

Curriculum Vitae

I. Personal Information

Name: Pablo Fredes, Dr. Eng.

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Research Interests: Far-UVC LEDs, Thermal management performance for Solid State Lighting in UV-C range, Ultraviolet germicidal applications, Photonics disinfectants, Product Development, HealthTech Innovation, CleanTech Industry, Biophotonics, Optoelectronics, Automation, Internet of Thing (IoT), SCADA systems, Industry 4.0, sensing and telemetry.

II. Education

2018 Dr. Eng. Sci. (*summa cum laude*), Electrical Engineering Department, University of Santiago, Chile.

2015 Master of Philosophy of Science degree, Philosophy Department, University of Santiago, Chile.

2011 Physics Engineering, Faculty of Science, Physics Department, University of Santiago, Chile.

2009 Bachelor's degree in Applied Physics, Faculty of Science, Physics Department, University of Santiago, Chile.

Additional Training and Courses

2024 – Career Accelerator, OPTICA Foundation, Estes Park, Colorado, USA

2023 – Innovation School, OPTICA Foundation Headquarters, Washington DC, USA.

III. Teaching experience

2023 – Present, Professor of Robotics and Automation, DUOC UC, Technical Training Center of Pontifical Catholic University of Chile.

2023 – Present, Adjunct Professor of Electricity, Electronics and Digital Electronics, Mechanical Engineering Department, Faculty of Engineering, University of Santiago of Chile.

2011 – Present, Adjunct Professor of Experimental Physics and Instrumentation, Physics Department, Faculty of Science, University of Santiago of Chile.

2013 – 2020, Adjunct Professor of Medical Physics, School of Medicine, University of Los

Andes, Santiago, Chile.

2019 - 2020, Adjunct Professor of Reactors Design, School of Industrial Engineering, Universidad Mayor, Santiago, Chile.

Professional Experience

2022 – Present, Director of Innovation project: “Implementation of UV-C technology and its impact on the incidence of healthcare-associated infections and colonization of antibiotic-resistant bacteria in the critical care unit”, Supported by Hydraluvx Chile, in association with Medical Science Faculty and Physics Department of the University of Santiago of Chile, and the Hospital Dr. Sotero del Rio, Santiago, Chile.

2021 - 2022, Director of Research Project, entitled “Heat Extraction Improves the High-Power UV-C LEDs Emission and Lifetime Applying 3-Pad Technology”. Performed in collaboration with Violumas / Cofan Komot USA, Hydraluvx Spa Santiago Chile and Science Faculty of University of Santiago of Chile.

2015 Project Manager “UV germicidal dose determination for microbiological threats in the salmon industry”, in ADL Diagnostic Chile, project code: CORFO 12BPC2-13531.

2014 Project Manager “UV water disinfection for agricultural irrigation applied to the organic farm”. Technological Center for Sustainability, Buin, Chile. Support by: OSA Young Professionals Town Hall Meeting Grant, Washington, DC, USA.

2013 Founder of Hydraluvx, startup oriented to the development and commercialization of Ultraviolet Disinfection Technologies, www.hydraluvx.com.

2012 – 2013 Technical Assistant “Temperature measurements, data analysis and characterization for the solar water heating devices”. Optics and Semiconductors Laboratory, Physics Department, University of Santiago, Chile.

2012 – 2013 General Manager in, “The First Chilean Congress in Optics and Photonics”, supported by Optical Society of America (OSA), Research and Development Office of the University of Santiago (VRID), Chilean Society of Physics (SOCHIFI) and National Fund for Science and Technology (CONICYT).

2011 – 2012 General Manager “Development and commercialization of water treatment systems based on UV light”, Fund to encourage the technological development (FONDEF) supported by National Fund for Science and Technology (CONICYT), Chile.

Publications (peer review)

2024, M. A. Khan, M. Muta, K. Fujimoto, J. Gonzalez, **P. Fredes**, E. Gramsch, Y. Iwaisako, H. Yaguchi, and H. Hirayama, ‘Estimation of Junction Temperature in Single 228 Nm-Band AlGaIn Far-Ultraviolet-C Light-Emitting Diode on c-Sapphire Having 1.8 MW Power and 0.32% External Quantum Efficiency’, Physica Status Solidi (A) Applications and Materials

Science, 2400064 (2024), 1–9, <https://doi.org/10.1002/pssa.202400064>

2022 P. Fredes, U. Raff, C. Soto, and P. Sharma, "Empirical and Theoretical study of the Thermal Performance of High Power UVC LEDs," in Optica Advanced Photonics Congress 2022, Technical Digest Series (Optica Publishing Group), paper PvTh3F.1. <https://doi.org/10.1364/PVLED.2022.PvTh3F.1>

2021 P. Fredes, U. Raff, E. Gramsch, M. Tarkowski, "Estimation of the Ultraviolet-C Doses from Mercury Lamps and Light-Emitting Diodes Required to Disinfect Surfaces", Journal of Research of the National Institute of Standards and Technology, 126:126025. <https://doi.org/10.6028/jres.126.025>

2021 P. Fredes, U. Raff, E. Gramsch, "Optical considerations for design of surface disinfection devices based on UV-C LEDs", Proc. SPIE 12078, International Optical Design Conference 2021, 120780E (19 November 2021); <https://doi.org/10.1117/12.2603623>

2020 P. Fredes, U. Raff (2021) Tools of Neuroscience. In: Zeise M.L. (eds) Neuroscience for Psychologists. Springer, Cham. https://doi.org/10.1007/978-3-030-47645-8_10

2019 P. Fredes, U. Raff, E. Gramsch, J. Cuenca, and J. Pascal, "Thermoelectric Control of Deep UV LED to Improve Optical Performance," in Advanced Thermoelectric Materials for Energy Harvesting Applications, S. Memon, Ed. p. 13. DOI: 10.5772/intechopen.85964 <https://www.intechopen.com/chapters/66796>

2019 P. Fredes, U. Raff, E. Gramsch, J. Pascal, J. Cuenca, "Junction temperature control of UV-C LEDs based on a thermoelectric cooler device," Microelectronics Reliability, 98, pp 24-30, <https://doi.org/10.1016/j.microrel.2019.04.011>

2017 P. Fredes, U. Raff, J. Cuenca, E. Gramsch, and C. Soto, "Improving the Optical Performance and Lifetime of Deep UV LEDs by Thermoelectric Control," in Light, Energy and the Environment, OSA Technical Digest (Optical Society of America, 2017), paper STu1C.2. <https://doi.org/10.1364/SSL.2017.STu1C.2>

Conference's presentation (Invited Talks, Oral, and Poster)

2024, M. A. Khan, J. Gonzalez, **P. Fredes**, E. Gramsch, Y. Kashima, H. Yaguchi, Y. Iwaisako and H. Hirayama; "Thermal Investigation of AlGa_N UVB LED on c-Sapphire Having External-Quantum Efficiency of 10%", 21st International Conference on Metal Organic Vapor Phase Epitaxy (ICMOVPE XXI), Las Vegas, Nevada, USA.

2023, B. Troncoso, C. Contreras, P. Donato, M. Herrera, C. Rios, U. Raff, **P. Fredes**, E. Gramsch, "Experiences, learnings and projections on UV Technology for disinfection, in the post-pandemic context at the national level", VII Chilean Congress of Public Health and IX Chilean Congress of Epidemiology "Learnings, opportunities and challenges that the pandemic leaves us", Temuco, Chile.

2023, P. Fredes, B. Troncoso, C. Rios, E. Gramsch, "Disinfection based on germicidal radiation and the Health Register of Disinfectant Products", XVI Scientific Conference, Institute of Public Health of Chile, Ministry of Public Health, Santiago, Chile.

2023, B. Troncoso, C. Contreras, **P. Fredes**, and C. Sosa, "Protocolization of the Use of UV-C Technology as a Disinfection Method in Clinical Spaces," Lib. Minutes LUX 2023 XVI Jornadas Argentinas Luminotecnia, Argentina.

2022 P. Fredes, B. Troncoso, C. Ríos, and E. Gramsch, "Air and Surface Disinfection Using UV-C Technology for the Reduction of HAIs, a General Perspective in the Covid-19 Context," Libr. Minutes XVI Congr. Iberoam. LUXAMÉRICA Lighting 2022, pp. 75–81, 2022, Chile.

2022 P. Fredes, U. Raff, C. Soto, and P. Sharma, "Empirical and Theoretical study of the Thermal Performance of High Power UVC LEDs," in Optica Advanced Photonics Congress, Maastricht, Netherlands.

2021 P. Fredes, U. Raff, E. Gramsch, "Optical Considerations for Design of Surface Disinfection Devices Based on UV-C LEDs" in the "OSA Optical Design and Fabrication Congress", Rhodes Island, USA.

2020 P. Fredes and U. Raff, "Relevant key parameters to migrate Hg lamps to LEDs, in the UV range for fluence determination" in the "Workshop on Ultraviolet Disinfection Technologies & Healthcare Associated Infections" organized by the National Institute of Standards and Technology (NIST), Gaithersburg, Maryland, USA.

2019 P. Fredes, U. Raff, E. Gramsch, "Solid State Lighting in UV-C range, challenges and new applications in Sciences and Engineering", in the "OSA Network Students Conference IONS" Living Systems Institute, Exeter University, United Kingdom.

2018 P. Fredes, U. Raff, E. Gramsch, and J. Pascal, "Thermal management performance of deep UV LED sources applying thermoelectric cooler devices" in the "International Conference UV LED Technologies and applications ICULTA- 2018", Berlin, Germany.

2018 J. Cuenca, **P. Fredes**, U. Raff and E. Gramsch, "Optical and thermal performance of UV-C LED is improved using Thermoelectric cooler devices", in the "OSA Network Students Conference IONS KOALA", Sydney, Australia.

2018 P. Fredes, J. Cuenca, U. Raff and E. Gramsch, "Junction Temperature Control of UV-C LEDs based on Thermoelectric Cooler Device to improve the Optical Performance and Lifetime", Kunming, Yunnan, China.

2017 P. Fredes, U. Raff, J. Cuenca, E. Gramsch, and C. Soto, "Improving the Optical Performance and Lifetime of Deep UV LEDs by Thermoelectric Control," in Light, Energy and the Environment Congress, National Center for Atmospheric Research (NCAR), Boulder, CO, USA.

2016 P. Fredes and U. Raff “UV Lamp calibration (253.7 nm) based on a geometrical photometry using Si photodiode and bioassays, applied to the salmon industry”. In the International Ultraviolet Association (IUVA) World Conference 2016, Vancouver, British Columbia, Canada.

2012 P. Fredes and E. Gramsch, “Computational modeling and photometry in UV Disinfection Technology for water and wastewater” in the “OSA Network Students Conference IONS North America”, Columbia University and City College of New York, USA.

Research Thesis Supervision Experience

The following theses are a requirement to obtain the professional title of **Physical Engineer** for the University of Santiago of Chile.

2021 - 2022, Eng. Lucas Martinez: Thermoelectric control to improve the electro-optical efficiency and life time of high-power UV-C LEDs.

2024 Eng. Aaron Aedo: Automation of the thermo-optical and electronic characterization process of high-power UV-C LEDs applying IoT technologies.

2024 Eng. Javier Gonzales: Thermo-optical and surface irradiance distribution simulations of Far UV LEDs and thermal modeling of p-type contacts. (in association with RIKEN Japan).

Memberships

2024 Advanced UV for Life, Berlin, Germany.

2020 Electrical and Electronic Industry Association of Chile (AIE), Chile.

2015 International Ultraviolet Association (IUVA), Maryland, USA.

2008 Optical Society of America (OSA), Washington, USA.

Contacts Information for Professionals References.

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