# Andrew G. Kirk

Department of Electrical and Computer Engineering
McGill University
3480 University St, Montreal, Quebec
H3A 0E9, CANADA

Tel: 514 398 1542
Fax: 514 398 3127
Email: andrew.kirk@mcgill.ca

## A. ACADEMIC APPOINTMENTS, RECOGNITION AND SERVICE

| | |
|---|---|
| 2011-present | *Professor*<br>Department of Electrical and Computer Engineering, McGill University |
| 2013/06 to 2018/05 | *Chair*<br>Department of Electrical and Computer Engineering, McGill University |
| 2011/09-2013/05 | *Interim Dean*<br>Faculty of Engineering, McGill University |
| 2011/06-2011/09 | *Chair*<br>Department of Electrical and Computer Engineering, McGill University (service interrupted to take up position as Interim Dean) |
| 2011-2018 | *James McGill Professor* (Research Chair)<br>Department of Electrical and Computer Engineering, McGill University |
| 2007-2018 | *Director*, McGill Institute for Advanced Materials, McGill University |
| 2006-2011 | *Associate Dean for Research and Graduate Education*<br>Faculty of Engineering, McGill University |
| 2002–2010 | *Associate Professor*<br>Department of Electrical and Computer Engineering, McGill University |
| 2000-2010 | *William Dawson Scholar* (Research Chair)<br>Department of Electrical and Computer Engineering, McGill University |
| 1996–2002 | *Assistant Professor*<br>Department of Electrical and Computer Engineering, McGill University, |

**Visiting positions**

| | |
|---|---|
| 2019/09-present | *Visiting Researcher*, Lady Davis Institute of the Jewish General Hospital, Montreal |
| 2018/11-2019/7 | *Visiting Researcher* (sabbatical visit), Universidad Politécnica de Valencia |
| 2006 (6 months) | *Visiting Academic* (sabbatical visit), Centre for Ultrahigh Bandwidth Optical Systems, University of Sydney, Australia |
| 2002 (6 months) | *Visiting Researcher* (sabbatical visit), Department of Electronics and Electrical Engineering, University of Glasgow, UK. |

**Post-doctoral research**

| | |
|---|---|
| 1994–1996 | *HCM Fellowship*<br>Vrije Universiteit Brussels, Belgium, Department of Applied Physics<br>Design, analysis and packaging of parallel optical interconnects. |
| 1992–1993 | *JGF Research Fellow*<br>University of Tokyo, Japan, Department of Mathematical Engineering.<br>Reconfigurable optical interconnects for parallel processing applications. |

**Education**

| | |
|---|---|
| 1989-1992 | Ph.D. in Physics, King's College, London. UK |
| 1986-1989 | B.Sc. (Hons) in Physics, University of Bristol, UK |

**Awards, Scholarships and Fellowships**

2014 McGill University, Faculty of Engineering, *William and Rhea Seath Award for Engineering Innovation*
2011 McGill University, *James McGill Professor* (7 year appointment, equivalent to CRC Tier I)
2009 Erasmus Mundus *Distinguished Professor Scholarship* (European Commission)
2009 *Bourse d'enseignment en genie* (Québec Government, Ministère de l'Education, du Loisir et du Sport)
2006 NSERC *Synergy Award (*as member of Agile All-Photonic Networks team)
2005 McGill University: *Renewal of William Dawson Scholar* (5 year appointment, equivalent to CRC Tier II)
2004 McGill University: *Principal's Award for Excellence in Teaching at the Associate Professor Level*
2003 McGill University: *Royal Bank Faculty Associate Award for Teaching and Learning*
2004 Department of Electrical and Computer Engineering: *Professor of the Year*
2001 McGill University: *Principal's Award for Excellence in Teaching at the Assistant Professor Level*
2001 Department of Electrical and Computer Engineering: *Outstanding Teacher Award*
2000 McGill University: *Appointment as William Dawson Scholar* (5 year appointment, equivalent to CRC Tier II)
1992 Japanese-German Foundation: *JGF Research Fellowship*

**Research Centre and Network Affiliations**

- **Centre for Advanced Systems and Technologies** (SYTACOM; FQRNT Research Network and McGill Research Centre):Member (2006-)
- **Centre for Biorecognition and Biosensors** (CBB; FQRNT Research Network and McGill Research Centre): Associate Member (2005-2011)
- **McGill Institute for Advanced Materials** (MIAM): Member (2004-)
- **Agile All-Photonic Networks** (AAPN; NSERC Strategic Research Network): Member (2002-2008)
- **Canadian Institute for Telecommunications Research** (CITR; NSERC Network of Centres of Excellence Program): Member and leader of Micro-optics program (1996-2001).

**Professional activities**

- **Guest Editor**, *IoP J.Phys Photonics* focus issue on photothermal materials and applications (2023-2024)
- **Guest Editor**, *IoP J.Phys Photonics* focus issue on novel applications of integrated photonics (2019)
- **Member,** Executive Editorial Board for IOP Journal *J.Phys Photonics* and **Chair** of Optical sensors and detection, and photonic sensing' cluster (2018-present)
- **Treasurer**, Canadian Heads of Electrical and Computer Engineering Departments (CHECE) (2016-2018)
- **Member of Board**, *PROMPT* (2013-2015)
- **Elected Member**, *IEEE-Photonics Society Board of Governors* (2012/15)
- **Chair**, *Joseph Fraunhofer Award Committee*, Optical Society of America (OSA), responsible for leading the deliberations for the selection of the 2010 recipient (2009-2011)
- **Member**, *Young Investigator Award Committee*, IEEE Photonics Society (2009-2012)
- **Member**, *Conseil Scientifique*, NanoQuebec (responsible for advising Administrative Committee on Scientific Directions), (2009-12)
- **Member** of *IEEE-Photonics Society Meetings Council*, responsible for developing strategic planning process for conferences (2008-2011)
- **Member** of the Awards Committee of the Optical Society of America (OSA) (2008-2011)
- **Chair** of IEEE-Photonics Society (formerly IEEE-LEOS) *Nanophotonics Technical Area Committee*, responsible for coordination of nanophotonics activities (2008-2010)
- **Chair**, *Symposium on Metamaterials and Plasmonics*, 2008 IEEE-LEOS Annual Meeting (Newport Beach, CA)
- **Chair** of *Nanophotonics Program* for 2007 and 2008 *IEEE-LEOS Annual Meeting* (Lake Buena Vista, FL and Newport Beach, CA)
- **Representative** for the Optical Society of America (OSA) for *IEICE Photonics in Switching* Conference, Sapporo, Japan, 2008



IPR2025-00436, Exhibit 1004, Page 2

- **Member of Board**, Centre québécois de recherche et de développement de l'aluminium (CQRDA), (2006-2013)
- **Member of Scientific Committee,** Centre for Research and Innovation in Aerospace in Quebec (CRIAQ), (2006-2008)
- **Member** of the Program Committees for Nanophotonics Program IEEE-LEOS Annual Meeting (2007), SPIE Annual Meeting (various programs, 2001-2003), CLEO Europe 2000 (optical interconnects program), SPIE Photonics Fabrication Europe, Canadian MEMS Workshop
- **Referee** for OSA Optics Express, OSA Applied Optics, OSA Optics Letters, OSA JOSA A, IEEE J. Photonics Technology Letters, IEEE J Sel Topics in Quantum Electronics, IEEE J Lightwave Technology, Optics Communications
- **Reviewer** for funding proposals to NSERC, FQRNT, CFI, CRC, Science Foundation Ireland, Singapore Science and Engineering Research Council, Israel Science Foundation, UK EPSRC
- **Consultant** for Nortel Networks, Corning Inc, JDS Uniphase, Texas Instruments
- **Member**, Scientific Committee for the annual '*Science, on tourne'* competition of the Quebec Federation of Cegeps (1997-2006), responsible for preparing the annual team challenge and for adjudicating on the day of the competition.

**University responsibilities**

- **Deputy Research Integrity Officer,** responsible for the promotion of research integrity at McGill and for handling allegations related to research misconduct (2024-present)
- **Member**, Advisory Committee for the Appointment of Vice-Principal Research and Innovation (2023)
- **President/President-Elect, McGill Association of University Teachers** (May 2020-April 2023)
- **Chair**, Department of Electrical and Computer Engineering (April 2011-September 2011 and July 2013-May 2018). Responsible for departmental of 44 professors, 1100 undergraduate students and over 300 graduate students.
- **Interim Dean**, Faculty of Engineering (October 2011-June 2013). Responsible for operation of one of Canada's leading schools of Engineering, containing 150 professors, 135 support staff, 3000 undergraduate students and 1100 graduate students. Successfully lead campaign for $10M endowment for the Trottier Institute for Sustainability in Engineering and Design; successfully proposed new Department of Bioengineering and led recruitment of first professors of bioengineering.
- **Member**, *Strategic Repositioning Initiative* (2010-2012)
- **Member**, *Working Group on Disclosure of Conflict of Interest*, Vice-Principal Research and International Relations, (2010-11)
- **Member**, *Tenure and Promotion Committee*, Department of Electrical and Computer Engineering, (2010-11)
- **Member**, *Advisory Committee for the Selection of a Provost* (2009)
- **Member**, *Task force on Indirect Costs*, Vice-Principal Research and International Relations, (2008-2010)
- **Member**, *Driving Innovation Steering Committee* (2008-2010)
- **Director**, McGill Institute for Advanced Materials (MIAM) (2007-present). Responsible for coordination and promotion of advanced materials, nanoscience and nanotechnology at McGill. Managing McGill Nanotools Microfabrication facilities and characterization facilities. Lead acquisition of $7.2M in new fabrication and characterization equipment, recruited new staff, obtained $1.6M in NSERC funding (over 6 years) for CREATE training program in integrated sensor systems, with participation of three other Montreal-area universities and several industrial and international partners.
- **Associate Dean for Research and Graduate Education**, Faculty of Engineering (2006-2011): Responsibilities include coordination of major research funding applications in the faculty, management of faculty graduate fellowship program, representation of Faculty on a range of university committees
- **Chair,** Search Committee for Lorne Trottier Chair in Aerospace Engineering (2007-08). Successfully identified inaugural chairholder.
- **Chair**, Search Committee for Nanophotonics/Nanoelectronics faculty position, Department of Electrical and Computer Engineering. Successfully recruited Prof. Zetian Mi (2006). Also member of numerous faculty search committees both within the Electrical and Computer Engineering Department and external to it.
- **Member**, search committee for Professional Associates for University Teaching and Learning Services (2006)
- **Member**, search committee of Director, University Teaching and Learning Services (2005)



IPR2025-00436, Exhibit 1004, Page 3

- **Member** of Senate Nominating Committee (2004-2005 (stepped down due to sabbatical))
- **Member of Council**, McGill Association of University Teachers: (2002-2005). Organized University Forum on Teaching and Learning in 2005. Nominated as **MAUT President Elect** in 2006, but withdrew due to assumption of position of Associate Dean Research and Graduate Education position in Engineering.
- **Chair,** Engineering Computing Committee, Faculty of Engineering, and Ex-officio member of McGill University Senate Committee on Information Services and Technology: (2004-2005). Implemented major review of support for undergraduate computing use and coordinated improved access to CAD tutorials.
- **Member**, Chair's Advisory Committee, Department of Electrical and Computer Engineering (2004-present)
- **Co-organizer** of the inaugural Faculty of Engineering Symposium on Teaching and Learning (2005)
- **Member** of the Learning Management Software (LMS) evaluation group (Office of the CIO). Responsible for reviewing candidate LMS systems and reporting on perceived strengths and weaknesses (2003-2004)
- **Senator**, McGill University Senate: Twice elected as Faculty Representative: 2002-05, 2021-23
- **Member** of Senate Nominating Committee (2005)
- **Chair**, Management Committee of MIAM Microfabrication Facility: Chair (2002-2006): Responsible for recruitment, planning, outreach and fund raising
- **Member**, Planning Committee, Faculty of Engineering: (2002-2005)
- **Affiliate Member,** Teaching and Learning Services (TLS), McGill University (2003-present)
- **Co-instructor** for Course Design and Teaching Workshop (McGill TLS), offered to instructors (1 week course, 2 times at McGill and 2 times at Simon Fraser University) (2002-2007)
- **Member**, Graduate Committee, Department of Electrical and Computer Engineering, (2003-)
- **Reader**, Scholarships Committee, McGill University (2001-2006)
- **Departmental Secretary**, Department of Electrical and Computer Engineering. Responsible for organization and recording of departmental meetings (1999-2004)
- **Undergraduate Advisor**, Department of Electrical and Computer Engineering, 1996-2002



IPR2025-00436, Exhibit 1004, Page 4

## B. GRADUATE AND UNDERGRADUATE SUPERVISION

(*†Awarded external fellowship, (e.g. NSERC, FQRNT, INO, SPIE, national), ‡Awarded McGill graduate fellowship)*

**PhD students in progress**

1. Chen, Yiwen, "Multichannel plasmonic PCR", 2023-present
2. Faruque, Md. Omar‡, "Integrated photonic biosensors for accelerated PCR diagnostics", 2023-present
3. Lee, Seung (Co-supervised with Prof. M.Paliouras, Jewish General Hospital), thesis topic: photothermal therapy for cancer treatment, 2021/09-present
4. Oudjedi, Fatma‡, "Nanoparticle-based photothermal therapy for cancer treatment", 2019-present
5. Motavas, Mohammad, "Multiplexed biosensors based on RF detection methods in optical microcavities", 2019-present
6. Gamal, Rania‡, "Integrated cavity ring down spectroscopy system", 2014-present (timeline extended sue to approved leave)

**M.Eng (thesis) students in progress**

1. Labeau, Marine, "Fluorescence thermometry for plasmonic PCR system", 2024-present
2. Hogue, Vincent‡, "Multichannel ultrafast plasmonic PCR system development", 2023-present
3. Dodoo, Joel‡,"Efficient Multi Mode Interferometer designs for On-Chip Optical Interconnects", 2023-present

**PhD students graduated**

1. Mohammadyousef, Padideh‡, "Plasmonic thermocycling and amplicon monitoring", 2017-2021, current position: Research Engineer, Nexless Healthcare, Montreal
2. Boroojerdi,Merhnoosh, "Integrated Tunable Silicon-On-Insulator Filters", 2011-2017, current position: Research Engineer, Cienna Inc, Ottawa
3. Soltani, Fatemeh, "Investigation of Low-Power Integrated Optical Switches and Modulators", 2010-2017, current position: Applications Engineer, Cienna Inc, Ottawa
4. Abumazwed, Ahmed†, "Nano-imprint fabrication of plasmonic nanostructures for sensing", 2010-2017, current position: Optical Engineer, OZ Optics, Ottawa
5. Filion-Côté, Sandrine†, "Surface plasmon resonance sensors", co-supervised with M.Tabrizian (Biomedical Engineering), 2011-2016, current position: project manager, CMC Electronics Inc, Montreal
6. Cheema, Imran‡, "Towards optimal whispering gallery mode microcavity sensors: Novel techniques and analyses", 2008-13, current position: Assist. Prof., Lahore University of Management Sciences, Pakistan
7. Zhang, Roy†, "Optical properties of nano-crystalline cellulose", co-supervised with M.Andrews (Chemistry), 2009-13, current position: Scientist at Blue-O-Technology Inc, Vancouver
8. Veerasubramanian, Ventakrishnan, "Applications of side-wall grating resonators", 2008-12, current position: Senior Optical Engineer, Infinera, India
9. Jafari, Amir‡, "Distributed etched diffraction grating demultiplexer", 2006-11, present position: Senior Optical Designer, Huawei, Ottawa
10. Khorshidahmad, Amin, "Photonic crystal demultiplexers and wavelength converters",2006-2011, current position: Research Associate, University Laval
11. Alleyne, Colin, "Enhancing sensitivity for surface plasmon resonance biosensors using periodic structures and spectro-angular image analysis", 2003-2009, current position: Developer, Xtranormal Inc, Montreal
12. Menard, Michael†, "Integrated Fabry-Perot optical space switches", 2003-2009, current position: Professor, UQAM, Montreal
13. Hoa, Xuyen†, "Guided immobilization of bioreceptors on nano-gratings for enhanced surface plasmon resonance biosensing", co-supervised with M.Tabrizian (Biomedical Engineering), 2005-2009, current position: Research Officer at National Research Council Canada
14. Bisaillon, Eric†, "Applications of sub-wavelenegth diffractive optical structures", 2002-2007, current position: Scientist, Government of Canada



IPR2025-00436, Exhibit 1004, Page 5

15. Bakhtazad, Aref, “Photonic bandgap superprisms”, 2001-2006, current position: Research Associate at Nanofabrication Facility, University of Western Ontario
16. Dong, Po, “Techniques for vertical waveguide coupling”, 2001-2005, current position: Principal Scientist, Bell Labs
17. Chateauneuf, Marc†, “Scalability of dense free-space optical interconnects”, 1997-2003, current position: Research Scientist at Defence Research and Development Canada
18. Lacroix, Frederic†, “Design, analysis and implementation of free-space optical interconnects”, 1998-2001, current position: Medical Physicist at Centre hospitalier universitaire de Québec

**M.Eng (thesis) students graduated**

1. Perrier, Timothy, “Multichannel biosensing using broadband cavity ringdown spectroscopy”, 2021-2023, now employed as Assoc. Optics Engineer at Terran Orbital in California, US.
2. Shen, Sihui, “Multichannel ultrafast plasmonic PCR system development”, 2020-2022, current position: silicon validation engineer at Synopsys Inc, Montreal, Qc
3. Benchekroun, Mamoun, 2019-2021. Thesis topic: monitoring of ultrafast plasmonic thermocycling; current position: Project Engineering at Open Systems International, Montreal, Qc
4. Uchehara, Gideon, 2016-2018, thesis title “Real Time Label-Free Monitoring of Plasmonic Polymerase Chain Reaction Products", PhD student, University of Victoria
5. Tran, Ngoc Anh Minh, 2016-2017, thesis title “Universal Point of Care Biosensor using Ultrafast Plasmonic Polymerase Chain Reaction”, current position: PhD student, McGill
6. Burns, Margaret, 2015-2017, thesis title “Towards the Plasmonic-Photonic Hybridization of High Whispering Gallery Mode Microcavity Sensor and Gold Nanorod”, current position: Engineer, l3-Wescam, Ontario
7. Haines, Matthew, 2014-2016, thesis title: “Progress Towards Development of Loop Mirror and Resonant Coupling Modulators in Silicon with Integrated Electro-Optic Polymers “, current position: Optical R&D Engineer, Thalmic Labs, Ontario
8. Najih, Mohammed†, thesis title: “Modeling Coherence Effects on Cavity-Based Spectroscopy”, 2013-2017. Current position, PhD student, McGill
9. Wang, Songzhe, 2012-13, current position: Engineer, Nuance Inc, Montreal
10. Boechler, Graham, 2011-13, current position: Engineer, URS, San Francisco
11. Karami, Sara, co-supervised with Odile Liboiron-Ladouceur, 2011-13, current position: Engineer at Iridian Inc, Ontario
12. St-Quentin, Andra†, 2010-12, current position: Optics R&D, MTT Innovation Inc, Vancouver
13. Filion-Côté, Sandrine†, 2009-2011, current position: optical design engineer, Lumenwerx Inc, Montreal
14. Fatehi, Arya, 2009-11, current position: Engineer, Novellis Inc
15. Taslimi, Shahrzad, 2008-10, current position: Optical system designer, Ciena Inc, Ontario
16. Chien, Wein†, co-supervised with M.Tabrizian (Biomedical Engineering), 2006-2008, current position: unknown
17. Bhatnagar, Sameer, 2005-2008, current position: Cegep instructor
18. Khalid, Zeeshan, 2005-2007, current position: Princpal Test Engineer at Broadcom Corporation
19. Marinescu, Cristina†, 2003-2005, current position: Electro-Optics Developer at Ciena
20. Sanyal, Poulomi, 2003-2005, current position: RF Account Manager-Aerospace and Defense, Automotive and Utilities at Rohde & Schwarz
21. Malic, Lidija†, 2003-2005, current position: Research Officer at National Research Council Canada
22. Souleymani, Ali, 2002-2004, current position: Hardware design engineer, SoleNet Inc
23. Hoa, Xuyen†, 2002-2004, current position: Research Officer at National Research Council Canada
24. Prentice, James, 2001-2003, current position: Senior Product Manager, PMC-Sierra
25. Alleyne, Colin, 2001-2003, current position: Developer, Xtranormal Inc, Montreal
26. Varano, Robert†, 2001-2003, current position: Senior Principal Engineer at Reflex Photonics, Montreal



IPR2025-00436, Exhibit 1004, Page 6

27. Thomas-Dupuis, Frederic†, 2001-2003, current position: Partner at Oliver Wyman, Montreal,
28. Simard, Marc, 2000-2002, current position: unknown
29. Lin, Julianna†, 1999-2001, current position: Design Engineer, Apple Inc, CA
30. Michael, Feras, 1999-2000, current position: Senior Electrical Engineer, TeraDiode Inc
31. Bisaillon, Eric†, 1999-2001, current position: Scientist, Government of Canada
32. Brady, Greg†, 1998-2000, current position: Optical Engineer, KLA Tencor
33. Maj, Tomasz, 1998-2000, current position: Product Line Manager, Finisar
34. Cheng, Fan, 1997-2000, current position: unknown
35. F.-Brosseau, Daniel, 1997-1999, current position: Associate, McKinsey and Company
36. Mathieu, Frederick, 1996-2000, current position: Engineer, ALSTOM
37. Lacroix, Frederic, 1996-1998, current position: Medical Physicist at Centre hospitalier universitaire de Québec

**Post-doctoral researchers completed**

1. Roche, Philip, 2008-2012,
2. Sun, Guilin†, 2005-2008,
3. Jugessur, Aju, 2004-2006,
4. Jafari, Reza†, 2003-2004,
5. Lugo, Eduardo*, 2001-2004,
6. Belanger, Nicholas*, 2003-2005

**Honors Undergraduate Students, 2 semesters)**

1. Bucheeri, Khaled 2023
2. Zhu, Yi 2020
3. Grenier, Nicolas 2020
4. Samee, Mohamed 2020
5. Zang, Wen Bo 2016
6. Tranh, Ngoc Anh Minh 2015
7. Najih, Mohamed 2012
8. Xue, Hao Ying 2011
9. Salih Safa, Muhammed 2011
10. Wang, Songzhe 2010
11. Xu, Da-Qian 2009
12. Filion-Cote, Sandrine 2008
13. Khatamian, Yasha 2007
14. Larom, Bar 2006
15. Khalid, Zeeshan 2004
16. Radita, Christian 2003
17. Sharma, Vikas 2002
18. Latif, Salman 2002
19. Kena-Cohen, Stephane 2001
20. Marinescu, Cristina 2001
21. Bres, Camille 2001
22. Brien, Samuel 2001
23. Sabourin, Patrick 2001
24. Xuyen, Hoa 2001
25. Hooshangi, Sara 2000
26. Hsieh, Taulee 1999
27. Dalle, Marwan 1999
28. Varano, Robert 1999
29. Thomas-Dupuis, Frederic 1999
30. Seghal, Puja 1998
31. Girolamo, Cosmo 1998
32. Barakat, Neil 1998
33. Lin, Julianna 1998
34. Chateauneuf, Marc 1996
35. F.-Brosseau, Daniel 1996

**B.Eng. Capstone Design Project Teams supervised, 2 semesters**

2024: Nicki Esfehani, Alice Munduruca; Gizem Oznalcaci; Madeleine Incutiyayezu

2023-24: Joseph Saliba, Pasha Hakim; Kazuto Kambara; Philippe Sarouphim Hochar,

2023-24: Jessica Li, Joyce Liu, Ann Trinh; Niels Mainville

2023-24: Shiyuan Qiao, Guo Cheng, Zhiheng Zhou, Junbo Wang (co-supervised)

2023-24 Lyon Belyansky, James Kary, Jason Jiang, Eliott Vacher Detournière, Liam Gibbons (Mechanical Engineering)

2022-23: Marine Labeau, Ralph Younan, Shabthana Kandasamy, Vincent Hogue

2022-23 Jianbin Cheng, Tony Zhang, Yushu Zhao

2021-22: Anna Decterov, Sunishtha Koul, Zhuohong Li, Brian Zhang

2020-21: Kenny Huynh, Adrian Dybka

2019-20: Ryan Lo, Zuoya Wang, Lucas Shtychno, Nafisa Islam (Mechanical Engineering)

2017-18: Peter Moutsatsos, James McCallum; Liam Ashworth; Aram Nercessian (Mechanical Engineering)

2017-18: Nasif Alam, Wesley Sun, Hunter Hauswirth,



IPR2025-00436, Exhibit 1004, Page 7

**SURE undergraduate summer students**

1. Li, Zhuohong 2022
2. Licoppe, Aidan 2022
3. Tchirnov, Rachel 2020
4. Kirby, Tai 2020
5. Deng, David 2020
6. Yun, Jasper 2020
7. Benchekroun, Mamoun 2018
8. Shen, Sihui 2018
9. Fulleringer, Alexander 2017
10. Savoie, Mathieu 2017
11. Tang, Vera 2017
12. Khan, Fazal Mahmood 2017
13. Mian, Muhammad Anees Rehman 2017
14. Lemes Arai, Juliana 2016
15. Bozzo, Sara Anne 2016
16. Fang, Szu-Chieh 2016
17. Guenin, Laurent 2016
18. Quinn, Peter 2016
19. Gong, Yanhao 2016
20. Shen, Chen 2015
21. Zang, Wen Bo 2015
22. Wolfe, Sean 2015
23. Tranh, Ngoc Anh Minh 2014
24. Shen, Lulan 2014
25. Wang, Hong Yi 2014
26. Ben Zvi, Libby 2013
27. Robinson, Warren 2013
28. Bare, Milena 2013
29. Dupressoir, Patrick 2012
30. Fakih, Ibrahim 2011
31. Dhane, Sina 2011
32. Hemsworth, Nick 2011
33. Wong, Jeremy 2010
34. Hamza, Rias 2010
35. Waldman, Eric 20



IPR2025-00436, Exhibit 1004, Page 8

## C. FUNDING HISTORY

**Operating grants**

| Investigators (PI: Principal Investigator) | Project | Amount/year , % available to candidate) | Years of tenure |
|---|---|---|---|
| A.Kirk (PI) | Mitacs, Accelerate, Design and Implementation of an External-Cavity Laser (ECL) as a Tunable Coherent Source for Optical Communication and Sensing Applications Using Hybrid Integration, partner organisation: Les Systèmes Fonex Data Inc. | $30,000 (100%) | 2023-2025 |
| A.Kirk (PI), M.Trifiro (Co-PI), M.Paliaouras (Co-PI) | NSERC Alliance Grant, Plasmonic PCR for point of care diagnostics, supporting organisations Nexless Healthcare and Trilogix Inc | $171,962 (50%) | 2023-2025 |
| A.Kirk (Co-PI), M.Trifiro (Co-PI), M.Paliaouras (Co-PI) | *PCR Plasmonique* MEDTEQ Impact Program, with co-funding from Nexless Inc and Trilogix Inc | $171,962 (50%) | 2023-2025 |
| A.Kirk (Co-PI), M.Trifiro (Co-PI), M.Paliaouras (Co-PI) | *Plasmonic PCR: Rapid Point-of-Care COVID-19 Diagnostic Platform.* CIHR Operating Grant: COVID-19 - Diagnostics | $358,850 (30%) | 2020-22 |
| Kirk, A.G. (PI) | *Integrated multiplexed optical biosensors for rapid diagnostics* NSERC Discovery Grant | $33000 (100%) | 2020-2025 |
| B.Brenner (Co-PI), N.Kronfli (Co-PI), A.Kirk (Co-Investigator), M.Paliouras (Co-Investigator) | *Design of a Rapid Point-of-Care PCR device for the diagnosis and management of HIV, HCV and other infectious diseases for key vulnerable populations in real-world settings* McGill MI4 Seed Grant | $150,000 (30%) | 2019-20 |
| Kirk, AG (PI), Trifiro M; Paliouras, M; Yargeau, V. | *High speed, portable PCR system for rapid and in situ water quality testing* Trottier Institute for Sustainability in Engineering and Design Planetary Health Seed Funding Program | $75,000 (40%) | 2018-20 |
| Trifiro, M (PI), Kirk, AG (Co-PI), Paliouras, M and Roche, P | *Plasmonic PCR: Rapid Diagnostics through Plasmonics* Genome Quebec, Disruptive Innovation in Genomics Competition | $125,000 (30%) | 2016-18 |
| Kirk, A.G. (PI) | *Integrated photonic biosensors for time domain measurements* NSERC Discovery Grant | $47,000 (100%) | 2015-2020 |
| Tabrizian, M. (PI), Kirk, A.G., Faucher, S. | *Integrated on-chip microfulidic system with surface plasmon resonance biosensor for time-effective detection of legionella pneumophila in contaminated water* NSERC Strategic Grant | $142,000 (33%) | 2014-2017 |
| Mi, Z. (principal), D. V. Plant, and A. G. Kirk. | *3-Dimensionally integrated nanophotonic circuits on Si for terahertz-speed chip-level optical* | $136,000 (33%) | 2012-2015 |



IPR2025-00436, Exhibit 1004, Page 9

| | | | |
|---|---|---|---|
| | *communications*<br>NSERC, Strategic Grant,. | | |
| Kirk, A.G. (PI) | *Nanophotonic Engineering for Telecommunications and Biomedicine*<br>McGill University, James McGill Chair | 15,000 (100%) | 2011-2018 |
| Tabrizian, M.T. (PI); Kirk, A.G.; Juncker, D; Veres, T. | *Towards a Portable and Fully Automated SPR-Based Digital Microfluidics Array Platform Integrating Diffractive Optical Elements for Genomics and Proteomics*<br>Genome Quebec | 132,500 ( 25%) | 2010-2013 |
| Kirk, A.G. (PI) and Andrews, M | *Integrated polymer electro-optic switches*<br>NanoQuebec | 66,667 ( 50%) | 2010-2012 |
| Andrews, M (PI); Kirk, AG and 2 others | *Encres à base de nano cellulose cristalline pour une sécurité et une couleur*<br>FQRNT Arbora-Nano program | 75,000 ( 25%) | 2010-2013 |
| Kirk, A.G. (PI) and 9 others | *NSERC CREATE training program in Integrated Sensor Systems*<br>NSERC CREATE program | 300,000 ( 10%) | 2010-2016 |
| Kirk A.G. (PI); Mi, Z and Plant, D.V. | *Direct integration of microtube lasers on silicon*<br>NSERC Strategic Research Program | 136,000 ( 30%) | 2010-2013 |
| Kirk, A.G. (PI); Charette, P; Tabrizian, M; Beauvais, J. | *Senseurs à résonance de plasmon de surface à sensibilité accrue*<br>FQRNT Team Grant | 43,200 ( 33%) | 2008-2010 |
| Kirk, A.G. (PI); Plant, D.V., Aimez, V. | *Heterogeneous integration processes for planar optoelectronics*<br>NSERC Strategic Research Program | 99,900 ( 33%) | 2008-2010 |
| Tabrizian, M.T. (PI); Kirk, A.G.; Juncker, D; Charette, P.; Veres, T. | *Integrated Proteomics Platforms for High-Throughput Biomarker Discovery and Validation*<br>Genome Canada and Genome Quebec, Technology Development Program | 816,704 ( 20%) | 2008-2010 |
| Kirk A.G. (PI) | *Nanoplasmonic Optical Biosensors*<br>NSERC Discovery Grant | 36,000 (100%) | 2007-2015 |
| Kirk, A.G. (PI) | *Integrated Fabry-Perot Optical Space Switch*<br>NSERC Idea to Innovation program | 94,035 (100%) | 2007 |
| Kirk, A.G. (PI) and 9 others | *Microfabrication Facilities Access*<br>NSERC Major Resource Access | 60,000 (10%) | 2006 |
| Colman, D.R. (PI); Kirk A.G., and 9 others | *Engineering Repair of the Central Nervous System*<br>CIHR (Innovative Approaches to Health Research | 295,000 (5%) | 2005-2007 |
| Tabrizian, M. (PI) ; Kirk, A.G. ; Verres, T. | *Novel surface plasmon resonance biointerface for time-effective analysis of sepsis biomarkers*<br>NSERC CRD | 99,300 (33%) | 2005-2007 |
| Kirk, A.G. (PI) | *William Dawson Scholar Research Grant (renewal)*<br>McGill University | 15,000 (100%) | 2005-2010 |



IPR2025-00436, Exhibit 1004, Page 10

| | | | |
|---|---|---|---|
| Kirk, A.G.(PI) and 4 others | *Fully integrated grating-based surface plasmon resonance sensors*<br>FQRNT Team Grant | 76,550<br>(30%) | 2005-2007 |
| Kirk, A.G. (PI) | *Integrated micro-optical systems for future optical networks*<br>NSERC Discovery Grant | 35,850<br>(100%) | 2004-2006 |
| Kirk, A.G. (PI) | *Integrated planar waveguide structures*<br>NSERC eMPOWR program | 20,000<br>(100%) | 2005 |
| Kirk, A.G. (PI) | *Improved optical systems for particle Measurements* (NSERC CRD | 42,778<br>(100%) | 2005 |
| Kirk, A.G. (PI) | *Novel technique for efficient nonlinear optical frequency conversion*<br>NSERC Idea to Innovation program | 79,535<br>(100%) | 2004 |
| Ward, B. (PI); Kirk, A.G. and 3 others | *SELDI-ToF MS in blood-borne protozoan* infections: novel diagnostic approach<br>CIHR | 98,000<br>(10%) | 2004-2005 |
| Plant, D.V. (PI); Kirk A.G. and 12 others | *Agile All-Photonic Networks*<br>NSERC Research Networks program | 1,700,000<br>(8%) | 2003-2007 |
| Beauvais, J. (PI); Kirk A.G. and 4 others | *High resolution lithography for the fabrication of photonic devices*<br>PROMPT ( VRQ) | 125,000<br>(12%) | 2003-2004 |
| Kirk, A.G. (PI) | *3-D integrated micro-optics*<br>NSERC eMPOWR program | 20,000<br>(100%) | 2003 |
| Grutter, P. (PI); Kirk, A.G. and 5, others | *Micromachining facilities access*<br>NSERC Major Facilities Access | 130,000<br>(15%) | 2003-2005 |
| Kirk, A.G. (PI) and Plant, D.V. | *Tunable photonic bandgap devices*<br>NanoQuebec ( VRQ) | 60,000<br>(50%) | 2002-2003 |
| Plant, D.V. (PI); Kirk, A.G. (and 3others | *Optical CDMA for local access*<br>FQRNT ( Team Grant) | 70,000<br>(25%) | 2002-2004 |
| Kirk, A.G. (PI) | *William Dawson Scholar Research Grant*<br>McGill University | 15,000<br>(100%) | 2000-2004 |
| Kirk, A.G. (PI) | *Multi-drop free-space optical interconnects*<br>NSERC Research Grant | 33,160<br>(100%) | 1999-2002 |
| Kirk, A.G (PI), | *Micro-optics for wavelength routing*<br>CIPI ( NSERC NCE program) | 59,000<br>(100%) | 1999-2002 |
| Kirk, A.G. (PI) | *Optical technology*<br>CITR ( NSERC NCE program) | 118,000<br>(100%) | 1998-2001 |
| Plant, D.P. (PI); Kirk, A.G. | *VLSI photonics*<br>BAE Systems ( Research contract) | 502,000<br>(50%) | 1998-2001 |
| Kirk, A.G., (PI) | *Optical Technology*<br>CITR ( NSERC NCE program) | 135,000<br>(100%) | 1998-1999 |
| Plant, D.P. (PI); Kirk, A.G. | *Free space optical interconnect ASIC development*<br>Nortel Advanced Technologies ( Research contract) | 208,000<br>(50%) | 1998- 1999 |



IPR2025-00436, Exhibit 1004, Page 11

| | | | |
|---|---|---|---|
| Kirk, A.G. (PI) | *Robust micro-optical components for free*-space digital optical systems<br>FCAR New Researcher grant | 14,000<br>(100%) | 1997-1999 |
| Plant, D. (PI); Kirk, A.G. | *The optomechanics of free-space optical interconnects.* NSERC IOR | 25,000<br>(50%) | 1997-1998 |
| Kirk, A.G. (PI) | *Micro-optics for free-space digital optical systems*<br>NSERC Research Grant | 24,000<br>(100%) | 1996-1998 |
| Kirk, A.G. (PI) | *Start-up funding*<br>McGill University Dept. Electrical and Computer Engineering and Faculty of Engineering | 30,000<br>(100%) | 1996 |

**Infrastructure and equipment Grants**

| **Investigators** | **Project** | **Amount/year (% available to candidate)** | **Years of tenure** |
|---|---|---|---|
| Plant, D.V (PI), Kirk, A.G., and four others | *All-Band Device Testbed* (NSERC Research Tools and Instruments | 150,000 ( 50%) | 2014 |
| Mi, Z. (PI), Kirk, A.G. and 8 others | *An RF Plasma Nitrogen Source for the Development of Nanoscale Nitride Semiconductors for Phosphor-Free Solid State Lighting (Solar Fuels (and Chip-Level Optical Communications* (NSERC Research Tools and Instruments | 57,839 ( 10%) | 2013 |
| Kirk, A.G. (PI) and 9 others | *Electron Beam Deposition System for Multi-User Nanofabrication Facility* (NSERC Research Tools and Instruments | 148,200 ( 10%) | 2011 |
| Kirk, A.G (PI).; Charette, P; Tabrizian, M; Beauvais, J. | *Senseurs à résonance de plasmon de surface à sensibilité accrue (* Equipment funding component) | 46,900<br>(50%) | 2008 |
| Plant, D.V. (PI); Kirk, A.G. and 8 others | *IFLOWS*<br>MDEIE ( Quebec)/McGill infrastructure program | 2,979,000<br>(50%) | 2007 |
| Kirk, A.G. ( co-PI); Vinals, co-PI), J and 8 others | Tools for Functional Materials<br>MDEIE ( Quebec)/McGill infrastructure program | 7,200,000<br>(25%) | 2007 |
| Plant,D, (PI) Kirk, A.G., Chen, L. | *Burst Mode Technologies for High Bit Rate All-Photonic Access Networks*<br>NSERC Research tools and instruments | 36,122<br>(33%) | 2005 |
| Kirk, A.G. (PI), Plant,D, Chen, L. | *Photonic nanopositioning equipment*<br>NSERC Research Tools and Instruments | 63,640<br>(33%) | 2004 |
| Chen, L. (PI), Kirk, A.G., Plant,D, | *Components for ultrahigh bandwidth transmission experiments and ultrafast photonics research*<br>NSERC Research Tools and Instruments | 33,616<br>(33%) | 2003 |
| Chen, L. (PI), Kirk, A.G., Plant,D | *10 Gb/s lightwave receiver for dynamic recirculating loop transmission experiments*<br>NSERC Research Tools and Instruments | 70,068<br>(33%) | 2002 |



IPR2025-00436, Exhibit 1004, Page 12

| | | | |
|---|---|---|---|
| Chen, L. (PI), Kirk, A.G., Plant,D | *Wavelength-division-multiplexing transmitters and components for lightwave systems research* NSERC Research Tools and Instruments | 23,461 (33%) | 2001 |
| Grutter, P. (PI), Kirk, A.G. and 5 others | *Tools for Nanoscience and Technology* Canadian Foundation for Innovation | 9,396,172 (10%) | 2001 |
| Blostein, M.L (PI), Kirk, A.G. and 8 others | *Experimental facilities for research in multimedia communications systems* Canadian Foundation for Innovation | 1,824,355 (10%) | 2001 |
| Kirk, A.G. (PI), Kordoc, K. | *The impact of high capacity parallel optical interconnects on system design and performance* CFI New Opportunities Program | 321,068 (50%) | 2000 |
| Kirk, A.G. (PI) | *Micro-optics for free-space digital optical systems* McGill University (Faculty of Graduate Studies (Equipment grant | 15,000 (100%) | 1998 |
| Kirk, A.G. (PI) | *Robust micro-optical components for free-space digital optical systems* FCAR New Researcher Equipment grant | 15,000 (100%) | 1998 |

**Grants for Teaching (Infrastructure and operations)**

| Investigator | Purpose | Amont per year | Years of tenure |
|---|---|---|---|
| Kirk, A.G. | *Bourse d'enseignment en genie* ( Québec Government (MELS) | 25,000, (stipend and teaching support) | 2009-2013 |
| Kirk, A.G. | *Enhancement of the undergraduate Optical Communications teaching laboratory,* Québec Government (MELS) | $214,000 ( equipment) | 2000 |
| Kirk, A.G. | *Creation of an undergraduate Optical Communications teaching laboratory,* Québec Government (MELS) | $273,000 (equipment) | 1999 |



IPR2025-00436, Exhibit 1004, Page 13

## D. RESEARCH CONTRIBUTIONS IN PAST SIX YEARS

Full references for citations are given in 'Publications'. Authors whose names are underlined were under my supervision (or co-supervision) at the time the research was performed.

***A: Ultrafast plasmonic thermocycler for polymerase chain reaction***

The polymerase chain reaction (PCR) is used in thousands of laboratories around the world to amplify nucleic acid sequences for applications including DNA sequencing, gene analysis and identification of infectious diseases, and is now well-known as the most accurate method for detecting the SARS-Cov-2 virus. The amplification process requires the sample to be repeatedly heated and cooled in a cycle from 51 °C, 91 °C and 72 °C. The time required for this cycle represents a significant bottleneck. In Roche et al 2017 [J10] we show that very rapid and accurate thermocycling (30 cycles in 600 seconds) can be achieved by laser heating of gold nanoparticles that are contained within the sample vessel followed by forced air cooling. This is the fastest rate reported to date for practical 20 mL sample sizes this and paper has been cited 22 times to date by other researchers, indicating the significant interest that the results hold. This heating technique was originally conceived by the PI and P.Roche in 2012 when P.Roche was under the direction of the PI and demonstrated with partners in the Jewish General Hospital (M.Trifiro, and M.Paliouras, who provided biological and medical expertise) and initial results were published in P. J. R. Roche et al, *Analyst*, **137** (19), pp 4475–4481, 2012. In the 2017 paper we also show that the same plasmonic heating mechanism can be used to directly extract the DNA from bacterial cells prior to amplification, opening the way to a 'single pot' PCR system.

On the basis of this research we were invited to attend an invitation-only meeting by Health Canada to describe the potential impact on antimicrobial resistance []. The team was also awarded a $717,700 grant by the CIHR to adapt this technology to the amplification of SARS-Cov2 RNA (and hence the diagnosis of Covid-19) and deliver a prototype suitable for end-users. In collaboration with industrial partners we have now developed a 4-channel user-ready PCR system that outperforms other solutions in terms of performance, delivering PCR results in 7-15 minutes and RT-PCR results in 15-25 minutes.

A US and Canadian patent has been granted for the intellectual technology that has arisen from this research [P1] and it is currently being extended to other countries. McGill has licensed the patent to our industrial partners and they are currently considering commercial production.

***B: Direct detection of low copy number DNA via ultraviolet quantification***

All quantitative PCR (qPCR) machines require a mechanism to detect the concentration of DNA as thermocycling proceeds. This allows the original concentration of the target DNA to be inferred, providing invaluable diagnostic information. Commercial qPCR systems employ fluorescent detection, using either DNA intercalating dyes or dye molecules that bind specifically to amplicons or primers. This approach works well in most cases, but on some occasions can lead to errors due to photobleaching. The fluorescent reagents also represent an additional cost that can add up to $100,000's over the lifetime of an instrument. Because our plasmonic PCR system allows for a direct optical path through the PCR tube (which is typically not possible in thermocyclers that use Peltier-effect block heaters) we investigated the quantification of DNA via measurement of the ultraviolet transmittance of the reaction mixture. The DNA precursors (deoxyribonucleotide triphosphate or dNTP molecules) have a higher absorption at 260 nm than bound double-stranded DNA (due to the availability of electrons in the pyrimidine rings) and so as DNA amplification proceeds the UV transmittance increases. By undertaking careful experimental design and measurements, and in conjunction with the plasmonic PCR system described previously, we have demonstrated that it possible to detect starting copy numbers of less than 3 DNA molecules, placing this method on par with fluorescence measurements in terms of sensitivity, and without requiring any additional reagents. The results were recently published in a high impact factor journal [J1] and accepted for presentation at academic conferences [C7]. We have also developed a complete model for the amplification process that permits the UV transmission to be predicted as the reaction proceeds and which provides a very good match with the experimental results. This model has already been presented at a competitive academic conference [C1] and is currently in preparation for submission to an academic journal. Patent protection has been applied for (as a continuation to [P1]).

***C: Real-time measurement of complex refractive index using surface plasmon resonance sensing***

Surface plasmon resonance (SPR) is a widely used technique for sensing molecules that are absorbed onto a noble metal surface. Most SPR systems measure the shift in the SPR resonance peak (in either angle or wavelength) and use this to infer the change in the effect refractive index at the surface. However, the SPR peak also changes in



IPR2025-00436, Exhibit 1004, Page 14

response to changes in the optical absorption of the bound layer, and so can be used to measure the complex refractive index. While other researchers had undertaken this previously, they were not able to extract accurate complex refractive index values in real time. In [J12] we employed the very successful projection method that we had first published in Alleyne et al, *Optics Express* **16** (24) pp 493-503, 2008 to provide a very high accuracy measurement of the real and imaginary parts of the refractive index in real time. We then applied this to measure the growth and subsequent removal of a bacterial biofilm in real time, providing an important insight into growth rates and also the efficacy of cleaning techniques and published in [J11]. This paper has subsequently been cited 10 times by other researchers. This research project was undertaken as a collaboration between colleagues in McGill Biomedical Engineering (M.Tabrizian and F.Malaine) who provided expertise into surface treatment and bacterial growth conditions, while my group provided expertise in optical systems and signal processing.

***D: Improved signal processing for localized surface plasmon resonance biosensors***

Localised surface plasmon resonance (LSPR), which makes use of the plasmonic response of metallic nanoparticles, permits researchers to probe closely bound molecules. In contrast to SPR, LSPR spectra are often broader and noisier, due to the dimensions of the nanoparticles and size variations that arise during fabrication. This can limit their sensitivity. In a series of papers we have pioneered new signal processing techniques which allow more information to be extracted than was previously possible. In [J13]] we extended our projection method to LSPR for the first time and showed that it can provide a better signal to noise ratio and precision than other techniques. This approach has now been adopted by several other researchers. In [J9] we focused on nanorods that have resonances at two wavelengths. While other researchers had previously demonstrated that by interrogating in two spectral bands it is possible to independently extract information about both the refractive index of the absorbed layer and also its depth, we showed that much greater precision can be achieved by applying maximum likelihood estimation (MLE) techniques to the data. Finally in [J8] we considered multiply-resonant crescent-shaped nanoparticles and showed that the results of the MLE method can be improved even further by adopting a non-linear response model rather than the previously employed linear response model. This work was a collaboration between my group and that of T.Tanaka at the Riken Institute, Japan, who contributed to the fabrication of the nanostructures, while we undertook experimental measurements, signal processing techniques and analysis of the data.

***E: Biosensing via broad-band phase shift cavity ring-down spectroscopy of optical microcavities***

Phase shift cavity ring-down spectroscopy (PS-CRDS) is a well-known technique for the characterization of gases using large optical cavities. In 2013 (Cheema et al, *Optics Express*, **21** (7), pp 8724-8735) we showed for the first time that the method could be applied to biosensing in optical microcavities and this work has since been cited over 40 times. We have subsequently extended this work to develop the first model to predict the PS-CRDS response to partially coherent light, and the results were presented at a conference [C11]. These results open the path to the deployment of highly sensitive microcavity-based optical sensors that do not require a tunable laser, and research on this topic is ongoing.



IPR2025-00436, Exhibit 1004, Page 15

## E. COMPLETE LIST OF PUBLICATIONS

### 1. Articles in refereed journals

J1. F. Oudjedi, S. S. Lee, M. Paliouras, M. Trifiro, S Wachsmann-Hogiu and A. G. Kirk, "In Vitro Raman Thermometry Using Gold Nanorod-Decorated Carbon Nanotubes, ACS Applied Nano Materials 7 (17), 20942-20953, DOI: 10.1021/acsanm.4c03865, 2024

J2. F. Oudjedi and A. G. Kirk, "Near-Infrared Nanoparticle-Mediated Photothermal Cancer Therapy: A Comprehensive Review of Advances in Monitoring and Controlling Thermal Effects for Effective Cancer Treatment", *Nano Select*, https://doi.org/10.1002/nano.202400107, 24 pages , September 2024

J3. I. Brukner, M. Paliouras, M. Trifiro, M.Bohbot, D.Shamir, A. G. Kirk, 'Assessing different PCR master mixes for ultrarapid DNA amplification: important analytical parameters', Diagnostics, 14 (5), 477, 2024.

J4. F. Oudjedi, S. S. Lee, M. Paliouras, M. Trifiro, and A. G. Kirk, "Enhancing in vitro photothermal therapy using plasmonic gold nanorod decorated multiwalled carbon nanotubes," Biomedical Optics Express, vol. 14, no. 12, pp. 6629-6643, Dec 2023, doi: 10.1364/boe.504746.

J5. S. S. Lee, F. Oudjedi, A. G. Kirk, M. Paliouras, and M. A. Trifiro, "Photothermal therapy of papillary thyroid cancer tumor xenografts with targeted thyroid stimulating hormone receptor antibody functionalized multiwalled carbon nanotubes," Cancer Nanotechnology, vol. 14, no. 1, Dec 2023, Art no. 31, doi: 10.1186/s12645-023-00184-9.

J6. P.Mohammadyousef, M.Paliouras, M.Trifiro, A.G.Kirk, "Plasmonic and label-free real-time quantitative PCR for point-of-care diagnostics'", *The Analyst*, **146**, 5619, 2021.

J7. F.Soltani, D.Patel, M.Ménard, D.V.Plant, A.G.Kirk, 'DPSK Modulation With a Dual-Drive Silicon Photonic Loop-Mirror Modulator', *IEEE Photonics Technology Letters*. **31**(3), pp 1037-1040, 2019

J8. A.Abumazwed, W.Kubo, T.Tanaka**,** A.G.Kirk, 'Improved method for estimating adlayer thickness and bulk RI change for gold nanocrescent sensors', *Scientific Reports* **8**, 6683, DOI: 10.1038/s41598-018-24950-7, 2018

J9. A.Abumazwed, W.Kubo, T.Tanaka, A.G.Kirk, 'Improved self-referenced biosensing with emphasis on IP 1multiple-resonance nanorod sensors', *OSA Optics Express*, **25** (20),pp 24803-24815, 2017

J10. P.J.R. Roche, M. Najih, S.S. Lee, L. K. Beitel, M. Carnevale, M. Paliouras, A.G.Kirk, M. A. Trifiro, 'Real Time Plasmonic qPCR: How fast is Ultra-fast? 30 cycles 1 in 54 seconds', *The Analyst*, **142**, pp 1746-1755, 2017

J11. S. Filion-Côté, F.Melaine, A.G.Kirk**,** M. Tabrizian**,** 'Monitoring of bacterial film formation and its breakdown with an angular-based surface plasmon resonance biosensor', *The Analyst*, **142** (13), pp 2386-2394, 2017

J12. S. Filion-Côté, M. Tabrizian and A.G.Kirk**,** 'Real-Time Measurement of Complex Refractive Indices with Surface Plasmon Resonance', *Sensors and Actuators B,* **245**, pp 747-752, June 2017

J13. A.Abumazwed, C.Shen, W.Kubo, T.Tanaka, **A.Kirk**, 'Projection method for improving signal to noise ratio of localized surface plasmon resonance biosensors', *OSA Biomedical Optics Express*, **8** (1), pp. 446-459, 2017

J14. M. T. Boroojerdi, M. Ménard and A.G.Kirk, 'Two-period contra-directional grating assisted coupler', *OSA Optics Express*, **24** (20), pp 22865-22874, 2016

J15. M. T. Boroojerdi, M. Ménard and A.G.Kirk, 'Wavelength tunable integrated add-drop filter with 10.6 nm bandwidth adjustability', *OSA Optics Express,* **24** (19), pp 22043-22051, 2016

J16. M.I.Cheema and A.G.Kirk , Analytical expressions for wave-guide coupled phase shift microcavity ring down spectroscopy, JOSA B, **32** (2), pp 355-362, 2015

J17. S. Filion-Côté, P. J. R. Roche, A. M. Foudeh, M. Tabrizian and A.G.Kirk, 'Design and analysis of a spectro-angular surface plasmon resonance biosensor operating in the visible spectrum', *Rev. Sci. Instrum*. **85**, 093107, 2014

J18. M. I. Cheema, C.Shi, A. M. Armani, and A.G.Kirk**,** 'Optimizing the signal to noise ratio of microcavity sensors, *IEEE Photonics Technology Letters,* **26** (20), pp 2023-2026, 2014

J19. M. I. Cheema, U. A. Khan, A. M. Armani, and A.G.Kirk, "Towards more accurate microcavity sensors: maximum likelihood estimation applied to combination of quality factor and wavelength shifts", *OSA Optics Express*, **21** (19), pp. 22817-22828, 2013



IPR2025-00436, Exhibit 1004, Page 16

J20. M.I.Cheema and A.G.Kirk, 'Accurate determination of the quality factor and tunneling distance of axisymmetric resonators for biosensing applications', *OSA Optics Express* , **21** (7), pp 8724-8735, DOI: 10.1364/OE.21.008724, April 2013

J21. Y. P. Zhang, V. P. Chodavarapu, A.G.Kirk, and M. P. Andrews, 'Structured color humidity indicator from reversible pitch tuning in self-assembled nanocrystalline cellulose films', Sensors And Actuators B-Chemical, **176**, pp 692-697, DOI: 10.1016/j.snb.2012.09.100, Jan 2013

J22. Y. P. Zhang, V. P. Chodavarapu, A.G.Kirk, and M. P. Andrews, "Nanocrystalline cellulose for covert optical encryption," Journal of Nanophotonics, 6 (1), 063516, Jul 2012.

J23. V.Veerasubramanian, G. Beaudin, A.Giguere, B. Le Drogoff, V. Aimez, A.G.Kirk, ' Design and Demonstration of Apodized Comb Filters on SOI' , IEEE Photonics Journal **4** (4), pp 133-1139, DOI: 10.1109/JPHOT.2012.2204971, 2012

J24. V.Veerasubramanian, G. Beaudin, A.Giguere, B. Le Drogoff, V. Aimez, A.G.Kirk , 'Waveguide-coupled drop filters on SOI using quarter-wave shifted sidewalled grating resonators', *OSA Optics Express,* **20** (14), pp 15983-15990, 2012

J25. P. J. R. Roche, L. K. Beitel, R. Khan, R. Lumbroso, M. Najih, M. C.-K. Cheung, J. Thiemann, V. Veerasubramanian, M. Trifiro, V. P. Chodavarapu and A.G.Kirk 'A Plasmonic Thermocycler for the Amplification of Human Androgen Receptor DNA', *Analyst*, **137** (19), pp 4475 – 4481, 2012

J26. Z. Tian, P. Bianucci, P. J. R. Roche, M. H. T. Dastjerdi, Z. Mi, P. J. Poole, A.G.Kirk, and D. V. Plant, "Dynamical thermal effects in InGaAsP microtubes at telecom wavelengths," *Opt. Lett.* **37**, 2712-2714 (2012)

J27. M. I Cheema, S Mehrabani, A A. Hayat,Y-A Peter, A M. Armani, **A G Kirk**, 'Simultaneous measurement of quality factor and wavelength shift by phase shift microcavity ring down spectroscopy', *OSA Optics Express*, **20** (8), pp. 9090-9098, 2012 (also selected for the *Virtual Journal of Biomedical Optics*, **7** (6) May 2012*)*

J28. P J. R. Roche, M C-K Cheung, S Filion-Côté, J Milette, T Gonzalez, G Gopalakrishnan, M P. Andrews, B R. Lennox, L Reven and **A G. Kirk**, 'Characterisation of a Gold Nanorod Sol–Gel Utilising Inter-particle Coupling to Yield High Refractive Index Sensitivity' *Plasmonics*, **7**,(2), pp 331–339, 2012

J29. A. Khorshidahmad, **A.G. Kirk** , 'Reflective Heterostructure Photonic Crystal Superprism Demultiplexer', *IEEE Photonics Technology Letters* , **4**, pp 303-305, 2012

J30. P.Roche, S. Filion-Cote, M. C-K Cheung, V. Chodavarapu and **A. G Kirk** 'A camera phone localised surface plasmon biosensing platform towards low cost label free diagnostic testing', *Journal of Sensors*, Article ID 406425, 7 pages, doi:10.1155/2011/406425, 2011

J31. Z. Tian, V. Veerasubramanian, P. Bianucci, S. Mukherjee, Z. Mi, A.G.Kirk, and D.V. Plant 'Selective polarization mode excitation in InGaAs/GaAs microtubes using an adiabatically tapered fiber', *OSA Optics Letters* **36** (17), pp 3506-3508, 2011

J32. A.Jafari, A.G.Kirk, 'Distributed Etched Diffraction Grating Demultiplexer with Flat-Top Insertion Loss Envelope', *IEEE Photonics Journal*, DOI 10.1109/JPHOT.2011.2162823, 2011

J33. A.Jafari**,** A.G.Kirk, 'Demonstration of Distributed Etched Diffraction Grating Demultiplexer', *IEEE Photonics Journal*, **3** (4), p. 651-657, 2011

J34. Z. Tian, V. Veerasubramanian, P. Bianucci, S. Mukherjee, Z. Mi, A.G.Kirk, and D.V. Plant 'Single rolled-up InGaAs/GaAs quantum dot microtubes integrated with silicon-on-insulator waveguides', *OSA Optics Express* **19**, pp 12164-12171, 2011

J35. M. C.-K. Cheung, P. J. R. Roche, M.Hajj-Hassan, **A.G. Kirk**, Z.Mi, V.P. Chodavarapu, 'Controlling optical properties and surface morphology of dry etched porous silicon', *J. Nanophotonics*, **5**, 053503, DOI:10.1117/1.3571270, 2011

J36. C.Alleyne, P.J.R. Roche, S. Filion Cote, A.G.Kirk,' Analysis of Surface Plasmon Spectro-Angular reflectance spectrum: Real-Time Measurement, Resolution Limits and applications to Biosensing', *OSA Optics Letters* , **36** (1), pp 46-48 2011

J37. Philip J.R. Roche, Maurice C-K. Cheung, Lei Yao, **Andrew G. Kirk**, Vamsy P. Chodavarapu, 'Enhancement of luminescent quenching based oxygen sensing by gold nanoparticles: a comparison between luminophore:matrix:nanoparticle thin films on glass and gold coated substrates', *J. Nanophoton.* **4**, 043521, 2010



IPR2025-00436, Exhibit 1004, Page 17

J38. A. Khorshidahmad, **A.G. Kirk**, 'Nested Photonic Crystal Cavity for On-Chip Wavelength Conversion',*IEEE Photonics Technology Letters* , **22**, pp 679-681, 2010

J39. A. Khorshidahmad, **A.G. Kirk,** 'Composite superprism photonic crystal demultiplexer: analysis and design', *Optics Express*, **18**, pp.20518-20528, 2010

J40. P. J.R. Roche, M. C-K Cheung**, A.G. Kirk**, V.P. Chodavarapu, F.V. Bright, 'Application of Gold quenching of Luminescence to improve Oxygen sensing using a Ruthenium (4,7-diphenyl-1,10-phenanthroline)3 Cl2:TEOS thin film', *J.Sensors and Actuators B.*, **147**, pp581-586, 2010

J41. A. Khorshidahmad, **A.G. Kirk**, 'Wavelength conversion by dynamically reconfiguring a nested photonic crystal cavity',*OSA Optics Express*, **18** (8), pp 7732-7742, 2010

J42. M.Menard, A.G.Kirk ,'Integrated Fabry-Perot Comb Filters for Optical Space Switching', *J.Lightwave Technol.*, **28**, pp 768-775, 2010

J43. M.Menard, A.G.Kirk, 'Design of Fabry-Perot filters in planar waveguides with deep-etched features for optical space switching ',*Optics Express*, **17** pp 17614-17629, 2009

J44. A. Khorshidahmad, **A.G. Kirk**, 'Wavelength conversion by interband transition in a double heterostructure photonic crystal cavity', Optics Letters **34** (19) pp 3035-3037, 2009

J45. X.D. Hoa, M. Tabrizian, A.G.Kirk, Enhanced SPR Response from Patterned Immobilization of Surface Bioreceptors on Nano-gratings, *J.Biosensors and Bioelectronics*, 24 (2009) 3043–3048, 2009.

J46. X.D. Hoa, M. Tabrizian, A.G.Kirk, 'Rigorous Coupled-Wave Analysis of Surface Plasmon Enhancement from Patterned Immobilization on Nano-Gratings', *J.Sensors*, doi:10.1155/2009/713641, 2009.

J47. W-Y Chien, M. Z. Khalid, X.D. Hoa, A.G.Kirk, 'Monolithically Integrated Surface Plasmon Resonance Sensor Based on Focusing Diffractive Optic Element for Optofluidic Platforms', *J.Sensors and Actuators B*, **138**, 441-445, 2009

J48. C.J. Alleyne, A.G.Kirk, P.G. Charette, 'Numerical method for high accuracy index of refraction estimation from surface plasmon photonic bandgap structures.', *OSA Optics Express* **16** (24) pp 493-503, 2008

J49. X.D. Hoa, M. Martin, A. Jimenez, J. Beauvais, P. Charette, A.G.Kirk and M.Tabrizian, 'Fabrication and Characterization of Patterned Immobilisation of Quantum dots on Metallic Nano-gratings', *Biosensors and Bioactuators* (available on-line doi:10.1016/j.bios.2008.07.069), 2008

J50. G.Sun, A.G.Kirk, 'Analyses of negative refraction in the partial bandgap of photonic crystals', *Optics Express* **16** (6) pp 4330-4336, 2008 [Impact factor 4.0]

J51. M.Menard, A.G.Kirk, 'Assessment of Integration of Off-axis Fresnel Lenses into a Free-space Interconnect', *OSA Applied Optics* **46**, (30), pp. 7500-7505, 2007. [Impact factor 1.7]

J52. G.Sun, and A.G.Kirk**,** 'On the relationship between Bloch modes and phase-related refractive index of photonic crystals', *OSA Optics Express*, **15**, pp. 13149-13154, 2007 [Impact factor 4.0]

J53. X.D. Hoa, **A.G. Kirk**, M. Tabrizian, 'Towards integrated and sensitive surface plasmon resonance biosensors: A review of recent progress', *Biosensors and Bioelectronics*, **23**, pp 151–160, 2007.

J54. R.Jafari and A.G.Kirk, 'Comparison of three ANSYS finite element tools for analysis of MEMS micromirrors', *Journal Of Micro-Nanolithography MEMS And MOEMS* **6** (4), 040311, 2007

J55. A.Bakhtazad and A.G.Kirk, 'First band S-vector photonic crystal superprism demultiplexer design and optimization', *J.Lightwave Technol*., **25**, pp 1322-1333, 2007. [Impact factor 2.8]

J56. C.J. Alleyne, **A.G. Kirk**, R.C. McPhedran, N-A.P. Nicorovici, and D. Maystre, 'Enhanced SPR sensitivity using periodic metallic structures', *OSA Optics Express*, **15**, pp 8163-1869, 2007 [Impact factor 4.0]

J57. L.Malic, A.G.Kirk , 'Integrated miniaturized optical detection platform for fluorescence and absorption spectroscopy', *J.Sensors and Actuators A*, 135, pp 515-524, 2007. [Impact factor 1.4]

J58. J. E.Lugo, M.Ocampo, A.G.Kirk, D.V.Plant, P.M.Fauchet, 'Electrochemical sensing of DNA with porous silicon layers', *Journal of new materials for electrochemical systems*, **10** (2), pp 113-116, 2007.

J59. G.Sun, A.S.Jugessur and A.G.Kirk, 'Imaging properties of dielectric photonic crystal slabs for large object distances', *Optics Express*, **14**, (15), pp. 6755-6765, 2006 [Impact factor 4.0]

J60. E. Bisaillon, D. Tan, B. Faraji, **A.G. Kirk**, L. Chrowstowski, and D. V. Plant , 'High reflectivity air-bridge subwavelength grating reflector and Fabry-Perot cavity in AlGaAs/GaAs', *Optics Express*, **14** (7), pp. 2573-2582, 2006. [Impact factor 4.0]



IPR2025-00436, Exhibit 1004, Page 18

J61. P Dong, J. Upham, A. Jugessur and A.G.Kirk, 'Observation of continuous-wave second harmonic generation in semiconductor waveguide directional couplers', *Optics Express* **14** (6) pp 2256-2262, March 2006 [Impact factor 4.0]

J62. A. S. Jugessur, A. Bakhtazad, A.G.Kirk, L. Wu, T. F. Krauss, and R. M. De la Rue, "Compact and integrated 2-D photonic crystal super-prism filter-device for wavelength demultiplexing applications," *Optics Express*, vol. 14, no. 4, pp. 1632-1642, Feb.2006. [Impact factor 4.0]

J63. M. Ménard, F. Thomas-Dupuis, and **A. G.Kirk**, "One-dimensional to two-dimensional channel formatting with micro-optics for wavelength division multiplexing networks," *OSA Appl. Opt.* **45**, pp 122-130, 2006 [Impact factor 1.7]

J64. M.Simard, Z.Khalid, and **A.G. Kirk**, 'Digital optical space switch based on micromotor grating scanners', *IEEE Photonics Technology Letters,* **18** (2), pp 313-315, 2006. [Impact factor 2.3]

J65. P. Dong and A.G.Kirk, "Compact double-grating coupler between vertically stacked silicon-on-insulator waveguides," *Applied Optics*, vol. 44, no. 35, pp. 7540-7547, Dec.2005. [Impact factor 1.7]

J66. J. Azana, J. E. Lugo, A.G.Kirk, and D. V. Plant, "New insights into the problem of shadowlike projection of a plane object illuminated by a spherical wavefront," *Optics Communications*, vol. 247, no. 4-6, pp. 257-264, Mar.2005.

J67. A. Bakhtazad and A.G.Kirk, '1-D slab photonic crystal k-vector superprism demultiplexer: analysis, and design', *Optics Express* **13** (14), pp 5472-5482, 2005. [Impact factor 4.0]

J68. C.J.Alleyne, **A G Kirk**,, 'Rigorous coupled wave analysis applied to transmission efficiency of diffractive beam array relays for free-space optical interconnects', *Applied Optics*, vol. 44, no. 7, pp. 1200-1206, Mar.2005. [Impact factor 1.7]

J69. P.Dong and A.G.Kirk, 'Nonlinear Frequency Conversion in Waveguide Directional Couplers'*, Physical Review Letters* **93**, 133901, 2004. [Impact factor 7.1]

J70. Jie Wen; Hoa, X.D.; **Kirk, A.G**.; Lowther, D.A. 'Analysis of the performance of a MEMS micromirror', IEEE Transactions on Magnetics, **40** (2), pp 1410-13, 2004.

J71. M.Châteauneuf**,** A.G.Kirk**, '**Six-Degrees-of-Freedom Alignment Technique That Provides Diagnostic Misalignment Information**',** *Applied Optics* **43** (13), pp 2689-2694, (2004). [Impact factor 1.7]

J72. P. Dong, J. Azana, and A.G.Kirk, "Synthesis of fiber Bragg grating parameters from reflectivity by means of a simulated annealing algorithm," *Optics Communications* **228**, 303-308 (2003).

J73. A.G.Kirk, D.Plant, F.Lacroix, M. Châteauneuf, M. H. Ayliffe, 'Design rules for highly parallel free-space optical interconnects', *IEEE J.Sel. Topics in Quantum Electronics*, **9** (2), pp 531- 547, 2003 **[Invited Impact factor 2.8]**

J74. M.Châteauneuf**,** A.G.Kirk**, '**Determination of the optimum cluster parameters in a clustered free-space optical interconnect**',** *Applied Optics*, **42** (29), pp. 5906-5917, 2003. [Impact factor 1.7]

J75. F. Thomas-Dupuis, M.Chateauneuf, and **A.G. Kirk** 'Design, Implementation, and Characterization of a Folded Spot-Array Generator for a Modulator-Based Free-Space Optical Interconnect', *Applied Optics* **42**[27], 5399-5406. 2003. [Impact factor 1.7]

J76. **A.G. Kirk**, D.V. Plant, T.H. Szymanski, Z.G. Vranesic, J.A. Trezza, F.A.P. Tooley, D.R. Rolston, M.H. Ayliffe, F.K. Lacroix, D. Kabal, B. Robertson, E. Bernier, D.F.-Brosseau, 'Design and Implementation of a Modulator-based Free-space Optical Backplane for Multiprocessor Applications', *Applied Optics*, **42** (14), pp 2465-2481, 2003 **[Impact factor 1.7]**

J77. M. Châteauneuf, M. H. Ayliffe, and A.G.Kirk 'In Situ Technique to Measure the Orthogonality of a Plane Wave to a Substrate', *Optics Letters*, **28** (9), pp 677-679, 2003 [Impact factor 3.5]

J78. M. Châteauneuf, A.G.Kirk, D. V. Plant, T. Yamamoto, J. D. Ahearn, W. Luo, '512-channel vertical-cavity surface-emitting laser based free-space optical link' *Applied Optics* **41**, pp 5552-55561 (2002). **[Impact factor 1.7]**

J79. F.Lacroix, E.Bernier, M.H.Ayliffe, F.A.P.Tooley, D.V.Plant, A.G.Kirk, "Implementation of a compact, four-stage, scalable optical interconnect for photonic backplane applications", *Applied Optics* 41 (8), pp 1541-1555, 2002. [Impact factor 1.7]



IPR2025-00436, Exhibit 1004, Page 19

J80. J.Lin, V.Sharma, F.Michael, A.G.Kirk, 'Design and characterization of two-axis rotational micromirrors using multi-User MEMS processes', SPIE Journal of Micro-electromechanical systems, 1 (1) pp 70-78, 2002.

J81. E. Bisaillon, D.F.-Brosseau, T. Yamamoto, M. Mony, E. Bernier, D. Goodwill, D.V. Plant, **A.G. Kirk**, 'Free-space optical link with spatial redundancy for misalignment tolerance', *IEEE Photonics Technology Letters,* **14**, (2) 222-224*,* 2002 [Impact factor 2.3]

J82. Xin Xue, Haiqing Wei and A.G.Kirk, Beam analysis via fractional Fourier transform, *Optics Letters*, **26**, pp 1746-1748, 2001 **[Impact factor 3.5]**

J83. M.H.Ayliffe, M.Chateauneuf, D.R.Rolston, A.G.Kirk, D.V.Plant,'Six-degrees of freedom alignment of two-dimensional array components using *in-situ* off-axis diffractive structures', *Applied Optics*, **40** (35), pp 6515-6526, 2001 [Impact factor 1.7]

J84. M.H.Ayliffe, M.Chateauneuf, D.R.Rolston, A.G.Kirk, D.V.Plant, 'Design and testing of a kinematic package supporting a 32 x 32 array of GaAs modulators flip-chip bonded to a CMOS chip', *IEEE J. Lightwave Technology,* **19** (10), pp 1543-1599, 2001 [Impact factor 2.8]

J85. F.Lacroix and A.G.Kirk, 'Tolerance stack-up in free-space optical interconnects', *Applied Optics*, 40 (29), pp 5240-5247, 2001. [Impact factor 1.7]

J86. D.V. Plant, M.B. Venditti, E. Laprise, J. Faucher, K. Razavi, M. Chateauneuf, **A.G. Kirk**, J.D.Ahearn, 'A 256 Channel Bi-Directional Optical Interconnect Using VCSELs and Photodiodes on CMOS', *IEEE Journal of Lightwave Technology*, **19** (8), pp. 1093-1103, 2001 **[Impact factor 2.8]**

J87. D.Plant and A.G.Kirk, 'Optical Interconnects at the Chip and Board Level: Challenges and Solutions', *Proc. IEEE* , **88** (06), pp 806-817, 2000, **[Invited, Impact factor 3.7]**

J88. F. Lacroix, M. Ayliffe and **A.G. Kirk** 'Tolerancing of polarization losses in free-space optical interconnects', *OSA Optics Express*, **7** (12) p 381, 2000 [Impact factor 4.0]

J89. X.Xue, H. Wei and A.G.Kirk 'Intensity-based modal decomposition of optical beams in terms of Hermite-Gaussian functions', *J. Opt. Soc. Am. A*, **17** (6), pp 1086-1091, 2000.

J90. D F.-Brosseau, F Lacroix, M H. Ayliffe, E Bernier, B Robertson, F A. P. Tooley, D V. Plant, and **A G. Kirk**, 'Design, implementation, and characterization of a kinematically aligned, cascaded spot array generator for a modulator-based free-space optical interconnect', *Applied Optics*, **39** (5), pp 733-745, 2000.

J91. T Maj, **A G. Kirk**, D V. Plant, J F. Ahadian, C G. Fonstad, K L. Lear, K Tatah, M S. Robinson, J A .Trezza, 'Interconnection of a two-dimensional array of vertical cavity surface emitting lasers to a receiver array via a fiber image guide', *Applied Optics* **39**(5), pp. 683-689, 2000.

J92. F Lacroix, M Chateauneuf, X Xue, **A G Kirk**, 'Experimental and numerical analysis of misalignment tolerances in free-space optical interconnects', *Applied Optics*, **39** (5), pp 704-713, 2000.

J93. M H Ayliffe, D Kabal, F Lacroix, E Bernier, P Khurana, **A G Kirk**, F A P Tooley and D V Plant, 'Electrical, thermal and optomechanical packaging of large 2D optoelectronic device arrays for free-space optical interconnects'*, J. Opt. A: Pure Appl. Opt*. **1**, pp 267–271, 1999

J94. R. Buczynski, V. Baukens, T. Szoplik, A. Goulet, N. Debaes, **A. Kirk**, P. Heremans, R. Vounckx, I. Veretennicoff, H. Thienpont 'Fast optical thresholding with an array of optoelectronic transceiver elements', *IEEE Photonics Technology Letters,* **11** (3) pp 367-369, 1999. [Impact factor 2.3]

J95. A Goulet, N. Nieuborg, H. Thienpont, **A. Kirk**, P Koczyk, P.Heremans, M Kuijk, C. DeTandt, W Ranson, R Vounckx, I Veretennicoff 'Polarization-based reconfigurable optical interconnects in free-space optical processing modules', *IEEE Photonics Technology Letters,* **10** (3) pp 367-369, 1998. [Impact factor 2.3]

J96. N.Nieuborg, **A. Kirk**, C. Van de Poel, H. Thienpont and I. Veretennicoff, 'Polarization-selective diffractive optical elements with an index-matching gap material', *Applied Optics*., **36** (20) pp 4681-4685, 1997.

J97. **A G Kirk**, A Goulet, H. Thienpont, N. McArdle and K-H Brenner, M Kuijk, P Heremans, I Veretennicoff, 'A compact optical imaging system for arrays of optical thyristors', *Applied Optics*., **36** (8) pp 3070-3078, 1997.

J98. **A G Kirk**, H. Thienpont, A. Goulet, P. Heremans, G. Borghs, M. Kuijk, R. Vounckx and I. Veretennicoff, 'Demonstration of optoelectronic logic operations with differential pairs of optical thyristors', *IEEE Photonics Technology Letters,* **8** (3) pp 467-469, 1996. [Impact factor 2.3]



IPR2025-00436, Exhibit 1004, Page 20

J99. **A G Kirk**, H. Thienpont, A. Goulet, P. Heremans, G. Borghs, M. Kuijk, R. Vounckx and I. Veretennicoff, 'Parallel optoelectronic data transcription with fan-out between planes of PnpN optical thyristors.', *IEEE Photonics Technology Letters*, **8** (3) pp 464-466, 1996. [Impact factor 2.3]

J100. **A G Kirk**, T Tabata, M Ishikawa, 'Design of an optoelectronic cellular processing system with a reconfigurable holographic interconnect', *Applied Optics* **33** (8) pp 1629-1639, 1994. **(*Selected by the SPIE as a Critical Paper*)**

J101. **A G Kirk**, T Tabata, M Ishikawa, 'Programmable diffractive optical interconnects for cellular processing applications', *Optoelectonics* **9** (1) pp 13-23, 1994.

J102. **A G Kirk**, T Tabata, M Ishikwa, H Toyoda, 'Reconfigurable computer generated holograms', *Opt. Commun.* **105** pp 302-308, 1994. **(*Selected by the SPIE as a Critical Paper*)**

J103. M. A. Hands, W. Peiffer, H. Thienpont, **A. Kirk**, T. J. Hall, D. Pignon, and P. Parmiter, "Proposal for stochastic bit stream processing using optoelectronic smart pixels: A neural network architectural case study," *Journal of Parallel and Distributed Computing*, **41**, no. 1, pp. 92-108, 1997

J104. **A G Kirk**, G D Kendall, M-Y Chan, T J Hall, 'Optoelectronic approaches to cellular processing architectures', *Optical Computing and Processing* **3** (1) pp 53-68, 1993.

J105. N C Roberts and **A G Kirk**, 'Binary phase gratings for hexagonal array generation',*Optics Communications* **94** (6) pp 501-505, 1992. **(*Selected by the SPIE for a 'Milestone' series Vol. 146* )**

J106. **A G Kirk**, S Jamieson, H Imam and T J Hall, 'Experimental implementation of an optoelectronic matrix-matrix multiplier which incorporates multiple imaging', *Optical Computing and Processing* **2** (4) pp 293-294, 1992.

J107. **A G Kirk**, A K Powell and T J Hall, 'Error diffusion and the representation problem in computer generated hologram design', *Optical Computing and Processing* **2** (3) pp 199-212, 1992.

J108. **A G Kirk** and T J Hall, 'Design of computer generated holograms by simulated annealing: observation of meta-stable states', *Journal of Modern Optics* **39** (12) pp 2531-2539, 1992.

J109. **A G Kirk** and T J Hall, 'Design of computer generated holograms by simulated annealing: coding density and reconstruction error', *Opt. Commun.* **94** (6) pp 491-496, 1992. **(*Selected by the SPIE for a 'Milestone' series Vol. 146*)**

J110. **A G Kirk**, A K Powell, T J Hall, 'A generalisation of the error diffusion method for binary computer generated hologram design', *Optics Communications* **92** pp 12-18, 1992.

### 2. Book Chapters

B1. A.G.Kirk, 'Plasmonic Nanostructures for Sensing' in *Photonic Materials (Ed. P. Chakraborty), Encyclopedia of Materials: Electronics* series, Elsevier, 17 pages, March 2022, (https://www.sciencedirect.com/science/article/pii/B9780128197288000115 )

B2. A.G.Kirk , 'Free-space optical interconnects', in *Optical Interconnects: The Silicon Approach*, Pavesi, Lorenzo; Guillot, Gérard (Eds.), Springer Series in Optical Sciences, Springer (Berlin), 2006

B3. **A G Kirk** and T J Hall, 'Interconnects within optically thin elements', Chapter in *Perspectives for Parallel Optical Interconnects,* Ph Lalanne, P Chavel (Eds.), Springer-Verlag, Berlin, 1991.

B4. **A G Kirk**, A K Powell, T J Hall 'A new approach to the design of quantised computer generated holograms', Chapter in *Optical Information Technology*, S D Smith and R F Neale (Eds.), Springer-Verlag, Berlin, 1991.

### 3. Invited talks or lectures at meetings without conference proceedings

I1. A.Kirk, 'Rapid DNA amplification: Recent approaches to accelerating nucleic acid diagnostic methods', Invited Presentation, Photons Canada Workshop on Biophotonics and Applications, August 2023

I2. A.Kirk**, '**Rapid DNA amplification: Recent approaches to accelerating nucleic acid diagnostic methods', Invited Keynote presentation, International Conference on Biomedical Engineering and Systems (ICBES'23), London, UK 2023

I3. A.Kirk, 'Optical nanostructures for POC medical diagnostics', National Autonomous University of Mexico (UNAM), Nov 2022 (delivered via Zoom)

I4. A.G.Kirk, 'Photonic biosensing: opportunities and challenges', Department of Chemical Engineering and Materials Science, Stevens Institute, New Jersey, USA, November 2019



IPR2025-00436, Exhibit 1004, Page 21

I5. A.G.Kirk, 'Photonic biosensing: opportunities and challenges', OSA and SPIE Student Chapter Seminar Series, University of Toronto, October 2019

I6. A.G.Kirk, 'Plasmonics for biosensing and medical diagnostics', Department of Chemistry, Universidad Politécnica de Valencia, Spain, June 2019

I7. A.G.Kirk, 'Photonic biosensing: opportunities and challenges', Nanophotonics centre, Catalan Institute of Nanoscience and Nanotechnology, Spain, June 2019

I8. A.G.Kirk, 'Photonic biosensing: opportunities and challenges', Nanobiotechnology for Diagnostics (Nb4D) group, Institute for Advanced Chemistry of Catalonia, Barcelona, Spain, May 2019

I9. A.G.Kirk, 'Photonic biosensing: opportunities and challenges', Nanophotonics centre, Universidad Politécnica de Valencia, Spain, September 2017

I10. A.G.Kirk, 'Integrated resonant photonic structures for biosensing and telecommunications', University of Toronto, Department of Electrical and Computer Engineering, August 2014

I11. A.G.Kirk, 'Nanophotonics for sensing', Neuroengineering Training Program, McGill University, October 2013

I12. A.G.Kirk, 'Nanophotonics for sensing', Integrated Sensor Systems Training Program, McGill University, September 2013

I13. A.G.Kirk, 'Photonic resonant microsensors', Riken Institute, Tokyo, April 2012

I14. A.G.Kirk, 'Resonant structures for integrated photonic sensors', Boston University, April 2012

I15. A.G.Kirk, 'The cloak of invisibility', *Classes without Quizzes (*public lecture), McGill University, October 2010

I16. A.G.Kirk**,** 'Biocapteur spectro-angulaire basé sur la résonance plasmonique de surface', *Association Francophone pour le Savoir*, Montreal, 2010

I17. A.G.Kirk **, '**Integrated photonic systems for applications in telecommunications and biosensing', seminar, University of St Andrews, UK, July 2010

I18. A.G.Kirk **, '**Integrated photonic systems for applications in telecommunications and biosensing', seminar, Ghent University, Belgium, July 2010

I19. A.G.Kirk **, '**Integrated photonic systems for applications in telecommunications and biosensing', seminar, Vrije Universiteit Brussel, Brussel , Belgium, July 2010

I20. A.G.Kirk, 'Integrated Photonic Biosensors', 2 hours of lectures at the *Erasmus Mundus Master in Photonics* summer program, Heriot-Watt University, Edinburgh UK), June 2010.

I21. A.G.Kirk, 'Nanophotonic integration strategies', 22$^{nd}$ Entretiens Jacques Cartier, Lyons and Grenoble (France), December 2009).

I22. A.G.Kirk, 'Integrated and Micro-optics', 8 hours of lectures at the *IIM UNAM Materials Science and Engineering summer course 2009* (Mexico City, Mexico), June 2009.

I23. A.G.Kirk, 'Nanophotonics', The Cutting Edge Lecture Series: Royal Society Lectures in Science (public lecture), McGill University, December 2008

I24. A.G.Kirk, 'The cloak of invisibility', *Classes without Quizzes (*public lecture), McGill University, October 2008

I25. A.G.Kirk, 'Free-space principles in integrated nanophotonics', seminar, Kyoto University, August 2008

I26. A.G.Kirk, 'Free-space principles in integrated nanophotonics', seminar, University of Tokyo, August 2008

I27. A.G.Kirk, 'Dispersion engineering in photonic and plasmonic crystals', seminar, University of Toronto, November 2007

I28. A.G.Kirk**,** 'Metamaterials and Negative Refraction: Is Harry Potter's Invisibility Coat Possible?', *Sigma Xi lecture series*, McGill University, October 2007

I29. A.G.Kirk, 'The integration of photonic nanostructures into surface plasmon resonance optical biosensors', in *Nanobiotechnology for analysis and energy conversion*, 19$^{th}$ Entretiens Jacques Cartier, Lyons and Grenoble (France), December 2006.

I30. A.G.Kirk, 'Optical Engineering: Learning by Design', in *Creative Teaching Methods for Photonics*, IEEE-LEOS Annual Meeting, Montreal, October 2006

I31. A.G.Kirk, 'Engineering wavefront dispersion in planar waveguides with photonic crystals', seminar, Cornell University, August 2006



IPR2025-00436, Exhibit 1004, Page 22

I32. A.G.Kirk, 'Applications of optically resonant structures in telecommunications and bio-sensing', seminar, Swinburne University, January 2006

I33. A.G.Kirk, 'Applications of optically resonant structures in telecommunications and bio-sensing', seminar, Macquarie University, January 2006

I34. A.G.Kirk, 'Applications of optically resonant structures in telecommunications and bio-sensing', seminar, University of Sydney, January 2006

I35. A.G.Kirk, 'Dispersion Engineering', seminar, University of Toronto, October 2005

I36. A.G.Kirk, 'Free-space optics', 3 hours of lectures at the *Photonics Winter School on Silicon Photonics*, University of Trento (Italy), February 2005.

I37. A.G.Kirk, 'Free-space optical interconnect design', seminar, St Andrews University, November 2002

I38. A.G.Kirk, 'Free-space optical interconnect design', seminar, University of Glasgow, October 2002

I39. A.G.Kirk, 'Progress in Packaging Techniques for Free-Space Micro-optical systems', IEEE-LEOS workshop on integrated optics and passive micro-optics, Brugge, Belgium, 1998.

I40. A.G.Kirk, 'Parallel processing system with reconfigurable holographic interconnections', Japan Optics Society Spring Meeting, Nagaoka, Japan, 1993

### 4. Invited posters

IP 1. M.Trifiro, M. Paliouras, S.Trifiro and A.G.Kirk, 'Ultrafast, high throughput digital PCR platform: Redefining Point of Care diagnostics', Health Canada workshop on Antimicrobial Resistance, Ottawa, May 2016

### 5. Contributions to Conference Proceedings

C1. Motavas, M. and **Kirk, A** , 'Maximising sensitivity of absorption-based ring resonator biosensors to changes in analyte absorption', 2024 IEEE Photonics Conference (IPC),Rome, Italy, November 2024.

C2. Motavas, M., Perrier T, Gamal, R. and **Kirk, A**, 'Evaluation of requirements for phase-shift cavity ring-down spectroscopy biosensing using integrated microring resonators', IEEE IPC Conference, Orlando, USA, November 2023

C3. Oudjedi, F., Lee, S.S., Paliouras,M, Trifiro,M., Wachsmann-Hogiu, S., Kirk, A. 'Gold Nanorod-Decorated Carbon Nanotubes for Cellular-Level Raman Thermometry', Japan Society of Applied Physics Annul Meeting, Kumamoto, Japan, September 2023

C4. Shen, S and **Kirk, A**. 'Investigation of Heating Process and Ultra-violet Quantification of Plasmonic Polymerase Chain Reaction (PCR) System for Point of Care Applications', 6th Asia Conference on Energy and Environment Engineering (ACEEE 2023), Chengdu, China, June 2023

C5. Oudjedi, F; Lee, S; Paliouras, M; Trifiro, M; **Kirk, A,** 'Gold nanorod-decorated multiwalled carbon nanotubes for near-infrared photothermal therapy', SPIE BIOS 2022, United States, San Francisco, Volume 11978, Plasmonics in Biology and Medicine XIX; 1197809, SPIE, January 2022

C6. P.Mohammadyousef, M.Paliouras, M.Trifiro, A.G.Kirk, 'Model-Based Analysis for Real-Time Label-Free Ultraviolet Quantification of Ultrafast Plasmonic Polymerase Chain Reaction', *IEEE Conference on Engineering in Medicine and Biology (EMBC) 2020*, MoAT6.395, 2020

C7. P.Mohammadyousef, M.Paliouras, M.Trifiro, A.G.Kirk**,** 'A Novel Portable Fluorophore-free Photonic qPCR for Point-of-Care Applications, OSA Biophotonics Congress: Biomedical Optics, April 2020

C8. P.Mohammadyousef, G.Uchehara, M.Paliouras, M.Trifiro, A.G.Kirk, 'Ultrafast VCSEL-based Plasmonic Polymerase Chain Reaction with Real-time Label-free Amplicon Detection for Point-Of-Care Diagnostics', *SPIE BIOS 2020,* San Francisco, USA, February 2020

C9. P.Mohammadyousef, M.Paliouras, M.Trifiro, A.G.Kirk, 'Ultrafast plasmonic and real-time label-free polymerase chain reaction', *SPIE BIOS 2020,* San Francisco, USA, February 2020

C10. G. Uchehara, **A.G. Kirk**, M.Trifiro, M.Paliouras, P.Mohammadyousef, 'Real time label-free monitoring of plasmonic polymerase chain reaction products', Proc. SPIE 10969, Nano-, Bio-, Info-Tech Sensors and 3D Systems III, 109690A, March 2019

C11. **A.G. Kirk**, R. Gamal, M. Najih, ´Do you need a tunable laser for resonant cavity optical sensors?´, *SPIE Optics and Optoelectronics Conference*, Prague, Czech Republic, April 2019



IPR2025-00436, Exhibit 1004, Page 23

C12. N.Tran, P.Mohammadyousef, M.Paliouras, M.Trifiro, **A.Kirk**,`Real-time fluorophore-free optical monitoring of ultrafast DNA amplification for qPCR`, *2nd European Biosensor Symposium*, Florence, Italy February 2019

C13. A. Abumazwed, W. Kubo, T. Tanaka, and A.G.Kirk, 'Towards accurate LSPR biosensors based on the projection method: a direct measurement for refractive index', SPIE Photonics North, Ottawa, June 2017

C14. F. Soltani, M. Menard**,** A.G.Kirk, 'Integrated silicon photonic reflective modulator for passive optical networks', IEEE/OSA Conference on Lasers and Electro-optics (CLEO), JW2A.127, May 2017

C15. M. T. Boroojerdi, M. Menard**,** A.G.Kirk**,** Bandwidth Tunable SOI Add-Drop Filter, IEEE/OSA Conference on Lasers and Electro-optics (CLEO), JTh2A.111, May 2017

C16. M. T. Boroojerdi, M. Ménard, and A.G.Kirk, 'Bandwidth Tunable SOI Add-Drop Filter', IEEE International Photonics Conference, Waikoloa, Hawaii, USA, 2016

C17. F.Soltani, D.Patel, M.Ménard, D.V.Plant, A.G.Kirk, 'Low-power DPSK modulation at 10 Gbps using a silicon photonic loop mirror modulator', *IEEE International Photonics Conference*, Waikoloa, Hawaii, USA, 2016

C18. F.Soltani, M.Menard, A.G.Kirk, 'Low-power 20Gb/s Modulator with an Integrated Loop Mirror', *Proc. Asia Communications and Photonics Conference*. (OSA Publishing), paper ASu5B.3, Hong Kong, China, Nov. 2015

C19. MT Boroojerdi, M Menard, A.G.Kirk, 'Implementation of integrated bandwidth tunable optical add-drop filter using contra directional grating assisted couplers', *Proc. IEEE Photonics Conference*, pp 355-356, Reston VA, Oct. 2015

C20. S.Filion-Cote, M.Tabrizian, **A.G Kirk**, 'Surface plasmon resonance biosensor as a tool for the measurement of complex refractive indices', Proc. *IEEE Engineering in Medicine and Biology Society (EMBC), 2015 37th Annual International Conference*, pp 6413-6416, Milan (Italy), Aug 2015

C21. F.Soltani, M.Menard, A.G.Kirk, 'Optical Modulator with an Integrated Loop Mirror', *Proc. IEEE Optical Interconnects Conference*, April 20-22, San Diego, USA, 2015

C22. A. Abumazwed, W. Kubo, T. Tanaka, A.G.Kirk**,** 'Numerical and experimental investigation of plasmonic properties of silver nanocrescent structures for sensing applications', Proc. *Proc. SPIE 9371, Photonic and Phononic Properties of Engineered Nanostructures V*, 937127-937127-7, San Francisco, CA, Feb 2015

C23. S. Karami, A.G.Kirk, O. Liboiron-Ladouceur, 'Efficient method for Long Range Surface Plasmon (LRSPP) wave excitation with Si-based grating couplers', *IEEE International Photonics Conference 2014*, pp 554-555, October 2014.

C24. A.G.Kirk and M.I.Cheema, 'Optimally combining wavelength and quality factor information for sensing in whispering gallery mode optical microcavities', *Proc. SPIE Photonics North*, Montreal, May 2014 (**Invited**)

C25. A. Abumazwed, W. Kubo, T. Tanaka, A.G.Kirk, 'Design and fabrication of plasmonic nanostructures for optical biosensing by nanoimprint lithography', *Proc. SPIE Photonics North*, Montreal, May 2014 (**Invited**)

C26. A. Abumazwed **and** A.G.Kirk, 'Plasmonic properties of suspended nanodisc structures for enhancement of the local electric field distributions', *Proc. SPIE Photonics North*, Montreal, May 2014

C27. A. Abumazwed, W. Kubo, T. Tanaka, A.G.Kirk, 'Study and measurement of plasmonic properties of gold double nanotube structure arrayed on a polymer substrate', *Proc. IEEE Photonics Conference 2013*, TuH1.3, Seattle, WA, September 8-12 2013

C28. A. Abumazwed, W. Kubo, T. Tanaka, A.G.Kirk, 'Simulation and experimental studies on plasmonic properties associated with gold nanofin array on a polymer film', *Proc. IEEE Photonics Conference 2013*, TuH1.6, Seattle, WA, September 8-12 2013

C29. M.Taghi Boroojerdi, A.G.Kirk, 'Wavelength and Bandwidth Tunable SOI Switch Using Integrated Gratings', , *Proc. IEEE Photonics Conference 2013*, WD2.4, Seattle, WA, September 8-12 2013

C30. Z Mi, MHT Dastjerdi, P Bianucci, Z Tian, Q Zhong, V Veerasubramanian, PJ Poole**, AG Kirk**, DV Plant, 'Rolled-up 1.5 µm InAs quantum dot tube lasers and integrated nanophotonic circuits on Si', *IEEE Photonics Society Summer Topical Meeting Series*, p. 34-35, 2013

C31. M.I. Cheema, U.A. Khan, A.M. Armani, **A.G. Kirk**, 'Application of phase shift ring down spectroscopy to microcavities for biosensing', SPIE BIOS 2013, ***Invited Keynote talk***

C32. S. Filion Côté, P. J. R. Roche, A.G.Kirk, 'Spectro-angular optical biosensor based on surface plasmon resonance operating in the visible spectrum', *Proc. SPIE 8597, Plasmonics in Biology and Medicine X*, 859711 (February 21, 2013); doi:10.1117/12.2004583, 2013

C33. V Veerasubramanian, G Beaudin, A Giguere, B Le Drogoff, V Aimez, **A G Kirk**, 'Apodized comb filters on SOI using sidewalled sampled gratings', *OSA Integrated Photonics Research, Silicon and Nano-Photonics (IPR) Topical Meeting*, Colorado Springs, June 2012

C34. Philip J. R. Roche, Kevin Greig, Yucai Wang, Maurice C. K. Cheung, **Andrew G. Kirk**, Vamsy P. Chodavarapu, 'Design of a gel electrophoresis device with an integrated transmitter/receiver system for power delivery



IPR2025-00436, Exhibit 1004, Page 24

and data communication: toward a wireless lab-on-chip', *SPIE Photonics West*, paper 8212-23 of Conference 8212, January 2012

C35. Philip J. Roche, Maurice Cheung, V. Chodavarapu, Brian Ward, Momar Ndao, **Andrew Kirk**, 'A study of a self diagnostic platform for the detection of A2 biomarker for Leishmania donovani', *SPIE Photonics West,* Paper 8229A-11 of Conference 8229A, January 2012

C36. Philip J. R. Roche, Songzhe Wang, Maurice Cheung, Vamsy Chodavarapu, **Andrew G. Kirk**, 'A nanorod polymer micro-array formed by microcontact printing', *SPIE Photonics West*, Paper 8231-20 of Conference 8231, January 2012

C37. Philip J. R. Roche, Maurice C. Cheung, Lenore Beitel, Mark A. Trifiro, **Andrew G. Kirk**, Vamsy P. Chodavarapu, 'Optical mapping by low-cost instrumentation and disposable chemically induced nanochannels', *SPIE Photonics West*, Paper 8231-16 of Conference 8231, January 2012

C38. Z. Mi, P. Bianucci, M. H. T. Dastjerdi, S. Mukherjee, Z. Tian, V. Veerasubramanian, A.G.Kirk, and D. V. Plant, '1.3 – 1.55 µm Self-organized InAs Quantum Dot Microtube Lasers on Silicon', *Proc. IEEE Photonics Conference 2011*, Arlington, VA, p. 535-536, 2011

C39. Z. Tian, V. Veerasubramanian, P. Bianucci, Z. Mi , A.G.Kirk, and D. V. Plant, , 'Characterization of InGaAs/GaAs microtubes at transparent wavelengths', , *Proc. IEEE Photonics Conference 2011*, Arlington, VA, p. 745-746, 2011

C40. V. Veerasubramanian; G. Beaudin; A. Giguere; B. LeDrogoff; V. Aimez; A.G.Kirk , 'Demonstration of waveguide-coupled sidewalled grating filters on SOI', *Proc. IEEE Photonics Conference 2011*, Arlington, VA, p. 597-598, 2011

C41. V. Veerasubramanian; G. Beaudin; A. Giguere; B. LeDrogoff; V. Aimez; A.G.Kirk, 'Vertical SG-DBR Based Tunable Hybrid Silicon Evanescent Laser', *Proc. Conference on Lasers and Electro-optics*, Baltimore 2011.

C42. A.G.Kirk, 'Integration strategies for planar photonic devices', *Proc. Intl. Topical Meeting on Information Photonics*, Ottawa, ON, May 2011, ***Invited***

C43. M.I.Cheema and A.G.Kirk, 'Application of ring down measurement approach to micro-cavities for bio-sensing applications', *Proc. SPIE Photonics West*, San Francisco, CA, 2011.

C44. Y-P Zhang, V P. Chodavarapua, **A G. Kirk**, M P. Andrews, M Carluer and Gilles Picard, 'Origin of iridescence in chiral nematic phase nanocrystalline cellulose for encryption and enhanced color', *Proc. SPIE Photonics West*, San Francisco, CA, 2011.

C45. V. Veerasubramanian, G. Beaudin, A. Giguère, B. LeDrogoff, V. Aimez, A.G.Kirk, 'Hybrid III-V silicon Silicon evanescent lasers with vertical sidewalled gratings', . *IEEE Photonics Society Winter Topical Meeting* (Keystone, CO), January 2011

C46. A.Khorshidahmad, A.G.Kirk**,** 'Tunable Multi-wavelength Source based on a Nested Heterostructure Photonic Crystal Cavity', *Proc. IEEE Photonics Society Winter Topical Meeting* (Keystone, CO), January 2011

C47. Philip J. R. Roche, Maurice Cheung , Songzhe Wang, Behnam Banan, Vamsy Chodavarapu, **Andrew G. Kirk**, 'Demonstration of a reusable plasmonic polymer microarray sensing platform'*, Proc. SPIE Conference on Nanoscale Imaging, Sensing, and Actuation for Biomedical Applications VIII*, San Francisco, CA, DOI: 10.1117/12.878848 , January 2011

C48. A.Jafari and A.G.Kirk, 'Demonstration of a distributed etched diffraction grating demultiplexer', *Proc. IEEE Photonics Society Annual Meeting* (Denver CO), November 2010.

C49. A.Khorshidahmad, A.G.Kirk , 'Multi-wavelength Generation via a Heterostructure Cavity Embedded in a Photonic Crystal Ring', , *Proc. IEEE Photonics Society Annual Meeting* (Denver CO), November 2010.

C50. V. Veerasubramanian, G. Beaudin, A. Giguère, B. LeDrogoff, V. Aimez, and A.G.Kirk, 'Waveguide coupled drop filters on SOI using vertical sidewalled grating resonators', *Proc. IEEE Photonics Society Annual Meeting* (Denver CO), November 2010.

C51. M.Cheema and A.G.Kirk, 'Implementation of the Perfectly Matched Layer to Determine the Quality Factor of Axisymmetric Resonators in COMSOL', *COMSOL Conference 2010*, Boston MA 2010.

C52. A.Khorshidahmad, A.G.Kirk, 'Optical Frequency Comb Generation via a Heterostructure Cavity Embedded within a Photonic Crystal Ring Resonator', *Proc. OSA Frontiers in Optics*, Rochester NY, FTH15, 2010

C53. P.J.R. Roche, M. Cheung, **A.G. Kirk**, V. Chodavarapu, 'Enhancement of luminescent quenching oxygen sensing by gold nanoparticles: a comparison between luminophore:matrix:nanoparticle thin film on glass and gold coated substrates', *SPIE Proceedings* (Photonics North, Niagara Falls, Canada), June 1st-3rd, 2010



IPR2025-00436, Exhibit 1004, Page 25

C54. M.Menard and A.G.Kirk , 'Integrated Fabry-Perot Comb Switches: Transmission Experiments', *Proc. IEEE-Photonics Society Annual Meeting*, WV3, Antalya, Turkey, 2009

C55. C.Alleyne, P.Roche, A.G.Kirk, 'Spectro-angular surface plasmon biosensor applied to drug binding assays', *Proc. IEEE-Photonics Society Annual Meeting*, WR3, Antalya, Turkey, 2009

C56. A.Khorshidahmad, A.G.Kirk , 'Wavelength Conversion by Interband Transition in a Nested Photonic Crystal Cavity', *Proc. IEEE-Photonics Society Annual Meeting*, MD4, Antalya, Turkey, 2009

C57. A.Khorshidahmad, A.G.Kirk , 'Analysis of the Composite Superprism Demultiplexer', *Proc. IEEE-Photonics Society Annual Meeting*, ThL3, Antalya, Turkey, 2009

C58. A.Khorshidahmad, A.G.Kirk**,** 'Wavelength Conversion by Interband Transition in a Double Heterostructure Photonic Crystal Cavity', *Proc. OSA Topical Meeting on Integrated Photonics and Nanophotonics Research Applications (IPNRA)* 2009

C59. A.Khorshidahmad, A.G.Kirk 'Nested Photonic Crystal Cavity for On-chip Wavelength Conversion', *Proc. IEEE-LEOS Topical Meeting in Nanophotonics*, Innsbruck, Austria, 2009

C60. A. Khorshidahmad and A.G.Kirk, "Scheme for in-plane pumping of a photonic crystal heterostructure cavity," *Proc. IEEE-LEOS Annual Meeting 2008*, Newport Beach, CA, 2008

C61. A.Jafari and A.G.Kirk, 'Distributed Etched Diffraction Grating Demultiplexer with Engineered Response', *Proc. IEEE-LEOS Annual Meeting 2008*, Newport Beach, CA, 2008

C62. A.Khorshidahmad, A.G.Kirk, Stratified Photonic Crystal Demultiplexer, *Proc. Integrated Photonics and Nanophotonics Research and Applications (IPNRA) 2008 Technical Digest.* (Optical Society of America, Ed.), 2008.

C63. A.G.Kirk, 'A comparison of beam deflection electro-optic switches', *Proc. IEICE Photonics in Switching International Topical Meeting*, Sapporo, Japan, August 2008. ***Invited***

C64. M.Menard and A.G.Kirk, 'Broadband integrated Fabry-Perot electro-optic switch', *Proc. IEICE Photonics in Switching International Topical Meeting*, Sapporo, Japan, August 2008

C65. C.Alleyne, A.G.Kirk, P.Charette, 'High accuracy numerical method for index of refraction estimation with surface plasmon bandgap structures', *IEEE Conference on Lasers and Electro-optics*, San Jose, CA, 2008

C66. X.D. Hoa, M. Martin, A. Jimenez, J. Beauvais, P. Charette, M. Tabrizian and A.G.Kirk, 'Patterned Immobilisation of Quantum Dots for Enhanced SPR', *IEEE LEOS Annual Meeting 2007* (Buena Vista, FL), October 2007.

C67. Z.Khalid, C.Alleyne, X.Hoa, M.Tabrizian, J.Beauvais, P.Charette, N.A.Nicorovici, R.C.McPhedran, A.G.Kirk, 'Integrated surface plasmon resonance sensor with periodic nanostructures for sensitivity enhancement', *SPIE Photonics West* (San Jose CA), in 'Plasmonics in Biology and Medicine IV', 6450-20, 2007.

C68. E. Bisaillon, D. T. H. Tan, M.-C. Nadeau, L. Chrostowski and A.G.Kirk, 'Distributed-Grating Wavelength Demultiplexer in SOI', *IEEE-LEOS Annual Meeting*, (Montreal, QC), 2006

C69. A.Bakhtazad and **A.G. Kirk**, 'Stratified Photonic Crystal Demultiplexer', *IEEE-LEOS Annual Meeting*, (Montreal, QC), 2006

C70. A.Bakhtazad, A.Khorshidahmad, A.S.Jugessur and **A.G. Kirk**, '1-D Photonic Crystal as an Anti-Reflection Layer for First Band Photonic Crystals', *IEEE-LEOS Annual Meeting*, (Montreal, QC), 2006

C71. N-A Nicorovici, L.Botten, R.McPhedran, X.Hoa, A.G.Kirk, 'Rigorous modal method for the analysis of lamellar metallic gratings for surface plasmon resonance sensing', *IEEE-LEOS Annual Meeting*, (Montreal, QC), 2006.

C72. C. J. Alleyne, **A.G. Kirk**, R.C. McPhedran and N.A. Nicorovici, D. Maystre, 'Enhanced SPR Sensitivity Using Sinusoidal Gratings', *IEEE-LEOS Annual Meeting*, (Montreal, QC), 2006.

C73. G.Sun, **A.G. Kirk**, 'Pseudo-interference and its application in determining averaged phase refractive index of photonic crystals', *Proc. IEEE-LEOS Annual Meeting* (Montreal, QC), p. 841-842, 2006.

C74. G.Sun, A.S.Jugessur, A.G.Kirk, 'Saturated Super-Resolution Imaging of Photonic Crystal with Negative Refraction; Proc IEEE Optical Data Storage Topical Meeting, 2006, pp 73-75, 2006

C75. X. D. Hoa, **A.G. Kirk** and M. Tabrizian, 'Modelling and Implementation of a Novel SPR Biointerface for Time-Effective Detection of Sepsis Biomarkers', *Proc. IEEE Workshop on Computer Architecture for Perception and Sensing (CAMPS 2006)*, Montreal, 2006.



IPR2025-00436, Exhibit 1004, Page 26

C76. M. Ménard and A.G.Kirk, "On the Application of the Transfer Matrix Method to Integrated Optics Simulations," in *Integrated Photonics Research and Applications (IPRA) 2006 Technical Digest.* (Optical Society of America, Ed. 2006.) W. D. 2 April 24-26, 2006.

C77. E. Bisaillon, D. T. H. Tan, J. Laniel, A. Jugessur, L. Chrostowski, A.G.Kirk, "A Shallow-Etched Distributed-Grating Wavelength Demultiplexer in SOI", in *Integrated Photonics Research and Applications (IPRA) 2006 Technical Digest.* (Optical Society of America, Ed. 2006), IWA2, April 24-26, 2006.

C78. E. Bisaillon, J. Laniel, A. S. Jugessur, and A.G.Kirk, "A Shallow-Etched Multilayer Grating-based Wavelength Demultiplexer in SOI," in *Proceedings of the IEEE LEOS Annual Meeting* IEEE, 2005, pp. 596-597.

C79. A.S.Jugessur, A.Bakhtazad, L. Wu; A.G.Kirk, T.F.Krauss, R.M.De La Rue, 'Integration of a 2-D Photonic Crystal Superprism with 1-D Photonic Crystal Microcavity Filters for high channel selectivity', Proc. IEEE LEOS Annual Meeting, 2005, pp 183-184, 2005.

C80. A. S. Jugessur, P. Pottier, R. M. De la Rue, and A.G.Kirk, "2-D Photonic crystals microcavity filters based on hexagonal lattice structures embedded in ridge waveguides," in *Proceedings of SPIE - The International Society for Optical Engineering,* 5971 ed Toronto, ON, Canada: International Society for Optical Engineering, Bellingham WA, WA 98227-0010, United States, 2005

C81. A. Bakhtazad and A.G.Kirk, "Design and optimization of 32 channel DWDM demultiplexer using 2-D slab photonic crystal," in Proceedings of the IEEE LEOS Annual Meeting IEEE, 2005, pp. 179-180.

C82. P.Dong, A.G.Kirk, 'Nonlinear frequency conversion in waveguide directional couplers', Proc. SPIE Vol. 5646 (Nonlinear Optical Phenomena and Applications), pp 191-199, 2005.

C83. D. V. Plant and A.G.Kirk, "Design rules for high speed, low power optoelectronic-VLSI (OE-VLSI) circuits and systems," in *Progress in Biomedical Optics and Imaging - Proceedings of SPIE,* 5730 ed San Jose, CA, United States: International Society for Optical Engineering, Bellingham, WA 98227-0010, United States, 2005, pp. 73-79.

C84. A.G.Kirk and A.Bakhtazad, 'Wavefront engineering with photonic crystal structures in slab waveguides', SPIE Photonics North, Toronto, 2005

C85. P.Dong and A.G.Kirk, 'Nonlinear Optical Harmonic Oscillator Results in Efficient Frequency Conversion', Conference on Lasers and Electro-Optics, 2005 (CLEO), Volume 3, Page(s):2272 – 2274, May 22-27, 2005.

C86. M. Mony, E. Bisaillon, E. Shoukry, **A.G. Kirk**, and D.V. Plant, 'Reprogrammable Optical Phase Array (ROPA) for use in an Agile All-Photonic Network', *OSA Topical Meeting on Optics in Information Processing,* Baltimore, 2005.

C87. A.G.Kirk and A.Bakhtazad, 'Dispersion optimization of a 1-D superprism based on phase velocities', Proc IEEE LEOS Annual Meeting 2004, Volume 2, pp 879 – 880, 2004.

C88. Bakhtazad, A. and Kirk, A. G. 'Lens design with planar 1-D photonic crystal.', Proc. Photonics North, Ottawa 2004. 2004.

C89. P.Dong and A.G. Kirk, 'Second-order Bragg waveguide grating as a 1D photonic band gap structure in SOI waveguide', Proc. SPIE Photonics North, Ottawa, 2004

C90. R. Jafari Shapoorabadi, Xuyen Dai Hoa and A.G.Kirk, 'Comparison of three finite element models for analysis of MEMS Micromirrors', Proc. SPIE Photonics North 2004 (Ottawa, September 2004).

C91. A.G.Kirk, M.Menard, P.Dong and E.Bisaillon, 'Integration strategies for micro-optical systems', **Proc. SPIE 5453** Micro-Optics, VCSELs, and Photonic Interconnects (Ed. H. Thienpont, K. D. Choquette, M. R. Taghizadeh), 2004. ***Invited***

C92. M. Ménard, F. Thomas-Dupuis, M. Châteauneuf and A.G.Kirk, 'Improved 2-D optical (de)multiplexer', Proc. Optics in Computing 2004 (OiC 2004), European Optical Society, 2004.

C93. P.Dong, A.Kirk, 'Compact grating coupler between vertically stacked Silicon-on-insulator waveguides', Proc. SPIE **5357** (Optoelectronic integration on silicon), pp 135-142, 2004

C94. Bakhtazad, A. and Kirk, A. G. Weighted index method for planar 1-D photonic crystals. Proc.SPIE 5360 (Photonic crystals, devices and materials) , 52-61. 2004.

C95. A.Bakhtazad, A.G.Kirk, 'Superprism effect with planar 1D photonic crystal', *Proc SPIE* **5360** (Photonic crystals, devices and materials), pp 364-372, 2004.



IPR2025-00436, Exhibit 1004, Page 27

C96. A.G.Kirk, 'A project-based graduate level course in optical engineering', Education in Optics and Photonics (Optical Society of America), Tucson AZ, October 2003

C97. P.Dong and A.G.Kirk, 'Compact Double-Grating Coupler between Vertically Stacked Waveguides', Photonics North, Montreal, June 2003.

C98. A.G.Kirk**,** F.Thomas-Dupuis, M.Menard, M.Châteauneuf, 'Integrated 3-D micro-optics for optical fiber networks', Proc. *Photonics 2002*, Mumbai, India 2002.

C99. A.G.Kirk and M.Châteauneuf, 'Optical design choices for VCSEL-based free-space optical interconnects', SPIE Photonics Fabrication Europe, Bruges, October 2002 *Invited*

C100. M.Châteauneuf and **A.G. Kirk**, 'Determination of the Optimum Cluster Parameters for a Clustered Free-Space Optical Interconnect', *Proc. LEOS Annual Meeting*, pp 899-900, Glasgow, UK, November 2002.

C101. C.J. Alleyne and **A.G. Kirk**, 'Transmission Uniformity of Diffractive Parallel Optical Interconnect Relays: A Numerical Analysis Based on Rigorous Coupled Wave Theory', *Proc. LEOS Annual Meeting*, pp 901-902, Glasgow, UK, November 2002.

C102. M.Chateauneuf, M.H.Ayliffe, A.G.Kirk, 'Improved six-degrees of alignment technique combining Fresnel lenses and gratings', *Proc Intl Topical Meeting in Optics in Computing*, pp 212-214, Taipei, Taiwan, April 2002.

C103. F. Thomas-Dupuis, M. Châteauneuf, M. Ménard and **A.G. Kirk**, 'Design of a two-dimensional optical wavelength (de)multiplexer', *Proc Intl Topical Meeting on Optics in Computing*, pp 221-223, Taipei, Taiwan April 2002.

C104. F. Thomas-Dupuis, M. Châteauneuf, A.G.Kirk, 'Assembly and characterization of a folded spot array generator for a modulator-based free-space optical interconnect', *Proc Intl Topical Meeting on Optics in Computing*, Taipei, Taiwan , pp 328-330, April 2002.

C105. A.G.Kirk and D.Plant, 'Recent Developments in Parallel Optical Interconnects' *Proc. SPIE 4455 (Micro and Nanooptics for Optical Interconnection and Information Processing*), pp 198-208, 2001 ***Invited***

C106. P. Tuteleers, **A. Kirk**, M. Châteauneuf, H. Ottevaere, V. Baukens, C. Debaes, M. Vervaeke, A. Hermanne, I. Veretennicoff, H. Thienpont, 'Investigation of the replication quality of plastic micro-optical interconnection components', *Proc. Sixth annual symposium of the IEEE/LEOS Benelux Chapter*, Brussels, pp. 73-77, 2001.

C107. J.E.Lin, F.S.J.Michael, A.G.Kirk, 'Investigation of improved design for rotational micromirrors using multi-user MEMS process', *Proc. SPIE 4407 (MEMS Design, Fabrication, Characterization, and Packaging)*, June, 2001.

C108. M. Châteauneuf, M. Venditti, E. Laprise, J. Faucher, K. Faucher, K. Razavi, F. Thomas-Dupuis, A.G.Kirk, D. V. Plant, T Yamamoto, J. A Trezza, W. Luo, "512-channel vertical-cavity surface-emiting laser based free-space optical link: results," in *Optics in Computing, OSA Technical Digest* (Optical Society of America, Washington DC, 2001), pp.64-66., 2001

C109. **A.G. Kirk**, `Recent developments in parallel optical interconnects', Proceedings of the International Conference on Fiber Optics and Photonics, Calcutta (India), p. 168-175, 2000 ***Invited***

C110. M.H.Ayliffe, D.R.Rolston, E.L.Chuah, E.Bernier, F.S.J.Michael, D.Kabal, A.G.Kirk, D.V.Plant, 'Packaging of an optoelectronic VLSI chip supporting a 32x32 array of surface-active devices', *Optics in Computing 2000 (Proc. SPIE 4089)*, pp 508-520, 2000.

C111. E. Bernier, F. Lacroix, M.H. Ayliffe, B. Robertson, F.A.P. Tooley, D.V. Plant, **A.G. Kirk**, 'Implementation of a Compact, Four-Stage, Scalable Optical Interconnect', in *Proc. International Topical Meeting on Optics in Computing*, Quebec City, June 18-23 2000.

C112. M. Châteauneuf, F. Thomas-Dupuis, **A.G. Kirk**, 'Design, implementation, and characterization of a folded spot array generator for a modulator-based free-space optical interconnect', in *Proc. International Topical Meeting on Optics in Computing*, Quebec City, June 18-23 2000.

C113. McCarthy, F. Tooley, E. Laprise, D. Plant, **A. Kirk**, M. Oren, J. Zhao, Y. Lu, 'Free-space optical interconnect system using polarisation rotating modulator arrays', in *Proc. International Topical Meeting on Optics in Computing*, Quebec City, June 18-23 2000.

C114. **A.G. Kirk**, D.V. Plant, T.H. Szymanski, Z.G. Vranesic, J.A. Trezza, F.A.P. Tooley, D.R. Rolston, M.H. Ayliffe, F.K. Lacroix, D. Kabal, B. Robertson, E. Bernier, D.F.-Brosseau, F.S.J. Michael, E.L. Chuah , 'A Modulator-based



IPR2025-00436, Exhibit 1004, Page 28

Multistage Free-space Optical Interconnection System', in *Optics in Computing 2000,* SPIE 4089, pp. 449-459, 2000.

C115. D.V. Plant, E. Bernier, E. Bisaillon, M. Mony, M. Salzberg, T. Yamamoto, D.J. Goodwill, **A.G. Kirk**, 'A 5 Gb/s, 2 Channel Bi-Directional Adaptive Redundant FSOI Demonstrator System', in *Proc*. *International Topical Meeting on Optics in Computing*, Quebec City, June 18-23 2000.

C116. M. Châteauneuf, M. Venditti, E. Laprise, J. Faucher, K. Razavi, **A.G. Kirk**, D.V. Plant, T. Yamamoto, J.A. Trezza, W. Luo, 'Design and Implementation and characterization of a 2-D Bi-Directional Free Space Optical Link', in *Proc*. *International Topical Meeting on Optics in Computing*, Quebec City, June 18-23 2000.

C117. X. Xue, **A.G. Kirk**, 'A Moment Method for Estimating the Beam Parameters of a Mixture of Hermite-Gaussian Modes', in *Proc*. *International Topical Meeting on Optics in Computing*, Quebec City, June 18-23 2000.

C118. F. Lacroix, **A.G. Kirk**, 'Tolerance Stackup Effects in Optical Interconnect Systems', in *Proc*. *International Topical Meeting on Optics in Computing*, Quebec City, June 18-23 2000.

C119. E. Bisaillon, T. Yamamoto, D. F-Brosseau, E. Bernier, D. Goodwill, **A.G. Kirk**, D.V. Plant, 'Optical Link for an Adaptive Redundant Free Space Optical Interconnect', in *Proc*. *International Topical Meeting on Optics in Computing*, Quebec City, June 18-23 2000.

C120. M. Mony, M. Salzberg, P. Popescu, E. Bernier, D.V. Plant, **A.G. Kirk**, '1.25Gb/s, 9x1 optical receiver array, for an tive redundant interconnect system, using NT25 technology', in *Proc*. *International Topical Meeting on Optics in Computing*, Quebec City, June 18-23 2000.

C121. D.V. Plant, J.A. Trezza, M. Venditti, E. Laprise, J. Faucher, K. Razavi, M. Chateauneuf, T., A. Ghanem, F. Thomas-Dupuis, P. Sehgal, **A.G. Kirk**, W. Luo, 'A 256 Channel Bi-Directional Optical Interconnect Using VCSELs and Photodiodes on CMOS', in *Proc*. *International Topical Meeting on Optics in Computing*, Quebec City, June 18-23 2000.

C122. X.Xue, **A.Kirk**, 'Transverse modal decomposition of VCSELs based on intensity measurements', *Proc SPIE 3952 (Optoelectronic Interconnects VII),* January 2000.

C123. T Maj, A.G.Kirk, D Plant, J Ahadian, C Fonstad, K Lear, K Tatah, M Robinson, J A Trezza, 'Interconnection of a 2D VCSEL array to a receiver array via a fiber image guide', PDP3, *Optics in Computing*, OSA Technical Digest (Optical society of America, Washington DC, 1999).

C124. F Lacroix, M Chateauneuf, X. Xue, A.G.Kirk, 'Experimental and numerical study of misalignment tolerances in clustered free-space optical interconnects', *Optics in Computing*, OSA Technical Digest (Optical society of America, Washington DC, 1999), pp 136-138, 1999.

C125. A.G.Kirk, F.K.Lacroix, M.H.Ayliffe, D.F-Brosseau, M.Chateauneuf, B.Roberston, F.A.P. Tooley, D.V.Plant,'A multistage free-space optical interconnect for backplane applications: implementation issues', to be presented at the IEEE/LEOS 11th Annual Meeting, Orlando, Florida, December 1998.

C126. M.H. Ayliffe, D Kabal, P Khurana, F Lacroix, A.G.Kirk, F.A.P. Tooley, D.V. Plant, 'Optomechanical, electrical and thermal packaging of large 2D optoelectronic device arrays for free-space optical interconnects, *Optics in Computing*'98, Proc. SPIE **3490**, pp 502-505, 1998.

C127. F. K. Lacroix, B.Robertson, M.H. Ayliffe, E. Bernier, F.A.P. Tooley, M. Chateauneuf, D.V. Plant, A.G.Kirk, 'Optomechanical Design and Implementation of a Clustered Free-Space Optical Interconnect for Backplane Applications', *Optics in Computing*'98, Proc. SPIE **3490**, pp 107-110, 1998

C128. **A.G. Kirk**, D. F.-Brosseau, F.K. Lacroix, E. Bernier, M.H. Ayliffe, B. Robertson, F.A.P. Tooley and D.V. Plant 'Design and implementation of a two-stage optical power supply spot array generator for a modulator-based free-space interconnect', *Optics in Computing*'98, Proc. SPIE **3490**, pp 48-51, 1998.

C129. A.G.Kirk, F Mathieu, F Lacroix, D Plant, M Mony, P Khurana, C Cryan, K Tateno and T Kurokawa, 'Two-dimensional optical interconnects with fiber arrays, *Proc. 6th Micro-optics conference and 14th topical meeting on gradient index optical systems*, Tokyo, pp 296-299, Japan Applied Physics Society, 1997.

C130. A.G.Kirk, F Lacroix, F Mathieu, F Tooley, 'Demonstration of a free-space optical broadcast network', in Optics in Computing, Vol. 8, 1997 OSA Technical Digest (Optical Society of America, Washington DC, 1997), pp. 165-167.



IPR2025-00436, Exhibit 1004, Page 29

C131. A.G.Kirk, H Thienpont, 'Speed and parallelism trade-offs in optoelectronic transceiver systems', in *Optics in Computing,* Vol. 8, 1997 OSA Technical Digest (Optical Society of America, Washington DC, 1997), pp. 124-126.

C132. A.G.Kirk, N Nieuborg, H Thienpont, P Heremans, M Kuijk, R Vounckx, I Veretennicoff, 'Anisotropic diffractive optical logic inverter for PnpN optical thyristors', Optical Computing '96 Technical Digest, OWC32, 1996.

C133. H Thienpont, A.G.Kirk, A Goulet, S Kufner, M Kufner, N Nieuborg, M Kuijk, R Vounckx, P Heremans, G Borghs, I Veretennicoff, 'Optoelectronic subsystems for optical information processing with optical thyristors', Optical Computing '96 Technical Digest, OTuB6, 1996.

C134. H. Thienpont, A.G.Kirk, A. Loge, J. Fernandez, P. Heremans, N. Langloh, R. Vounckx, I. Veretennicoff, 'Progress in the simulation and implementation of parallel optical computing architectures in the framework of th Human Capital and Mobility Networks', Int. Conf. on Digital Signal Processing, Vol. 1, pp. 233 - 240, 1995.

C135. M A Hands, W Peiffer, H Thienpont, A.G.Kirk, T J Hall, 'A case study for the implementation of a stochastic bit stream neuron: the choice between electrical and optical interconnects', *Proc. 2nd IEEE Conference on Massively Parallel Processing Using Optical Interconnections*, pp 63-75, 1995.

C136. H Thienpont, A.G.Kirk, I Veretennicoff, P Heremans, B Knupfer, G Borghs, M Kuijk, R Vounckx, "Optical thyristor based subsystems for digital parallel procesing: demonstrators and future perspective", *Proc. 2nd IEEE Conference on Massively Parallel Processing Using Optical Interconnections*, pp 228-238, 1995.

C137. H. Sahli, R. Buczynski, N. Langloh, A.G.Kirk, V. Christopoulos, H. Thienpont and J. Cornelis, 'Design of Optical Parallel Computers: Tools, Systems, and Components', *Proc EOS Topical Meeting on Optics and Information*, vol. 6, pp. 12.9, 1995.

C138. N. Nieuborg, A.G.Kirk, A. Jourdain, H. Thienpont and I. Veretennicoff, 'Polarization-Selective Gratings for use in Optical Interconnection Systems: Technology and Perspectives'*, Proc EOS Topical Meeting on Optics and Information*, vol. 6, p 11.5, 1995.

C139. A.G.Kirk, R Buczynski, H Thienpont, 'Scalabiltiy issues in optical thyristor information processing systems', *Proc. EOS Topical Meeting on Optics and Information* vol. 6, p. 3.2, 1995.

C140. N Nieuborg, C Van de Poel, A.G.Kirk, H Thienpont, I Veretennicoff, 'Polarisation-selective diffractive and computer-generated optical elements', Optical Computing '95, Technical Digest.

C141. N McArdle, K-H Brenner, J Moisel, A.G.Kirk, H Thienpont, 'A comparison of GRIN rod lenses and planar ion-exchange microlenses for the interconnection of optoelectronic device arrays', Optical Computing '95, Technical Digest.

C142. H Thienpont, A.G.Kirk, I Veretennicoff, P Heremans, G Borghs, M Kuijk, R Vounckx, 'Demonstrator circuitry for optical data transcription and digital optical logic based on differential pairs of optical thyristors', OSA Topical Meeting on Optical Computing, Technical Digest pp.154-156, March 1995.

C143. A.G.Kirk, K Praet, H Thienpont, 'The suitability of GRIN rod lenses for imaging arrays of PnpN optical thyristors in optoelectronic computer architectures', OSA Topical Meeting on Optical Computing, Technical Digest pp.68-70, March 1995.

C144. N Nieuborg, C Van de Poel, A.G.Kirk, H Thienpont, I Veretennicoff, 'Highly polarisation-selective diffractive optical elements for use in optical interconnection and routing systems', *Holographic and Diffractive Optics*, San Jose, CA, February 1995 (to appear in Proc SPIE **2404**).

C145. A.G.Kirk and H Thienpont, 'An optoelectronic programmable logic array which employs diffractive optical interconnections', *Holographic and Diffractive Optics*, San Jose, CA, February 1995 (to appear in Proc SPIE **2404**).

C146. A.G.Kirk, H Thienpont, 'Interconnection issues for VSTEP optoelectronic information processing systems', *Optical Interconnects III*, San Jose, CA, February 1995 (to appear in Proc SPIE **2400**).

C147. H Thienpont, W Peiffer, T Van de Velde, A.G.Kirk, M Kuijk, L Dognin, J Fernandez, I Veretennicoff, R Vounckx, P Heremans, G Borghs 'Demonstrator circuitry for optical data transcription and digital optical logic based on differential pairs of optical thyristors'. Cleo/Europe '94, Technical Digest, p. 349, 1994.

C148. H Thienpont, T Van de Velde, A.G.Kirk, W Peiffer,M Kuijk, W Stevens, J Fernandez, I Veretennicoff, R Vounckx, P Heremans, G Borghs, 'Optical circuitry for data transcription and digital optical logic based on photothyristor differential pairs', Optical Computing '94, Technical Digest, p. 203-204, 1994**.**



IPR2025-00436, Exhibit 1004, Page 30

C149. A.G.Kirk, H Thienpont, 'Programmable logic array with differential pairs of PnpN photothyristors : an experimental assessment', Optical Computing '94, Technical Digest, Postdeadline paper PD 14, 1994.

C150. A.G.Kirk, H. Thienpont, A Leroy, 'Optical interconnection issues for systems containing photothyristor smart pixels', IEEE/LEOS Topical Meeting on Smart Pixels, Technical Digest, Postdeadline paper PD 1, Nevada, 1994.

C151. T Tabata, A.G.Kirk, M Ishikawa, 'Optical interconnections using a real-time Fourier transform hologram', Proc. Japan Soc. Appl. Phys. Autumn Meeting, September 1993.

C152. A.G.Kirk, T Tabata, M Ishikawa, 'Reconfigurable shift-invariant diffractive interconnects for optical processing', Japan Society of Applied Physics, 40th Spring Meeting, No. 3, p 876, 1993.

C153. A.G.Kirk, M Ishikawa, S Jamieson, T J Hall, 'The design and fabrication of quasi-periodic computer generated holograms', Proc. IEE Conference on Holographic Systems, Components and Applications, Neuchatel, Switzerland, 13-15 September 1993.

C154. A.G.Kirk, T Tabata, M Ishikawa, 'Signal to noise ratio enhancement with quasi-periodic computer generated holograms', Japan Society of Applied Physics, 40th Spring Meeting, No. 3, p 902, 1993.

C155. A.G.Kirk, T Tabata, M Ishikawa, 'Cellular processing with diffractive optical elements', in Optical Computing Technical Digest 1993 (Optical Society of America, Washington, D.C. 1993), 7 pp 284-287.

C156. A.G.Kirk, S Jamieson, H Imam, T J Hall, 'Experimental implementation of a 25 channel free-space optical switching architecture', in Optical Computing Technical Digest 1993 (Optical Society of America, Washington, D.C. 1993), 7 pp 295-298.

C157. M J Birch, W A Crossland, A.G.Kirk, T J Hall, D G Vass, 'The design of optical crossbar switches using FELC/VLSI technology and free-space optics', Smart Pixels, LEOS Topical Meeting, Santa Barbara, 1992.

C158. K K Virdee, K D Bird, A.G.Kirk, T J Hall, 'Fan-in optics for SLM-based optical crossbar switching system using microlenses', IOP Conf. on Applied Optics and Optoelectronics, September 1992.

C159. A.G.Kirk, S Jamieson, K Virdee, C Lakamp, T J Hall, 'A comparison of forward and inverse design techniques for computer generated holograms', IOP Conf. on Applied Optics and Optoelectronics, September 1992.

C160. A.G.Kirk, I Plunkett, S Jamieson, T J Hall, 'Multifacet computer generated holograms for optoelectronic associative memories', IOP Conf. on Applied Optics and Optoelectronics, September 1992.

C161. H Imam, A.G.Kirk, K D Bird, T J Hall, 'Design of multiphase level holograms', in Holographic Systems, Components and Applications IEE Publication No. 342, pp 166-170, September 1991.

C162. J Bonisch, A.G.Kirk, S.Rehman, T J Hall, R E Burge, 'The fabrication of high resolution diffractive elements by electron beam lithography' in Holographic Systems, Components and Applications IEE Publication No. 342, pp 200-204, September 1991.

C163. A.G.Kirk, G D Kendall, H Imam, T J Hall, 'An optical neural network with reconfigurable holographic interconection', Proc. SPIE Vol. 1402, 1991.

C164. A.G.Kirk, H Imam, T J Hall, 'An efficient holographic interconnect in 0.01 cm3', in Holographic Systems, Components and Applications, IEE Publication 342, pp 161-165, September 1991.

C165. A.G.Kirk, T J Hall, W A Crossland, 'A compact and scalable free-space optical crossbar', in Holographic Systems, Components and Applications IEE Publication No. 342, pp 137-141, September 1991.

C166. A.G.Kirk, H Imam, K Bird and T J Hall, 'The design and fabrication of computer generated holographic fanout elements for a matrix-matrix interconection scheme', Proc. SPIE Vol. 1574, 1991.

C167. P S Cawte, S C Robertson, J Bonisch, A.G.Kirk, T J Hall, R.E.Burge, 'Holographic Optical Elements and Their Application to High Density Backplanes', *High Performance Electronic Packaging*,IEE., London, 29-30 Nov., 1990.

C168. A.G.Kirk, R G Hoptroff & T J Hall, 'A Genetic Algorithm Solution to Computer Generated Holograms', IOP Conf. 'Applied Optics and Opto-Electronics', Nottingham, 17-20 Sept. 1990

**6. Presentations at conferences without proceedings (selected)**

W1. Mark Andrews, Yu Ping Zhang, Melodie Carluer, Vamsy Chodavarapu, **Andrew Kirk** and Gilles Picard 'Origin of Iridescence in Nanocrystalline Cellulose for Encryption and Enhanced Color, *MRS Fall Meeting* (Boston MA), November 2010.



IPR2025-00436, Exhibit 1004, Page 31

**7. Patents granted**

P1. P.Roche, **A. Kirk**, L.Beitel, M.Paliouras,M.Trifiro, V. Chodavarapu, M. Najih, J. Thiemann*, Heating mechanism for DNA amplification, extraction or sterilization using photo-thermal nanoparticles*, US Patent US10604798B2, Filed December 14 2012, granted Feb 8 2018.

P2. A.G.Kirk, T K Deis, R E Aldrich, D D Stancil, T ESchlesinger, *Polarization insensitive scanning system for electro-optic switching telecommunications includes optical beam splitter and electro-optic scanning devices*, International Patent Application WO200216999-A, 2002.

P3. A.G.Kirk and E.Bisaillon, *Integrated etched multilayer grating based wavelength demultiplexer*, US Patent 7,440,654, granted in 2008

**8. Patent applications**

PA 1. F.Soltani*,* M.Menard and A.G.Kirk, *Optical loop enhanced modulators*, US Patent Application 15/482,990, filed in 2016

**9. Public Awareness and Optics Education**

E1. A.G.Kirk*, '*Optical Engineering: Learning by design', Education and Training in Optics and Photonics (Optical Society of America), Ottawa, ON, May 2007

E2. A.G.Kirk, 'A project-based graduate level course in optical engineering', Education and Training in Optics and Photonics (Optical Society of America), Tucson, AZ, October 2003.

E3. J. Kirk, A.G.Kirk, 'An educational experiment: bringing primary students into a high tech lab', *OSA Optics and Photonics News*, pp. 58-60, February 1997



IPR2025-00436, Exhibit 1004, Page 32