaAs/AlGaAs Vertical Cavity Surface Emitting (VCSEL) epitaxial technology
- Silicon on Germanium/ Silicon on Insulator and high quality silicon epitaxy.

www.compoundsemiconductorcentre.com - Wyn Meredith

## CUBRIC

### CardiffUniv. Brain Research Imaging Centre

CUBRIC Maindy Park, the new home for Cardiff University's Brain Research Imaging Centre will open in the Spring of 2016. Housing a combination of neuroimaging equipment unique within Europe, CUBRIC will continue to further its world-leading research which has already established Cardiff University as one of the UK's top three Universities for Neuroimaging, Psychology and Psychiatry. To use the facility it is necessary to book and agree in advance as trained technicians will operate the equipment. Cost of people and usage are charged and funds should account for this.

http://sites.cardiff.ac.uk/cubric - Lisa Kennedy (Research and Finance Manager)



### Glyndwr Innovations Ltd

Glyndwr Innovations Ltd is an incubation centre for several areas of activity inlcuding Medicine and healthcare, aerospace, automotive and defense sectors. Glyndwr innovations provide a flexible service for clients requiring support with drafting, reverse engineering or additional support with documentation. We can also project manage large scale engineering projects from a concept design to a full working prototype. The Centre offers pooling of equipment. *www.glyndwrinnovations.com - Charlotte James* 

## NPL

### National Physical Laborory

NPL is the UK's National Measurement Institute, and is a world-leading centre of excellence in developing and applying the most accurate measurement standards, science and technology available. Advanced microscopy including super-resolution (dSTORM, SIM), adaptive optics, modelling of light propagation and optical coherence tomography (OCT). Multiplex point-ofcare diagnostics with optical detection. We offer a range of measurement services including biomolecular structural analysis and diagnostics, cellular and tissue imaging, and characterisation of biomaterials and bioaerosol monitoring. NPL's optical radiation scientists provide a wide range of measurements for characterising sources and detectors and the properties of materials, covering the ultraviolet, visible and infrared regions. NPL has extensive facilities for characterising all kinds of light source, including a new goniometer facility which can characterise both the spectral and spatial distribution of the output from a source.

www.npl.co.uk - Alex Knight

## **Enterprise Europe Network**

Enterprise Europe Network exists to help ambitious businesses innovate and grow internationally. It is free of charge and simple to use with local contacts and insight across each part of the UK. Jointly funded by the European CommissEnterprise Europe Network's experts advise and connect those looking to commercialise ideas and succeed in new international markets.

Enterprise Europe Network is the world's largest support network for SMEs with international ambitions. Our teams, embedded in 63 countries, combine international business expertise with local knowledge to help you take your innovation into new markets. We help your business grow faster through tailored support, new commercial, technology and research partnerships and access to finance.

http://een.ec.europa.eu - Lawson J. Coombes



The Welsh Optoelectronics Forum was founded twenty years ago as an alliance between industry, local universities and the public sector. Building on the strength of the cluster of companies working in optics and optical materials in North Wales it now embraces photonics activity from across the Principality, recognising particularly the rapid developments in compound semiconductor research and manufacture in the south. It counts amongst its members the major research institutes in Wales, companies ranging from SMEs to multinationals, innovation organisations and government departments. Major aims include facilitation of technology transfer, skills development and networking. With Welsh Government support it established OpTIC, a technology centre, incubation space and conference facility, as an industry resource (now owned and run by Glyndŵr University). WOF aims to provide an entry point for those wishing to tap into the wealth of photonics activity in Wales.

<u>www.wof.org.uk</u> - Susan Sheridan



Technology Scotland is the representative body for the enabling technology community in Scotland, bringing together industry, academia and government in technology clusters to develop products and services utilising electronics, photonics, nanotechnology, advanced materials and beyond.

The Vision of Technology Scotland is to become the recognised 'home' for Enabling Technology companies in Scotland and be a catalyst for economic growth.

The deployment of Key Enabling Technologies (KETs) to support re-industrialisation are crucial issues for future competitiveness and employment in Scotland, and Technology Scotland aims to shape and develop an integrated approach to KET related research and innovation.

Technology Scotland will provide clear business value to member companies, addressing needs that can be met through networking, collaboration, capability development and a clearly recognisable Scottish brand.

https://technologyscotland.scot - Stephen Taylor

# Conclusions

This brochure is to our knowledge the first overview of the field of BioPhotonics across UK, gathering companies of all size, academic groups and research centres as well as associations and networks acting at local, regional, national and European level.

This work was made by Swansea University thanks to the support of the FP7 OASIS project. The project aims at reinforcing the field of biophotonics in Europe by several means, including this brochure.

As mentioned in the introduction Biophotonic is an highly fragmented field, often a bi-face Giano looking sometime as Photonics, other times as Lifescience due to different funding schemes and the several different, yet overlapping, networks and associations involved. In addition most companies have only few employees, if not only one, the funder.

There is therefore a strong need to access both financial and technical support, with a preference to enter markets were devices can de cheaply designed and built. We hope that by showing how many actors could potentially interplay and provide synergies the OASIS project will open new paths for collaborations.

The same holds at the level of Networks, Associations and Research Centres, were different players have different geographical vision and different management and technical skills, yet they could definitively enhance efficiency by strict collaboration and good information sharing.

We hope this Brochure will provide a background overview to foster best-practises at regional and national level. This Brochure being part of a set of seven Brochures covering partner countries in the OASIS project (France, Germany, Italy, The Netherlands, Spain and Sweden) will add the UK players to provide a first Eu-wide overview of the field.

The understanding of the different weaknesses and strengths across Europe will support better integration of regional and national resources enhancing the European competitiveness and, as final goal, develop and retain skilled workforce in Europe and provide better Healthcare.

