OTHMAN H. Y. ZALLOUM, PhD, MInstP, CPhys,
ASSOCIATE PROFESSOR OF PHYSICS

Personal and Contact Information
Palestine Polytechnic University
College of Applied Sciences
Department of Applied Physics and Electronics
Phone: +(972) 2-223305
Email: ozalloum@ppu.edu

EDUCATION

1994 Ph. D. (Physics) The National University of Ireland, University College Dublin, Dublin, Ireland.
1991 M. Sc. (Physics) The National University of Ireland, University College Dublin, Dublin, Ireland.
1990 B. Eng.(Honors) The National University of Ireland, University College Dublin, Dublin, Ireland.
1986 National Certificate in Electronics Engineering, Waterford Institute of Technology, Ireland.

POSTDOCTORAL APPOINTMENTS AND TEACHING EXPERIENCE

Associate Professor in Physics	Palestine Polytechnic University	07/2012 – Present
Assistant Professor in Physics	Palestine Polytechnic University	08/2010 – 07/2012
Research Scientist*	University of Tennessee Space Institute, USA	05/2008 – 03/2010
Research Associate*	McMaster University, Hamilton, Ontario, Canada	03/2004 – 12/2007
Research Associate*	Johns Hopkins University, Maryland, USA	01/2003 – 12/2003
Assistant Professor in Physics	Palestine Polytechnic University, Hebron, Palestine	09/1998 – 10/2002
Assistant Professor in Physics	Zarqa University, Jordan	09/1997 – 09/1998
Assistant Professor in Physics	Al-Zaytoonah University of Jordan, Jordan	02/1995 – 09/1997

*Over the period 10/2002 – 08/2010, I was an Assistant Professor in Physics on a Leave of Absence from the Palestine Polytechnic University.

POSTDOCTORAL RESEARCH EXPERIENCE

1. **The University of Tennessee, Space Institute, Goethert Parkway, Tullahoma, TN, 05/2008 – 03/2010.**

   I was a research scientist at the University of Tennessee Space Institute with Professor William Hofmeister. The research can be divided into the following categories:

i. **Development of an amplified femtosecond laser system for material micro/nanostructuring with an integrated Raman microscope.**

   In order to obtain new insights into laser-induced chemical material modifications, I have led the team to introduce a novel combined approach of femtosecond pulsed laser-direct writing and in situ Raman microscopy within a single experimental apparatus. We have developed a new scanning microscope, the first of its kind, which provides a powerful tool for micro-/nanomachining and characterization of

material properties and allows us to relate materials' functionality with composition. We addressed the issues of light delivery to the photomodification site and showed the versatility of the system using tight focusing. Amplified femtosecond pulses were generated by a Ti:sapphire laser oscillator and a chirped-pulse regenerative amplifier, both pumped by a diode-pumped frequency doubled neodymium-doped yttrium orthovanadate (Nd:YVO(4)) laser operating at 532 nm. The research involved the application of Raman spectroscopy and scanning electron microscopy imaging of femtosecond laser micro-/nanomachining on the surface and in the bulk of single-crystal diamond. This effective combination helps to shed light on the influence of the local structure fluctuations on controllability of the laser processing and the role of the irradiation in the ablation processes ruling out possible imprecisions coming from the use of the two independent techniques. The results of this research was published in the refereed Journal: Rev. Sci. Instrum. 2010 May;81(5):053906. doi: 10.1063/1.3430073.

ii. Femtosecond micromachining of HPHT single-crystal diamond with direct laser writing using tight focusing.

We investigated the formation of diversiform micro-/nano-structures in High-Pressure High-Temperature (HPHT) synthetic single-crystal diamond by tight-focusing 200 fs regeneratively amplified Ti: Sapphire laser pulses centered at $\lambda = 800$ nm. Ablated samples of synthetic single crystal nanodiamond and their acetate replicas were analyzed using scanning electron microscopy (SEM). Using pulse energies that were significantly above the threshold for permanent change, it was shown from this work that amplified femtosecond pulses were capable of producing controlled modification of HPHT single-crystal diamond at size scales below the diffraction limit and provided negligible collateral heating and shock-wave damage. This was attributed to the low thermal losses and negligible hydrodynamic expansion of the ablated material during the femtosecond laser pulse. It was shown that low pulse energy is a key factor for the accurate and precise machining of micropattems. This work was published in Optics Express, Vol. 18, Issue 12, pp. 13122-13135 (2010).

iii. Worked on the design of new, advanced and durable Silicon-based sensors to measure acceleration, strain and temperature of structural components on high-temperature aerospace materials in extreme environments. Applications of these sensors in high thermal (>1800^{o}F) and acoustic loads include air-breathing and rocket propulsion systems, airframe and spacecraft structures and hypersonic vehicle systems.

iv. Given the responsibility to teach special topics for the graduate programs (MS and PhD) and was involved in the teaching of Pulsed Laser Deposition (PLD) at the University of Tennessee Space Institute. The PLD method of thin film growth involves evaporation of a solid target in an ultra-high vacuum chamber by means of short and high-energy laser pulses.

2. McMaster University Faculty of Engineering Physics, Hamilton, Ontario, Canada, 03/2004 - 12/2007.

I was a research associate in the Thin Film Laboratory of Professor Peter Mascher for the period from March 2004 to December 2007. I have been actively involved in the advanced characterization of new silicon-based semiconductor nanoclusters with or without rare-earth doping. The research can be divided into the following four categories:

i. Silicon nanocrystals – a major focus of my research has been the exploration and description of the formation of silicon nanocrystals in silicon-rich oxides, nitrides, and oxy-nitrides, produced by post-deposition annealing of thin films grown by ECR-PECVD or inductively coupled plasma (ICP) CVD.

Of particular interest are the effects of annealing in materials that are highly silicon rich, for applications in future nano-photonic devices. For such devices, nano-structured silicon shows substantial promise as quantum confinement effects make luminescence possible, which serves as the foundation of the rapidly emerging field of silicon photonics.

ii. **Rare-earth-doped structures** - in collaboration with industrial partners, we have demonstrated very high, optically active concentrations of Er, Td, Ce, and Eu by using in-situ doping processes. Studies at the Canadian Light Source synchrotron facility have provided critical information on the luminescence mechanisms and the incorporation characteristics of the RE in various Si-based matrices. Most exciting from a practical perspective is the potential for tunability of the emission wavelength and/or the generation of white light.

iii. **Synchrotron studies** - A more and more important aspect of our work is the application of synchrotron-based techniques to the investigation of the luminescence mechanisms in rare earth doped, silicon-based structures. The results provide evidence that luminescence from these materials is correlated with the excitation of O-related energy states, and demonstrate that the composition and bonding structure of the silicon oxide host matrix play an active role in determining the luminescent properties, even though the microstructure of the films may vary from sample to sample. In order to optimize the luminescence from such materials it is, therefore, necessary to consider the local bonding environment of the RE-ions and specific details of electronic states associated with the host matrix.

This research has potential applications for use in a variety of applications including solid state lighting and solar cells. Semiconductor nanoclusters can be utilized to produce novel lasers and optical devices and can be used as a monolithically integrated silicon-based emitter for optical telecommunications. My contributions in this area have led to the publication of a series of groundbreaking findings in top-ranked scientific journals and in many more refereed conference proceedings, in addition to many presentations at local and international conferences and symposia.

iv. **Development of New Electro-Optical Characterization Facilities** - I have developed new electro-optical characterization facilities for photonic materials and devices. These facilities now contribute to the optical, electrical and spectroscopic characterization of light emitting nanostructures both at room and cryogenic temperatures and have fostered relationships with industry and are a great networking tool. One of the systems was published in the American Institute of Physics Journals "Review of Scientific Instruments" under the title "Laser Photoluminescence Spectrometer based on CCD detection for Silicon Based Photonics".

3. **The Johns Hopkins University, School of Medicine, The Wilmer Ophthalmological Institute, The John Hopkins Hospital, January 13, 2003 – December 31, 2003.**

I have joined Professor David Guyton's group for a one-year Research Fellowship in Ophthalmic Instrumentation, and I was soon promoted to Research Associate in Ophthalmology (faculty rank).The primary projects that I have contributed to were applications in pediatric vision screening, remote control via visual fixation, monitoring of eye alignment, and eye tracking.

I conducted a comprehensive PSpice simulation of a complete and sophisticated electronic control system for retinal birefringence scanning devices. In my work, I have modeled the electronic signal processing unit used to measure changes in retro-reflected, polarized, near-infrared light to detect the projection into space of the uniquely oriented nerve fibers surrounding the fovea (the area of the retina used for fixation). I have also contributed significantly to the optical and mechanical designs of a new no-moving-parts eye fixation monitor. The advantages of this new device are that it:(i) requires no

calibration for each subject, (ii) avoids the added noise and vibration from a rapidly spinning motor as normally required for retinal birefringence scanning devices. The results of this study were published in detail in the Journal of Biomedical Optics, a favorite journal for peer-reviewed papers that utilize modern optical technology for improved health care and research.

A further development stemming from my contributions was reported in: "Directional eye fixation sensor using birefringence-based foveal detection" published in the peer-reviewed journal Applied Optics. This paper demonstrated the feasibility of an eye tracker sensor that utilizes birefringence-based foveal position detection. The method and device can be used for remote, noninvasive continuous monitoring of foveal fixation within ±1 degree in both the horizontal and the vertical directions, but at a relatively slow speed. The field can potentially be expanded by using other birefringence structures of the fundus of the eye such as the retinal nerve fiber layer around the optic disc. The other advantage of this approach is that it requires no rigid head fixation and needs no head-mounted appliances. The potential widespread use or application of this sensing technology includes remote control and security applications via visual fixation, aids for disabled individuals, and other areas of environmental control via visual fixation.

I also contributed to the subjects of two platform presentations at the Annual Meeting of the Association for Research in Vision and Ophthalmology in 2004, and the publication of a brief summary paper in the Biomedical Optics and Medical Imaging section of SPIE Newsroom. The paper was entitled "Changing polarization of foveal nerve fibers in the eye allows detection of central fixation".

TRAINING COURSES

Fellowship in Medical Physics, Queensland University of Technology, School of Physical and Chemical Sciences, Brisbane, Queensland, Australia, 15/07/2013 – 17/09/2013.

I was awarded a Fellowship Placement by the International Atomic Energy Agency (IAEA) in Vienna to undertake a two-month placement in Australia in the Science and Engineering Faculty, Queensland University of Technology (QUT). The fellowship was related to the IAEA's TC project entitled: Supporting Education and Training in Radiation Protection and Medical Physics (Oracle Project Number:3060293) (PAL9007).The fellowship placement was coordinated by The Australian Nuclear Science and Technology Organisation (ANSTO), and was intended to provide an in depth exposure to a research and academic environment as well as the skills and experience to effectively teach in a medical physics program. During the course of the fellowship:

1. I undertook a period of education, training and research in Medical Physics that included participation in lectures and tutorials for the following units that forms part of the coursework component of the QUT Masters in Medical Physics Program:

    - PCN212 Radiotherapy Physics
    - PCN112 Medical Imaging Science
    - PCN214 Health and Occupational Physics

    These units comprise lectures, tutorials and practical classes, some of which are in clinical departments.

2. I Gained experience and knowledge related to the Training, Education and Accreditation Program (TEAP) run by the Australasian College of Physical Scientists and Engineers in Medicine (ACPSEM) and how it has been implemented in Queensland.

3. I Learned about the current research projects in medical physics currently being carried out at QUT and elsewhere in Brisbane.

PCN214 Health and Occupational Physics

The content of the Health and Occupational Physics course includes history of safety provisions, responsibility, legislation; Role of safety officer, medico-legal implications; Causes of accidents, human error; Hazard analysis, system safety planning; Instrumental safety – dialysis; Electrical hazards; Electrical protection; Nonionizing-electromagnetic radiation hazards; Lasers; UV radiation; Philosophy of radiation protection; absorbed, equivalent and effective dose; radiation weighting factors; organ weighting factors; stochastic and deterministic effects; recommendations on radiation dose limits; external and internal exposure; ingestion and inhalation; derived limits; codes of practice; potential exposure and constraint; Biological effects and risks to populations; Radiation protection in medical areas; radiation protection in mining and milling of radioactive ores; radioactivity in soil, water, air and biota; pathway analysis; radiation protection in other professional situations, transport, disposal, storage and handling of radioactive materials; Radiation shielding.

PCN112 Medical Imaging Science

The content of the Medical Imaging Science course includes: Nuclear Medicine: Radionuclide selection; production and quality control; Pharmaceutical selection and organ localisation; Preparation of "kits" and quality control; Imaging Systems: The gamma camera - principle of image formation, collimators, resolution, factors affecting image quality; dynamic imaging; NEMA quality control; Principles of SPECT and PET; Butterworth and resolution recovery filters; Iterative reconstruction including OSEM; Attenuation correction and scatter correction leading to quantitative SPECT; PET scintillators and their properties, 2D versus 3D PET systems; Internal dosimetry including the MIRD method; Foetal dosimetry including placental transfer, comparisons with doses in diagnostic radiology; Methods of patient-specific dosimetry for therapy applications including dose kernel convolution and Monte Carlo techniques; Absolute activity estimation from geometric mean planar images; Patient related radiation safety issues including concerns regarding pregnant/ lactating/ paediatric patients, doses to carers and friends, discharge requirements for patients after radionuclide therapy. Clinical applications: i) Programming: Introduction to SciLab and SciLab graphics; Matrix operations; Programming with SciLab. Control structures. Functions; Reading and displaying images with SciLab; the digital image: pixels, binary numbers, palettes, look-up tables, windowing; ii) Image processing: histograms, contrast stretching, histogram equalisation, spatial filtering, frequency filtering; Image quality: contrast, noise, S/N ratio, spatial resolution, modulation transfer function; Visual perception, contrast-detail-diagram, receiver operating characteristic.

PCN212 Radiotherapy

The content of the Radiotherapy course includes: Radiotherapy and its role in the treatment of cancer; Basic radiation physics; Dosimetric Principles, Quantities and Units; Radiation Dosimeters; Radiation Monitoring Instruments; External Beam Radiotherapy Equipment; Physical Aspects of External Photon Beams; Clinical Treatment Planning; Physical and Clinical Aspects of Electron Beams; Calibration of photon and electron beams; Acceptance Tests and Commissioning; Quality Assurance of external beam radiotherapy; Physical and Clinical Aspects of Brachytherapy; Basic Radiobiology;

Special Procedures and Techniques in Radiotherapy including stereotactic, Total body irradiation (TBI), Intraoperative Radiotherapy, Conformal and Intensity Modulated Radiotherapy (IMRT), Image - Guided Radiotherapy, Heavy Ion and Proton Therapy; Radiation Protection and Safety. The practical work consisted of attending five practical sessions. Four of these were at the Mater Public Hospital.

RECENT GRADUATION SEMINARS UNDER MY SUPERVISION

(All were nominated to the Student Innovation Conference (SIC) held at the Palestine Polytechnic University in the academic years 2013-2014 and 2014-2015 and appeared in the SIC handbooks).

1. Biological and Physical Effects of Nuclear Radiation, Intesar Zalloum, Atheer Shamisti, Dujana Kamal, and Othman Zalloum
2. SPECT and PET: principles, Strengths and Recent Advancements, Mai Zalloum, Esra'a Alkdoor, Ghadeer Qawasmi, and Othman Zalloum
3. Advances in Brachytherapy, Bayan Alsalaymeh, Shatha Aljunaidi, and Othman Zalloum
4. Recent Advances in Medical Ultrasound Imaging, Abeer Shabaneh,Rawdah Awawdeh,Maram Doudin, and Othman Zalloum

PROFESSIONAL SOCIETIES

Member, Institute of Physics (MInstP, CPhys), United Kingdom
Member, European Optical Society (MEOS), France
Member, American Optical Society

HONORS AND AWARDS

1990 Canon Scholarship Award and Certificate of Distinction from Cantec in Association with the Dublin Institute of Technology for outstanding project work at University College, Dublin.
1990 Full scholarship for Masters Degree research study at University College Dublin.
1991 Full scholarship for Doctor of Philosophy research study at University College Dublin.
1995 Chartered Physicist, CPhys, Institute of Physics, United Kingdom.
2003 Executive Vice President of Johns Hopkins Postdoctoral Association

PEER REVIEWER

- “Applied Physics Letters”
- “Optics Express”
- “Optics Letters”
- “Optical Engineering”
- “Review of Scientific Instruments“
- “Nanotechnology”
- “Semiconductor Science and Technology”

SYNERGISTIC ACTIVITY

- Point of contact (coordinator) at the PPU to communicate with the National Committee for the Management Program of Cooperation between Palestine and the International Atomic Energy Agency (IAEA).
- Head of the scientific committee for the Faculty of Applied Sciences at the Student Innovation

Conference on held on 18/06/2014 at the PPU.

- Member of the Scientific Committee at the Palestinian Conference on Graduate Student Research in Natural and Applied Sciences on held on 22 March 2014 at Birzeit University.
- Member of the scientific committee at the Student Innovation Conference held on 12/06/2013 at the PPU.
- Physics Chair in the Third Palestinian Conference on Modern Trends in Mathematics and Physics (PCMTMP)" held on July 16-18, 2012 at the Palestine Polytechnic University in Hebron, Palestine.
- Service in many university committees. First-hand experience in curriculum reform and development. Played a key role in managing contacts with industrials partners and key research collaborators.

COURSES TAUGHT AND DEVELOPED

Physics of Medical Imaging, Radiation Physics, Radiation Protection and Safety, Modern Physics, Optics, Physics of Sensors, Classical Mechanics, Statistical Mechanics and Thermodynamics, Mathematical Physics, Quantum Mechanics, Electronics and Laboratories, General Physics Series, General Physics Laboratories, Intermediate Physics Laboratories, Advanced Physics Laboratories, Graduation Seminars

ENGINEERING COURSES TAUGHT AND DEVELOPED

Measurements and Sensors, Metrology, Instrumentations and Sensors are taught for engineering students in Palestine Polytechnic University. In addition, I supervised a number of graduation research projects.

COMPUTER SKILLS

- Optical design and modeling tools (Code V, OSLO, OpticsLab, RSoft, BeamPROP™ and FullWAVE™, CircuitMaker).

- Modeling, simulation studies and monte carlo methods in Physics. Special interest applies to radiation transport, radiative transfer calculations, light-matter interaction, and the angular distribution of light scattering in the form of laser diffractometry.

- Fluency with data analysis software such as Matlab, OrginLab, and MathCad. Development of high speed data acquisition software and instrument control using LabVIEW.

- Acquainted with web-based course delivery tools such as Virtual Blackboard and E-Learning methods, and educational technology applications.

PUBLICATIONS

1. **Zalloum, O. H. Y.**, Parrish M, Terekhov A, Hofmeister W "An amplified femtosecond laser system for material micro-/nanostructuring with an integrated Raman microscope" Review of scientific instruments, **81**(5):053906- (2010) *Selected for the June 2010 issue of Virtual Journal of Ultrafast Science.*

2. **Zalloum, Othman H. Y.** , Matthew Parrish, Alexander Terekhov, and William Hofmeister "On femtosecond micromachining of HPHT single-crystal diamond with direct laser writing using tight focusing" Optics Express, Vol. 18, Issue 12, pp. 13122-13135 (2010). Selected by Virtual Journal of Ultrafast Science. / Volume 9 / Issue 8 / Condensed Matter Physics (2010)
3. Roschuk, T, P.R.J. Wilson, J. Li, **O.H.Y. Zalloum**, J. Wojcik, and P. Mascher, "Structure and luminescence of rare earth-doped silicon oxides studied through their X-ray absorption near edge structure and X-ray excited optical luminescence", physica status solidi B 1-6 (2009) /DOI 10.1002/PSSB.200945531- Editor's Choice Volume 247, Issue 2, pages 248–253, February 2010, Wiley Online Library, (2010).
4. Blakie D. E., **O. H. Y. Zalloum**, J. Wojcik, E. A. Irving, A. P. Knights, P. Mascher, and P. J. Simpson. "Photoluminescence and positron annihilation spectroscopy of MeV Si^+ ion-irradiated Si_yO_{1-y}:Er ($y \approx 1/3$) thin films." Journal of Applied Physics 105, 053517. (2009).
5. Li J., **Othman Zalloum**, Tyler Roschuk, Chenglin Heng, Jacek Wojcik, and Peter Mascher "The formation of light emitting cerium silicates in cerium-doped silicon oxides" *Applied Physics Letters* **94**, 011112 (2009)
6. Heng, C. L., E. Chelomentsev, **O. H. Y. Zalloum**, J. Wojcik and P. Mascher "Photoluminescence from Er-doped Si-rich Si oxides deposited by magnetron sputtering in Ar or $Ar+H_2$ plasma" Journal of Vacuum Science & Technology A: Vacuum, Surfaces, and Films, **27**(1): pp. 101-108 (2009).
7. Li J., **O. H. Y. Zalloum**, T. Roschuk, C. L. Heng, J. Wojcik, and P. Mascher, "Light Emission from Rare-Earth Doped Silicon Nanostructures," *Advances in Optical Technologies*, vol. 2008, Article ID 295601, doi:10.1155/2008/295601 (2008).
8. Heng, C. L., **O. H. Y. Zalloum**, J. Wojcik, T. Roschuk, and P. Mascher, "On the effects of double-step anneal treatments on light emission from Er-doped Si-rich silicon oxide" Journal of Applied Physics 103, 024309 (2008).
9. Heng, C.L**., O. H. Y. Zalloum**, T. Roschuk, D. Blakie, J. Wojcik and P. Mascher. "Photoluminescence studies for an Er-doped Si-rich SiO_x film: effects of annealing gas ambients and double-step processes." Electrochem. Solid-State Lett. **10**, pp. K20-K23 (2007).
10. Gramatikov, B. I., **O. H. Y. Zalloum**, Y. K. Wu, D. G. Hunter and D. L. Guyton. "Directional eye fixation sensor using birefringence-based foveal detection."Applied Optics 46(10): pp. 1809-1818 (2007).
11. Comedi, D., **O. H. Y. Zalloum**, J. Wojcik and P. Mascher. "Light emission from hydrogenated and unhydrogenated Si-nanocrystal/Si dioxide composites based on PECVD-grown Si-rich Si oxide films." IEEE Journal of Selected Topics in Quantum Electronics 12(6), pp. 1561-1569 (2006).
12. Pi, X. D., **O. H. Y. Zalloum**, A. P. Knights, P. Mascher and P. J. Simpson. "Electrical conduction of silicon oxide containing silicon quantum dots." Journal of Physics-Condensed Matter 18(43): pp. 9943-9950 (2006).
13. Gramatikov, B. I., **O. H. Y. Zalloum**, Y. K. Wu, D. G. Hunter and D. L. Guyton (2006). "Birefringence-based eye fixation monitor with no moving parts." Journal of Biomedical Optics 11(3), 034025 (2006).
14. Comedi, D., **O. H. Y. Zalloum**, E. A. Irving, J. Wojcik and P. Mascher. "H-induced effects in luminescent silicon nanostructures obtained from plasma enhanced chemical vapor deposition grown Si_yO_{1-y}: H($y > 1/3$) thin films annealed in ($Ar+5\%H_2$)." Journal of Vacuum Science & Technology A 24(3): pp. 817-820 (2006).
15. Pi, X. D., **O. H. Y. Zalloum**, T. Roschuk, J. Wojcik, A. P. Knights, P. Mascher and P. J. Simpson. "Light emission from Si nanoclusters formed at low temperatures." Applied Physics Letters 88(10). 103111 (2006).

16. **Zalloum, O. H. Y**., M. Flynn, T. Roschuk, J. Wojcik, E. Irving and P. Mascher. "Laser photoluminescence spectrometer based on charge-coupled device detection for silicon-based photonics." Review of Scientific Instruments 77(2), 023907 (2006).
17. Comedi, D., **O. H. Y. Zalloum**, E. A. Irving, J. Wojcik, T. Roschuk, M. J. Flynn and P. Mascher. "X-ray-diffraction study of crystalline Si nanocluster formation in annealed silicon-rich silicon oxides." Journal of Applied Physics 99(2), 023518 (2006).
18. Comedi, D., **O. H. Y. Zalloum** and P. Mascher. "H-sensitive radiative recombination path in Si nanoclusters embedded in SiO_2." Applied Physics Letters 87(21) (2005).
19. Pi, X. D., **O. H. Y. Zalloum**, J. Wojcik, A. P. Knights, P. Mascher, A. D. W. Todd and P. J. Simpson. "Formation and oxidation of Si nanoclusters in Er-doped Si-rich SiO_x." Journal of Applied Physics 97(9): 096108-096108-3 (2005).
20. **Zalloum, O. H. Y.** "Design of a modern optical fibre spectral transmissometer and a 120 degrees scattering meter." Journal of Optics-Nouvelle Revue D Optique 29(2), pp. 53-62 (1998).
21. **Zalloum, O**., E. O'Mongain, J. Walsh, S. Danaher and L. Stapleton. "Dye Concentration Estimation by Remotely-Sensed Spectral Radiometry." International Journal of Remote Sensing 14(12), pp. 2285-2300 (1993).
22. Wilson, P.R.J., T Roschuk, **O.H.Y. Zalloum**, J. Wojcik, and P. Mascher. "The Effects of Deposition and Processing Parameters on the Electronic Structure and Photoluminescence from Nitrride-Passivated Silicon Nanoclusters" . ECS Trans. **16**, (21) 33-41 (2009).
23. Heng, C.L., **O.H.Y. Zalloum**, E. Chelomentsev and P. Mascher. "Photoluminescence from magnetron-sputtered SiO_2 films co-doped with (Er, Ge) under excitation of a 325 nm He-Cd laser line." ECS Trans. **6**, (3) pp. 549-559 (2007).
24. Roschuk, T., **O. H. Y. Zalloum**, J. Wojcik, H. Zhang, and P. Mascher . "A Comparison of the Effects of Silicon Oxide and Silicon Nitride Host Matrices on the Photoluminescence from Si Nanocrystals after High Temperature Annealing". ECS Trans. 6, (3) pp. 523-529 (2007).
25. Wojcik J, T. Roschuk, **O.H.Y. Zalloum**, C.L. Heng, D.E. Blakie, A.P. Knights, and P. Mascher "Fabrication and Characterization of Silicon Nanostructures for Integration in Photonics Devices and Circuits", Society of Vacuum Coaters 505/856-7188, 50th Annual Technical Conference Proceedings, ISSN 0737-5921 pp. 334-337 (2007).
26. Blakie, D. E., **O. H. Y. Zalloum**, J. Wojcik, E. J. Irving, A. P. Knights and P. Mascher "Coupled luminescence centres in erbium-doped silicon rich silicon oxide thin films." Proc. SPIE 6343, 63433S (2006).
27. Comedi, D., **O. H. Y. Zalloum**, D. E. Blakie, J. Wojcik and P. Mascher. "Formation of and Light Emission from Si Nanocrystals Embedded in Amorphous Silicon Oxides." ECS Trans. **3**, (11) pp:3-8 (2006).
28. Flynn, M., **O. H. Y. Zalloum**, J. Wojcik, I. Calder, S. Gujrathi, S. Hill and P. Mascher. "The Impact of the Rare-earth Precursor on the Composition, Structure and Luminescence of Er-doped Silicon-rich Silicon Oxide Films." Published in: Group IV Photonics, 3rd IEEE International Conference on Group IV Photonics, Ottawa, Canada. pp: 46-48, ISBN: 1-4244-0096-1, INSPEC Accession Number: 9274170, Digital Object Identifier: 10.1109/GROUP4.2006.1708160 (2006).
29. Blakie, D., **O. H. Y. Zalloum**, J. Wojcik, E. J. Irving, A. P. Knights and P. Mascher. "Erbium doped silicon rich silicon oxide luminescent thin films deposited by ECR-PECVD." Proc. SPIE 5970, 597013 (2005).
30. Roschuk, T., Wojcik, J., Comedi, D., Flynn, MJ., Irving, E.A., **Zalloum, O.H.Y.**, and Mascher, P."*Optical Properties of Nanostructures based on Silicon Rich Silicon Oxide Thin Films"* in *Proc. of the 207th Electrochemical Society Meeting*, Quebec city, Canada, May 15-20. PV 2005-01 - ISBN 1-56677-459-4 - Silicon Nitride and Silicon Dioxide Thin Insulating Films and Other Emerging Dielectrics VIII. *Editors: R. E. Sah, M. J. Deen, J. Zhang, Y. Yota, and Y. Kamakura. pp.* 136-147 (2005). http://www.ecampus.com/book/1566774594

31. Gramatikov, B., **O. Zalloum**, Y.-K. Wu, D. Guyton and D. Hunter "Changing polarization of foveal nerve fibers in the eye allows detection of central fixation." The International Society for Optical Engineering, SPIE Newsroom Article in Biomedical Optics & Medical Imaging, DOI: 10.1117/2.1200608.0351 (2006), http://spie.org/x8630.xml
32. Wilson P. R. J., T. Roschuk, O. H. Y. Zalloum, J. Wojcik, and P. Mascher. "The Effects of Deposition and Processing Parameters on the Electronic Structure and Photoluminescence from Nitride-Passivated Silicon Nanoclusters." 214th ECS Meeting, Volume 16, Issue 21 Science and Technology of Dielectrics for Active and Passive Devices, Honolulu, HI, USA. (2008).
33. Knights A P, D E Blakie, O H Y Zalloum, J Wojcik, P Mascher, and P J Simpson. "Impact of defect introduction on Er^{3+} luminescence from*SiyO1-y:Er* (y=1/3) thin films characterized by photoluminescence and positron annihilation Spectroscopy" 212th ECS Meeting, Abstract #1179, The Electrochemical Society, Washington DC, USA. (2007).
34. Roschuk T., J. Wojcik, M. Flynn, E. A. Irving, D. Comedi, O. Zalloum, and *P. Mascher. "*A comparison of luminescent silicon nanocrystals formed in silicon rich silicon oxide thin Films deposited by ECR-PECVD and ICP-CVD." 13th Int. Symp. "Nanostructures: Physics and Technology" St Petersburg, Russia, June 20-25, 2005.
35. Comedi D., O.H.Y. Zalloum, E.A. Irving, J. Wojcik, and *P. Mascher. "*Enhanced photoluminescence from nano-structured silicon-rich silicon-oxide (SRSO) Films fabricated by ECR-PECVD and thermally annealed in ($Ar+5\%H_2$)". 13th Int. Symp. "Nanostructures: Physics and Technology" St Petersburg, Russia, June 20-25, 2005.

CONFERENCES

1. "Effect of Sample Temperature on Photoluminescence (PL) Centers in Er-Doped Si_yO_{1-y} ($y \geq 0.32$) Thin Films" Presentedat the ***Third Palestinian Conference on Modern Trends in Mathematics and Physics (PCMTMP)*** which was held on July 16-18, 2012 at the Palestine Polytechnic University in Hebron, Palestine.
2. "Nanomaterials for Sustainable Energy Future; Focus on Energy Conversion." **Oak Ridge National Laboratories**, (September 25, 2008).
3. P. R. J. Wilson, T. Roschuk, O. H. Y. Zalloum, J. Wojcik, and P. Mascher."The Effects of Deposition and Processing Parameters on the Electronic Structure and Photoluminescence from Nitride-Passivated Silicon Nanoclusters', **214th ECS Meeting** - Honolulu, HI, (October 12 - October 17, 2008).
4. Chen, C., C. Fradin, R.R. LaPierre, O.H.Y. Zalloum, and P. Mascher, "*Growth of Be-doped AlGaAs nanowires by molecular beam epitaxy and their temperature dependent photoluminescence properties"*, ***NanoForum CANADA***, University of Waterloo, Waterloo, Ontario, Canada, (June 18-June 20 2007).
5. Flynn, M., O.H.Y. Zalloum, J. Wojcik, I. Calder, S. Gujrathi, S. Hill, and P. Mascher, "*The Impact of the rare-earth precursor on the composition, structure and luminescence of Er-doped silicon-rich silicon oxide films*" ***3rd IEEE International Conference on Group IV Photonics***, Ottawa, Ontario, Canada, (September 13-15 2006).
6. Heng, C., E. Chelomentsev, O. Zalloum, and P. Mascher, "*The micro-structural study and photoluminescence from SiO_2 films co-doped with Ge, Er and Au (or Ag)." **212th Electrochemical Society Meeting***, Washington, DC, USA, (7-12 October 2007).
7. Heng, C.L., O.H.Y. Zalloum, E. Chelomentsev, and P. Mascher, "*Study of the photoluminescence in (Er, Ge) co-doped SiO_2 films and in (Er, Ge, Si) co-doped SiO_2 films*", ***19th Canadian Materials Science Conference***, McMaster University, Hamilton, Ontario, Canada, (June 20-22 2007).
8. Heng, C.L., O.H.Y. Zalloum, E. Chelomentsev, J. Wojcik, and P. Mascher, *A compare study on the photoluminescence of Er-doped Si-rich SiO_x films fabricated by plasma enhanced chemical*

vapor evaporation and magnetron sputtering, ***NanoForum CANADA***, University of Waterloo, Waterloo, Ontario, Canada, (June 18-June 20 2007).

9. Knights, A., D. Blakie, O. Zalloum, J. Wojcik, P. Mascher, and P. Simpson., *Impact of defect introduction on Er^{3+} luminescence from Si_yO_{1-y}:Er (y<1/3) thin films characterized by" photoluminescence and positron annihilation spectroscopy*, ***212th Electrochemical Society Meeting***, Washington, DC, USA, (7-12 October 2007).
10. Li, J., O. Zalloum, J. Wojcik, and P. Mascher, *Fabrication and characterization of rare-earth-doped silicon oxide structures*, ***19th Canadian Materials Science Conference***, McMaster University, Hamilton, Ontario, Canada, (June 20-22 2007).
11. Milgram, J.N., J. Wojcik, O. Zalloum, P. Mascher, and A.P. Knights, *Integrating luminescent Si nanocrystal films into low loss optical waveguides*, ***SPIE Photonics West: OPTO 2007***, San Jose,California, USA, (20-25 January 2007).
12. Roschuk, T., O.H.Y. Zalloum, J. Wojcik, and P. Mascher, *Luminescence from Si nanoclusters formed in silicon oxide and silicon nitride based materials*, ***NanoForum CANADA***, University of Waterloo, Waterloo, Ontario, Canada, (June 18-June 20 2007).
13. Roschuk, T., J. Wojcik, O. Zalloum, and P. Mascher, *The effects of deposition parameters and annealing treatments on the structure of Si-rich silicon nitride and oxynitride thin films*, ***212th Electrochemical Society Meeting***, Washington, DC, USA, (7-12 October 2007).
14. Roschuk, T., O.H.Y. Zalloum, J. Wojcik, and P. Mascher, *Structural and luminescent properties of Si nanoclusters*, ***19th Canadian Materials Science Conference***, McMaster University, Hamilton, Ontario, Canada, (June 20-22 2007).
15. Blakie, D., O.H.Y. Zalloum, J. Wojcik, E.J. Irving, A.P. Knights, P. Mascher, and P.J. Simpson, *Positron spectroscopy of defects in ion-irradiated erbium-doped silicon rich silicon oxide luminescent thin films for silicon photonics*, ***XIVth International conference on positron annhilation***, McMaster University, Hamilton, Ontario, Canada, (July 23rd and July 28th 2006).
16. Comedi, D., O.H.Y. Zalloum, J. Wojcik, and P. Mascher, *Light emission from hydrogenated and unhydrogenated Si-nanocrystal/Si dioxide composites based on PECVD-grown Si-rich Si oxide films*, ***210th Electrochemical Society Meeting***, Cancun, Mexico, (October 29-November 3 2006).
17. Heng, C., O.H.Y. Zalloum, J. Wojcik, and P. Mascher, *Photoluminescence from Er-doped Si-rich SiO_2 films: A two-step annealing processes to control efficient light emission from both Er ions and nanostructures*, ***Group IV Semiconductor Nanostructures symposium***, Boston, MA, USA, (November 27-December 1 2006).
18. Roschuk, T., D. Comedi, O.H.Y. Zalloum, J. Wojcik, and P. Mascher, *Structural, electronic, and optical analysis of luminescent Si-nanocrystal systems*, ***2006 MRS Fall Meeting***, Boston, MA, USA, (November 28-December 2 2006).
19. Roschuk, T., D. Comedi, O.H.Y. Zalloum, J. Wojcik, E. Chelomentsev, M. Flynn, and P. Mascher, *Properties of Si nanocrystals formed in inductively coupled plasma CVD grown SiO_x thin films*, ***209th Meeting of the Electrochemical Society***, Denver, CO, USA, (May 7-12 2006).
20. Roschuk, T., M. Flynn, J. Wojcik, O.H.Y. Zalloum, D. Comedi, and P. Mascher, *Optical properties of silicon nanocrystal-based photonic materials*, ***Ontario Centres of Excellence Discovery***, Toronto, Ontario, Canada, (February 7 2006).
21. Blakie, D., O. Zalloum, J. Wojcik, E.A. Irving, A.P. Knights, and P. Mascher, *Erbium doped silicon rich silicon oxide thin films deposited by ECR-PECVD*, ***Ontario Photonics Consortium (OPC) Research Showcase/Workshop***, Hamilton, Ontario, Canada, (June 1 2005).
22. Blakie, D., O. Zalloum, J. Wojcik, E.A. Irving, A.P. Knights, and P. Mascher, *Erbium doped silicon rich silicon oxide luminescent thin films deposited by ECR-PECVD*, ***Photonics North***, Toronto, Canada, (September 12 2005).
23. Comedi, D., Zalloum, O.H.Y., Irving, E.A., Wojcik, J., and Mascher, P., *Enhanced Photoluminescencefrom Nano-structured Silicon-Rich-Silicon-Oxide (SRSO) Films Fabricated by*

ECR-PECVD and Thermally Annealed in (Ar+5%H_2), ***13th Int. Conf. "Nanostructures: Physics and Technology",*** St Petersburg, Russia, (June, 20-25, 2005).

24. Comedi, D., O.H.Y. Zalloum, E.A. Irving, J. Wojcik, and P. Mascher, *H Induced Effects on the Photoluminescence from Silicon Nanostructures Obtained from PECVD Grown Si_yO_{1-y} (y<1/3) Thin Films Annealed in (Ar+5%H_2)*, ***12th Canadian Semiconductor Technology Conference***, Ottawa, Canada, (August 16-19 2005).
25. Comedi, D., O.H.Y. Zalloum, E.A. Irving, J. Wojcik, T. Roschuk, M.J. Flynn, and P. Mascher, *X-Ray diffraction study of silicon nanocrystals embedded in SiO_2 obtained by thermal annealing of silicon rich silicon oxide thin films*, ***12th Canadian Semiconductor Technology Conference***, Ottawa, Canada, (August 16-19 2005).
26. Mascher, P., T. Roschuk, J. Wojcik, M. Flynn, E. Irving, and O. Zalloum, *Optical properties of nanostructures based on silicon rich silicon oxide (SRSO) thin films*, ***207th Meeting of the Electrochemical Society***, Quebec City, QC, Canada, (May 15-20 2005).
27. Pi, X., O.H.Y. Zalloum, J. Wojcik, M. Flynn, A.P. Knights, P. Mascher, A.D.W. Todd, W.N. Lennard, and S.J. Peter, *Formation and oxidization of silicon nanocrystals in erbium-doped silicon-rich silicon oxide*, ***MRS Spring Meeting***, San Francisco CA, (March 28-April 1 2005).
28. Roschuk, T., Wojcik, J., Flynn, M., Irving, E.A., Comedi, D., Zalloum, O., and Mascher, P., *A Comparison of Luminescent Silicon Nanocrystals Formed in Silicon Rich Silicon Oxide Thin FilmsDeposited by ECR-PECVD and ICP-CVD,* ***13th Int. Conf. "Nanostructures: Physics and Technology",*** St Petersburg, Russia, (June, 20-25, 2005).
29. Roschuk, T., J. Wojcik, M. Flynn, O.H.Y. Zalloum, and P. Mascher, *Pit-formation in amorphous Si thin films after high temperature thermal annealing*, ***MRS Spring Meeting***, San Francisco CA, USA, (March 31 2005).
30. Roschuk, T., M. Flynn, J. Wojcik, O. Zalloum, E. Irving, and P. Mascher, *Luminescent Si nanocrystalsformed within silicon rich silicon oxide thin films*, ***MRS Spring Meeting***, San Francisco, CA, (March 28-April 1 2005).
31. Roschuk, T., O.H.Y. Zalloum, D. Comedi, M. Flynn, J. Wojcik, and P. Mascher, *Optical properties of nanocrystalline silicon and their potential applications*, ***12th Canadian Semiconductor Technology Conference***, Ottawa, Ontario, Canada, (August 16 -19 2005).
32. Roschuk, T., O.H.Y. Zalloum, D. Comedi, M.J. Flynn, J. Wojcik, and P. Mascher, *Optical properties of Si-based materials*, ***Trends in Nanotechnology***, Oviedo, Spain, (29 August-2 September 2005).
33. Gramatikov, B.I., O.H.Y. Zalloum, Y.K. Wu, D.G. Hunter, and D.L. Guyton, *Birefringence-based eye fixation monitor with no moving parts*, ***ARVO (Association for Research in Vision and Ophthalmology)***, Ft. Lauderdale, Florida, USA, (April 25-29 2004).
34. Guyton, D.L., O.H.Y. Zalloum, K.R. Gemp, D.G. Hunter, and B.I. Gramatikov, *Simplified polarization birefringence technique for detecting eye fixation*, ***ARVO (Association for Research in Vision and Ophthalmology)***, Ft. Lauderdale, Florida, USA, (April 25-29 2004).
35. Roschuk, T., J. Wojcik, M. Flynn, O.H.Y. Zalloum, and P. Mascher, *Si-based thin films fabricated through ECR-PECVD for photonic applications*, ***Silicon-Based Photonics Workshop***, McMaster University, Hamilton, Ontario, Canada, (November 2004).