Curriculum Vitae - Stephen Madden

E-mail: stephen.madden@anu.edu.au

Education

Oct 1985 - Oct 1989.

PhD: "New Techniques For Large Scale Integrated Optics Matrix Switching", Imperial College of Science, Technology, and Medicine, University of London, United Kingdom.

Major PhD work areas were: new waveguide fabrication techniques/technologies for waveguide devices up to 30cm x 30cm, Liquid Crystal integration in planar devices to build low loss active devices, modelling of optical switch matrix architectures, and design of waveguide devices and interconnects.
Held industrial award for the duration of this degree.

Oct 1982 - Oct 1985.

B.Sc. 1st Class Honours in Electronic Engineering, Imperial College Of Science, Technology, and Medicine, University of London, United Kingdom. Sponsored & supported by Plessey Research

Final year project on Liquid Crystal filled tunable fibre optic Fabry-Perot optical filter
Undergraduate research opportunities program - worked on coaxial fibre couplers.

World Records/Firsts Held

- Lowest loss Liquid Crystal waveguides ever made – still current after >20 years !
- First low loss electron beam direct write waveguides in silica
- First analysis of static and dynamic response of 2-D confined Liquid Crystals to applied voltage
- First simultaneous 4 channel optical phase conjugation in Semiconductor optical Amplifier
- First Tree Structured DWDM, highest performance DWDM then commercially available
- Lowest Dispersion and dispersion slope Fibre Bragg Grating filters then available
- Designed and manufactured special components used in “Terabit Internet” demonstration
- First Client-server based high performance low cost production DWDM characterisation system
- First 40nm hybrid integrated, polymer tuned, cascaded sampled grating laser
- First to solve ~30 year old sampled DBR reflector design problem to allow any envelope shape and asymmetry to compensate laser gain chip wavelength variation
- Highest index contrast low loss germanosilicate waveguides at 10% contrast and 0.1dB/cm loss
- Lowest loss chalcogenide waveguides ever made at 0.05dB/cm in As_2S_3
- First 1.2TB/s all optical demultiplexing demonstration in a non-resonant system using waveguides
- First demonstration of low loss high index contrast polysiloxane waveguides fabricated by nanoimprint
- First polarisation insensitive polymer single step nanoimprinted channel grating waveguides
- First polymer nanoimprinted waveguide gratings meeting theoretical spectral response
- First fabrication tolerant directional coupler design
- First demonstration of thermally stable Tellurite films
- First demonstration of high quality Tellurium dioxide plasma etching
- First low loss planar tellurite waveguides (<0.05dB/cm)
- First Er Doped Tellurite planar waveguide amplifier (record 1480nm pumped 2.8dB/cm gain)
- First tellurite waveguide lasers
- First low loss buried channel chalcogenide waveguides
- First low loss thermally nanoimprinted chalcogenide waveguides
- Highest nonlinearity glass waveguide ever made
- First loss compensated nonlinear waveguides
- Lowest loss taper transitions from nanometre scale waveguides for fibre coupling ever demonstrated
- First supercontinuum source to span 2-8micron range

Refereed Journal Publications to December 2019

Published: 154 Total Career ISI H Factor: 43 Ave Citations per paper: >33

1 US Patent (granted); 3 US/PTO Patent (applications)

Competitive Grant Income in last 5 years

DP200101893 Harnessing opto-acoustic interactions for on-chip optical isolation (A$620k)

DP190101477 Equipping VIKiNG: Mid-IR technology for exoplanet characterisation (A$ 435k)

LP180100276 Laser cleaning processes for Roads and Maritime Services bridges (A$ 1.3m)

LP170100112 Integration of broadband microwave photonic frequency convertors (A$ 700k)

Accelerating Commercialisation Grant "MIROPA fs - A step change - mid-infrared laser system" 2016 (A$ 200k)

Discovery Translation Fund Grant # 202 Extension Mid-infrared Optical Parametric Amplifier (MIROPA) 2015 (A$ 35k)

Discovery Translation Fund Grant # 202 Mid-infrared Optical Parametric Amplifier (MIROPA) 2015 (A$ 50k)

LP150100914 Brighter than a synchrotron mid-IR sources for spectroscopy & sensing (A$ 335k)

Agilent Technologies Applications and Core Technology University Research Grant, On-chip Glass Mode Locked Laser for MIR Sensing & Ultrafast Instrumentation, 2014 (US$ 55k)

CE11E0091 Centre for Ultrahighbandwidth Devices for Optical Systems (A$23800k) to 2017

Relevant Professional Experience.

May 2004-Present

Current Appointment as tenured Associate Professor in Laser Physics Centre, ANU. Chief Investigator in CUDOS and CUDOS MIR Science Leader. Leader ANFF Optofab Precision Optics capability.

Major Roles:

- Research Chalcogenide waveguides, nanowires, materials, and advanced processing methods
- Research high performance photonic crystals in chalcogenide membranes
- Investigation of film normalisation techniques to try to achieve bulk like chalcogenide thin films
- Research into dry etch and nanoimprint methods for high index contrast polysiloxane waveguides
- Investigations into Tellurite films, etching, and fabrication of low loss waveguides, waveguide amplifiers & lasers
- Research use of thermal nanoimprint methods for fast, low cost, high quality chalcogenide waveguide fabrication
- Clean room design, build, management of LPC and new 600m^2 Physics facility
- Processing tool spec, purchase, install, maintain, expansion of capabilities
- Development of measurement capabilities through custom built hardware, equipment acquisition, custom software
- Supervision of >10 PhD and Masters students in total
- Acquisition of major facilities through LEIF/NCRIS/ANFF
- Establishment and running of ANFF Optofab Precision Optics capability - coatings, diamond turning, and photonic chips
- Ultrafast pulsed laser ablation of materials for surface processing, film deposition, and cleaning
- Lecturing on Integrated optics

September 2002 to April 2004

- Consulting in optical metrology
- Writing Labview based code for niche markets including:
  - Critical Dimension tool for extracting linewidth & line edge roughness from optical and SEM images with nm precision
  - Image restoration library for processing images from optical microscopes to improve the resolution
  - FFT based library to speed up FFT functions inside Labview
- 4 months travelling in Europe, immigration back into Australia, suing tenants who significantly damaged our home, renovating house, "enjoying" the first 9 months of our new daughter's life.

February 2001 – August 2002

Acting VP of Engineering, Sparkolor Corporation, Santa Clara, California USA

Sparkolor developed new world leading tunable laser technology based on hybrid integration of semiconductor laser chips to an integrated optics waveguide tuning circuit utilising a thermo-optic polymer. We achieved high yields in prototype devices, >10mW into fibre, and >40nm tuning range. Sparkolor raised over A$70m from leading VC houses and I was employee number 7. I acted initially as integration leader and program controller as well as being a member of the technical staff undertaking experimental work. In the last 6 months I was appointed to the role of acting VP Engineering by the CEO. I made direct technical contributions in all areas of the product technology, design, fabrication process and characterisation, worked on outside sourcing and relationship management, & personally prevented several showstopper problems not caught by even the technical experts running the areas involved. Note that Intel Corporation bought Sparkolor in August 2002 for the laser technology, at which time I decided to take a long vacation and return to Australia. Major disclosable achievements at Sparkolor include:

Technical:

- Personally invented solutions to two of the three critical problems which turned the laser concept into a viable product, and contributed significantly to solving the third amongst a group of three people
- Contributed many processing techniques and designs to the wafer fab effort, ensured the in house fab came up and was used ASAP, identified probable processing problems ahead of time ensured mitigation plans were implemented in a timely manner
- Provided many of the measurement techniques and procedures used in the characterisation lab, undertook the really difficult measurements personally
- Invented 12 pieces of IP integral to the product covering areas such as laser resonator designs, grating designs, bonding schemes, OIC processing techniques, physical structures for the OIC for active functions, etc
- Undertook overall chip and wafer layout design
- Set up grating writing system and wrote the first gratings, invented three sampled grating writing schemes including the one currently used, and wrote the process control software to enable it to work
- Wrote much of the Labview code in the company covering seven major applications in metrology, optical characterisation, and system/process control
- Co-ordinated the early modelling of the device and later drew upon wide range of modelling experience to identify the approximations within the overall laser model which made it pessimistic with regards to the tuning performance when it predicted we could not reach spec thereby causing major concerns at Board and VC level
- Co-inventor of an OADM patented by Intel

Leadership/Managerial:

- Managed laser development project to prototype stage – direct control over what was done by ~45 people in all areas for laser prototypes, pushed development ahead to meet schedule
- Carried overall responsibility for the chip design, all integration aspects, front and back end processing – final say in the decision process for all technical development within the company was placed with me by CEO
- Planned most of the laser project and instituted a number of company wide initiatives to ensure we had focus where it was needed at different times
- Recruited staff for wafer processing, characterisation, grating, modelling, and electronics areas
- Assisted in the second round of VC financing, and in the sale to Intel

Jan 1997 – Jan 2001

Director of Research and Product Development, ADC AOFR (part of ADC Telecommunications), Canberra, Australia.

Tasked with developing novel component line based upon Fibre Bragg Gratings and fibre Mach-Zehnder interferometers. During my time with ADC, I I) developed FBG/MZI technology in house from a ground zero position, II) invented, patented, and built DWDM & OADM structures to provide market leading performance, III) engineered the devices and packaging into mass producible products and Telcordia qualified them, IV) provided the process technologies and custom built grating fabrication production machines and rolled technology into production. In the course of this work I developed very advanced fibre grating technology and extensively investigated the issues in fabricating quality chirped gratings, many of which have never been discussed in any public domain and I believe were not understood by many groups at that time. I also developed very high quality OADM components with short wavelength losses below 0.2 dB for both single channel and band drop devices with greater than 50 dB transmission isolation. Also highly involved in process design and fabrication of phase masks by Ibsen AS who were later acquired by ADC. Non-disclosure agreements prevent the discussion of many of the technical details, challenges, and solutions in the work undertaken during these four years. On a more general level, my duties included:

- Generated technological roadmap, key IP, and many of the designs/process technologies for grating DWDM component line
- Planned and project managed all aspects of the development and provided reporting back into Corporate HQ, undertook R&D into selected "tricky" areas personally
- Managed accelerated product development process, selected technology path for implementing products
- Built R&D team from three to twenty four and provided staff development
- Led and participated in investigations into advanced areas of technology, such as FBG/MZI processing, OADM development, dispersion improvement program, advanced grating designs, etc.
- Contributed significant technical & experimental input to progress project areas rapidly and overcome significant technical problems, and was an in house technical consultant in other areas of the company
- Selected and managed partners for key outsourced technologies and worked with them to secure supply of appropriate solutions
- Developed new low cost high performance production oriented measurement technology for DWDM production line and innovative environmental test system for Telcordia qualification
- Drove the rollover onto the production floor, including machine, process, software, and user interface design, testing and implementation, and provided ongoing technical support for manufacturing in all areas other than scheduling
- Provided technical support to marketing groups (including making marketing visits to major systems vendors, e.g. Nortel, Ciena, Lucent, Sumitomo) and manufacturing operation, assisted with customer related issues
- Participated in ADC's Fibre Division Strategic planning

- Assisted in the acquisition of companies through provision of technical due diligence and recommend takeover targets
- Identified new market opportunities and possible future directions

Oct 1991 – Jan 1997
Principal Engineer, Telstra Research Laboratories, Melbourne, Australia.
Planned, project managed, and worked on Photonic Network project covering all optical network architectures and optical technologies for short to medium term application in Telstra's Metropolitan and National scale networks. These were based upon passive optical wavelength routers and used wavelength agile sources. Investigations covered requirements, multiplexing issues, transmission impairments, component needs and technologies, network architectures, signalling and network management, and network synchronisation.

- Prepared project plans and budgeting for Photonic Networks Program and ran it
- Prepared strategic and policy advice for Telstra's Executive management, commercial units, Industry Committees/Expert panels, and the Australian Government on optical networking and customer access networks
- Was Telstra's corporate face for optical networking technology, invited speaker at conferences and symposia
- Set directions and milestones for A$1.5m pa research contract with Melbourne University
- Set up, contributed to, and administered TRL's involvement in the EU ACTS PHOTON program on optical networking. TRL was part of a consortium with partners such as Siemens AG, Alcatel SEL, etc, which built and operated a 10 GBits/s per channel Photonic Network using all optical cross connects and DWDM transmission.
- Ran collaboration with Akzo Nobel on planar polymer waveguide switches
- Designed and fabricated MZI based planar devices in silica on silicon
- Analysed and designed WDM components (Fabry-Perot, Mach-Zehnder, & Arrayed Waveguide Grating devices).
- Started up and worked upon a collaborative program on multichannel dispersion and non linear distortion compensation using four wave mixing in semiconductor optical amplifiers for long haul systems
- Demonstrated the world's first four channel spectral invertor
- Investigated fast wavelength stabilisation and frequency locking of tunable lasers, established and nurtured a relationship with Siemens AG for supply of prototype TTG tunable laser chips.
- Modelling of special MQW active regions for gain levered tunable semiconductor laser diodes
- Researched and evaluated components, transmission issues, and systems for Telstra's inter capital WDM links
- Analysed applications of OADM to SDH transmission systems, particularly Metropolitan ring systems.
- Performed a technical feasibility study of options for implementation of GBits/s per user LANs based on optical networks.
- Appointed as head of TRL's recruitment panel for final 18 months with TRL (in addition to technical duties)

February 1990 - September 1991
Dept. Of Elec. Eng, Nottingham University, UK.
Assisting in undergraduate teaching program whilst writing up thesis. Designed and implemented several undergraduate lab experiments for Power Electronics labs and ran these labs. Wrote up two papers on LC switching and optical matrix switch design. Feasibility study, design, and testing of optical sensing methods for probe-circuit spacing control in system to perform electro-optic probing of >10 GBits/s VLSI circuits (sub-micron lateral/vertical resolutions required). Carried out within an industrial consortium under EU RACE program

October 1985 – March 1990
Imperial College, London
PhD. Studies on Integrated Optics. Other than mentioned above, developed a new waveguide fab and deep trench RIE process. Thesis work led to a major Japanese company providing >$3m funding for the department to continue the work.

January 1985 – June 1985
Imperial College London
Developed, built, and tested Liquid Crystal filled Fabry Perot Tunable filter built between two fibres (i.e. no collimating optics).

July 1984 - October 1984
Plessey Research (Caswell) Limited, Towcester, UK.
Prototyped wavelength division multiplexers using both single mode and multimode fibre. The multimode device later became a commercial product. Built an 11 channel WDM spectrum slicing demonstrator for multichannel analogue TV transmission on multimode fibre.

July 1983 - October 1983
Plessey Research (Caswell) Limited, Towcester, UK.
Investigations leading to improved yield on micron gate length FETs. Process control investigations in Plessey's Silicon pilot plant conducted in class 10 and class 100 clean rooms, on a variety of equipment including Steppers and Photolithography line, RIE, Plasma Deposition, wet etching, oxidation furnaces.

Leisure Interests

Badminton (captain of Imperial College Badminton Club, played UK Division 1 level, registered coach).
Formula 1 motor racing, learning to drive my sports car in a manner befitting it on the track!!
Bush walking (when time allows)
Listening to music (my tastes are pretty eclectic)
Art, particularly the Impressionist era, Art Nouveau, and Constructivism
Ancient Egypt, particularly the Amarna period of Aten Re monotheism under Akhenaten

Publications

Book Chapters:

a) X. Gai, D. Choi, S. J. Madden, and B. Luther-Davies, "*Materials and structures for waveguide nonlinear photonics*", in All-Optical Signal Processing", Data Communication and Storage Applications Series: Springer Series in Optical Sciences, Vol. 194 , S. Wabnitz, B. Eggleton, (Eds.) 2015

b) K. Vu, S. J. Madden, "*Fabrication of active and passive Tellurite thin films and waveguides for integrated optics*", in Amorphous chalcogenides: advances and applications, Pan Stanford Publishing, ISBN-10: 9814411299, 2014

Journal Publications:

2019

1. A. Zarifi, B. Stiller, M. Merklein, Y. Liu, B. Morrison, A. Casas-Bedoya, G.H. Ren, T.G. Nguyen, K. Vu, D.Y. Choi, A. Mitchell, S.J. Madden, & B.J. Eggleton, *On-chip correlation-based Brillouin sensing: design, experiment, and simulation*, Journal of the Optical Society of America B-Optical Physics **36**, 146-152 (2019).
2. M. Sinobad, A. Della Torre, B. Luther-Davis, P. Ma, S. Madden, S. Debbarma, K. Vu, D. J. Moss, A. Mitchell, J. M. Hartmann, J. M. Fedeli, C. Monat, and C. Grillet, "Dispersion trimming for mid-infrared supercontinuum generation in a hybrid chalcogenide/silicon-germanium waveguide," Journal of the Optical Society of America B-Optical Physics 36, A98-A104 (2019).
3. B. Stiller, M. Merklein, K. Vu, P. Ma, S. J. Madden, C. G. Poulton, and B. J. Eggleton, "Cross talk-free coherent multi-wavelength Brillouin interaction," APL Photonics 4 (2019).
4. Y. W. Xie, A. Choudhary, Y. Liu, D. Marpaung, K. Vu, P. Ma, D. Y. Choi, S. Madden, and B. J. Eggleton, "System-Level Performance of Chip-Based Brillouin Microwave Photonic Bandpass Filters," Journal of Lightwave Technology 37, 5246-5258 (2019).
5. A. Zarifi, B. Stiller, M. Merklein, Y. Liu, B. Morrison, A. Casas-Bedoya, G. Ren, T. G. Nguyen, K. Vu, D. Y. Choi, A. Mitchell, S. J. Madden, and B. J. Eggleton, "Brillouin spectroscopy of a hybrid silicon-chalcogenide waveguide with geometrical variations," Optics Letters 43, 3493-3496 (2018).

2018

6. A. Zarifi, B. Stiller, M. Merklein, Y. Liu, B. Morrison, A. Casas-Bedoya, G. Ren, T.G. Nguyen, K. Vu, D.Y. Choi, A. Mitchell, S.J. Madden, & B.J. Eggleton, *Brillouin spectroscopy of a hybrid silicon-chalcogenide waveguide with geometrical variations*, Optics Letters **43**, 3493-3496 (2018).
7. A. Zarifi, B. Stiller, M. Merklein, N. Li, K. Vu, D.Y. Choi, P. Ma, S.J. Madden, & B.J. Eggleton, *Highly localized distributed Brillouin scattering response in a photonic integrated circuit*, APL Photonics **3** (2018).
8. B. Stiller, M. Merklein, C. Wolff, K. Vu, P. Ma, C.G. Poulton, S.J. Madden, & B.J. Eggleton, *On-chip multi-stage optical delay based on cascaded Brillouin light storage*, Optics Letters **43**, 4321-4324 (2018).
9. M. Sinobad, C. Monat, B. Luther-Davies, P. Ma, S. Madden, D.J. Moss, A. Mitchell, D. Allioux, R. Orobtchouk, S. Boutami, J.M. Hartmann, J.M. Fedeli, & C. Grillet, *Mid-infrared octave spanning supercontinuum generation to 8.5 mu m in silicon-germanium waveguides*, Optica **5**, 360-366 (2018).
10. M. Merklein, B. Stiller, K. Vu, S.J. Madden, & B.J. Eggleton, *A chip-integrated coherent photonic-phononic memory (vol 8, 2017)*, Nature Communications **9** (2018).
11. E. Giacoumidis, A. Choudhary, E. Magi, D. Marpaung, K. Vu, P. Ma, D.Y. Choi, S. Madden, B. Corcoran, M. Pelusi, & B.J. Eggleton, *Chip-based Brillouin processing for carrier recovery in self-coherent optical communications*, Optica **5**, 1191-1199 (2018).

2017

12. B. Morrison, A. Casas-Bedoya, G. Ren, K. Vu, Y. Liu, A. Zarifi, T.G. Nguyen, D.Y. Choi, D. Marpaung, S.J. Madden, A. Mitchell, & B.J. Eggleton, *Compact Brillouin devices through hybrid integration on silicon,* Optica **4**, 847-854 (2017).
13. M. Merklein, B. Stiller, K. Vu, S.J. Madden, & B.J. Eggleton, *A chip-integrated coherent photonic-phononic memory*, Nature Communications **8** (2017).
14. H.D. Kenchington Goldsmith, M. Ireland, P. Ma, N. Cvetojevic, & S. Madden, *"Improving the extinction bandwidth of MMI chalcogenide photonic chip based MIR nulling interferometers,"* Optics Express **25**, 16813-16824 (2017).
15. A. Choudhary, M. Pelusi, D. Marpaung, T. Inoue, K. Vu, P. Ma, D.Y. Choi, S. Madden, S. Namiki, & B.J. Eggleton, *"On-chip Brillouin purification for frequency comb-based coherent optical communications,"* Optics Letters **42**, 5074-5077 (2017).
16. A. Choudhary, Y. Liu, B. Morrison, K. Vu, D.Y. Choi, P. Ma, S. Madden, D. Marpaung, & B.J. Eggleton, *"High-resolution, on-chip RF photonic signal processor using Brillouin gain shaping and RF interference,"* Scientific Reports **7** (2017).
17. A. Choudhary, B. Morrison, I. Aryanfar, S. Shahnia, M. Pagani, Y. Liu, K. Vu, S. Madden, D. Marpaung, & B.J. Eggleton, *"Advanced Integrated Microwave Signal Processing With Giant On-Chip Brillouin Gain,"* Journal of Lightwave Technology **35**, 846-854 (2017).
18. I. Aryanfar, D. Marpaung, A. Choudhary, Y. Liu, K. Vu, D. Choi, P. Ma, S. Madden, B. Eggleton, *Chip-based Brillouin radio frequency photonic phase shifter and wideband time delay*, Opt. Letts **42** 1313-1316 (2017).
19. H-D. Kenchington Goldsmith, N. Cvetojevic, M. Ireland, and S. Madden, *Fabrication tolerant chalcogenide mid-infrared multimode interference coupler design with applications for Bracewell nulling interferometry*, Opt. Express **25**, 3038-3051 (2017).

2016

20. M.D.J. Quinn, K. Vu, S. Madden, & S.M. Notley, *Photothermal Breaking of Emulsions Stabilized with Graphene*, Acs Appl Mater Inter **8**, 10609-10616 (2016).
21. M. Pagani, K. Vu, D.Y. Choi, S.J. Madden, B.J. Eggleton, & D. Marpaung, *Instantaneous microwave frequency measurement using four-wave mixing in a chalcogenide chip*, Optics Communications **373**, 100-104 (2016).
22. M. Merklein, B. Stiller, I. Kabakova, U. Mutugala, K. Vu, S. Madden, B. Eggleton, & R. Slavik, *Widely tunable, low phase noise microwave source based on a photonic chip*," Optics Letters **41**, 4633-4636 (2016).
23. K.L. Yan, K. Vu, R.P. Wang, & S. Madden, *Greater than 50% inversion in Erbium doped Chalcogenide waveguides*, Optics Express **24**, 23304-23313 (2016).
24. Y. Yu, X. Gai, P. Ma, K. Vu, Z.Y. Yang, R.P. Wang, D.Y. Choi, S. Madden, & B. Luther-Davies, *Experimental demonstration of linearly polarized 2-10 mu m supercontinuum generation in a chalcogenide rib waveguide*, Optics Letters 41, 958-961 (2016).
25. A. Choudhary, I. Aryanfar, S. Shahnia, B. Morrison, K. Vu, S. Madden, B. Luther-Davies, D. Marpaung, & B.J. Eggleton, *Tailoring of the Brillouin gain for on-chip widely tunable and reconfigurable broadband microwave photonic filters*, Optics Letters 41, 436-439 (2016).
26. H.Y. Jiang, D. Marpaung, M. Pagani, K. Vu, D.Y. Choi, S.J. Madden, L.S. Yan, & B.J. Eggleton, *Wide-range, high-precision multiple microwave frequency measurement using a chip-based photonic Brillouin filter*, Optica 3, 30-34 (2016).

2015

27. N. Singh, D.D. Hudson, Y. Yu, C. Grillet, S.D. Jackson, A. Casas-Bedoya, A. Read, P. Atanackovic, S.G. Duvall, S. Palomba, B. Luther-Davies, S. Madden, D.J. Moss, & B.J. Eggleton, *Midinfrared supercontinuum generation from 2 to 6 mu m in a silicon nanowire*, Optica 2, 797-802 (2015).

28. L. Carletti, M. Sinobad, P. Ma, Y. Yu, D. Allioux, R. Orobtchouk, M. Brun, S. Ortiz, P. Labeye, J.M. Hartmann, S. Nicoletti, S. Madden, B. Luther-Davies, D.J. Moss, C. Monat, & C. Grillet, *Mid-infrared nonlinear optical response of Si-Ge waveguides with ultra-short optical pulses*, Optics Express 23, 32202-32214 (2015).

29. K. Yan, K. Vu, and S. J. Madden, "*Internal gain in Er-doped As_2S_3 chalcogenide planar waveguides*", Optics Letters 40, 796-799 (2015).

30. Y. Yi, B. Zhang, X. Gai, C. Zhai, S. Qi, W. Guo, Z. Yang, R. Wang, D. Choi, S. Madden, and B. Luther-Davies, *1.8-10 μm mid-infrared supercontinuum generated in a step-index chalcogenide fiber using low peak pump power*, Optics letters 40, pp. 1081-1084, (2015).

31. N. Singh, D.D. Hudson, R.P. Wang, E.C. Magi, D.Y. Choi, C. Grillet, B. Luther-Davies, S. Madden, & B.J. Eggleton, *Positive and negative phototunability of chalcogenide (AMTIR-1) microdisk resonator*, Optics Express **23**, 8681-8686 (2015).

32. P. Ma, D.Y. Choi, Y. Yu, Z.Y. Yang, K. Vu, T. Nguyen, A. Mitchell, B. Luther-Davies, & S. Madden, *High Q factor chalcogenide ring resonators for cavity-enhanced MIR spectroscopic sensing*, Optics Express **23**, 19969-19979 (2015).

33. M. Merklein, I. Kabakova, T. Büttner, D. Choi, B.. Luther-Davies, S. J. Madden, and B. Eggleton, "*Enhancing and inhibiting stimulated Brillouin scattering in photonic integrated circuits*", Nature Communications **6**, pp. 6396-6399, (2015).

34. D. Marpaung, B. Morrison, M. Pagani, R. Pant, D. Choi, B. Luther-Davies, S. J. Madden, and B. Eggleton, *Low-power, chip-based stimulated Brillouin scattering microwave photonic filter with ultrahigh selectivity*, Optica **2**, 76-83 (2015).

35. K. Vu, S. Farahani, and S. J. Madden, *980nm pumped Erbium doped Tellurium oxide planar rib waveguide laser and amplifier with gain in S, C and L band*, Optics Express **23**, 747-755 (2015).

36. S. Marzban, J. Bartholomew, S. Madden, K. Vu, M. Sellars, *The observation of photon echoes from evanescently coupled rare-earth ions in a planar waveguide,* Physical Review Letters, 115, Art. No. 013601 (2015).

37. L. Carletti, P. Ma, Y. Yu, B. Luther-Davies, D. Hudson, C. Monat, R. Orobtchouk, S. Madden, D. J. Moss, M. Brun, S. Ortiz, P. Labeye, S. Nicoletti, C. Grillet, *Nonlinear optical response of low loss silicon germanium waveguides in the mid-infrared,* Optics Express **23**, pp. 8261–8271 (2015).

38. M. Pagani, K. Vu, D. Choi, S. Madden, B. Eggleton, D. Maupang, *Instantaneous microwave frequency measurement using four-wave mixing in a chalcogenide chip*, Optics Communications, **314** pp. 1-5 (2015).

2014

39. T. Büttner, M. Merklein, I. Kabakova, D. Hudson, D. Choi, B. Luther-Davies, S. J. Madden, and B. Eggleton, "*Phase-locked, chip-based, cascaded stimulated Brillouin scattering*," Optica **1**, 311-314 (2014).

40. M. Pagani, D. Marpaung, D. Choi, S. J. Madden, B. Luther-Davies, B. Eggleton, "*Tunable wideband microwave photonic phase shifter using on-chip stimulated Brillouin scattering*", Optics Express, **22** pp. 28810-28818, (2014).

41. T. Wang, X. Gai, W. Wei, R. Wang, Z. Yang, X. Shen, S. Madden, & B. Luther-Davies, "*Systematic z-scan measurements of the third order nonlinearity of chalcogenide glasses*," Optical Materials Express **4**, 1011-1022 (2014).

42. Y. Yu, X. Gai, P. Ma, D.-Y. Choi, Z. Yang, R. Wang, S. Debbarma, S.J. Madden, & B. Luther-Davies, "*A broadband, quasi-continuous, mid-infrared supercontinuum generated in a chalcogenide glass waveguide*," Laser & Photonics Reviews **8**, 792-798 (2014).

43. Y. Zhang, J. Schroeder, C. Husko, S. Lefrancois, D.-Y. Choi, S. Madden, B. Luther-Davies, & B.J. Eggleton, "*Pump-degenerate phase-sensitive amplification in chalcogenide waveguides*," Journal of the Optical Society of America B-Optical Physics **31**, 780-787 (2014).

44. B. Morrison, D. Marpaung, R. Pant, E. Li, D.-Y. Choi, S. Madden, B. Luther-Davies, & B.J. Eggleton, "*Tunable microwave photonic notch filter using on-chip stimulated Brillouin scattering*," Optics Communications **313**, 85-89 (2014).

45. K. Yan, K. Vu, Z. Yang, R. Wang, S. Debbarma, B. Luther-Davies, and S. Madden, "*Emission properties of erbium-doped Ge-Ga-Se glasses, thin films and waveguides for laser amplifiers*," Opt. Mater. Express **4**, 464-475 (2014).

2013

46. Y. Yu, X. Gai, T. Wang, P. Ma, R.P. Wang, Z.Y. Yang, D.Y. Choi, S. Madden, & B. Luther-Davies, *Mid-infrared supercontinuum generation in chalcogenides,* Optical Materials Express **3**, 1075-1086 (2013).

47. K. Vu, K.L. Yan, Z. Jin, X. Gai, D.Y. Choi, S. Debbarma, B. Luther-Davies, & S. Madden, *Hybrid waveguide from As2S3 and Er-doped TeO2 for lossless nonlinear optics,* Optics Letters **38**, 1766-1768 (2013).

48. Y. Paquot, J. Schroder, E. Palushani, R. Neo, L. Oxenlowe, S. Madden, D. Choi, B. Luther-Davies, M. Pelusi, & B. Eggleton, *Automatic DGD and GVD compensation at 640 Gb/s based on scalar radio-frequency spectrum measurement,* Applied Optics **52**, 1919-1927 (2013).

49. R. Neo, J. Schroder, Y. Paquot, D.Y. Choi, S. Madden, B. Luther-Davies, & B.J. Eggleton, *Phase-sensitive amplification of light in a chi(3) photonic chip using a dispersion engineered chalcogenide ridge waveguide,* Optics Express **21**, 7926-7933 (2013).

50. P. Ma, D.Y. Choi, Y. Yu, X. Gai, Z. Yang, S. Debbarma, S. Madden, & B. Luther-Davies, *Low-loss chalcogenide waveguides for chemical sensing in the mid-infrared,* Optics Express **21**, 29927-29937 (2013).

51. I.V. Kabakova, R. Pant, D.Y. Choi, S. Debbarma, B. Luther-Davies, S.J. Madden, & B.J. Eggleton, *Narrow linewidth Brillouin laser based on chalcogenide photonic chip,* Optics Letters **38**, 3208-3211 (2013).

52. F. Gao, R. Pant, E. Li, C. Poulton, D. Choi, S. Madden, B. Luther-Davies, & B. Eggleton, *On-chip high sensitivity laser frequency sensing with Brillouin mutually-modulated cross-gain modulation,* Optics Express **21**, 8605-8613 (2013).

53. X. Gai, Y. Yu, B. Kuyken, P. Ma, S.J. Madden, J. Van Campenhout, P. Verheyen, G. Roelkens, R. Baets, & B. Luther-Davies, *Nonlinear absorption and refraction in crystalline silicon in the mid-infrared,* Laser & Photonics Reviews **7**, 1054-1064 (2013).

54. S. Madden, Z. Jin, D. Choi, S. Debbarma, D. Bulla, and B. Luther-Davies, *Low loss coupling to sub-micron thick rib and nanowire waveguides by vertical tapering*, Opt. Express 21, 3582-3594 (2013).

55. K. Tan, D. Marpaung, R. Pant, F. Gao, E. Li, J. Wang, D. Choi, S. Madden, B. Luther-Davies, J. Sun, and B. J. Eggleton, *Photonic-chip-based all-optical ultra-wideband pulse generation via XPM and birefringence in a chalcogenide waveguide*, Opt. Express 21, 2003-(2011) (2013).

56. R. Pant, E. Li, C. Poulton, D. Choi, S. Madden, B. Luther-Davies, and B. Eggleton, *Observation of Brillouin dynamic grating in a photonic chip*, Opt. Lett. 38, 305-307 (2013).

2012

57. S. J. Madden and K. T. Vu, *High-Performance Integrated Optics with Tellurite Glasses: Status and Prospects*, (Invited), International Journal of Applied Glass Science, 3, 289–298, (2012).

58. J. He, C. Xiong, A. Clark, M. Collins, X. Gai, D. Choi, S. Madden, B. Luther-Davies, & B.Eggleton, *Effect of low-Raman window position on correlated photon-pair generation in a chalcogenide* $Ge_{11.5}As_{24}Se_{64.5}$ *nanowire*, J Appl Phys 112 (2012).

59. X. Gai, D.Y. Choi, S. Madden, Z.Y. Yang, R.P. Wang, & B. Luther-Davies, *Supercontinuum generation in the mid-infrared from a dispersion-engineered As_2S_3 glass rib waveguide*, Optics Letters 37, 3870-3872 (2012).

60. M. Collins, A. Clark, J. He, D. Choi, R. Williams, A. Judge, S. Madden, M. Withford, M. Steel, B. Luther-Davies, C. Xiong, & B. Eggleton, *Low Raman-noise correlated photon-pair generation in a dispersion-engineered chalcogenide As_2S_3 planar waveguide*, Optics Letters 37, 3393-3395 (2012).

61. A. Byrnes, R. Pant, E. Li, D. Choi, C. Poulton, S. Fan, S. Madden, B. Luther-Davies, & B. Eggleton, *Photonic chip based tunable and reconfigurable narrowband microwave photonic filter using stimulated Brillouin scattering*, Optics Express 20, 18836-18845 (2012).

62. X. Gai, D. Choi, S. Madden, & B. Luther-Davies, *Polarization-independent chalcogenide glass nanowires with anomalous dispersion for all-optical processing*, Optics Express 20, 13513-13521 (2012).

63. K.Yan, R. Wang, K. Vu, S. Madden, K. Belay, R. Elliman, & B. Luther-Davies, *Photoluminescence in Er-doped Ge-As-Se chalcogenide thin films*, Optical Materials Express 2, 1270-1277 (2012).

64. B. Eggleton, T. Vo, R. Pant, J. Schroder, M. Pelusi, D. Choi, S. Madden, and B. Luther-Davies, *Photonic chip based ultrafast optical processing based on high nonlinearity dispersion engineered chalcogenide waveguides.* Laser & Photonics Reviews. 6(1): p. 97-114 (2012).

65. R. Pant, A. Byrnes, C. Poulton, E. Li, D. Choi, S. Madden, B. Luther-Davies, and B. Eggleton, *Photonic-chip-based tunable slow and fast light via stimulated Brillouin scattering.* Optics Letters. 37(5): p. 969-971 (2012).

66. T. Vo, J. Schroder, B. Corcoran, J. Van Erps, S.J. Madden, D.Y. Choi, D.A.P. Bulla, B. Luther-Davies, M.D. Pelusi, and B.J. Eggleton, *Photonic-Chip-Based Ultrafast Waveform Analysis and Optical Performance.* IEEE Journal of Selected Topics in Quantum Electronics. 18(2): p. 834-846 (2012).

2011

67. K. Vu and S. Madden, *Reactive ion etching of tellurite and chalcogenide waveguides using hydrogen, methane, and argon*, Journal of Vacuum Science & Technology A, 29, pp. 011023 (2011).

68. T. Han, S. Madden, S. Debbarma, and B. Luther-Davies, *Improved method for hot embossing As_2S_3 waveguides employing a thermally stable chalcogenide coating.* Optics Express. 19(25): p. 25447-25453 (2011).

69. F.Li, S. Jackson, C. Grillet, E. Magi, D. Hudson, S. Madden, Y. Moghe, C. O'Brien, A. Read, S. Duvall, P. Atanackovic, B. Eggleton, & D. Moss, *Low propagation loss silicon-on-sapphire waveguides for the mid-infrared*, Optics Express 19, 15212-15220 (2011).

70. X. Gai, D. Choi, S. Madden, and B. Luther-Davies, *Interplay between Raman scattering and four-wave mixing in As_2S_3 chalcogenide glass waveguides.* Journal of the Optical Society of America B-Optical Physics. 28(11): p. 2777-2784 (2011).

71. C. Monat, M. Spurny, C. Grillet, L. O'Faolain, T. Krauss, B. Eggleton, D. Bulla, S. Madden, and B. Luther-Davies, *Third-harmonic generation in slow-light chalcogenide glass photonic crystal waveguides.* Optics Letters. 36(15): p. 2818-2820 (2011).

72. R. Pant, E. Li, D. Choi, C. Poulton, S. Madden, B. Luther-Davies, and B. Eggleton, *Cavity enhanced stimulated Brillouin scattering in an optical chip for multiorder Stokes generation.* Optics Letters. 36(18): p. 3687-3689 (2011).

73. R. Pant, C. Poulton, D. Choi, H. McFarlane, S. Hile, E. Li, L. Thevenaz, B. Luther-Davies, S. Madden, and B. Eggleton, *On-chip stimulated Brillouin scattering.* Optics Express. 19(9): p. 8285-8290 (2011).

74. Y. Paquot, J. Schroder, J. Van Erps, T. Vo, M. Pelusi, S. Madden, B. Luther-Davies, & B. Eggleton, *Single parameter optimization for simultaneous automatic compensation of multiple orders of dispersion for a 1.28 Tbaud signal.* Optics Express. 19(25): p. 25512-25520 (2011).

75. T. Vo, R. Pant, M. Pelusi, J. Schroder, D. Choi, S. Debbarma, S. Madden, B. Luther-Davies, and B. Eggleton, *Photonic chip-based all-optical XOR gate for 40 and 160 Gbit/s DPSK signals.* Optics Letters. 36(5): p. 710-712 (2011).

76. R. Pant, T. Vo, C. Xiong, M. Pelusi, S. Madden, B. Luther-Davies, and B. Eggleton, *Ultrahigh-bandwidth, on-chip all-optical pulse erasure using the □3 process in a nonlinear chalcogenide waveguide*, Optics Letters, 36: pp. 298-300, (2011).

77. C. Xiong, G. Marshall, A. Peruzzo, M. Lobino, A. Clark, D. Choi, S. Madden, C. Natarajan, M. Tanner, R. Hadfield, S. Dorenbos, T. Zijlstra, V. Zwiller, M. Thompson, J. Rarity, M. Steel, B. Luther-Davies, B. Eggleton, and J. O'Brien, *Generation of correlated photon pairs in a chalcogenide As_2S_3 waveguide*. Applied Physics Letters, 98, pp. 051101-051101-3, (2011).

78. T. Vo, J. Schroder, B. Corcoran, J. van Erps, S. Madden, D. Choi, D. Bulla, B. Luther-Davies, M. Pelusi, B. Eggleton, Photonic-Chip-Based Ultrafast Waveform Analysis and Optical Performance Monitoring, IEEE Journal on Selected Topics in Quantum Electronics, 18, pp. 834 – 846, (2011).

2010

79. X. Gai, S. J. Madden, D. Choi, D. Bulla, B. Luther-Davies, *Dispersion engineered $Ge_{11.5}As_{24}Se_{64.5}$ nanowires with a nonlinear parameter of 136,000$W^{-1}km^{-1}$ at 1550nm*, Optics Express, 18, pp. 18866-18874, (2010).

80. T. Han, S. J. Madden, D. A. Bulla, and B. Luther-Davies, *Low loss Chalcogenide glass waveguides by thermal nano-imprint lithography*, Optics Express. 18, pp. 19286-19291, (2010).

81. K. T. Vu and S. J. Madden, *Tellurium dioxide Erbium doped planar rib waveguide amplifiers with net gain and 2.8dB/cm internal gain*, Optics Express, 18, pp. 19192-19200, (2010).

82. T. Han, S. Madden, B. Luther-Davies, and R. Charters, *High-Quality Polarization-Insensitive Polysiloxane Waveguide Gratings Produced by UV Nanoimprint Lithography* IEEE Photonics Technology Letters, 22, pp. 1720-1722, (2010).

83. X. Gai, T. Han, A. Prasad, S. Madden, D. Choi, R. Wang, D. Bulla, and B. Luther-Davies, *Progress in optical waveguides fabricated from chalcogenide glasses*, Optics Express, 18, pp. 26635-26646, (2010).

84. M.W. Lee, C. Grillet, C. Monat, E. Magi, S. Tomljenovic-Hanic, X. Gai, S. Madden, D.Y. Choi, D. Bulla, B. Luther-Davies, and B.J. Eggleton, *Photosensitive and thermal nonlinear effects in chalcogenide photonic crystal cavities*, Optics Express, 18: pp. 26695-26703, (2010).

85. J. Van Erps, J. Schröder, T. D. Vo, M. D. Pelusi, S. J. Madden, D-Y Choi, D. A. Bulla, B. Luther-Davies, and B. J. Eggleton, *Automatic dispersion compensation for 1.28Tb/s OTDM signal transmission using photonic-chip-based dispersion monitoring*, Optics Express 18, pp. 25415-25421, (2010).

86. R. Pant, C. Xiong, S. Madden, B. Luther Davies, B. Eggleton, *Investigation of all-optical analog-to-digital quantization using a chalcogenide waveguide: A step towards on-chip analog-to-digital conversion*, Optics Communications, 283, pp. 2258-2262, (2010).

87. D. Choi, S. Madden, D. Bulla, R. Wang, A. Rode, B. Luther-Davies, *Thermal annealing of arsenic tri-sulphide thin film and its influence on device performance*, Journal Of Applied Physics, 107, art# 053106, (2010).

88. M. Pelusi, F. Luan, D. Choi, S.J. Madden, D. Bulla, B. Luther-Davies, and B. Eggleton, *Optical phase conjugation by an As2S3 glass planar waveguide for dispersion-free transmission of WDM-DPSK signals over fiber*, Optics Express, 18, pp. 26686-26694, (2010).

89. T.D. Vo, H. Hu, M. Galili, E. Palushani, J. Xu, L.K. Oxenlowe, S.J. Madden, D.Y. Choi, D.A.P. Bulla, M.D. Pelusi, J. Schroder, B. Luther-Davies, and B.J. Eggleton, *Photonic chip based transmitter optimization and receiver demultiplexing of a 1.28 Tbit/s OTDM signa,*. Optics Express, 18, pp. 17252-17261, (2010).

90. D. Choi, S. Madden, D. Bulla, R. Wang, A. Rode, B. Luther-Davies, *Submicrometer-Thick Low-Loss As_2S_3 Planar Waveguides for Nonlinear Optical Devices*, IEEE Photonics Technology Letters, 22, pp. 495-497, (2010).

91. M. Pelusi, F. Luan, S. Madden, D. Choi, D. Bulla, B. Luther-Davies, B Eggleton, *Wavelength Conversion of High-Speed Phase and Intensity Modulated Signals Using a Highly Nonlinear Chalcogenide Glass Chip*, Photonics Technology Letters, Volume 22, Issue 1, pp.3-5, (2010).

92. J. Van Erps, F. Luan, M. Pelusi, T. Iredale, S. Madden, D. Choi, D. Bulla, B. Luther-Davies, H. Thienpont, B. Eggleton, *High-Resolution Optical Sampling of 640-Gb/s Data Using Four-Wave Mixing*

in Dispersion-Engineered Highly Nonlinear As2S3 Planar Waveguides, Journal of Lightwave Technology, Volume 28, Issue 2, pp. 209 – 215, (2010).

93. T. Vo, J. Schroder, M. Pelusi, S. Madden, D. Choi, D. Bulla, B. Luther-Davies, and B. Eggleton, *Photonic Chip-Based Simultaneous Multi-Impairment Monitoring for Phase-Modulated Optical Signals*, Journal of Lightwave Technology, 28, pp. 3176-3183, (2010).
94. T. Vo, M. Pelusi, J. Schröder, F. Luan, S. Madden, D. Choi, D. Bulla, B. Luther-Davies, and B. Eggleton, *Simultaneous multi-impairment monitoring of 640 Gb/s signals using photonic chip based RF spectrum analyzer*, Optics Express 18, pp. 3938-3945, (2010).

2009

95. S. Madden and K. Vu, *Very low loss reactively ion etched Tellurium Dioxide planar rib waveguides for linear and non-linear optics*, Optics Express 17, 17645-17651, (2009).
96. S. Madden, M. Zhang, D. Choi, B. Luther-Davies, R. Charters, *High index contrast polysiloxane waveguides fabricated by dry etching,* Journal Of Vacuum Science & Technology A, 27, Issue 3, pp. 561-565, (2009).
97. D. Bulla, R. Wang, A. Prasad, A. Rode, S. Madden, B. Luther-Davies, *On the properties and stability of thermally evaporated Ge-As-Se thin films*, Applied Physics A-Materials Science & Processing , Volume 96, Issue 3, pp. 615-625, (2009).
98. N. Baker, M. Roelens, S. Madden, B. Luther-Davies, C. de Sterke, B. Eggleton, *Pulse train generation by soliton fission in highly nonlinear chalcogenide (As2S3) waveguide Bragg grating*, Electronics Letters, Volume 45, Issue 15, pp. 799 – 800, (2009).
99. M. Lee, C. Grillet, S. Tomljenovic-Hanic, E. Mägi, D. Moss, B. Eggleton, X. Gai, S. Madden, D. Choi, D. Bulla, and B. Luther-Davies, *Photowritten high-Q cavities in two-dimensional chalcogenide glass photonic crystals*, Optics Letters, volume 34, pp. 3671-3673, (2009).
100. F. Luan, M. Pelusi, M. Lamont, D. Choi, S. Madden, B. Luther-Davies, B. Eggleton, *Dispersion engineered As_2S_3 planar waveguides for broadband four-wave mixing based wavelength conversion of 40 Gb/s signals*, Optics Express 17, pp. 3514-3520, (2009).
101. T. Han, S. Madden, M. Zhang, R. Charters, and B. Luther-Davies, *Low loss high index contrast nanoimprinted polysiloxane waveguides*, Optics Express, 17, pp. 2623-2630, (2009).
102. M. Pelusi, T. Vo, F. Luan, S. Madden, D. Choi, D. Bulla, B. Luther-Davies, and B. Eggleton, *Terahertz bandwidth RF spectrum analysis of femtosecond pulses using a chalcogenide chip*, Optics Express, 17, pp. 9314-9322, (2009).
103. M. Galili, J. Xu, H. Mulvad, L. Oxenlowe, A. Clausen, P. Jeppesen, B. Luther-Davies, S. Madden, A. Rode, D. Choi, M. Pelusi, F. Luan, B. Eggleton, *Breakthrough switching speed with an all-optical chalcogenide glass chip: 640 Gbit/s demultiplexing*, Optics Express, 17, pp. 2182-2187, (2009).
104. M. Pelusi, F. Luan, T.Vo, M. Lamont, S. Madden, D. Bulla, D. Choi, B. Luther-Davies, B. Eggleton, *Photonic-chip-based radio-frequency spectrum analyser with terahertz bandwidth*, Nature Photonics, 3 pp. 139-143, (2009).

2008

105. M. Lee, C. Grillet, C. Poulton, C. Monat, C. Smith, E. Mägi, D. Freeman, S. Madden, B. Luther-Davies, and B. Eggleton, *Characterizing photonic crystal waveguides with an expanded k-space evanescent coupling technique*, Optics Express, 16, pp. 13800-13808 (2008).
106. M. Lamont, B. Luther-Davies, D. Choi, S. Madden, and B. Eggleton, *Supercontinuum generation in dispersion engineered highly nonlinear (γ = 10 /W/m) As_2S_3 chalcogenide planar waveguide*, Optics Express, 16, pp. 14938-14944 (2008).
107. M. Lamont, B. Luther-Davies, D. Choi, S. Madden,et al., *Net-gain from a parametric amplifier on a chalcogenide optical chip,* Optics Express, 16, Issue 25, pp. 20374-20381, (2008).

108. D. Choi, S. J. Madden, A. Rode et al., *Surface roughness in plasma-etched As2S3 films: Its origin and improvement*, IEEE Transactions On Nanotechnology, 7, Issue 3, pp. 285-290, (2008).

109. D. Choi, S. Madden, A. Rode, et al., *A protective layer on As2S3 film for photo-resist patterning,* Journal Of Non-Crystalline Solids, 354, Issue 47-51, pp. 5253-5254, (2008).

110. D. Choi, S. Madden, A. Rode, et al., *Dry etching characteristics of amorphous As2S3 film in CHF3 plasma,* Journal Of Applied Physics, 104, Issue 11, 113305, (2008).

111. M. Pelusi, V. Ta'eed, L. Fu, E. Magi, M. Lamont, S. Madden, D. Choi, D. Bulla, B. Luther-Davies, B. Eggleton, *Applications of highly-nonlinear chalcogenide glass devices tailored for high-speed all-optical signal processing*, IEEE Journal Of Selected Topics In Quantum Electronics, 14, pp. 529-539, (2008).

112. A. Prasad, C. Zha, R. Wang, A. Smith, S. Madden, B. Luther-Davies, *Properties of $Ge_xAs_ySe_{1-x-y}$ glasses for all-optical signal processing*, Optics Express, 16, Issue 4, pp. 2804-2815, (2008).

113. D. Freeman, C. Grillet, M. Lee, C. Smith, Y. Ruan, A. Rode, M. Krolikowska, S. Tomljenovic-Hanic, M. De Sterke, M. Steel, B. Luther-Davies, S. Madden, D. Moss, Y. Lee, B. Eggleton, *Chalcogenide glass photonic crystals*, Photonics And Nanostructures-Fundamentals And Applications, 6, pp. 3-11, (2008).

114. D. Choi, S. Madden, A.Rode, R. Wang, B. Luther Davies, *Plasma etching of As_2S_3 films for optical waveguides*, Journal Of Non-Crystalline Solids, 354, pp. 3179-3183, (2008).

115. S. Madden, D. Choi, M. Lamont, V. Ta'eed, N. Baker, M. Pelusi, B. Luther-Davies, B. Eggleton, *Chalcogenide Glass Photonic Chips*, Optics & Photonics News, 19, no. 2, pp. 18-23, (2008).

2007

116. S. Madden, D. Choi, D. Bulla, A. Rode, B. Luther-Davies, V. Ta'eed, M. Pelusi, B. Eggleton, *Long, low loss etched As_2S_3 chalcogenide waveguides for all-optical signal regeneration,* Optics Express, 15, Issue 22, pp.14414-14421, (2007).

117. V. Ta'eed, M. Pelusi, B. Eggleton, D. Choi, S. Madden, D. Bulla, B. Luther-Davies, *Broadband wavelength conversion at 40 Gb/s using long serpentine As_2S_3 planar waveguides,* Optics Express, 15, Issue 23, pp.15047-15052, (2007).

118. C. Zha, A. Smith, A. Prasad, R. Wang, S. Madden, B. Luther-Davies, *Properties and structure of Ag-doped As_2Se_3 glasses*, Journal Of Nonlinear Optical Physics & Materials 1, 6, no. 1, pp. 49-57, (2007).

119. Choi DY, Madden S, Rode A, Wang RP, Luther-Davies B, *Nanoscale phase separation in ultrafast pulsed laser deposited arsenic trisulfide (As_2S_3) films and its effect on plasma etching*, Journal Of Applied Physics, 102, pp. (2007).

120. C. Smith, D. Wu, M. Lee, C. Monat, S. Tomljenovic-Hanic, C. Grillet, B.Eggleton, D. Freeman, Y. Ruan, S. Madden, B. Luther-Davies, H. Giessen, Y. Lee, *Microfluidic photonic crystal double heterostructures*, Applied Physics Letters 91, 121103, (2007).

121. M. Lee, C. Grillet, C. Smith, D. Moss, B. Eggleton, D. Freeman, B. Luther-Davies, S. Madden, A. Rode, Y. Ruan, Y.Lee, *Photosensitive post tuning of chalcogenide photonic crystal waveguides,* Optics Express, 15, Issue 3, pp.1277-1285, (2007).

122. D. Choi, S. Madden, A. Rode, R. Wang, B. Luther-Davies, N. Baker, B. Eggleton, *Integrated shadow mask for sampled Bragg gratings in chalcogenide (As_2S_3) planar waveguides,* Optics Express, 15, pp.7708-7712, (2007).

123. M. Lamont, V. Ta'eed, M. Roelens, D. Moss, B. Eggleton, D. Choi, S. Madden, B. Luther-Davies, *Error-free wavelength conversion via cross-phase modulation in 5cm of As_2S_3 chalcogenide glass rib waveguide*, Electronics Letters, 43, no. 17, pp. 945-947, (2007).

124. V. Ta'eed, N. Baker, L. Fu, K. Finsterbusch, M. Lamont, D. Moss, H. Nguyen, B. Eggleton, D. Choi, S. Madden, B. Luther-Davies, *Ultrafast all-optical chalcogenide glass photonic circuits*, Optics Express, 15, Issue 15, pp.9205-9221, (2007).

125. M. Pelusi, V. Ta'eed, M. Lamont, S. Madden, D. Choi, B. Luther-Davies, B. Eggleton, *Ultra-high nonlinear As_2S_3 planar waveguide for 160-Gb/s optical time-division demultiplexing by four-wave mixing*. IEEE Photonics Technology Letters, 19, pp. 1496-8 (2007).

126. R. Wang, D. Choi, A. Rode, S. Madden, B. Luther-Davies. *Rebonding of Se to as and Ge in $Ge_{33}As_{12}Se_{55}$ films upon thermal annealing: evidence from x-ray photoelectron spectra investigations*. Journal of Applied Physics, 101, no.11, pp. 113517/1-4, (2007).

127. D. Choi, S. Madden, A. Rode, R. Wang, B. Luther-Davies, *Fabrication of low loss $Ge_{33}As_{12}Se_{55}$ (AMTIR-1) planar waveguides*. Applied Physics Letters, 91, no.1, pp. 11115/1-3, (2007).

128. R. Wang, A. Rode, S. Madden, B. Luther-Davies, *Physical aging of arsenic trisulfide thick films and bulk materials*. Journal of the American Ceramic Society, 90, no.4, pp. 1269-71, (2007).

129. R. Wang, C. Zha, A. Rode, S. Madden, B. Luther-Davies, *Thermal characterization of Ge-As-Se glasses by differential scanning calorimetry*, Journal Of Materials Science-Materials In Electronics, 18 Suppl. 1, pp. S419-S422, (2007).

130. C. Smith, C. Grillet, S. Tomljenovic-Hanic, E. Magi, D. Moss, B. Eggleton, D. Freeman, S. Madden, B. Luther-Davies, *Characterisation of chalcogenide 2D photonic crystal waveguides and nanocavities using silica fibre nanowires*. Physica B, 394, no.2, pp. 289-92, (2007)

131. K. Finsterbusch, N. Baker, V. Ta'eed, B. Eggleton, D. Choi, S. Madden, B. Luther-Davies, *Higher-order mode grating devices in As_2S_3 chalcogenide glass rib waveguides*. Journal of the Optical Society of America B (Optical Physics), 24, no.6, pp. 1283-90, (2007).

132. D. Choi, S. Madden, R. Wang, A. Rode, M. Krolikowska, B. Luther-Davies. *Nano-phase separation of arsenic tri-sulphide (As_2S_3) film and its effect on plasma etching*. Journal of Non-Crystalline Solids, 353, no.8-10, pp. 953-5, (2007).

133. R. Wang, A. Rode, S. Madden, C. Zha, R. Jarvis, B. Luther-Davies. *Structural relaxation and optical properties in amorphous $Ge_{33}As_{12}Se_{55}$ films*. Journal of Non-Crystalline Solids, 353, no.8-10, pp. 950-2, (2007).

134. C. Monat, C. Grillet, P. Domachuk, C. Smith, E. Magi, D. Moss, H. Nguyen, S. Tomljenovic-Hanic, M. Cronin-Golomb, B. Eggleton, D. Freeman, S. Madden, B. Luther-Davies, S. Mutzenich, G. Rosengarten, A. Mitchell, *Frontiers in microphotonics: tunability and all-optical control*. Laser Physics Letters, 4, no.3, pp. 177-86, (2007).

2006

135. V. Ta'eed, M. Lamont, D. Moss, B. Eggleton, D. Choi, S. Madden, and B. Luther-Davies, "All optical wavelength conversion via cross phase modulation in chalcogenide glass rib waveguides," Optics Express 14, pp. 11242-11247, (2006).

136. C. Grillet C. Smith, D. Freeman, S. Madden, B. Luther-Davies, E. Magi, D. Moss, B. Eggleton, *Efficient coupling to chalcogenide glass photonic crystal waveguides via silica optical fiber nanowires*. Optics Express, 14, no.3, (2006).

137. C. Grillet, D. Freeman, B. Luther-Davies, S. Madden, R. McPhedran, D. Moss, M. Steel, B. Eggleton. *Characterization and modeling of Fano resonances in chalcogenide photonic crystal membranes*. Optics Express, 14, no.1, (2006).

138. N. Baker, H. Lee, I. Littler, C.M. de Sterke, B. Eggleton, D. Choi, S. Madden, B. Luther-Davies, *Sampled Bragg gratings in chalcogenide (As_2S_3) rib-waveguides*. Optics Express **14** (2006).

139. R. Wang, S. Madden, C. Zha, A. Rode, B. Luther-Davies, *Annealing induced phase transformations in amorphous As_2S_3 films*. Journal of Applied Physics **100** pp. 63524-1-4 (2006).

140. K. Finsterbusch, N. Baker, V. Ta'eed, B. Eggleton, D. Choi, S. Madden, B. Luther-Davis, *Long-period gratings in chalcogenide (As_2S_3) rib waveguides*. Electronics Letters **42** pp. 1094-5 (2006).

2005

141. Y. Ruan, B. Luther-Davies, W. Li, A. Rode, V. Kolev, S.J. Madden. *Large phase shifts in As_2S_3 waveguides for all-optical processing devices*. Optics Letters **30** pp.2605-7 (2005).

142. D. Freeman, S. Madden and B. Luther-Davies, *Fabrication of planar photonic crystals in a chalcogenide glass using a focused ion beam*, Optics Express **13** pp. 3079-3086 (2005).

143. Y. Ruan, R.A. Jarvis, A.V. Rode, S.J. Madden, B. Luther-Davies. *Wavelength dispersion of Verdet constants in chalcogenide glasses for magneto-optical waveguide devices*. Optics Communications, **252** pp.39-45 (2005).

2004

144. V. G. Ta'eed, D. J. Moss, B. J. Eggleton, D. Freeman, S. Madden, M. Samoc, B. Luther-Davies, S. Janz, and D.-X. Xu, *Higher order mode conversion via focused ion beam milled Bragg gratings in Silicon-on-Insulator waveguides*, Opt. Express **12** pp. 5274-5284 (2004).

145. D. J. Moss, V. G. Ta'eed, B. J. Eggleton, D. Freeman, S. Madden, M. Samoc, B. Luther-Davies, S. Janz, and D.-X. Xu, *Bragg gratings in silicon-on-insulator waveguides by focused ion beam milling*, Applied. Physics Letters **85** pp. 4860-4862 (2004).

Pre ANU

146. J. Lacey, M. Summerfield, S. Madden, *Tunability of Polarisation Insensitive Wavelength Converters Based on Four Wave Mixing in Semiconductor Optical Amplifiers*, Journal of Lightwave Technology, December (1998).

147. J. Lacey, S. Madden, M. Summerfield, *Four Channel Polarisation Insensitive Optically Transparent Wavelength Converter*, IEEE Photonics Technology Letters, October (1997).

148. D. Moss, J. Canning, M. Faith, S. Madden, P. Kemeny, L. Poladian, F. Ladouceur, J. Love, C. Poulson, O. Leistiko, *Ultra Strong UV Written Gratings in PECVD Grown Germanosilicate Waveguide*", Optical Engineering **2998** pp.142-146 (1997).

149. J. Lacey, S. Madden, M. Summerfield, R. Tucker, A. Faris, *Four Channel WDM Optical Phase Conjugator Using Four Wave Mixing in a Single Semiconductor Optical Amplifier*, Electronics Letters, **31** pp. 743-744 (1995).

150. S. Madden, *Properties Of Non-Blocking Single Substrate Optical Space Switching Networks*, Applied Optics pp. 8375-8386 (1994).

151. J. Lewandowski, R. R. A. Syms, S. J. Madden, M. Green, *Buried Channel Waveguides in Plasma-Enhanced Chemical Vapour Deposited Silicon Oxynitride Layers on Silicon Substrates, Formed by Electron Beam Irradiation*, Optical And Quantum Electronics **23** pp.703-710, (1991).

152. D. Barbier, S. Madden, M. Green, *Waveguide Fabrication for Integrated Optics by Electron Beam Irradiation of Silica*, Journal Of Lightwave Technology **9** p. 715-720, (1991).

153. S. Madden, D. Barbier, M. Green, *Optical Channel Waveguide Fabrication Based on Electron Beam Irradiation of Silica*, Applied Physics Letters **57** pp. 2902-2905 (1991).

154. M. Green, S. Madden, *Low Loss Liquid Crystal Filled Optical Fibres*, Applied Optics, **28** pp. 5202-5203, (1989).