Cosimo Lacava

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Education

2010-2014 PhD in Electronics, Computer Science and Electrical Engineering - University of Pavia
Dissertation title: Nonlinear Silicon Photonic Devices

2008-2010 MSc in Optoelectronics and Systems - University of Pavia
Final Grade: 110/110 with honors (First Class Hons).

2005-2008 BSc in Electronics Engineering and Computer Science - Polytechnic of Bari
Final Grade: 110/110 with honors (First Class Hons).

Other Academic Experiences

Jun 2013 - May 2014 Visiting PhD student at the University of Glasgow
Development of silicon photonic nonlinear switching components

Nov 2012 - Jan 2013 Visiting PhD student at the University of Valencia
Development of silicon photonic nonlinear waveguides

Employment History

Nov 2017 - Present Optoelectronics Research Centre, University of Southampton, Southampton, SO17 1BJ, UK
Senior Research Fellow

Development of silicon photonic components for high speed optical communication networks.

- Design, fabrication and characterization of high speed (>50 Gb/s) silicon photonic modulators with RF electrical circuits integrated on board.
- Design of spectrally efficient optical networks for high speed operation (>100Gb/s) enabled by advanced modulation formats.
- Design of novel materials and devices for all optical signal processing. Study of nonlinear phenomenon in integrated optical waveguides. Fabrication and characterization of CMOS compatible optical processors.

Nov 2014 - Nov 2017 Optoelectronics Research Centre, University of Southampton, Southampton, SO17 1BJ, UK
Research Fellow

Development of silicon photonic components for high speed optical communication networks.

- Design, fabrication and characterization of high speed (>50 Gb/s) silicon photonic modulators with RF electrical circuits integrated on board.
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- Design of novel materials and devices for all optical signal processing. Study of nonlinear phenomenon in integrated optical waveguides. Fabrication and characterization of CMOS compatible optical processors.

Jan 2014 - Oct 2014 University of Pavia, Integrated Photonics Lab, Pavia, 27100 Italy
Research Associate

Design of silicon photonic components for optical communications.

- Design and characterization of silicon photonic integrated filters for optical communication applications.
- Design and characterization of silicon photonic mode converters.
- Design and characterization of nonlinear optical components for all optical signal processing applications.
- Design and characterization of silicon photonic - III-V semiconductor optical amplifiers.

Qualifications Summary

- **Integrated electro-optic devices for tele-com applications**
  - Design and characterization of high speed, electrically integrated, silicon photonic modulators. Design of the optical units and their integration with the required RF driving components. Extensive design experience acquired working in one of the most recognized research group in the world in the field of silicon photonics.
  - Design and characterization of active and passive silicon photonic components for optical communication applications. Extensive experience in designing waveguides, optical filters, mode coupling components, splitters, optical signal processors.
  - Design and characterization of nonlinear silicon photonic devices for fibre optic network applications. Extensive experience with different materials such as silicon, silicon nitride, tantalum pentoxide, amorphous silicon and glasses.
  - Extensive knowledge of optical design software such as Lumerical, BeamProp, PhotonDesign and VPI Photonics
- **Design of highly spectral-efficient optical networks based on silicon photonic components**
  - Design and implementation of complex modulation formats for direct detection systems (Optical Frequency Division Multiplexing, Discrete Multi Tone and Pulse Amplitude Modulation) and their implementation with silicon photonic components.

- Design of software-based digital signal processing (DSP) algorithms for optical networks.
- Characterization of direct detection-based and coherent optical networks.

- **Fabrication of integrated photonic devices based on CMOS technology. Cleanroom experience (3 years):**
  - Knowledge of general cleanroom procedures for the fabrication of CMOS components using 4 to 8 inch wafers.
  - Deposition of dielectric layers by Plasma Enhanced Chemical Vapour Deposition (PECVD) or Low Power Plasma Chemical Vapour Deposition (LPCVD) techniques.
  - Etching of optical layers by means of wet and dry techniques.
  - Spinning of various coating materials.
  - Regular user of post-fabrication tools such as Ellipsometer, AFM and dicing tools.

Teaching Experience

Nov 2016-Jun 2017 University of Southampton, SO17 1BJ Southampton (UK)
Adjunct Lecturer of Advanced Fibre Communications
MSc in Optical Fibre Technologies - ORC Southampton.

Nov 2013-Nov 2014 University of Pavia, Faculty of Engineering, Pavia, 27100 Italy
Adjunct Lecturer of Physics and Electromagnetism
60 hours as Adjunct Lecturer (BSc in Electronics and Computer Science).

Nov 2010-Nov 2013 University of Pavia, Faculty of Engineering, Pavia, 27100 Italy
Adjunct Lecturer of Mathematics and differential Calculus
300 hours as Adjunct Lecturer (BSc in Electronics and Computer Science).

Nov 2010-Current University of Pavia, University of Southampton
Student Supervisor
Direct supervision of: 4 PhD students, 6 MSc students and 8 undergraduate students to date.

Awards

- 2013 Japan Society for the Promotion of Science (JSPS) on silicon photonics projects. Award that recognized 5 outstanding PhD students in the field of silicon photonics. The award fully covered the participation to the 2nd JSPS School on silicon photonics held in Tokyo - January 2013
- 2011 Japan Society for the Promotion of Science (JSPS) on silicon photonics projects. Award that recognized 5 outstanding PhD students in the field of silicon photonics. The award fully covered the participation to the 1st JSPS School on silicon photonics held in Kyoto - November 2011
- 2008 - Awarded as best student of the Science and Engineering Faculty - Politecnico di Bari.

Profile Summary

CL holds a PhD in Electronics and Computer Science Engineering from the University of Pavia. Within his PhD he studied the second and third order nonlinear optical phenomenon, inside silicon on insulator devices. In 2014, he worked as Postdoctoral Fellow at the University of Pavia within the frame of a European Project named "Fabulous", which aimed to the realization of silicon photonic optical transceivers for passive optical networks. Thereafter, CL obtained a Research Fellow position at the Optoelectronics Research Centre (ORC), University of Southampton, tasked with the realization of high-speed silicon photonic systems for telecom and data-com applications. CL works within the frame of a 6M program grant, founded by the EPSRC Council, named "Silicon Photonics For Future Systems" which is set to tackle fundamental challenges that are still present in the silicon photonics technology. CL is responsible of the Work Package 3 that is devoted to the design, fabrication and realization of highly integrated optical transceivers, operated with advanced modulation formats, for transmissions at speeds exceeding 1 Tb/s.
CL has gained a significant experience and knowledge in the field on integrated optics and silicon photonics, and his research agenda covers a wide range of topics. His current research interests include:

- Study of optical nonlinear phenomenon in integrated photonic structures.
- All optical signal processing devices based on integrated photonic components.
- Long and short haul, high speed (>400 Gb/s) and high spectral efficiency (>2 b/s/Hz) optical systems and networks, operated with advanced modulation format.
- Silicon photonics active and passive components, for telecom and sensing applications.

CL has established himself as a central figure within the ORC and is regularly asked to attend major conferences as invited speaker (in 2017 he has been invited to disseminate his findings at Photonic in Switching and OSA CLEO-PR 2017). **CL has been recently promoted to a senior position within the ORC (Senior Research Fellow) and has received official offers to join world leaders companies such has Huawei and Microsoft Research.**
CL has published his results in high-reputable peer reviewed journals and conferences (40 publications, 1 invited review paper, 7 invited contributions, 1 post-deadline contribution).

Research Activity

CL has started his scientific career in 2011. He was awarded of a PhD scholarship to work on silicon photonic third- order nonlinear components for all optical signal processing applications. Since then, CL has mainly worked in the field of the integrated optics, developing a deep knowledge covering various aspects of this field. A detailed review of his research interests is reported below:

Study of second and third-order optical nonlinearities and their application in integrated optical components for all optical signal processing functionalities

The ability to process an optical signal with another optical signal, without the need to pass within the electrical domain, would unlock a new generation of signal processing which could operate at unprecedented rates and complexity levels. Nonlinear silicon photonics offers a route towards this goal, granting the ability to stimulate nonlinear processes with relatively low optical power levels, in cm-scale devices, by using third-order Kerr optical nonlinearities. Although this field has seen meaningful advancements in the last 10 years, significant limitations are still present. These are mainly related to the high level of linear and nonlinear losses that silicon shows at relatively high power levels, which in turn hinder the efficient generation of nonlinear optical effects. CL has tackled these issues, proposing both the use of novel materials or new device configurations, that can

resolve the aforementioned problems. During his PhD he mainly worked on the development of two main applications, which can be realized by making use of nonlinear devices, that were a) all-optical wavelength conversion and b) high speed all-optical switching. All optical wavelength conversion is a high desirable functionality which can resolve contention issues within modern optical networks. When two signals, placed at the same wavelengths, arrive at a network node at the same time, a contention issue is present. The ability to dynamically change the wavelength of one of the two (or more) signals is essential and would allow resolving the contention. The all-optical wavelength converter has the ability to realize this functionality, in the optical domain, without passing into the electrical domain and back. A possible route to realize such component is the use of the Four Wave Mixing nonlinear effect, which allows to convert a signal from a wavelength λ_1 to λ_2 by placing a third, relatively strong, continuous wave signal at $\lambda_1 + (\lambda_2 - \lambda_1)/2$. CL has extensively worked towards the realization of all optical, integrated, wavelength converters, that can operate at low power, and high bandwidth demonstrating wavelength conversion with optical power values of tens of mW, operating across a bandwidth of more than 40 nm [J1-J3]. All-optical switching also represents a key functionality for the next generation of optical networks. Switching an optical signal by means of another optical signal, would allow for extremely high speed optical modulation operations, paving the way to complex and sophisticated functionalities. During his PhD, CL has demonstrated all optical switching at rates of 40 GHz [J4], by making use of the ultrafast Kerr effect, whose speed was only limited by the testing instrumentation. The demonstrated device constituted a fundamental, scalable, building block, which can serve for the realization of integrated all optical processors.

CL has recently proposed the use of a novel technological platform based on Silicon-rich silicon nitride as light-guiding material. CL has focused his initial research efforts on the material fabrication, developing novel, reliable fabrication routines to obtain silicon nitride films containing different quantities of silicon. The deep knowledge of the fabrication process allowed to finely-tune the material properties, obtaining a flexible platform showing both low linear and nonlinear losses and high nonlinearities. This study has been recently published in Scientific Reports [J10] and presented at CLEO-PR 2017. The fabrication routines that he developed are now mature and are also currently used by the silicon photonics group (led by Prof. Graham Reed) to routinely produce silicon nitride devices, constituting part of fabrication protocols of the Cornerstone project (sotonfab.co.uk). This study is currently used as basis for the writing of an EPSRC project (in collaboration with Dr. Fred Gardes) which will look to develop advanced silicon nitride silicon rich devices for telecom and sensing applications. In order to explore the potentials of the developed platform and its use in a wider range of applications, CL has recently set another collaboration with Glasgow University (Prof. Marc Sorel) that will provide support in designing, fabricating and testing of silicon-rich silicon nitride waveguides for super-continuum generation, covering wavelengths ranging from visible to the mid infrared.

As an alternative route, CL has recently proposed the use of Ta_2O_5 as possible nonlinear material, exhibiting low loss and high nonlinearities at telecom wavelengths. This project is currently being investigated in collaboration with Prof. James Wilkinson who is providing fabrication support. Preliminary results have been presented at the Optical Fibre Communication Conference [C24] and further material developments are currently being investigated. CL coordinates this work within the optical communication, the silicon photonic and the integrated optics groups and he is currently responsible of the device fabrication and characterization steps.

During the last year, CL has started a new activity, focused on the development of multi-mode nonlinear photonic components. Nonlinear multimode optics allows for more sophisticated signal processing devices and many advanced applications have been already demonstrated in optical fibre by Dr Parmigiani (ORC) and her collaborators (Parmigiani et al. "C- to L-band wavelength conversion enabled by parametric processes in a few mode fiber", OFC 2017). Having recognized the importance of this work, CL has proposed to Dr. Parmigiani to start a new collaboration, with the aim of developing nonlinear multimode integrated waveguides, which will take advantage of both

the multi-mode interaction technique and strong nonlinearities given by integrated waveguides. CL is responsible of sample design fabrication, which will be performed both internally, at the ORC cleanroom, and externally at the University of Glasgow that will provide high-quality Silicon On Insulator (SOI) multimode waveguides. The capability to use the Glasgow Facility, at no additional costs, and their expertise to fabricate experimental samples have been enabled thanks to a strong collaboration CL has managed to establish with Prof. Marc Sorel and his collaborators.

Silicon photonic high-speed transceivers operated with advanced modulation formats

Silicon photonic has been widely identified as possible choice for the development of high speed (>100 Gb/s) transceivers, that can operate at both short and long distances. The development of such devices, for direct detection schemes and short reach connections (<100 km in length) represents a core task of the whole SPFS program and a work-package has been dedicated to that. During the last three years, CL managed to take a leadership role within the WP, actively influencing key decisions as well as leading research works and experiments. CL has focused his efforts to the development of low power devices and techniques which allow extremely high spectral efficiency transmissions (>2 b/s/Hz), thus enabling high-speed connections at low cost and system complexity. In order to pursue this goal he decided to internally develop a Discrete Multitone Modulation (DMT) system tailored to the specification of the existing, ORC-owned, silicon modulator technology. The developed system allowed CL to demonstrate a word record spectral efficiency system based on the combination of DMT modulation and linear silicon photonic modulator (SE=5b/s/Hz at a 50 Gb/s rate) [C30,C-I33] and currently constitutes the main result achieved within the SPFS-WP3 (journal publications are currently being submitted). This demonstration has been carried out at the Peking University, within the frame of a collaboration that CL still holds with this institution (Prof. Fan Zhang's group). These results have attracted considerable attention from the research community, and CL has been recently asked to give an invited speech at the last OSA Photonics in Switching conference (New Orleans – 2017) to describe these achievements.
CL is now the electro-optic devices design leader within the ORC-group, and he is working towards the realization of novel electro-optics devices (including the design of the electrical driver), that would show highly linear transfer functions, thus allowing the use of extremely high modulation formats (>128 QAM), eventually leading to the possibility to achieve transmission rates of the order of 400 Gb/s.

Development of efficient fibre to chip coupling solutions

Silicon photonics is nowadays a mature technology widely adopted by academic bodies and companies to produce advanced photonic components. The use of silicon as light-guiding material facilitates the realization of nm-scale components, which in turn enables the realization of densely integrated photonic circuits. This poses significant challenges when the circuit has to be interfaced to a standard optical fibre, which presents drastically different typical dimensions. Although many approaches have been proposed in the past, this topic remains one of the biggest challenges in the field, and achieving efficient and broadband interfaces is still an open issue. In the past four years CL worked towards the realization of novel devices that can show a coupling efficiency (between the silicon photonic circuit and a standard single mode optical fibre) of more than 80 % ,and which can be produced by only using CMOS compatible processes. He recently demonstrated the first silicon photonic interface to single mode optical fibre that showed an experimental efficiency exceeding 81 %, entirely fabricated within the ORC cleanroom only using CMOS-compatible processes [C29]. CL and his collaborators believe that the technique used to achieve this disruptive results can be of great interest to both academic and industrial bodies working in the field across the world. For this reason, a patent application (in the US) has been issued and a manuscript has been submitted to Scientific Reports journal. CL now plans to use the developed expertise to design and demonstrate

more advanced devices, which can operate with more than one polarization state, across multiple wavelength bands.

Other responsibilities and activities

- CL is a board member of the "Italian Association of Scientists in the UK (AISUK)" that provides support to italian scientists in the UK and does dissemination activities across the whole country.
- CL is a member of the "Equality and Diversity" Committee of the The Faculty of Science and Engineering (FPSE) at the University of Southampton
- CL serves as regular reviewer for the following scientific journals: Nature Communications, Scientific Reports, OSA Optics Express, OSA Optics Letters, OSA Optica, IEEE Journal of Lightwave and Technology, IEEE Photonics Technology Letters, IEEE Photonic Journal.

Journal Publications

[J1] A. Trita, C. Lacava, P. Minzioni, J.-P. Colonna, P. Gautier, J.-M. Fedeli, and I. Cristiani. "Ultrahigh four wave mixing efficiency in slot waveguides with silicon nanocrystals". In: *Applied Physics Letters* 99.19 (2011).

[J2] J. Matres, C. Lacava, G.C. Ballesteros, P. Minzioni, I. Cristiani, J.M. Fédéli, J. Martí, and C.J. Oton. "Low TPA and free-carrier effects in silicon nanocrystal-based horizontal slot waveguides". In: *Optics Express* 20.21 (2012).

[J3] C. Lacava, P. Minzioni, E. Baldini, L. Tartara, J.M. Fedeli, and I. Cristiani. "Nonlinear characterization of hydrogenated amorphous silicon waveguides and analysis of carrier dynamics". In: *Applied Physics Letters* 103.14 (2013).

[J4] C. Lacava, M.J. Strain, P. Minzioni, I. Cristiani, and M. Sorel. "Integrated nonlinear Mach Zehnder for 40 Gbit/s all-optical switching". In: *Optics Express* 21.18 (2013).

[J5] C. Lacava, V. Pusino, P. Minzioni, M. Sorel, and I. Cristiani. "Nonlinear properties of AlGaAs waveguides in continuous wave operation regime". In: *Optics Express* 22.5 (2014).

[J6] M.J. Strain, C. Lacava, L. Meriggi, I. Cristiani, and M. Sorel. "Tunable Q-factor silicon microring resonators for ultra-low power parametric processes". In: *Optics Letters* 40.7 (2015).

[J7] C. Lacava, M.A. Ettabib, I. Cristiani, J.M. Fedeli, D.J. Richardson, and P. Petropoulos. "Ultra-Compact Amorphous Silicon Waveguide for Wavelength Conversion". In: *IEEE Photonics Technology Letters* 28.4 (2016).

[J8] T. Domínguez Bucio, A.Z. Khokhar, C. Lacava, S. Stankovic, G.Z. Mashanovich, P. Petropoulos, and F.Y. Gardes. "Material and optical properties of low-temperature NH3-free PECVD SiNx layers for photonic applications". In: *Journal of Physics D: Applied Physics* 50.2 (2017).

[J9] M.A. Ettabib, C. Lacava, Z. Liu, A. Bogris, A. Kapsalis, M. Brun, P. Labeye, S. Nicoletti, D. Syvridis, D.J. Richardson, and P. Petropoulos. "Wavelength conversion of complex modulation formats in a compact SiGe waveguide". In: *Optics Express* 25.4 (2017).

[J10] Lacava C., I. Cardea, I. Demirtzioglou, A. E. Khoja, Li Ke, D.J. Thomson, R. Xiaoke, F. Zhang, Graham T. Reed, David J. Richardson, and P. Petropoulos. "49 . 6 Gb / s direct detection DMT transmission over 40 km single mode fibre using an electrically packaged silicon photonic modulator". In: *Optics Express* 25.24 (2017), pp. 124–125.

[J11] C. Lacava, S. Stankovic, A. Khokhar, T. Bucio, F. Gardes, G. Reed, D. Richardson, and P. Petropoulos. "Si-rich Silicon Nitride for Nonlinear Signal Processing Applications". In: *Scientific Reports* 7.1 (2017).

[J12] R. Marchetti, C. Lacava, Ali Z. Khokhar, X Chen, Ilaria Cristiani, David J. Richardson, Graham T. Reed, Periklis Petropoulos, and P. Minzioni. "High-efficiency grating couplers: demontration of a new design strategy". In: *Scientific Reports (accepted, in press)* (2017).

[J13] R. Marchetti, V. Vitali, C. Lacava, I. Cristiani, B. Charbonnier, V. Muffato, M. Fournier, and P. Minzioni. "Group-velocity dispersion in SOI-based channel waveguides with reduced-height". In: *Optics Express* 25.9 (2017).

[J14] R. Marchetti, V. Vitali, C. Lacava, I. Cristiani, G. Giuliani, V. Muffato, M. Fournier, S. Abrate, R. Gaudino, E. Temporiti, L. Carroll, and P. Minzioni. "Low-loss micro-resonator filters fabricated in silicon by CMOS-compatible lithographic techniques: Design and characterization". In: *Applied Sciences* 7.2 (2017).

[J15] X. Ruan, K. Li, D.J. Thomson, C. Lacava, F. Meng, I. Demirtzioglou, P. Petropoulos, Y. Zhu, G.T. Reed, and F. Zhang. "Experimental comparison of direct detection Nyquist SSB transmission based on silicon dual-drive and IQ Mach-Zehnder modulators with electrical packaging". In: *Optics Express* 25.16 (2017).

[J16] A. Xomalis, I. Demirtzioglou, E. Plum, Y. Jung, V. Nalla, C. Lacava, Kevin F MacDonald, P. Petropoulos, D. Richardson, and Nikolay I. Zheludev. "Fibre-optic metadevice for all-optical signal modulation based on coherent absorption". In: *Nature communications (accepted, in press)* (2017).

Journal Publications - Invited Contributions

[J-I17] C. Lacava, M.A. Ettabib, and P. Petropoulos. "Nonlinear silicon photonic signal processing devices for future optical networks (Invited)". In: *Applied Sciences* 7.1 (2017).

Conference Proceedings

[C18] A. Trita, C. Lacava, I. Cristiani, P. Gautier, J. P. Colonna, and J. M. Fedeli. "Four-wave-mixing efficiency and conversion bandwidth in silicon-nanocrystals slot waveguides fabricated by PECVD". In: *2011 Conference on Lasers and Electro-Optics Europe and 12th European Quantum Electronics Conference, CLEO EUROPE/EQEC 2011*. 2011.

[C19] C. Lacava, P. Minzioni, E. Baldini, J.M. Fedeli, and I. Cristiani. "Four Wave Mixing Efficiency in Hydrogenated Amorphous Silicon Waveguides". In: *2013 Conference on Lasers & Electro-Optics Europe & International Quantum Electronics Conference CLEO EUROPE/IQEC* (2013), pp. 1–1.

[C20] C. Lacava, M. J. Strain, I. Cristiani, and M. Sorel. "40 GHz nonlinear all optical switching in a Mach-Zehnder interferometer integrated device". In: *2013 Conference on Lasers and Electro-Optics Europe and International Quantum Electronics Conference, CLEO/Europe-IQEC 2013*. 2013.

[C21] M. J. Strain, C. Lacava, P. Minzioni, and M. Sorel. "Tailoring of dispersion in silicon vertical slot waveguides". In: *2013 Conference on Lasers and Electro-Optics Europe and International Quantum Electronics Conference, CLEO/Europe-IQEC 2013*. 2013.

[C22] M. J. Strain, P. Orlandi, C. Lacava, F. Morichetti, A. Melloni, P. Bassi, I. Cristiani, and M. Sorel. "Silicon micro-ring resonators with tunable Q-factor for ultra-low power parametric signal generation". In: *2013 Conference on Lasers and Electro-Optics Europe and International Quantum Electronics Conference, CLEO/Europe-IQEC 2013*. 2013.

[C23] C. Lacava, L. Carroll, D. Gerace, L. C. Andreani, M. Fournier, S. Messaoudene, N. Pavarelli, J. S. Lee, P. A. O'Brien, S. Menezo, and I. Cristiani. "Performance of 2D-Grating couplers designed through full 3D-FDTD numerical simulations". In: *IEEE International Conference on Group IV Photonics GFP*. 2014, pp. 203–204.

[C24] M. J. Strain, C. Lacava, I. Cristiani, and M. Sorel. "Ultra-low power Four Wave Mixing wavelength conversion in silicon micro-ring resonators with tunable Q-factor". In: *IEEE International Conference on Group IV Photonics GFP*. 2014, pp. 175–176.

[C25] C. Lacava, R. Marchetti, G. Giuliani, M. Fournier, S. Menezo, M. S, and P. Minzioni. "Impact of waveguide cross section on nonlinear impairments in integrated optical filters for WDM communication systems". In: *Conference on Lasers and Electro-Optics 2012*. Vol. 29. 2012. 2015, p. 27100.

[C26] C. Lacava, M J Strain, V. Pusino, R. Marchetti, P. Minzioni, M. Sorel, and I. Cristiani. "Highy Nonlinear AlGaAs Waveguides for Broadband Signal Generation". In: *Optics InfoBase Conference Papers*. Vol. 1084. 2004. 2015, p. 27100.

[C27] C. Lacava, A. Aghajani, P. Hua, D J Richardson, P. Petropoulos, and J S Wilkinson. "Nonlinear optical properties of ytterbium-doped tantalum pentoxide rib waveguides on silicon at telecom wavelengths". In: *Optical Fiber Communication Conference 2016 (OFC 2016)* 1 (2016), W4E.4.

[C28] C. Lacava, L. Carrol, A. Bozzola, R. Marchetti, P. Minzioni, I. Cristiani, M. Fournier, S. Bernabe, D. Gerace, and L. C. Andreani. "Design and characterization of low-loss 2D grating couplers for silicon photonics integrated circuits". In: *Proceedings of SPIE - The International Society for Optical Engineering*. Vol. 9752. 2016, p. 97520V.

[C29] C. Lacava, M.A. Ettabib, I. Cristiani, J.-M. Fedeli, D.J. Richardson, and P. Petropoulos. "Ultra-low-power silicon photonics wavelength converter for phase-encoded telecommunication signals". In: *Proceedings of SPIE - The International Society for Optical Engineering*. Vol. 9752. 2016.

[C30] C. Lacava, R. Marchetti, V. Vitali, I. Cristiani, G. Giuliani, M. Fournier, S. Bernabe, and P. Minzioni. "Reduced nonlinearities in 100-nm high SOI waveguides". In: *Proceedings of SPIE - The International Society for Optical Engineering*. Vol. 9753. 2016, p. 975313.

[C31] K. Bottrill, Mohamed A. Ettabib, James C. Gates, C. Lacava, F. Parmigiani, David J. Richardson, and P. Petropoulos. "Flexible Scheme for Measuring Chromatic Dispersion Based on Interference of Frequency Tones". In: *Optical Fiber Communication Conference*. 2017, Th4H.5.

[C32] R. Marchetti, C. Lacava, A. Khokhar, I. Cristiani, David J. Richardson, P. Petropoulos, and P. Minzioni. "Reflector-less Grating-Coupler with a -0 . 9 dB Efficiency Realized in 260-nm Silicon-On-Insulator Platform". In: *OSA Advanced Photonics Congress*. Vol. Part F52-I. 2017, pp. 2–4.

[C33] C. Lacava, I. Demirtzioglou, I. Cardea, A. E. Khoja, K. Li, D. J. Thomson, X. Ruan, F. Zhang, G.T. Reed, David J. Richardson, and P. Petropoulos. "Spectrally Efficient DMT Transmission over 40 km SMF Using an Electrically Packaged Silicon Photonic Intensity Modulator". In: *European Conference on Optical Communications (ECOC) 2017*.

Conference Proceedings - Invited and Post-Deadline Contributions

[C-I34] P. Petropoulos, M. Ettabib, K. Bottrill, C. Lacava, F. Parmigiani, K. Hammani, M. Brun, P. Labeye, S. Nicoletti, A. Bogris, A. Kapsalis, and D. Syvridis. "Advanced nonlinear signal processing in silicon-based waveguides (Invited)". In: *2015 20th European Conference on Networks and Optical Communications, NOC 2015*. 2015.

[C-I35] C. Lacava, Z. Liu, D. Thomson, Li Ke, J. M. Fedeli, D. J. Richardson, G. T. Reed, and P. Petropoulos. “Silicon photonic Mach Zehnder modulators for next-generation short-reach optical communication networks (Invited)”. In: *Proceedings of SPIE - The International Society for Optical Engineering*. Vol. 9772. 2016, p. 977209.

[C-I36] D.J. Thomson, C.G. Littlejohns, K. Li, M. Nedeljkovic, A.Z. Khokhar, F.Y. Gardes, G.Z. Mashanovich, C. Lacava, P. Petropoulos, D.J. Richardson, M.S. Rouifed, H. Qiu, T.G. Xin, T. Hu, Z. Zhang, H. Wang, P-W. Chiu, Y-F. Li, S.H. Hsu, and G.T. Reed. “Integrated silicon optical modulators (Invited)”. In: *PIERS 2016*. 2016.

[C-I37] F.Y. Gardes, C. Lacava, K. Debnath, T. Dominguez Bucio, M. Banakar, S. Stankovic, A. Alattili, A.Z. Khokhar, S. Saito, P. Petropoulos, I. Molina, R. Halir, A. Ortega-Moñux, J.G. Wanguemert-, Y. Chen, J. He, P. Cheben, and Jens H. Schmid. “Tunable index back end of line platform for enhanced integrated photonics (Invited)”. In: *Group IV Photonics (GFP), 2017*. 2017.

[C-I38] C. Lacava, D.J. Thomson, K. Li, I. Demirtzioglou, A. Shakoor, D.J. Richardson, F. Zhang, G.T. Reed, and P. Petropoulos. “Silicon photonic modulators for high speed optical analog links (Invited)”. In: *Photonics in Switching*. Vol. Part F57-P. 2017.

[C-I39] C. Lacava. “Low Loss Si-rich Silicon Nitride For Nonlinear Signal Processing Applications (Invited)”. In: *OSA CLEO Pacific Rim 2017*.

[C-I40] A. Xomalis, I. Demirtzioglou, V. Nalla, E. Plum, Y. Jung, C. Lacava, K.F. Macdonald, P. Petropoulos, David J. Richardson, and Nikolay I. Zheludev. “Fibre-optic metadevice for all-optical coherent signal processing at 40 Gbit/s”. In: *OSA CLEO Pacific Rim 2017 (Post-deadline Paper)*.