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Optical Networks

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Laser-based Materials Processing

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Call For Papers

General Information

Technical Programme

Available January 2005

The comprehensive Advance Technical Programme for this symposium will list conferences, paper titles, and authors in order of presentation; an outline of all planned special events; and hotel and registration information. All those who submit an abstract will receive a copy.

Registration Fee

All participants, including invited speakers, contributed speakers, session chairs, cochairs, and committee members pay a registration fee. Fee information will be available in the Technical Programme distributed in January 2005.

Student Travel Contingency Grants

A limited amount of student travel contingency grants will be awarded based on need. Grant applications can be found at http://www.spie.org/CommunityServices/StudentsAndEducators/ under the Scholarships & Grants section in the left menu. Applications must be received no later than 10 weeks prior to the meeting. Eligible applicants must be presenting an accepted paper at this meeting.

Clearance Information

If government and/or company clearance is required to present and publish your presentation, start the process now to ensure that you receive clearance if your paper is accepted.

Letters of Invitation for Visa Process

Individuals requiring letters of invitation to obtain travel visas to present their papers may access and print an Invitation Letter Request Form found at

http://spie.org/forms/invitationrequest.pdf

Please fill out a separate form for each person requesting a letter. Please allow ample time for processing requests. SPIE is not able to contact embassies in support of an individual attempting to gain entry to attend an SPIE meeting. Because the application for a visa can be a lengthy process, we recommend that you begin your visa application process as soon as you have been notified that your abstract has been accepted for presentation. We also recommend that you secure your travel visa before registering for the symposium. Cancellations after the preregistration cutoff can result in a cancellation fee.

Please visit the Department of Foreign Affairs web pages for visa services information:
http://foreignaffairs.gov.ie/services/visa/default.asp

SPIE's Event Project Manager for this symposium is Karin Burger. For information about the technical program, email: meetinginfo@spie.org.

Opto IRELAND

4–5 April 2005
Royal Dublin Society
Dublin, Ireland

Shared knowledge is our greatest resource

I believe that OPTO-Ireland 2005, appropriately held in the Royal Dublin Society by SPIE—The International Society for Optical Engineering, a society at the forefront of so many enabling technologies on which Ireland's very future depends, is of strategic national importance. Certainly, politicians and strategic thinkers are increasingly concerned with how to support Ireland's growing international reputation in photonics, lithographic, ophthalmic, and other diverse optical manufactures and associated leading-edge research. They see the political necessity is to spin off and commercialise Ireland's intellectual property and technologies.

This event, following the successful OPTO-Ireland 2002, gives the country an opportunity to once again showcase its impressive research, technologies, manufacturing, and educational prowess. OPTO-Ireland's 12 co-located conferences, exhibitions, courses, and plenary presentations provide an important opportunity for Ireland's engineering community—drawn from industry, third-level institutes, State Agencies, and elsewhere—to network with many Irish, European, and world leaders in their chosen fields. This event certainly comes at a highly opportune time, especially given new objectives set out in the European Union's 6th Framework policies. I appeal therefore to all concerned to maximise their efforts to fully grasp this unique opportunity.

You are all invited on to experience the wonderful ambience of the venerable old RDS—with facilities, you should remember, that were forged through historical events of national importance—but come to Ballsbridge prepared to help write a new page in the two-centuries-long odyssey of the sciences and engineering in Ireland.

Norman D. McMillan,
Institute of Technology Carlow (Ireland)
Symposium Chair

Cooperating Organisations

Enterprise Ireland

Institution of Engineers of Ireland (IEI)

Fáilte Ireland

Imaging and Vision (IRE01)

The manuscripts from this conference will be featured in their own proceedings volume and available through the SPIE Digital Library Summer 2005.

Conference Chair: **Fionn D. Murtagh**, Queen's Univ. Belfast (United Kingdom)

Programme Committee: **Jonathan G. Campbell**, Letterkenny Institute of Technology (Ireland); **Hugh Cormican**, Andor Technology Ltd. (United Kingdom); **Kenneth Dawson-Howe**, Trinity College Dublin (Ireland); **Peter Jarritt**, Northern Ireland Regional Medical Physics Agency (United Kingdom); **John Mallon**, Vigitek Ltd. (Ireland); **Philip J. Morrow**, Univ. of Ulster (United Kingdom); **Andrew Shearer**, National Univ. of Ireland/Galway (Ireland); **Paul F. Whelan**, Dublin City Univ. (Ireland)

Following OPTO-Ireland at OI in 2002 (see SPIE Proceedings Volume 4877) and in association with the Irish Pattern Recognition and Classification Society (web address http://www.iprcs.info) which organises the annual Irish Machine Vision and Image Processing Conference, the "Imaging and Vision" Conference at OI 2005 will address the following areas:

- medical imaging
- industrial machine vision
- scientific imaging, e.g. astronomy
- engineering imaging
- computer vision in transport applications
- imaging in genetics and proteomics.

IMPORTANT DATES

Abstract Due Date:
20 September 2004

Submissions imply the intent of at least one author to register, attend the symposium, present the paper (either orally or in poster format), and submit a full-length manuscript for publication in the conference Proceedings.

Final Summary Updates Due:
31 January 2005

Manuscript Due Date:
7 March 2005

Manuscripts will be peer-reviewed, and accepted papers will be published after the symposium in the Proceedings of SPIE. Condition for publication is that the author must register and present their paper at the symposium.

Submit your abstract online:
spie.org/events/ireland

Photonics Fabrication, Integration, and Packaging (IRE02)

Conference Chairs: **Harold S. Gamble**, Queen's Univ. of Belfast (United Kingdom); **Padraig Hughes**, NMRC/National Univ. of Ireland/Cork (Ireland); **Robert A. Moore**, Trinity College Dublin (Ireland)

Programme Committee: **Ekaterina V. Astrova**, A.F. Ioffe Physico-Technical Institute (Russia); **Kevin Berwick**, Dublin Institute of Technology (Ireland); **John McCarthy**, Trinity College Dublin (Ireland); **S. J. N. Mitchell**, Queen's Univ. of Belfast (United Kingdom); **Cormac O Donnell**, NMRC/National Univ. of Ireland/Cork (Ireland); **Tatjana S. Perova**, Trinity College Dublin (Ireland)

Over the last decade, significant advances in optoelectronic components occurred which drove the growth in the optical networks. For this to be sustainable however requires lower cost robust packaging solutions to integrate multiple photonic and electronic components in a manner, which affords greater reliability, intelligence (functionality/performance) and flexibility (reconfiguration) to the network.

This requirement places enormous value on the development of next generation photonics packages solutions. This conference gathers together packaging scientists and engineering experts to present their work which defines the future needs relating to Photonics fabrication, integration, and packaging with special emphasis placed on the need for intelligent low cost solutions. Topics presented should cover microphotonics (fabrication and characterisation), optical network domain (telescoms, datacoms) in addition to emerging biophotonics integration and packaging aspects.

Topics to be covered include:

- novel photonics packaging processes, tools and/or techniques
- low cost replication techniques applied to photonic packaging – embossing, imprint lithography, injection molding
- novel Planar Optical Interconnect and their integration – PLC glass, polymer, sol-gel
- hybrid interconnect technologies – flip-chip assemblies e.g. eutectic solder
- novel passive/active alignment techniques (fibre/PLC to device coupling)
- monolithic integration techniques and processes
- novel package architectures – free space and embedded interconnect for optical backplanes – integration compatibility with PCB - microcouplers, optical interconnect
- novel thermal management – active/passive cooling solutions
- reliability/self-test associated with photonic modules
- microphotonic components
- MEMS, MOEMS and micromachining
- modelling and characterisation.

Nanotechnology and Nanophotonics (IRE03)

Conference Chair: **Werner J. Blau**, Trinity College Dublin (Ireland)

Cochairs: **Jenny Patterson**, Intel Ireland (Ireland); **Gareth Redmond**, NMRC/National Univ. of Ireland/Cork (Ireland); **Donald Fitzmaurice**, National Univ. of Ireland/Dublin (Ireland)

The emerging field of nano-science and technology addresses the design, fabrication, and characterisation of functional objects with dimensions on the nanometer length scale. It is the natural continuation of the miniaturisation revolution that we have witnessed over the last decade where micron tolerances (micro-engineering) are routinely attained. Many consumer products, including PCs, CD-players and inkjet printers increasingly contain components with nanometer features.

Advances in this rapidly growing area will have long-term implications in a wide range of different scientific and engineering disciplines, including photonics. Nanoscale research is growing fast both in Ireland and worldwide, and nanotechnology is now widely acknowledged as a critical factor to substantial future growth of both Irish global knowledge-economy.

The 'Nanotechnology' conference will focus on the Fabrication and Integration of Nanoscale Systems/Devices.

Topics to be covered include:

- nanomaterials and nanofabrication for application in communication and information technology devices
- NEMS/MEMS devices
- nanofabrication
- nanoscale circuits
- nanophotonics
- nanostructured materials, i.e. nanowires/nanotubes/nanodots
- nanoscale metrology and characterisation
- CNT materials, devices and applications
- nanoscale magnetic applications
- nanoscale computing and modelling
- nanobiology, including nanotechnology for optical sensing and Lab-on-a-Chip applications.

Organising Committee

Liam Barry, Dublin City Univ. (Ireland)
Werner J. Blau, Trinity College Dublin (Ireland)
Brian W. Bowe, Dublin Institute of Technology (Ireland)
Gerard Byrne, National Univ. of Ireland/Dublin (Ireland)
Hugh J. Byrne, Dublin Institute of Technology (Ireland)
David C. Cameron, Dublin City Univ. (Ireland)
David M. Denieffe, Institute of Technology Carlow (Ireland)
Austin Duke, Enterprise Ireland (Ireland)
Gerard Farrell, Dublin Institute of Technology (Ireland)
Thomas Farrell, Intune Technologies Ltd. (Ireland)
Donald Fitzmaurice, National Univ. of Ireland/Dublin (Ireland)
Aiden Flanagan, Boston Scientific Corp. (Ireland)
Harold Gamble, Queen's Univ. Belfast (United Kingdom)
Thomas J. Glynn, National Univ. of Ireland/Galway (Ireland)
Martin Henry, Dublin City Univ. (Ireland)
Padraig Hughes, NMRC/ National Univ. of Ireland/Cork (Ireland)
David Kennedy, Dublin Institute of Technology (Ireland)
Elfed Lewis, Univ. of Limerick (Ireland)
Brian D. MacCraith, Dublin City Univ. (Ireland)
Jonathan Magee, Rofin-Baasel UK (United Kingdom)
Enda McGlynn, Dublin City Univ. (Ireland)
John G. McInerney, National Univ. of Ireland/Cork (Ireland)
James A. McLaughlin, Univ. of Ulster (United Kingdom)
Eucharia Meehan, Higher Education Authority (Ireland)
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Ronan F. O'Dowd, National Univ. of Ireland/Dublin (Ireland)
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Jenny Patterson, Intel Ireland (Ireland)
Gareth Redmond, NMRC/ National Univ. of Ireland/Cork (Ireland)
Alan Ryder, National Univ. of Ireland/Galway (Ireland)
John T. Sheridan, National Univ. of Ireland/Dublin (Ireland)
James E. Walsh, Dublin Institute of Technology (Ireland)

Call for Papers

Photon Management Research in Ireland (IRE04)

Conference Chairs: **John T. Sheridan**, National Univ. of Ireland/Dublin (Ireland); **Ronan F. O'Dowd**, National Univ. of Ireland/Dublin (Ireland); **Gerard D. O'Sullivan**, National Univ. of Ireland/Dublin (Ireland)

Programme Committee: **Hugh J. Byrne**, Dublin Institute of Technology (Ireland); **Padraig Dunne**, National Univ. of Ireland/Dublin (Ireland); **Eithne M. McCabe**, Trinity College Dublin (Ireland); **Thomas J. Naughton**, National Univ. of Ireland/Maynooth (Ireland); **Sile G. Nic Chormaic**, Cork Institute of Technology (Ireland); **David N. Nikogosyan**, National Univ. of Ireland/Cork (Ireland); **Feidhlim T. O'Neill**, National Univ. of Ireland/Dublin (Ireland); **Martina O'Neill**, Carl Stuart Ltd. (Ireland)

Some of the greatest potential provided by optical systems involves their ability to provide a huge number of diverse light distributions under a variety of spatial and temporal constraints. Beam splitting, multiplexing and shaping are typical examples. By combining optical engineering techniques (design and analysis software tools), and appropriate materials and fabrication techniques (e.g. micromachining, lithography and interferometric-holographic methods), it is clear that very flexible manipulation of light in time and space can be achieved.

The term Photonic Management has been introduced to emphasise the requirement to study flexible light control. General design and analysis approaches which include diffractive, refractive, and guided-waves effects may be necessary in a single optical system. A general optical system may involve either coherent or incoherent light and may or may not have an imaging function. However the optical system presents itself, the full exploitation of the innovative potential of the photonic aspects of the system leads naturally to a process of full photon management, which necessitates a generalised optical engineering approach.

This conference aims to provide a forum where researchers from a variety of specialist back-grounds can promote and exchange ideas. It is intended to be very broad and inclusive, suitable for those interested in presenting work on optical materials, devices, systems and fabrication technologies. The brief will include novel optical signal processing (i.e. free space based optical encryption) and optoelectronic control of power transfer (i.e. switching networks).

Applications under discussion shall include beam splitting, shaping, forming, multiplexing and switching for use in the areas of optical signal processing, optical computing, imaging, sensing and metrology. The presentation of work involving analysis and design techniques and tools based on the use of geometric, paraxial, Wigner and Fourier optics, and generalised electromagnetic models, including space and time based, are also of interest. Modelling fabrication processes and tolerance issues are also included.

Topics include but are not limited to:

- wave-optical engineering
- optical signal processing
- diffractive optics and holography
- optical engineering techniques
- light source modelling and characterisation
- beam switching and multiplexing
- modelling of light propagation
- design strategies for photon management
- novel image forming concepts
- splitting, shaping and diffusing light
- sub-wavelength and novel diffractive structures
- temporal pulse shaping
- novel materials and devices, design and characterisation
- fabrication, assembly and tolerancing of systems for photon management.

Optical Networks: Systems and Devices (IRE05)

Conference Chairs: **Gerard Farrell**, Dublin Institute of Technology (Ireland); **David M. Denieffe**, Institute of Technology Carlow (Ireland); **Liam Barry**, Dublin City Univ. (Ireland)

Programme Committee: **Prince Anandarajah**, Dublin City Univ. (Ireland); **Michael J. Connelly**, Univ. of Limerick (Ireland); **John Harkin**, Institute of Technology Carlow (Ireland); **Alan Marshall**, Queen's Univ. Belfast (United Kingdom); **David McDonald**, Intune Technologies Ltd. (Ireland); **Gavin McGowan**, FiberQuip Ltd. (Ireland); **Duncan McMillan**, OptoSci Ltd. (United Kingdom); **Paul Townsend**, National Univ. of Ireland/Cork (Ireland)

Much of the phenomenal growth in the use of Information and Communications Technology (ICT) over the last decade can be attributed to major advances in the research and development of photonic technologies, which have enabled the exploitation of the enormous capacity of optical fibre. Today, optical fibre communication networks operate at aggregate bit rates in excess of 100Gbps, and optoelectronic technology is the dominant carrier of global information. It is also central to the realisation of future networks that will have the capabilities demanded by society. These include virtually unlimited capacity to carry communication services of almost any kind, and full transparency that allows terminal upgrades in capacity and routing.

The central aim of this conference is the presentation of current high-quality research on optical networks and components and associated topics such as network architecture, design, operation and management.

Paper and poster presentations with an experimental and/or a theoretical focus are sought in the following areas and in related topics:

- optical transport, metropolitan and access networks
- multi-layer IP over optical architectures
- WDM networks, systems and components
- OTDM networks, systems and components
- optical transmission systems
- optical packet and burst switching
- automatic switched optical networks (G-MPLS)
- QoS issues in optical networks
- optical network performance modelling
- optical networks protection, restoration and reconfiguration
- routing and wavelength assignment
- optical amplification
- hybrid optical/wireless networks
- optical network management
- measurement, monitoring and supervision techniques
- reports on field-trials and experiments.

Surface Engineering and Nanotechnology (IRE06)

Conference Chairs: **David Kennedy**, Dublin Institute of Technology (Ireland); **David C. Cameron**, Dublin City Univ. (Ireland)

Programme Committee: **Gordon Chambers**, Dublin Institute of Technology (Ireland); **Mark E. Heaton**, Imperial College London (United Kingdom); **Suzanne Martin**, Dublin Institute of Technology (Ireland); **Emilia M. Mihaylova**, Dublin Institute of Technology (Ireland); **Kevin Tiernan**, Dublin Institute of Technology (Ireland)

The conference is ideally suited to engineers, managers and industrialists interested in the fields of Surface Engineering, materials, design and Nanotechnology and it is based on the belief that competitiveness depends largely upon advances in these fields of technology.

CONFERENCE OBJECTIVES:

- To provide an insight into developments in nanotechnology and its applications to new product designs and materials.
- To address the needs of emerging and existing SMEs in the Irish economy in surface engineering, product design and nanotechnology

The main topics covered include:

- surface engineering
- multi-functional materials and biomaterials
- nanostructured materials and nanopowders, nanorobots
- micro and nano systems/sensors
- smart packaging
- applications and research on nanotechnology
- materials testing
- optical measuring techniques
- R&D and nanotechnology education
- nano-technologies and nano-sciences
- new production processes and devices
- technologies for the safety and security of people
- intelligent manufacturing systems
- systems, instruments and equipment
- diagnosis and/or surgery
- sensors, actuators, and systems
- integration of miniaturised devices and related software into intelligent end-products
- surface engineering and nanotechnology
- technical innovations and business opportunities.

IMPORTANT DATES

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Laser-based Materials Processing (IRE07)

Conference Chairs: **Thomas J. Glynn**, National Univ. of Ireland/Galway (Ireland); **Gerard M. O'Connor**, NCLA/National Univ. of Ireland/Galway (Ireland); **Aidan J. Flanagan**, Boston Scientific Corp. (Ireland); **Gerald Byrne**, National Univ. of Ireland/Dublin (Ireland); **Jonathan Magee**, Rofin-Baasel UK (United Kingdom)

Advanced light sources have always played a significant role in the synthesis of materials and formation of small-scale microstructures. Although the wavelength of photons has been the key factor limiting minimum dimensions of 2D or 3D structures they could produce, the invention of holographic and phase mask projection has enabled engineers to fabricate devices with characteristic features well below the photon wavelength. A further reduction of device dimensions fabricated with photons has been achieved by implementing the processes that rely on strongly nonlinear optical phenomena. Optical processing methods have particular applicability in the field of micromachining where silicon etching technology is used to form three dimensional structures. Optical methods such as laser micromachining, photon-assisted deposition/etch processes, and nanolithography allow the fabrication of nanometer scale devices. These methods apply to many aspects of micromachining including deposition methods, selective material removal, patterning over topography, and device characterization. Furthermore, the use of optical processing methods can facilitate the use of materials not traditionally used in microtechnology to make high performance micromachined devices.

The aim of this conference is to bring together researchers, engineers and students investigating all aspects of micromachining and optical (photon)-based technologies for materials processing and nanostructuring.

Papers are solicited on the following and related issues:

- fundamental processes in the laser material interaction
- laser-based deposition
- optical nano-lithography, interferometric lithography
- nano-patterning (photo-etching, doping and annealing) using laser sources
- laser-generated nano-clusters and nano-cluster manipulation
- photon-based hybrid techniques -challenges and opportunities
- laser micro-machining
- material processes for microphotonic devices
- new fabrication technologies and processes
- photo-assisted microfabricaton processes
- ultrafast laser processes.

Optical Sensing (IRE08)

Conference Chair: **Brian D. MacCraith**, Dublin City Univ. (Ireland)

Cochairs: **Elfed Lewis**, Univ. of Limerick (Ireland); **James A. McLaughlin**, Univ. of Ulster (United Kingdom); **James E. Walsh**, Dublin Institute of Technology (Ireland)

Programme Committee: **A. Al-Shamma'a**, Univ. of Liverpool (United Kingdom); **Vincent Casey**, Univ. of Limerick (Ireland); **Hartmut Ewald**, Rostock Univ. (Germany); **Colin Fitzpatrick**, Univ. of Limerick (Ireland); **Donal A. Flavin**, Waterford Institute of Technology (Ireland); **Eon O'Mongain**, National Univ. of Ireland/Dublin (Ireland); **William B. Lyons**, Univ. of Limerick (Ireland); **Tong Sun**, City Univ. of London (United Kingdom)

In addition to being an area of rapid development and intense research in its own right, Optical Sensing embraces a large sector of modern technologies including photonics, intelligent instrumentation, advanced fabrication, devices and materials. This conference will provide delegates with a unique opportunity to discuss and exchange ideas on new scientific knowledge and emerging technologies. The wide range of technological areas is reflected in the growing number of application areas in which real problems are being addressed by the application of optical sensor technology. These include Biotechnology, Environmental Monitoring and ICT.

Researchers from academic and industrial backgrounds working in the general area of Optical Sensors are invited to contribute through active participation and information exchange in this conference. The emphasis will therefore be on high quality presentation of new and relevant research in this rapidly advancing area.

Contributions are invited in all areas relating to Optical Sensors some of which are included below:

- advanced sensing materials
- nanotechnology for optical sensors
- chemical sensing
- gas sensing
- electromagnetic radiation sensing
- ionizing radiation sensing
- thick and thin film sensing
- sensor packaging and assemblies
- intelligent sensor systems
- smart sensor structures
- novel sensor interrogation techniques

Some suggested application areas:

- environmental (e.g., water quality)
- medical/healthcare
- biomedical
- food technology
- biotechnology
- automotive
- aerospace
- agriculture
- marine.

Optoelectronics and Photonic Devices (IRE09)

Conference Chair: **John G. McInerney**, National Univ. of Ireland/Cork (Ireland)

Cochair: **Thomas Farrell**, Intune Technologies Ltd. (Ireland)

Programme Committee: **Louise Bradley**, Trinity College Dublin (Ireland); **Jens Buus**, Gayton Photonics Ltd. (United Kingdom); **Kent D. Choquette**, Univ. of Illinois/Urbana-Champaign; **Brian Corbett**, NMRC/National Univ. of Ireland/Cork (Ireland); **Andrea Fiore**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Bob Manning**, National Univ. of Ireland/Cork (Ireland); **Geert Morthier**, Univ. Gent (Belgium); **James O'Gorman**, Eblana Photonics Ltd. (Ireland); **Ian H. White**, Univ. of Cambridge (United Kingdom); **Anatoly V. Zayats**, Queen's Univ. Belfast (United Kingdom)

SCOPE

Materials growth and analysis, fabrication and manufacturing processes, experimental characterisation and modelling, fundamental science and engineering as they relate to semiconductor optoelectronic and photonic devices.

TOPICS FOR CONSIDERATION

These include but are not limited to the following:

- semiconductor laser materials growth, analysis, device fabrication, manufacturing
- packaging and reliability of photonic devices and components
- monolithic and hybrid integration of photonic devices and circuits, OEICs/PICs, optical subassemblies
- high performance diode lasers: high power/brightness, low threshold, uncooled, short pulses, tunable, narrow linewidth, large modulation bandwidth
- semiconductor optical amplifiers for communication, switching, signal processing
- novel semiconductor materials and gain media: wide bandgaps, mid-IR, antimonides, dilute nitrides, low-dimensional structures such as quantum dots
- optical nanostructures, microcavities, photonic bandgap effects
- sources, amplifiers, pump lasers, detectors and receivers for telecom, datacom
- high speed optical transmitters, receivers and electro-optic modulators.

Call for Papers

Spectroscopy (IRE10)

Conference Chairs: **Gerard D. O'Sullivan**, National Univ. of Ireland/Dublin (Ireland); **Hugh J. Byrne**, Dublin Institute of Technology (Ireland); **Enda McGlynn**, Dublin City Univ. (Ireland); **Alan G. Ryder**, National Univ. of Ireland/Galway (Ireland)

Programme Committee: **Padraig Dunne**, National Univ. of Ireland/Dublin (Ireland); **Ronan Faulkner**, Dublin City Univ. (Ireland); **Martin Lamb**, Queen's Univ. Belfast (United Kingdom); **Mike Mansfield**, National Univ. of Ireland/Cork (Ireland); **Cormac McGuinness**, Trinity College Dublin (Ireland); **Raymond O'Neill**, National Univ. of Ireland/Maynooth (Ireland); **Albert A. Ruth**, National Univ. of Ireland/Cork (Ireland); **Emma Sokell**, Univ. College Dublin (Ireland)

Spectroscopy has been associated with many of the great developments in Physics in the past 150 years. The development of the laser in the second half of the last century has allowed spectroscopy to make contributions at the cutting edge of atomic, molecular and solid state physics and opened up new areas such as quantum information systems, Bose Einstein condensation of atoms and molecules and ultrahigh precision measurements of fundamental quantities. In addition, spectroscopic systems and methods are not confined to the optical domain but extend to infrared and X-ray wavelengths.

The meeting will cover a wide range of topics of current interest, including but not limited to:

- spectroscopic techniques for material characterisation
- applications of laser spectroscopy to study fundamental processes in materials
- Raman, resonance Raman and surface-enhanced Raman scattering (SERS)
- spectroscopic tools for process monitoring, remote sensing
- laser induced fluorescence and phosphorescence
- spectroscopic studies of fundamental processes using ultra short laser pulses
- new spectroscopic approaches and methodologies
- light source development
- synchrotron radiation studies of atoms, molecules clusters, and surfaces
- spectroscopic instrumentation
- spectroscopy and laser diagnostics of plasmas
- nonlinear and multi-photon techniques
- applications in astrophysics
- chemometrics and spectroscopic data analysis.

Optics Education (IRE11)

Conference Chair: **Brian W. Bowe**, Dublin Institute of Technology (Ireland)

Cochairs: **Eucharia Meehan**, Higher Education Authority (Ireland); **Martin O. Henry**, Dublin City Univ. (Ireland)

Programme Committee: **Douglas Walsh**, OptoSci Ltd. (United Kingdom); **John Sheridan,** National Univ. of Ireland/Dublin (Ireland)

As developments continue in the research, development, engineering, and manufacturing of advanced instrumentation and devices using a range of lasers, optoelectronics, photonics, and imaging technologies, it is imperative that education at all levels develops so as to impart new knowledge and enhance graduate skills. Industries in these areas demand well-trained and educated technicians, engineers and scientists, and educators in these fields face many challenges to keep up with technological developments. The principal challenge lies first in attracting elementary and high school students to a career that is both demanding and rewarding, and then equipping them with the skills necessary to face a rapidly changing technological landscape. In recent years there has been a growing awareness at all levels of education of the importance of student-centred learning and the development of lifelong learning skills. This awareness, along with the developments in optical and optoelectronic technologies, has led to subsequent developments in educational approaches in the science and technology disciplines.

At this conference, we welcome contributions that describe innovative approaches at any education level, from elementary to higher education, in the optical sciences. Alternative education routes such as continuing education programs and online courses will be highlighted.

Specific topics may include, but are not limited to:

- practical teaching modules in the optical sciences for secondary schools
- inexpensive optics demonstrations for training in optics
- teaching optics and photonics laboratory skills
- photonics in the institutes of technology
- software and internet tools for optics education
- postgraduate courses in the optical sciences
- industry input into optics education at higher level
- outreach activities in schools
- corporate educational outreach.

Business Development (IRE12)

Conference Chairs: **Austin F. Duke**, Enterprise Ireland (Ireland); **Eoin O'Neill**, Trinity College Dublin (Ireland)

The Conference Committee are organising a session on the spin-off of new knowledge-intensive business from research in optronics, optics, nanotechnology, and related areas.

Papers from researchers, practitioners and entrepreneurs in the following areas will be welcomed:

- **Entrepreneurship training for graduate researchers in optics.**

These could range from generalised programmes which are implemented in physics and engineering departments targeted at undergraduates, postgraduates and post-docs, to novel training sessions, intensive workshops, boot camps etc. Experiences of collaboration between business schools and technical departments are eligible. They may also include surveys in general regional trends, benchmarking of training programmes, and the design and content of such programmes.

- **Regional incentives for spin-off company formation in optics.**

Including the support structure available to spin-off companies in the optical field, and its applications (nanotechnology etc) in particular regions.

- **Bridging the funding gap: how new ventures in optics and nanotechnology find funding.**

These contributions may be from venture capitalists, angel investor groups, seed funds, enterprise promotion agencies, and entrepreneurs themselves, showing how the gap between research funding and the business proposition acceptable to venture capital investors is crossed.

- **Policies on spin-off.**

Contributions that analyse how policies on a regional, national, and European scale impact the acceleration of the commercialisation of research in the field of optics. Contributions on the emergence of clusters, and the influence of large companies on the spin-out process are also encouraged.

- **Experiences in spin-off companies in the field of optics.**

Case histories of critical stages in the development of spin-off optical companies are important tools for the understanding by young entrepreneurs of the task that faces them. European experiences are particularly welcome.

The International Society for Optical Engineering

SPIE—The International Society for Optical Engineering is dedicated to advancing scientific research and engineering applications of optical, photonic, imaging, and optoelectronic technologies through its meetings, education programs, and publications.

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