2025 IEEE Photonics Conference (IPC)

Proceedings

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2025 SBFoton International Optics and Photonics Conference (SBFoton IOPC)
São Pedro, São Paulo, Brazil / September 21th - 24th 2025

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IOPC25
INTERNATIONAL OPTICS & PHOTONICS CONFERENCE
São Pedro, SP Brazil

2025 SBFoton International Optics and Photonics Conference (SBFoton IOPC)
São Pedro, São Paulo, Brazil
21-24 September 2025

Conference Program

Promotion

sbfoton

Embrapa Instrumentation

Support

Sisfóton — cpqd Laboratório Integrador

CNPq — Conselho Nacional de Desenvolvimento Científico e Tecnológico

CAPES

FAPESP

THORLABS

BRUKER

Instrutécnica — instrumentação para pesquisa e indústria

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KEYSIGHT TECHNOLOGIES

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Ministério da Ciência, Tecnologia e Inovação

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SBFoton Committee	Denise Maria Zezell (IPEN / SP) Herculano da Silva Martinho (UFABC / SP) Simone Telles (SBFoton / SP)

Conference Venue

Hotel Fazenda Fonte Colina Verde

With 44 years of tradition, Hotel Fonte Colina Verde is perfect for those looking for an attractive program for the whole family. With a 200,000 m² structure and more than 153 apartments, we offer differentiated service, typical country cuisine, a passionate farm atmosphere, and lots of fun for all ages.

Social Events

Sunday, 21 September
20:30 – 22:00 Cocktail

Tuesday, 23 September

20:00 – 22:00 Conference Dinner

Plenary Talks

	Title	Speaker	Chair
Sunday 19:30-20:30	From basic research with atoms and molecules to the applications of light in life science: the trajectory of CEPOF and its innovations	**Vanderlei Salvador Bagnato (IFSC-USP/SP/Brazil)**	
Monday Biophotonics 08:30-09:15	Translational Clinical Biophotonics	**Jürgen Popp (Friedrich Schiller University of Jena/German)**	Newton Cesário Frateschi
Monday Lasers 09:15-10:00	High Power, watt-class diode lasers – Overview of recent progress	**Daniel Renner (IEEE Photonics Society/USA)**	Newton Cesário Frateschi
Monday Photonics and quantum technologies 13:30-14:15	Integrated photonics for light-matter interaction in the second quantum revolution	**Gustavo Wiederhecker (UNICAMP/SP/Brazil)**	Thiago Pedro Mayer Alegre
Monday Integrated photonics and optoelectronics 14:15:15:00	Optical metrology for characterization of nanostructures	**Silvania F Pereira (Delft University of Technology/Netherlands)**	Thiago Pedro Mayer Alegre
Tuesday Optics and instrumentation 08:30-09:15	Photonics on Mars – the SuperCam instrument	**Ivair Gontijo (NASA/USA)**	Nilson Dias Vieira Junior
Tuesday Agri-photonics and sustainability	Laser-induced breakdown spectroscopy:	**Timur Labutin (Lomonosov Moscow University/Russia)**	Nilson Dias Vieira Junior

09:15-10:00	Expanding from extreme environments to Routine Natural Sample Analysis		
Tuesday Talk 13:30-14:00	The CPQD's Role in the Photonics Ecosystem and a Sisfóton Overview	**Rafael Figueiredo (CPQD/SP/Brazil)**	Erik Fujiwara
Wednesday Optical communication 08:30-09:15	Optical wireless technologies: Unlocking multi-terabit wireless connectivity	**Paulo Pereira Monteiro (University of Aveiro/Portugal)**	Alexandre de Almeida Prado Pohl
Wednesday Sensor, image and illumination 09:15-10:00	Waveguides with different architectures based on GeO2 and TeO2 using Si technology and fs laser irradiation: a review	**Luciana Reyes Pires Kassab (FATEC/SP/Brazil)**	Alexandre de Almeida Prado Pohl
Wednesday Talk 13:30-14:00	Emerging Photonic Trends in the Data Center & AI Infrastructure	**Rodrigo Vicentini (Keysight/Brazil)**	Alexandre de Almeida Prado Pohl

Oral Presentations

Monday Morning

10:30-11:50: Biophotonics, Session 1 (PL) (Chair: Herculano da Silva Martinho)

10:30-10:50	Invited Talk 1	**Hugh James Byme (Dublin Institute of Technology)**	No title
10:50-11:05	1571170927	Daniella L. Peres, Daniela Teixeira da Silva, Joaquim C. Felipe, Luciana Corrêa, Leandro L. de Matos, Thiago Martini Pereira, Denise Maria Zezell	Discriminating Oral Squamous Cell Carcinoma via μFTIR Spectroscopy Imaging and Tree-Based Models
11:05-11:20	1571172356	Daniella L. Peres, Daniela Teixeira da Silva, Joaquim C. Felipe, Luciana Corrêa, Leandro L. de Matos, Mário Olímpio de	Impact of Sampling Strategies on the Classification of micro-FTIR Hyperspectral Data

		Menezes, Thiago Martini Pereira, Denise Maria Zezell	
11:20-11:35	1571171399	Danielle Laskowski, Sido Feilstrecker Junior, Vinicius P. Anjos, Kevin S Costa, Thiago Neves Machado, Jorge Lenz, Emilson Ribeiro Viana, Rafael Eleodoro de Goes, Wido Herwig Schreiner, Arandi G. Bezerra, Jr.	Laser Ablation in Liquids as a Versatile Approach for the Synthesis of Hybrid Nanoparticles with Plasmonic and Magneto-Plasmonic SERS Applications
11:35-11:50	1571168008	Vinicius P. Anjos, Maria Renata V. B. Freire, Raffaele Stasi, Daniela de Fátima Teixeira da Silva, Denise M. Zezell	Chemometric Evaluation of Ampicillin Stability using FTIR Spectroscopy and Multivariate Techniques

10:30-11:50: Integrated Photonics and Optoelectronics, Session 1 (Room 1) (Chair: Lino Misoguti)

10:30-10:50	Invited Talk 2	**Cleber Renato Mendonça (IFSC-USP-São Carlos)**.	Ultrafast laser processing for novel photonic system
10:50-11:05	1571171272	**Gustavo H. Magro**, Maria Carolina Volpato, Eduardo Oliveira Bastos, Luis A. M. Barea, Pierre-Louis de Assis, Newton Cesário Frateschi	Hybrid integration of two-dimensional dichalcogenides for low power saturable absorption in photonic integrated circuits
11:05-11:20	1571170013	**Frida L. Flores Rivera**, Grethell Georgina Pérez Sánchez, Yolotzin Medina, Rodolfo López-Romero, Leandra I. de Abreu, Ivan A. Aldaya	Erbium and ytterbium co-doped calcium-zinc and sodium-zinc phosphate glasses as high-gain media for integrated photonics
11:20-11:35	1571171107	**Vinicius Pereira Pinto**, Jose Luis Clabel Huaman, Cleber Renato Mendonca, Gabriel de Oliveira Campos	Incorporation of $BaTiO_3$: Er/Yb Nanoparticles into Polymeric Resins for Two-Photon Polymerization
11:35-11:50	1571172758	**Ana Carolina Borges**, Abel Quispe, Alejandro Sierra, Stephany	Influence of Silicon Substrate Type and HF Concentration on the

		Torres, Andrea Balan, Walter Salcedo	Optical and Morphological Properties of Porous Silicon Microcavities

10:30-11:50: Agri-photonics and Sustainability, Session 1 (Room 2) (Chair: Anderson Rodrigues Lima Caires)

10:30-10:50	Invited Talk 3	**Giorgio Saverio Senesi (National Council Research (CNR) – Italy)**	Laser-induced Breakdown Spectroscopy: A fast in-situ technique applied to identify and discriminate grains and seeds of different nature and detect plant viruses
10:50-11:05	1571172396	**Luís Carlos Leva Borduchi**, Helga Maria Darezzo, Daniele Souza, Debora Marcondes Bastos Pereira Milori.	Integrating LIBS and Machine Learning to Identify Aphelenchoides besseyi Infection in Asymptomatic Soybean Leaves
11:05-11:20	1571161158	**Helga Maria Darezzo**, Luís Carlos Leva Borduchi, , Raphael Antonio Caface, Debora Marcondes Bastos Pereira Milori.	Detection of Escherichia coli in Tomatoes Using Laser-Induced Breakdown Spectroscopy and Machine Learning
11:20-11:35	1571171275	**Luís Carlos Leva Borduchi**, Helga Maria Darezzo, Debora Marcondes Bastos Pereira Milori, Ladislau Martin-Neto.	Total Carbon and Nutrient Quantification in Brazilian Soils Using LIBS Technique with One-Point Calibration
11:35-11:50	1571172368	Daniele Souza, Kleydson Stenio, **Vicente S. Mattos**, Luís Carlos Leva Borduchi, Arthur Lopes Marques Lara, Aida Magalhães, Debora Marcondes Bastos Pereira Milori.	Automated Nutritional Diagnosis in Plants Using DP-LIBS and LIBSsa Software

Monday Afternoon

15:30-16:35: Optics and Instrumentation, Session 1 (PL) (Chair: Lino Misoguti)

15:30-15:50	Invited Talk 4	**Daniel Varela Magalhães (IFSC-USP-São Carlos)**	Atomic standards of time and frequency and timekeeping applications
15:50-16:05	1571171102	**Lucas G. Woiblet**, Nick J. Schilder, Bernardo Dias da Costa, Pedro Vinicius Pinto Nascimento, Gustavo, Nunes Martins, Gustavo Wiederhecker, Thiago Alegre	Reliable and Affordable Interferometric Wavemeter
16:05-16:20	1571172420	**Julio Gallinaro Maranho**, Patricia Aparecida Ana	A Modular Open-Source Platform for Laboratory Automation in Spectroscopic Applications
16:20-16:35	1571172144	**Renato Moysés Mafra**, Lino Misoguti	Polarization-Resolved Heterodyne Z-Scan for nonlinear refractive index discrimination using ultrafast-high-repetition laser pulses

15:30-16:35: Lasers, Session 1 (Room 1) (Chair: Ricardo Rego Bordalo Correa)

15:30-15:50	Invited Talk 5	**Claire Marie Cisowski (University of Glasgow, UK)**	Skyrmions as topological light fields
15:50-16:05	1571167015	**Juan Coronel**, Eisa AlNeyadi, Aaesha Alteneiji, Predrag Sekulic, Guillaume Matras, Felix Vega	IR Spectral Beam Combining: Implementation and Performance Analysis
16:05-16:20	1571170599	**Felipe Maia Prado**, Jessica Dipold, Nicklauss Wetter	ReLU-like Nonlinear Activation from an Nd: YVO Random Laser
16:20-16:35	1571170735	**Paulo Jorge de Morais**, Rubens Cavalcante da Silva, Wagner de Rossi, Claudio C. Mota	Adaptive Optics Systems: Lagrange-Based Woofer-Tweeter Control

15:30-16:35: Optical Communication, Session 1 (Room 2) (Chair: Arismar Cerqueira Sodré Junior)

15:30-15:50	Invited Talk 6	**Paulo Sergio de Brito (Instituto Superior Técnico de Lisboa, Portugal)**	Quantum Technology: The pathway for intrinsic secure
15:50-16:05	1571171459	**Gabriel Bozelli**, Ana Laura Graças, João Pedro Gosmin, Artur Alfe, Leandra I. de Abreu, Ivan Aldaya	NSGA-II-based multi-objective optimization of neural networks for nonlinear compensation in digital coherent interconnects
16:05-16:20	1571171240	**Ivan A. Aldaya**, Pedro Henrique dos Santos Almeida, Robson Assis Colares, Darli Mello	Mitigation of Nonlinear Distortion in Unrepeatered Interconnects Employing Clustering Algorithms
16:20-16:35	1571170036	**Humberto V. Q. Melo**, Pedro Henrique dos Santos Almeida, Robson A. Colares, Darli A. A. Mello	PAM-4-based Cost Function for CD Estimation in Kramers-Kronig SSB-PAM-4 Systems

Tuesday Morning

10:30-11:55: Biophotonics, Session 2 (PL) (Chair: Lilia Coronato Courrol)

10:30-10:50	Invited Talk 8	**Peter Gardner (Manchester University, UK)**	Separating pussycats and tigers: Risk stratification of prostate cancer using infrared QCL imaging
10:50-11:10	Invited Talk 10	**Hilde Harb Buzza (Faculdad de Física, PUC-Chile)**	Optimizing the Photodynamic Effect with Photosynthetic Microalgae
11:10-11:25	1571172762	**Erika Toneth Ponce Ayala**, Layla Pires, Camila Aparecida Antunes, Michelle Barreto Requena, Vanderlei Salvador Bagnato, Sebastião Pratavieira	Evaluation of ALA-Mediated Sonodynamic, Photodynamic, and Sonophotodynamic Therapies in a Murine Model of Early-Stage Cutaneous Melanoma
11:25-11:40	1571172415	**Alfredo Hernández Mendoza**, Josué Daniel Rivera Fernández, Karen Roa Tort, Macaria Hernández Chávez, Diego Adrián Fabila Bustos	Low-cost driver for pulsed blue laser diode systems for telangiectasias treatment
11:40-11:55	1571171236	**Cynthia S. A. Caires**, Amanda F. Pires, Leandro O. Araujo, Anderson Caires, Samuel L. Oliveira	NIR-Triggered Photothermal Antimicrobial Strategy Using PCPDTBT Nanoparticles

10:30-11:55: Photonics and Quantum Technologies, Session 1 (Room 1) (Chair: Márcio Peron Franco de Godoy)

10:30-10:50	Invited Talk 7	**Thiago Pedro Mayer Alegre (UNICAMP-Campinas)**	Advances in Optomechanical Platforms for Quantum Photonics and Transduction
10:50-11:10	Invited Talk 7b	**Celso Villas Boas (UFSCar)**	Fundamental Light Interference to Quantum Communication: New Interpretation and Applications
11:10-11:25	1571171268	**Luís Gustavo Maciel Riveros**, Marvyn Inga, João B. Rosolem,	Evaluating Quantum Randomness: Random-Walk-Based

		Eduardo Mobilon, Tiago Sutili, and Rafaél C. Figueiredo	Characterization of Quantum-Random Number Generators
11:25-11:40	1571173964	**Maria Carolina França Volpato**, Kalebe Estevam, Marcelo I. Davanco, Pierre-Louis de Assis	Broadband photonic structures to achieve high coupling efficiencies and Purcell factors with dark and interlayer excitons in 2D materials
11:40-11:55	1571172784	**Bruno Santos de Souza**, Franciele Renata Henrique, Tiago Bonicelli Gambarotto, Marcio Daldin Teodoro, Paulo H. D. Ferreira, Filippo Giovanni Ghiglieno, Celso J. Villas Boas	Statistical Analysis of the Experimental Reconstruction of Photon Distribution for Attenuated Lasers

10:30-11:50: Sensors, Image and Illumination, Session 1 (Room 2) (Chair: Cleber Renato Mendonça)

10:30-10:50	Invited Talk 9	**Marcelo Nalin (IQ-UNESP-Araraquara)**	Rare Earths Containing Garnets Single Crystals for Magneto-Optical and Luminescent Sensors
10:50-11:05	1571172754	**Eduardo A. V. Souza**, Tales de Vargas Lisbôa, Eric Fujiwara, Axel Spickenheuer, Cristiano M. B. Cordeiro	Non-Invasive Investigation of Humidity in Natural Fibers Using Specklegram Analysis
11:05-11:20	1571155856	**Matheus Bulhões Barbosa**, Rodrigo Moreira Bacurau, Alex Dante	High-Resolution Microcontroller-Based Interrogator for Fiber Bragg Grating Arrays
11:20-11:35	1571172726	Jacilene Martins Medeiros, Antônio A. de Godoy von Zuben, Renato Goulart Jasinevicius, Luís Alberto Mijam Barêa, Arlindo Neto Montagnoli, José Alexandre Diniz, **Giuseppe Antonio Cirino**	Direct laser writing of binary Fresnel Zone Plates for low-cost Shack-Hartmann wavefront sensors
11:35-11:50	1571166107	Yungui Ma, Yifan Shao	Pixelated Bayer spectral router based on meta-atom arrays

Tuesday Afternoon

14:00-15:20: Lasers, Session 2 (PL) (Chair: Lúcia Akemi Miyazato Saito)

14:00-14:20	Invited Talk 11	**Henrique Guimarães Rosa (Machenzie-São Paulo)**	Thickness-dependent second harmonic generation in mechanically exfoliated 3R-niobium disulfide: An experimental and theoretical study
14:20-14:35	1571172807	**Felipe Maia Prado**, Sidney Leal da Silva, Niklaus Wetter	AND, OR, and XNOR Optical Logic Gates via Pixel-Wise Modulation with Spatial Light Modulators and 4f System
14:35-14:50	1571170663	**Elbis S. Cardoso**, Ricardo E. Samad, Claudio C. Motta	Comparative Analysis of Transverse Mode Instability in Single-Clad and Double-Clad Fibers
14:50-15:05	1571171277	**Elbis S. Cardoso**, Ricardo E. Samad, Claudio C. Motta	Theoretical Investigation of Transverse Mode Instability in Yb-DCFs Due to Thermally-Induced Modal Coupling
15:05-15:20	1571172414	**Marlon Medeiros Correia**, Tomas P. V. Andrade, Flávio Cruz	Stimulated Brillouin Scattering Fiber Ring Laser Synthesizing 10.9 GHz Low-Noise Microwave Continuous Wave Signal

14:00-15:20: Optical Communication, Session 2 (Room 1) (Chair: Darli Mello)

14:00-14:20	Invited Talk 12	**Filippo Giovanni Ghiglieno (UFSCar-São Carlos)**	From Snell to quantum cryptography: the optical fiber that connects the world
14:20-14:35	1571165647	Gabriel Leonardo da Silva, Amanda de Farias Ribeiro, **Enzo Dantas da Silva**, João Gabriel Marques de Carvalho, Flavio A. M. Marques, Alexandre A. C. Cotta, Jefferson E. Tsuchida, Diego C. Fuzatto, Leomar S. Marques, Walter Margulis, Jonas H. Osório	Optical fiber transverse displacement sensor based on a 3D-printed structure and specklegram analysis

14:35-14:50	1571171198	**Renan V. B. Carvalho**, Diego, Pinheiro, Henrique Alves Dinarte da Silva, Raul Almeida Jr, Carmelo Basto-Filho	A Methodology to Comprehend the Features Importance in Hybrid RSA Using ML
14:50-15:05	1571169364	**Pedro Henrique dos Santos Almeida**, Robson Assis Colares Darli Mello	Power Autocorrelation-based CD Estimation in IMDD Systems with Transmitter Precompensation
15:05-15:20	1571169734	**Lucca Zogbi, Lucca A. Santos**, Felipe Pinto, Arismar Cerqueira Sodré Jr	R-PoF System for B5G Smart Farming Applications

14:00-15:20: Integrated Photonics and Optoelectronics, Session 2 (Room 2) (Chair: João Batista Rosolem)

14:00-14:20	Invited Talk 13	**Evandro Conforti (Unicamp-Campinas)**	Photonic Integrated Circuits: Basic Challenges and Promises
14:20-14:35	1571172407	**Carlos Alvarado**, Marcos A. R. Franco, Paulos de Tarso Neves Jr, Alexandre Pohl	Influence of the Electrode Size in the Design of Polymer-based Phase Electro-Optic Modulators
14:35-14:50	1571172751	**Tomaz Catunda**, Antonio Ricardo Zanatta, Thiago Augusto Lodi, Leonardo Albino, Marcelo Nalin	Structural and Spectroscopic Properties of Nd doped YAG microsize Single Crystals
14:50-15:05	1571170047	**Miguel Nienstedt**, Luca O. Trinchao, Eduardo S. Gonçalves, Luiz Peres, Miguel Diniz, Paulo F. J. de Siqueira, Nathalia B. Tomazio, Thiago Alegre, Gustavo Widerhecker	Dynamics of Dual-Pumped Kerr Frequency Combs
15:05-15:20	1571167724	**Giovana Bonano Carlos**, Herculano Martinho, Carla Carolina Bandeira, André Mourão Batista	Diphenylalanine micro/nanotubes self-assembly control: geometric confinement, electric field and recrystallization effects

Wednesday Morning

10:30-11:50: Agri-photonics and Sustainability, Session 2 (PL) (Chair: Ladislau Martin Neto)

10:30-10:50	Invited Talk 14	**Anderson Rodrigues Lima Caires (UFMS-Campo Grande)**	Application of Chlorophyll Fluorescence in Agriphotonics
10:50-11:05	1571172409	**Vinícius G. Rufino**, Bianca B. Barreto, Yina J. Onofre, Tiago S. do Espirito Santo, Letícia P. Dantas, Otávio R. de Paula, Debora M. B. P. Milori	Fluorescence Image Processing and Machine Learning Models for Early Detection of Water Stress
11:05-11:20	1571171848	**Tiago S. do Espirito Santo**, Bianca B. Barreto, Yina J. Onofre, Vinícius G. Rufino, Kaique C. Pereira, Otávio R. de Paula, Letícia P. Dantas, Rafael Galbieri, Debora M. B. P. Milori	Laser-Induced Fluorescence Spectroscopy on Cotton Leaves for Early Detection of Nematode Infection
11:20-11:35	1571169856	**Bianca Batista Barreto,** Letícia P. Dantas, Otávio R. de Paula, Vinícius G. Rufino, Rafael Galbieri, Paulino R. Villas-Boas, Debora M. B. P. Milori	Early Diagnosis of Nematode Attack in Cotton Plants Using Photonic Techniques
11:35-11:50	1571172142	**Raphael Antônio Caface**, Helga Maria Darezzo, Arthur L. M. Lara, Daniela Souza, Debora M. B. P. Milori	Pb calibration using DP-LIBS in tomato cultivation

10:30-11:50: Optics and Instrumentation, Session 2 (Room 1) (Chair: Sérgio Celaschi)

10:30-10:50	Invited Talk 15	**Miguel Angel Venegas (Molecular Vista Inc)**	Understanding Chemical Characterization at the Nanoscale: Towards the development of a numerical Photo-induced Force Microscope (n-PifM), a virtual PiFM, for Image and spectroscopy calculations

10:50-11:05	1571165320	**Gabriel de Freitas**, Henrique Patriota Alves, Joaquim F. Martins-Filho	Design of Oxide/Metal/Hydride Plasmonic Devices Based on D-shaped Optical Fibers for H2 Sensing
11:05-11:20	1571158559	**Murilo Neco Saraiva**, Cleber R. Mendonça	Random Forest for chalcogenide glasses: A data-driven method for predicting the nonlinear refractive index
11:20-11:35	1571171335	**Ricardo Rego Bordalo Correia**, André L. D. Valentina, Amanda K. Fritsch, Antônio Z. Khoury	Second Harmonic Generation of Beams with Stochastic Structures
11:35-11:50	1571171345	**Yina Julieth Onofre**, Vinícius G. Rufino, Bianca B. Barreto, Tiago S. do Espirito Santo, Kaique C. Pereira, Gabriel L. de Moura, Rafael Galbieri, Debora M. B. P. Milori	Development of a Fluorescence Imaging Platform for Greenhouse Applications

10:30-12:05: Optical Communication, Session 3 (Room 2) (Chair: Jonas Henrique Osório)

10:30-10:50	Invited Talk 16	**Brian Pinheiro da Silva (SENAI)**	An Overview of Free-Space Optical Links in Brazilian Quantum Network
10:50-11:05	1571170003	**Ana Júlia N. Francisco**, Plinio S. Dester, Otávio Mendonça, Rafael A. Penchel, Leandra I. de Abreu, Ivan A. Aldaya	Multi-criteria evaluation of Bi-LSTM Recurrent Neural Network for Nonlinearity Compensation in Digital Coherent Optical Systems
11:05-11:20	1571169635	**João Pedro Gosmin**, Raphael Vico, Grethell G. P. Sánchez, Rafael A. Penchel, Ivan A. Aldaya, Leandra I. de Abreu	Anomaly detection in fiber-based distributed acoustic sensing systems employing autoencoders
11:20-11:35	1571171214	Carine Mineto, **Luis G. M. Riveros**, Jhonathan B. de Souza, Weskley	Analysis of Optical Propagation Delay as a

		Maurício, Tiago Sutili, Júlia A. S. Maciel, Maykon Silva, Rafael C. Figueiredo	Limiting Factor in 5G OpenRAN Fronthaul
11:35-11:50	1571169048	**Eduardo Lima**, Lara M. Souza, Arismar C. Sodré Junior	Tunable Optical Frequency Comb Generation Applied to DWDM and 5G Networks
11:50-12:05	1571171222	**Bruno Pereira de Souza** Rocha, Pablo R. N. Marciano, Maxwell E. Monteiro, Maria J. Pontes, Marcelo Segatto	Analysis of n-th Order Fully-Optical FIR Filters for Chromatic Dispersion Compensation

Wednesday Afternoon

14:00-15:35: Sensors, Image and Illumination, Session 2 (PL) (Chair: Erik Fujiwara)

14:00-14:20	Invited Talk 17	**Marcelo Eduardo Vieira Segatto (UFES, ES)**	Optical Fiber Sensors and Applications
14:20-14:35	1571172150	**Júlia C. X. de Lima**, Lidia O Rosa; Audrey Seda, Cristiano MB Cordeiro, Eric Fujiwara	Electrostatic-driven soft device with embedded optical fiber displacement sensor
14:35-14:50	1571172744	**Laila El Haddad**, Luis Barêa	Dissipative Optical Sensor based on a Photonic Molecule with U-Shaped Feedback Waveguide
14:50-15:05	1571166295	**Sergio Celaschi**; Henrique De Canavarro Alencar; Alexandre Augusto De Melo	Continuously monitoring the Biological Oxygen Demand of effluents by optically determining
15:05-15:20	1571171398	**Luiz Peres**, Luca O. Trinchao, Eduardo S Gonçalves, Miguel Nienstedt, Paulo F. J. de Siqueira, Nathalia B Tomazio, Thiago Alegre, Gustavo Wiederhecker	Characterizing Supermode Overlaps in Coupled Microresonators through Kerr and Thermal
15:20-15:35	1571158333	**Bruno Trefilio Magalhães**, Ana Luiza Costa Silva, Marcio Godoy	Light-stimulated atmosphere-dependent neuromorphic device

14:00-15:35: Biophotonics, Session 3 (Room 1) (Chair: Luciano Bachmann)

14:00-14:20	Invited Talk 18	**Kássio Michell Gomes de Lima (UFRGN-Natal)**	Use of multivariate classification algorithms with variable selection applied to biospectroscopy
14:20-14:35	1571172488	**Eduardo Ignacio Castellón** Castillo; Diego Adrián Fabila Bustos; Rodrigo Mercado Pimentel; Macaria Hernández Chávez	EasyBrainGen: An Easy-To-Use Automated Workflow for Generating 3D Brain Models from MRI Based on FastSurfer

14:35-14:50	1571171279	**Barbara Regina Melo Ribeiro;** Fernanda Luiza Menezes; Luisa Helena Carmo Araújo; Danielle Cristina Teles Ferreira; Sara Santos Bernardes; Ana Maria de Paula	Nonlinear microscopy imaging and automated analysis allow evaluation of changes in collagen fibers in melanoma
14:50-15:05	1571169061	**Murilo S Sampaio**; Luismar Barbosa da Cruz, Jr; Kaio Bernardo Barros; Luciano Bachmann	Evaluating Skin Tone Classifications through Simulated Optical Properties
15:05-15:20	1571173799	**Maria L F Vicente**; Houssam Hajjoul; Francisco Eduardo Gontijo Guimarães	Singlet oxygen generation by a single soot nanoparticle: a two-photon confocal microscopy quantification
15:20-15:35	1571162948	**Luismar Barbosa da Cruz**, Jr; Marlon Rodrigues Garcia; Lilian Tan Moriyama; Vanderlei Bagnato; Sebastião Pratavieira	Impact of Occupational Activities on Fingerprint

14:00-15:35: Lasers, Session 3 (Room 2) (Chair: Paulo Henrique Dias Ferreira)

14:00-14:20	Invited Talk 19	**Nilson Dias Vieira Junior (IPEN-São Paulo))**	Implementation of an ultra-high-intensity laser multiuser facility in Brazil
14:20-14:35	1571161149	**Otávio Augusto Capeloto**; Vitor Santaella Zanuto; Leandro Herculano da Silva; Nelson Guilherme Castelli Astrath; Luis Carlos Malacarne; Gustavo Vinicius Bassi Lukasievicz	Nanosecond Thermoelastic Waves Detection in Optical Material by Pulsed Thermal Mirror and Thermal Lens Methods
14:35-14:50	1571167688	**Giovanni Budroni**, Nt; André F.V. Fonseca; Ana Flávia Nogueira; Jonathas Siqueira	Effect of Quantum Dot Passivation on Hybrid Perovskite Photoconductivity Probed by Optical Pump-Terahertz Probe

14:50-15:05	1571169711	**Sergio Castrillon Salazar**; Henrique Guimarães Rossa; David Steinberg; Matheus G Bonando; Suelene Silva Piva; Cecília de Carvalho C. C e Silva; Juan Zapata; Lúcia Akemi Miyazato Saito	Blade-coated graphene oxide onto D-shaped fiber as a saturable absorber for femtosecond pulse generation
15:05-15:20	1571171231	**Ricardo E. da Silva**; Cristiano MB Cordeiro	Laser-Assisted Deposition of Carbon Nanotubes in Optical Fibers with Multiparameter Control
15:20-15:35	1571172785	**Felipe Maia Prado**; Sidney Leal da Silva; Niklaus Wetter	High-SSIM Reconstruction of Computer-Generated Off-Axis Holograms Using Neural Networks

Poster Presentations

Monday 22
Porter Session 1 (16:35 – 18:00)

Biophotonics

Poster number	Manuscript number	Title	Authors
1	1571172790	Thermal Analysis of Skin-Mimicking Phantoms Under Low Intensity Laser	**Julia Cristina da Silva Oliveira**; Murilo S Sampaio; Kaio Bernardo Barros; Carlos Eduardo Girasol; Luciano Bachmann; Luismar Barbosa da Cruz, Jr
2	1571171409	Ex Vivo Thermal Response of Artificially Pigmented Porcine Skin under Photobiomodulation Protocols	**Isabel Cristina Tinós**; Macsiel Nunes Lima Neves; Julia Cristina da Silva Oliveira; Lilian Tan Moriyama; Luismar Barbosa da Cruz, Jr; Marlon Rodrigues Garcia
3	1571172737	Curcumin and Berberine-Functionalized Selenium Nanoparticles: Synthesis, Characterization, and Biomedical Applications	**Geovanna N Barnabé**; Isabela Lopes; Marcia Franzolin; Bianca Moraes; Susana Barreto; Lilia Coronato Courrol
4	1571170773	Development of a Compact LED Driver and Python-Based Graphical Control Interface for Lens-Free Holographic Microscopy	**Marlon Rodrigues Garcia**; Camila de Paula D'almeida; Cesar Yudi Kuramoto; Felipe Alvarenga Carvalho; Sebastião Pratavieira
5	1571169042	Optics in Pulse Oximetry: Correlation with Oxygen Saturation Accuracy	**Kaio Bernardo Barros**; Jocássia Silva Pinheiro; Murilo S Sampaio; Luismar B. Cruz Junior; Fernando Fagundes Ferreira; Anibal Basile-Filho; Rinaldo Guirro; Luciano Bachmann
6	1571172429	Spatial Dependence of OCT-Based Measurements of Stratum Corneum Thickness and External Ridge Width on Human Digital Core	**Macsiel Nunes Lima Neves**; Luismar Barbosa da Cruz, Jr; Sebastião Pratavieira; Marlon Rodrigues Garcia
7	1571171799	Identifying Inflammatory Signatures in Heart	**Raffaele Stasi**; Daniela De Fátima Teixeira Da Silva;

		Tissue via FTIR and Linear Discriminant Mapping	Vinicius P Anjos; Emiliano Medei; Denise M Zezell
8	**1571172759**	Artificial Intelligence-Based System for the Diagnosis of Hepatic Steatosis	**Deyanira Lopez Salazar**; Josue Daniel Rivera Fernandez; Macaria Hernández Chávez; Carolina Guzmán Arriaga; Karen Roa Tort; Diego Adrián Fabila Bustos
9	**1571172753**	UVC decontamination of circulating preservation solution aimed at kidney transplantation improvement	**Loraine Carolina Goenaga Mafud**; Jose D Vollet Filho; Natalia Inada; Cristina Kurachi; Vanderlei Bagnato
10	**1571172428**	Prototype of a hybrid biosignal acquisition system integrating and optical electrode and fNIRS-based oximeter	**Amish Jocksan J Sierra islas**, Sr; Josue Daniel Rivera Fernandez; Luis Felipe de Jesus Hernandez Quintanar
11	**1571171418**	FTIR spectroscopy reveals systemic changes in apical periodontitis	**Giovana dos Santos Toledo**; Sara Maria Santos Dias da Silva; Paula Marinho; Maryane Rezende; Rayana Khoury; Luis Felipe Chagas e Silva de Carvalho
12	**1571164969**	Alveolar bone imaging with optical coherence tomography plus optical clearing agents: a pilot study for osteoporosis diagnosis	**Marcos Humberto Santos**; Marcella D. Zatta; Patricia Aparecida Ana
13	**1571155519**	Effects of GABA-Synthesized AgCuNPs and SeNPs on Sunflower Seed Development	Isabela Lopes; Charef Kazi Tani; Christophe Couteau; Lilia Coronato Courrol
14	**1571172459**	Crosslinking of gelatin films with Riboflavin and ultraviolet radiation: a pilot study	**Patrícia da Silva Souza**; Sonia Maria Malmonge; Nasser Ali Daghastanli; Patricia Aparecida Ana
15	**1571169724**	Radiative Transport Phenomenon in Turbid Media	**Bruno Henrique Garcia Malvestio**; Murilo S Sampaio; Luciano Bachmann
16	**1571165699**	Salivary ATR-FTIR Signatures for Obstructive Sleep Apnea: A Qualitative Review of	**Valeria Mendes**; Vinicius P Anjos; Daniela de Fátima Teixeira da Silva; Denise M Zezell

		Biomarkers and Methodological Validation	
17	**1571171250**	Diagnostic potential of FTIR spectroscopy in saliva: challenges in group differentiation	**Sara Maria Santos Dias da Silva**; Giovana dos Santos Toledo; Sara J Michalopoulos; Julia Nani Bittencourt Gouvea; Thiago Martini Pereira, Sr.; Luis Felipe Chagas e Silva de Carvalho
18	**1571172800**	UV-C Light Decontamination System Integrated with Organ Perfusion Machine for Transplantation	**Loraine Carolina Goenaga Mafud**; Jose D Vollet Filho; Daniel J Chianfrone; Washington L Coimbra; Natalia Inada; Cristina Kurachi; Vanderlei Bagnato
19	**1571172748**	Evaluation of Optical Clearing Agents and Mechanical Compression on Light Penetration in Skin Using Optical Coherence Tomography	**Jailda Nonato Dos Santos Oliveir**a; Camila Ramos Silva; Marcus Paulo Raele; Marcos Antonio Hortellani; Martha Ribeiro; Denise M Zezell; Marcello Magri Amaral

Agri-Photonics

Poster number	Manuscript number	Title	Authors
20	**1571169843**	Plant Stress Detection Using Photonic Techniques and Machine Learning	**Bianca Batista Barreto**; Letícia Piazentin Dantas; Otávio Rodrigues De Paula; Vinícius G Rufino; Francisco Aparecido Rodrigues; Debora M. Bastos Pereira Milori
21	**1571172782**	Label-Free Detection of Nitrate and Reactive Species in Plasma-Activated Water Using SERS on Gold Thin Films	**Isabela Machado Horta**; Nilton Francelosi Azevedo Neto; Felipe De Souza Miranda; Rodrigo Sávio Pessoa
22	**1571172667**	Change of Ligth Absorption and Scattering Due to Interactions Between Nanoparticles in Black Carbon Clusters	**Ana F Gomes**; Maria L F Vicente; Francisco Eduardo Gontijo Guimarães
23	**1571169018**	Laser-Induced Breakdown Spectroscopy and Chemometric Tools for Soil Fertility	**Andre T Maoze**, Sr; Gustavo Pontes; Alessandra de Souza Teixeira; Arcangelo Loss; Bruno Marangoni; Gustavo Nicolodelli

		Classification and Carbon Calibration	
24	**1571165432**	Laser Induced Breakdown Spectroscopy for evaluation of nutrients and adulterants in roasted and ground coffee	**Alessandra de Souza Teixeira**; Gustavo Pontes; Ricardo Schneider; Cleverson Busso; Otniel Freitas Silva; Andressa Moreira De Souza; Gustavo Nicolodelli
25	**1571172710**	Dronissil: Universal device for attachment to drones, unmanned aerial vehicles, and flying robots for autonomous operations of pest insect detection, identification, and elimination in crops	**Aline Bastos de Paiva**; Leomar S. Marques; Ariel Porto Da Silva; Bruno Carvalho Magalhães; Edgar Marques Paioleti Oliveira; Gabriela De Castro Lourenço; João Vitor Da Silva Santos; Júlia Mazoni Lopes; Nathan Bernardini De Loyolla; Nycolas Borges Da Silva; Lilian Ferreira De Sousa; Bruno Henrique Sardinha De Souza; Jefferson Tsuchida; Joaquim Paulo Da Silva; Joyce Dória; Tatiana Cardoso E Bufalo
26	**1571172786**	Applications of optical techniques for food quality analysis: milk, cheese and coffee	**Maria Jose Valenzuela Bel**l; Virgílio De Carvalho Dos Anjos
27	**1571172397**	OPC-LIBS for Quantification of Cd and Pb in Tomatoes: A Sustainable Approach to Food Safety Monitoring	**Luís Carlos Leva Borduchi**; Helga Maria Darezzo; Debora M. Bastos Pereira Milori
28	**1571172661**	Early Discrimination of Plant Stress Responses Using Laser-Induced Fluorescence Spectroscopy: A Case Study in Cotton	**Bianca Batista Barreto**; Vinícius G Rufino; Letícia Piazentin Dantas; Tiago Santiago do Espirito Santo; Yina Julieth Onofre; Rafael Galbieri; Debora M. Bastos Pereira Milori
29	**1571172122**	Carbon K-edge XANES Reveals Functional Chemistry Driving Soil Carbon Sequestration in Well-Managed Pasture	**Lucas Raimundo Bento**; Vitor Silveira Freitas; Steffen A. Schweizer; Patrícia P. A. Oliveira; José Pezzopane; Alberto C. De C. Bernardi;

			Debora M. Bastos Pereira Milori; Ladislau Martin-Neto
30	**1571166542**	Formation and Growth of Silver Nanoparticles: Effects of Light Intensity and Reaction Time in a Bio-Based Synthesis Using Açaí Seed Extract	**Lilia Coronato Courrol**; Thaina De Sousa
31	**1571170601**	Predicting Soil Carbon with NIRS in Brazilian soils	**Vitor Silveira Freitas;** Lucas Raimundo Bento; Daniele Souza; Vicente S Mattos; Debora M. Bastos Pereira Milori; Ladislau Martin-Neto
32	**1571166739**	Comparison of Soil Samples with Different Clay, Sand, and Silt Contents Using Speckle Interferometry	**Felipe Maia Prado**; Gustavo Di Chiacchio Faulin; Luis Eduardo Rissato Zamariolli; Pedro Henrique Miho de Souza; Niklaus Wetter; Sidney Leal da Silva
33	**1571170739**	Numerical Design of a Photonic Crystal Hydrogel Humidity Sensor for Agricultural Applications	**Licinius Dimitri Sá de Alcantara**

Sensors, Images and Illumination

Poster number	Manuscript number	Title	Authors
34	**1571172718**	Agar Optical Fibers Prepared by Dip Coating: Optical Characterization and Degradation Analysis	**Lidia O Rosa**; Francisco X. R. Neto; Eric Fujiwara; Cristiano MB Cordeiro
35	**1571165709**	Development of a Low-Cost Fabrication Process for PIN Photodiode Detectors	**Luis da Silva Zambom**; Ronaldo D Mansano; Henrique Chaves Gulino
36	**1571171261**	Distributed Acoustic Sensing and Convolution Neural Networks for Leak Detection in Low-Pressure Gas Pipelines	**Rodolfo Pinheiro Cruz**; Felipe Maia; Sérgio Barcelos; Luis E. Ynoquio Herrera; Ana M. Frattini Fileti
37	**1571172121**	Improving Light Shelf Performance by the Optimization of Tilt Angle	**Beatriz Miranda Viana**; Daniela Pawelski Amaro Marins; Maria José Pontes; José Leandro Félix Salles; Jussara Fardin; Marcelo E. Vieira Segatto; Helder Rocha

38	**1571172766**	Characterization of fiber bundles applied to visual inspection systems	**Mariana Chagas Alcantara dos Santos**; Bianca Yoshii; Jessica Guerreiro Santos Ramalho; Antônio Ivan Messias Soares Júnior; Valeria L da Silva
39	**1571162332**	Synthesis and characterization of rare-earth garnets for scintillators applications	**Breno C Siqueira**; Thiago Augusto Lodi, Sr; Leonardo Albino; Marcelo Nalin
40	**1571161365**	Performance Evaluation of FBG Array Sensors in Underground Power Distribution Lines	**Rivael S Penze**; Fabio R Bassan; Marvyn Inga; Joao B Rosolem

Lasers

Poster number	Manuscript number	Title	Authors
41	**1571161155**	Population and Thermal Lensing Effect in Nd3+ Doped Optical Materials	**Gustavo Vinicius Bassi Lukasievic**z; Otávio Augusto Capeloto; Vitor Santaella Zanuto; Mauro Luciano Baesso; Luis Carlos Malacarne; Nelson Guilherme Castelli Astrath
42	**1571169925**	Simulating Kramers Escape Dynamics under Forces in the Geometrical Optics Regime	**Gunther Damaceno Barbosa**; Antonio A. R. Neves
43	**1571165692**	Optical characterization of laser beams for the design of a laser deposition head with variable optics	**Bethina V Nicocelli**; Guilherme De Faveri; Joao B Rosolem; Luís Trabasso; Moisés Felipe Teixeira; Natalia Wendt Dreveck
44	**1571169853**	Fabrication and Characterization of an All-fiber 3 × 1 Pump Combiner	**Thassia Lopes Correia dos Santos**; Davi Pontes Nacaratti; Mauricio Moderno Carvalho; Claudio C. Motta; Thoroh Souza
45	**1571170844**	Fabrication and Characterization of a 7x1 End-Pumped Fiber Combiner	**Davi Pontes Nacaratti**; Thassia Lopes Correia dos Santos; Mauricio Moderno Carvalho; Thoroh Souza; Claudio C. Motta
46	**1571172711**	Enhancing Surface Finish of Additive	**Rener Washington Mariano dos Santos**; Lucas Da Silva

Manufactured 316L Stainless Steel via Laser Surface Remelting	Jubini; Jonas Jakutis; Rafael Humberto Mota De Siqueira; Ana Beatriz Ramos Moreira Abrahão

Tuesday 22
Porter Session 2 (15:30 – 17:30)

Integrated Photonics and Optoelectronic

Poster number	Manuscript number	Title	Authors
1	1571171334	Infrared Dataset Of Beach Sediment Samples and DFT Vibrational Calculations	**Julian Rayo Alape**
2	1571172319	Impact of Atomic Layer Deposited Al_2O_3 on the Dielectric Modulation and Optical Behavior of Plasmonic Silver Nanowire Networks	**Isabela Machado Horta**; Nilton Francelosi Azevedo Neto; Claudio Zepeda; Rodrigo Sávio Pessoa
3	1571171390	Ultrafast Terahertz Dynamics of Ti3C2Tx MXene	**Davi H. Soledade**; Giovanni Budroni, Nt; Daniel Corrêa; Jonathas Siqueira
4	1571172747	Epoxy with silver nanoparticles: a simple and cheap method for in situ synthesis	**Isabella D'andrea Lana da Silva**; Paulo H. D. Ferreira; Filippo Giovanni Ghiglieno; Vinicius Tribuzi Rodrigues Pinheiro Gomes
5	1571171463	Investigation of the optical properties of Er3+-doped fluorindate glasses	**Adriano Alemida da Silva**; Tomaz Catunda; Francisco Eroni Paz Eroni; Nefe Jefferson De Brito E Silva
6	1571171211	Effect of Ag-doping on the photoluminescence of nanostructered ZnS material	**Ana Laura Curcio;** Thiago Ardana Chaim; Maria Inês Basso Bernardi; Fábio S. De Vicente; Adriano J. G. Otuka; Alexandre Mesquita
7	1571171249	Red shift in photoluminescence emissions of ZnO nanoparticles with Mg incorporation	**Thiago Ardana Chaim**; Maria Inês Basso Bernardi; Fábio S. De Vicente; Adriano J. G. Otuka; Alexandre Mesquita
8	1571156210	Material Surface Analysis based on SD-OCT	**Vítor José Costa Rodrigues**; Emmanuel Leite De Medeiros; Tiago Henrique Brandao; José Mariano Lima Garcia; Fábio D. Simões; Daniel M Pataca
9	1571168142	Self-Assembly of Monodisperse	Paloma Elias da Silva Pellegrini, Renata C. Nome,

		Polystyrene Photonic Crystals via Blade Coating	Francisco Orlandini, Silvia V. G. Nista, Hugo E. H. Figueroa, Stanislav Moshkalev
10	**1571171326**	Fluorescence Properties of Graphene Quantum Dots embedded in GPTS/TEOS-derived Organic/Silica Sol	**Thiago Ardana Chaim**; Fábio S. De Vicente; Adriano J. G. Otuka; Alexandre Mesquita
11	**1571171088**	Characterization of group velocity dispersion in fiber-based Mach-Zehnder interferometers	**Gustavo Nunes Martins**; Lucas G Woiblet; André G Primo; Gustavo Wiederhecker; Thiago Alegre
12	**1571172755**	The refractive index of ion doped laser materials	**Davi S Oliveira**; Tomaz Catunda
13	**1571173949**	Photoluminescence of CaTiO3: Pr nanophosphor prepared by the polymeric precursosr method	**Melina Grandis**; Thiago Ardana Chaim; Adriano J. G. Otuka; Fábio S. De Vicente; Alexandre Mesquita
14	**1571172749**	Multiplex SERS Detection of Cationic Dyes Using Thin Silver Films Deposited by Magnetron Sputtering	**Nilton Francelosi Azevedo Neto**; Isabela Machado Horta; Jade Helena Campos Augstroze; Rodrigo Sávio Pessoa
15	**1571172732**	Two-Photon Polymerization of Fe2O3/Resin Nanocomposites for Magneto-Responsive Microstructures	**Daniel da Cruz Soares**; José Luis Clabel Huaman; Cleber R. Mendonca
16	**1571172419**	MoS_2-doped polymeric microstructures fabricated by two-photon polymerization	**Gabriel O Campos**; Vinícius Pereira Pinto; Kelly T. de Paula; Cleber R. Mendonca
17	**1571167190**	Photoinduced Effects in As_2S_3 and As_2Se_3 Thin Films by Femtosecond Excitation	**Orlando D Marbello Ospina**; Lino Misoguti; Nikita S Dutta; Craig B Arnold; Cleber R. Mendonca
18	**1571168663**	Dependence of amplitude and shape of the Z-scan curve on the detection aperture	**Lucius Borges de Souza**; Paulo C de Oliveira; Renato A Cruz; Tomaz Catunda

Optical Communication

Poster number	Manuscript number	Title	Authors

19	**1571172713**	Orthogonal Chirp Division Multiplexing for High-Speed Terahertz Wireless Systems	**Anderson Sanches**; Glecia Oliveira Pereira; Daniel M. C. Neves; Rafael Nobrega; Shyqyri Haxha; Antonio Jurado-Navas; Thiago R Raddo
20	**1571171264**	Experimental Analysis of a L-Band High-Concentration EDFA Performance Under Forward and Bidirectional Pumping	**Marcionilo José da Silva**; Marcelo Pereira Nogueira; Luis Gustavo Maciel Riveros; Tiago Sutili; Rafael C. Figueiredo
21	**1571169912**	Inferring Structured Beam Wavefront in Turbulent Free-Space Channel via Deep Learning	**Paulo Monteiro de Carvalho Monson**; Adriane Martins Alves; Antônio Pereira Junior; Yasmin Da Silva Bonfim; Marcos Gil De Oliveira; Cássio de Castro Silva; Christiano Moreira De Sá Do Nascimento; Braian Pinheiro da Silva; Valeria L da Silva
22	**1571171209**	Margin Analysis for QoT Estimation Using Analytical Network Digital Twins	**Marcos Antonio de Almeida Cora**; Jonathan Aguiar Soares; Darli Mello
23	**1571165308**	Analysis of the Influence of Different High-Power Laser Sources in a Raman-Amplified Radio and Power-over-Fiber Link	**Paulo Kiohara**; Romildo De Souza; Laura Ghisa; Veronique Quintard; Mikael Guegan; Arismar Cerqueira Sodré Junior; Olympio Coutinho; André Pérennou
24	**1571171256**	Performance Evaluation of Optical Short-Reach Links Without Blind Phase Search Algorithm Employing Narrow-Linewidth Lasers	**Júlia Aline Sousa Maciel**; Eduardo Rosa; Tiago Sutili; Rafael C. Figueiredo; Edson Porto da Silva
25	**1571168938**	Self-Homodyne ‘Coherent-Lite' Technique for Optical DWDM Communication Systems	**Mateus Souza Coelho**; Pablo Rafael Neves Marciano; Maxwell E. Monteiro; Maria Jose Pontes; Jair Adriano Lima Silva; Marcelo E. Vieira Segatto
26	**1571165419**	Assessment of a Hybrid RoF-MWP Architecture	**Frederico Francisco de Paula Campos**; Arismar

		over Free-Space Optical Links	Cerqueira Sodré Junior; Celso Henrique
27	**1571169022**	Unsupervised Regression for Nonlinear Equalization in Coherent Optical Interconnects	**Ana Laura Graças**; Gabriel Bozelli; Joao Pedro Gosmin; Artur Alfe; Leandra I de Abreu; Ivan A. Aldaya
28	**1571169886**	T-Shaped Microstrip Patch Antenna Design with Defected Ground Structure for Radio Frequency identification (RFID) and Modern Wireless Communications	**Maryam Liaqat**; Ali Raza; Matheus Henrique Barros da Silva; Ghulam Nabi; Maklayne Barros De Pontes Santiago; Frederico Nunes; Antonino Celso Dantas Antonino

Photonics and Quantum Technologies

Poster number	Manuscript number	Title	Authors
29	**1571171695**	Implementation of a Fiber-Based Quantum Key Distribution (QKD) Testbed Using Attenuated Laser Pulses	**Bruno Santos de Souza**; Franciele Renata Henrique; Marcio Daldin Teodoro; Celso J Villas Boas; Filippo Giovanni Ghiglieno; Paulo H. D. Ferreira

Optics and Instrumentation

Poster number	Manuscript number	Title	Authors
30	**1571171187**	Holographic optical tweezers using structured light beams	**Marcos R. R. Gesualdi**; Rafael A. Bonilla Suarez
31	**1571152849**	Spectroscopic Characterization of Indigenous Pigments from the Museum of Archaeology and Ethnology at UFPR	**Bruna M Gohl**; Carla Damasceno Feliciano; Evaldo Ribeiro; Sady Pereira Do Carmo Júnior; Emerson Cristiano Barbano
32	**1571165051**	Investigating Nonlinear Solvatochromism in Perylene	**Artur Barbedo**; André Pelosi; João Victor Pereira Valverde; Orlando D Marbello Ospina; Leonardo de Boni; Cleber R. Mendonca
33	**1571165052**	First-Order Hyperpolarizability of bromochalcone derivatives	**Nathan Bárbola Marucci**; João Victor Pereira Valverde; Eli Ducas; Pablo Gonçalves;

			Leonardo de Boni; Cleber R. Mendonca
34	**1571168607**	A Methodological Approach to Dental Tissue Analysis Using Raman Spectroscopy: Development and Clinical Insights	**Vicente S Mattos**; Jarbas de Castro Neto
35	**1571171127**	Evaluation of Fine-tuning EfficientNet and Vision Transformer model architectures for Oral Lesion Classification	**Akio Kenzo T Frazatto**; Ana Carolina F Motta; Ana Elisa R Alves Ribeiro; Renato Tinós; Luciano Bachmann
36	**1571172628**	Cost-Effective AI-Driven Integrated Photonics for Spectroscopic Analysis in Biofuels	**Pedro Oliveira Mariz de Carvalho**; Guilherme Luiz Chinini; Alex Dante; Luis E. Ynoquio Herrera; Sérgio Barcelos
37	**1571171196**	Turbulence effects in optical vortex: experimental generation and analysis via holographic techniques	**Marcos R. R. Gesualdi**; George Reis
38	**1571171431**	Optical Monitoring of Antioxidant Degradation in Oil-Based Systems	**Iuliia Riabenko**; Jeff Manthorpe; Ronald Miller
39	**1571171871**	Impact of Manual Agitation on FTIR Spectroscopic Characterization of Trichloroacetic Acid (TCA) Peels	**Sara J Michalopoulos**; Luis Feilipe Carvalho; Sheila C Cortelli; Fernando Gonçalves Togni; Nelson Maurício Júnior; Tatiana Aguilar
40	**1571153599**	AI-Driven Atmospheric Turbulence Compensation and Channel Modeling in FSO Systems	**Felipe Braga Bittar**; Andrés Pablo López Barbero; Fernando Guiomar; Gil Fernandes; Paulo P Monteiro; Vinicius Nunes Henrique Silva

Salivary ATR-FTIR Signatures for Obstructive Sleep Apnea: Review of Biomarkers and Sample Methodological Validation

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***Abstract* – This review investigates salivary ATR-FTIR spectral signatures as diagnostic and monitoring tools for Obstructive Sleep Apnea (OSA). The study not only reinforces previous findings but also consistently identifies key vibrational peaks (2962, 1643, 1546/1448, 1076, 1662 cm^{-1}). These results validate the proposed pre-analytical procedures for biofluid sample preparation, ensuring spectral reliability and demonstrating the effectiveness of this methodology in capturing salivary "molecular fingerprints" associated with OSA.**

***Keywords* – obstructive sleep apnea (OSA), ATR-FTIR spectroscopy, biomarkers, saliva, diagnosis**

I. Introduction

Obstructive Sleep Apnea (OSA) is a serious sleep-related breathing disorder affecting approximately one billion individuals worldwide [1]. It is characterized by intermittent hypoxemia and frequent micro-arousals, leading to significant neurological and hemodynamic consequences [2]. Although in-laboratory polysomnography (PSG) remains the diagnostic gold standard, its complexity, high cost, and limited accessibility restrict its widespread use. While home-based PSG methods are gaining traction, they primarily focus on oxygen saturation, overlooking other systemic effects of OSA [3]. This diagnostic gap underscores the need for a more accessible, well-tolerated, and effective approach for OSA management.

Saliva has emerged as a promising biofluid for biomarker identification, due to its non-invasive collection, ease of handling, and rich biochemical composition that reflects systemic health [4]. Attenuated Total Reflectance-Fourier Transform Infrared (ATR-FTIR) spectroscopy is a rapid label-free technique capable of providing detailed biomolecular information through infrared radiation interaction. Its ability to generate a unique "spectral fingerprint" makes it particularly suitable for biofluid analysis, offering a novel approach to investigate biochemical changes associated with OSA [5].

This review examines salivary ATR-FTIR spectral signatures as potential biomarkers for OSA and validates essential pre-analytical sample preparation steps to ensure reliable spectra acquisition. These methodological refinements are critical for data quality and reproducibility in biofluid vibrational spectroscopy, in alignment with standardization principles proposed by Baker et al. [5].

II. Methodology

The relevance of the results presented in this study stems from rigorous methodology applied to the collection, processing, and analysis of salivary samples using ATR_FTIR spectroscopy. These procedures ensure spectral reproducibility and reliable biomarker identification, in accordance with the standardization principles advocated by Baker et al. [10].

A. Saliva Sample Collection and Processing

A robust protocol for salivary ATR-FTIR sample handling is essential for generating clinically meaningful data. Each step plays a critical role in minimizing artifacts and preserving biological signs [5].

Sample Acquisition: The study protocol was approved by the Research Ethics Committee of the School of Dentistry of São Paulo University (No: 7.479.710 - CAAE: 85868825.6.0000.0075) and registered with Who-Rebec (code: RBR-4yn9vmm). All participants provided informed consent after receiving detailed information about the study.

Sample Collection: Participants were instructed to refrain from eating, drinking, or brushing their teeth for at least 30 minutes prior to collection. Unstimulated whole saliva was passively collected in sterile cryogenic polypropylene tubes, refrigerated, and processed within 24 hours [10].

Sample Processing: Saliva samples were centrifuged (Hermle equipment; 4,000 rpm, 5 minutes, room temperature), and the supernatant was stored at -80 °C. After thawing at room temperature and protected from light, triplicate 1 µL aliquots were deposited on Low-e slides [5] and placed in a desiccator.

Sample Drying: Slides were dried in a sealed, light-protected desiccator (~22°C, ~77% relative humidity) for at least 24 hours [11]. This step is crucial for optimizing absorption intensity and signal-to-noise ratio in ATR-FTIR spectroscopy [5]. Proper drying also ensures uniform sample thickness and distribution, which are vital for reproducible data and detection of subtle biochemical changes.

B. ATR-FTIR Spectra Acquirement

Spectra were acquired in ATR-absorbance mode using a diamond crystal ATR accessory coupled to a Cary 660 FTIR spectrometer (Agilent Technologies, USA), integrated with a microscope equipped with a 32 × 32 focal plane array (FPA) detector, and 5.5 µm spatial resolution. Acquisition parameters included 128 background scans, 64 sample scans, 4 cm^{-1} resolution, and a spectral range of 4000-900 cm^{-1}.

Pre-processing involved basilene correction and noise reduction using the Savitzky-Golay convolution method (7-point window, second-order polynomial). The second derivative was applied to enhance resolution in the fingerprint region, improving chemical specificity and facilitating chemometric analysis. Both zero-order and second-order derivative spectra were normalized using the Standard Normal Variate (SNV) algorithm.

III. Results and Discussion

A. Salivary FTIR Spectra

In Figure 1, the representative ATR-FTIR spectrum of human saliva obtained in this study is presented. Prominent absorption peaks were identified at 2962 cm^{-1}, 1643 cm^{-1}, 1546 $cm^{-1,}$ and 1076 cm^{-1}.

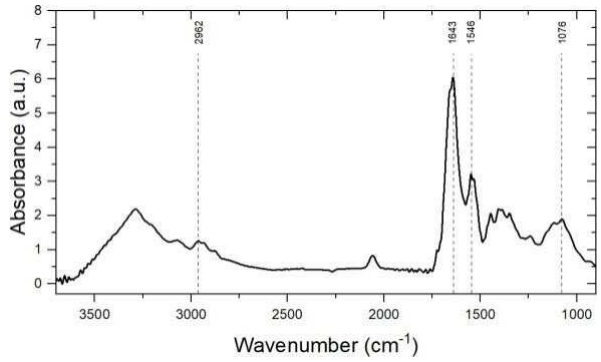

Fig. 1. ATR-FTIR spectra of human saliva obtained in this work. The main characteristic peaks of oral salivary analysis (OSA) are highlighted in accordance with the literature.

To enhance spectral resolution and resolve overlapping bands, second derivative processing was applied. This revealed peaks at 1662 cm^{-1}, 1643 cm^{-1}, 1548 $cm^{-1,}$ and 1076 cm^{-1}, as showned in Figure 2.

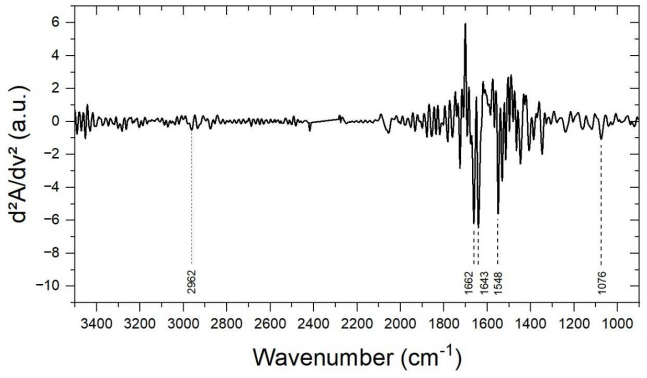

Fig. 2. Second derivative FTIR spectra of human saliva obtained in this work. The main characteristic peaks of oral salivary analysis (OSA) are highlighted in accordance with the literature.

B. Spectral Biomarkers and Methodology Validation

The spectral features identified in this study are strongly supported by existing literature, validating the sample preparation methodology employed. This external validation confirms that the analytical workflow reliably captures salivary biochemical information relevant to OSA.

The vibrational modes observed align with those described by Bacchin et al. [6] and are further corroborated by Campanella et al. [7], and Delrue et al. [8], reinforcing the reproducibility and clinical relevance of these biomarkers. Bacchin et al. pre-validated five vibrational modes with diagnostic potential for OSA (AUC > 0.8) [6], and their consistent detection across studies suggests stable biochemical alterations associated with the condition.

The vibrational modes identified included:

- 2962 cm^{-1}: Associated with lipid transport, potentially reflecting salivary cortisol levels. This peak falls within the C-H stretching region (3000-2850 cm^{-1}), commonly linked to lipids and proteins [6-8].
- 1670 cm^{-1}: Related to the anti-parallel β-sheet structure of Amide I (proteins), indicating possible transcriptional, or post-translational changes. Although it is not a central peak, it lies within the conformation range of Amide I, which can extend up to 1670 cm^{-1} [6-7]. In this study, the second derivative revealed a peak at 1662 cm^{-1}, reinforcing its relevance.
- 1638 cm^{-1}: Corresponds to β-sheet structures in Amide I, suggesting alterations in protein secondary structure. This aligns with the 1643 cm^{-1} peak observed here and is consistent with the literature values around 1631-1649 cm^{-1}.
- 1548 cm^{-1}: Represents Amide II vibrations (N-H bending and C-N stretching), potentially indicating reduced enzymatic degradation of salivary proteins. This is consistent with reported Amide II bands between 1542-1550 cm^{-1} [6-8].
- 1075 cm^{-1}: Attributed to symmetric PO_2^- stretching in nucleic acids, suggesting reduced DNA content. Literature supports this assignment with similar peaks around 1076-1080 cm^{-1}, linked to DNA, RNA, and phosphorylated molecules [6-8].

The consistent identification of these vibrational modes across studies validates the efficacy of the sample preparation protocol developed for ATR_FTIR analysis spectra. These findings confirm that the methodology preserves molecular fingerprints indicative of OSA-related biochemical changes.

C. Clinical Relevance of Salivary Spectral Signatures for OSA Diagnosis and Monitoring

As demonstrated by Bacchin et al. [6], specific alterations in salivary vibrational bands can distinguish individuals with and without OSA, offering a promising diagnostic alternative. These spectral changes reflect key aspects of OSA pathophysiology, such as oxidative stress and inflammation, affecting lipids, proteins, and nucleic acids. The present study builds upon this foundation by investigating whether salivary spectral analysis can also detect treatment-induced biochemical changes at the cellular level. This approach may provide a non-invasive method for monitoring therapeutic efficacy and patient adherence.

D. Consideration

The application of salivary spectral biomarkers in clinical research is highly relevant, particularly for evaluating treatment outcomes. For example, ATR-FTIR analysis has already demonstrated utility in monitoring insulin therapy adherence in diabetes mellitus [12]. Similarly, salivary spectroscopy could complement home-based PSG by offering biochemical insights into treatment response, thereby enhancing clinical decision-making in OSA management.

IV. Conclusion

Salivary ATR-FTIR spectroscopy presents significant potential for the diagnosis and monitoring of Obstructive sleep Apnea. The identification of specific spectral biomarkers - linked to lipids, proteins, and nucleic acids - offers a non-invasive, cost-effective alternative to conventional methods. This technique is particularly valuable for clinical research focused on treatment efficacy and patient monitoring. Its full potential depends on rigorous methodological standardization to ensure diagnostic accuracy, sensitivity, and specificity. Establishing reproducible protocols across laboratories and validating findings in diverse patient populations will be essential for integrating salivary ATR-FTIR spectroscopy into personalized OSA management.

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