Mariana Torres Carvalho

PERSONAL INFORMATION

Full name: Mariana Torres Carvalho
Date of Birth: 04th May 1979
Place of Birth: Recife – PE, Brazil
Nationality: Brazilian

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carvalho.mariana.t@gmail.com

BIOGRAPHY

Mariana Carvalho is a Research Engineer in the Diagnostic Tools and Methods group, from the Department of Life Sciences at the International Iberian Nanotechnology Laboratory (INL). Her research is focused on the development of new tools for *in vivo* diagnosis, specific in applications on cardiovascular diseases. Her main research area is in Bio-nano-photonics, primarily in optical coherence tomography (OCT) and optical microscopy (SPIM, fluorescent, confocal and non-linear microscopy).

Mariana worked in the Optics group at the physics department in Universidade Federal de Pernambuco – UFPE, Brazil, where she got her undergraduate degree, MSc and DSc. During her doctorate, she spent one year as a visiting student at MIT, USA, in Prof. James G. Fujimoto's group, in an internship, working in spectral OCT. Following the DSc., she worked for 3 years at Opto Eletrônica S.A., an Opto-Mechanical company based in São Carlos – SP, Brazil, developing optical systems for a device based on optical coherence tomography for ophthalmic purposes. At that time, she also worked on the development and testing of optical systems for aerospace cameras and their ground support equipment. In 2010, she began a postdoctoral fellowship at Instituto de Física de São Carlos – IFSC/USP, Brazil, where she worked with multiphoton microscopy and photodynamic therapy. Mariana moved to back to Recife in July 2013, where she stayed until March 2015. There she worked with nonlinear optics applied to the research and characterization of random lasers, along with optical coherence tomography applied to dentistry. From April 2015 to July 2016, she was at Durham University as a visiting Researcher. She had a post-doctoral fellowship from the Brazilian Agency CNPq, within the Science without borders program, to research on Adaptive Optics systems applied for Single Plane Illumination microscopy (SPIM). Before being hired by INL, Mariana was working with her former group in UFPE and collaborators in IPEN/USP. She was working on projects related to the development of nanomaterials for larvae control (*Aedes aegypti*), Optical Coherence tomography applied to skin diseases (hemangiomas) and Odontology, and Random Lasers characterization and applications.

RESEARCH INTERESTS

Mariana's research focuses on the application of optical techniques to basic research and life sciences. She has a wide background on optical techniques and device development and she focused on the development of optical devices that can be used on biomedical applications (OCT, microscopy and other optical characterization techniques). She worked on the characterization of Random Lasers, using linear and nonlinear spectroscopy, which involved the use of interferometric techniques to characterize spatial and temporal coherence. She also had a collaborative research with a research group from the electronics engineering department at UFPE, to characterize Nanoplasmonic devices. Therefore, Mariana's research work is multi-disciplinary and collaborative, in partnership with both engineers and life sciences professionals (dentistry and medicine).

She has an extensive ground knowledge in microscopy and interferometric techniques for material characterization. The optical coherence tomography (OCT) device is an instrument that she has profound knowledge, since it was the main subject of her doctorate thesis, used for both medical applications and material characterization. She has a big interest into Microscopy, since it can combine many techniques to obtain multidimensional imaging, enabling to obtain different information from one sample. Furthermore, she has worked with both confocal and multiphoton microscopy, as well as SPIM microscopy, in addition to spectroscopic and fluorescent imaging for optical diagnosis purposes.

EDUCATION

Universidade Federal de Pernambuco (UFPE)
Department of Physics, Recife – PE, Brazil.
Bachelor in Physic (2001).
PIBIC/CNPq scholarship (1998-2000)
Supervisor: Prof. Anderson Stevens Leônidas Gomes

Universidade Federal de Pernambuco (UFPE)
Department of Physics, Recife – PE, Brazil.
M.Sc. in Physic (2002).
CAPES scholarship (2001-2002)
Dissertation: "Caracterização de Amplificadores à Fibra Dopada com Túlio por Reflectometria Óptica Coerente no Domínio das Frequências" (*Characterization of Thulium Doped Fibre Optical Amplifiers by Coherent Optical Frequency Domain Reflectometry*).
Advisor: Prof. Anderson Stevens Leônidas Gomes

Universidade Federal de Pernambuco (UFPE)
Department of Physics, Recife – PE, Brazil.
D.Sc. in Physic (2006) with one year internship at the Massachusetts Institute of Technology, Research Laboratory of Engineering, in Cambridge – MA, USA (Supervisor: Prof. James G. Fujimoto).
CAPES scholarship (2002-2006) with fellowship PDEE/CAPES (2004-2005)
Thesis: "Técnicas de Interferometria Óptica aplicadas à Medicina, Odontologia e Comunicações Ópticas" (*Optical Interferometry techniques applied to medicine, dentistry and Optical Communications*).
Advisor: Prof. Anderson Stevens Leônidas Gomes

POST GRADUATE EDUCATION AND TRAINING

Universidade de São Paulo (USP)
Physics Institute of São Carlos, São Carlos – SP, Brazil.
- Postdoctoral Scholarship with FAPESP scholarship (2010 – 2013)
Project: "Desenvolvimento e estudos de técnicas multifotônica para diagnóstico e tratamento fotodinâmico" (*Development and Study of multiphoton techniques for diagnosis and photodynamic treatment*).
Supervisor: Prof. Vanderlei Salvador Bagnato

Universidade Federal de Pernambuco (UFPE)
Department of Physics, Recife – PE, Brazil.
- Research Scholarship with CNPq (DTI) scholarship (2013 – 2015)
Projects: "Novos processos e aplicações de lasers aleatórios (Random Lasers), com o objetivo de obter novos resultados em meios com não linearidade alta" (*New processes and applications of random lasers, in order to get new results in high linearity materials*) and "Nanofotônica em meios desordenados e vidros dopados com íons de terras raras aplicada ao desenvolvimento de novos conceitos em células solares" (*Nanophotonics in disordered media and glasses doped with rare earth ions applied to the development of new concepts in solar cells*).
Supervisor: Prof. Anderson Stevens Leônidas Gomes
- Research Scholarship with FACEPE (BCT) (2016 – 2017)
Projects: "Desenvolvimento e aplicações de nanolarvicidas de prata para controle vetorial de *Aedes aegypti* em área de transmissão do ZIKAV" (Development and applications of silver nanolarvicides for vector control of Aedes aegypti in the transmission area of ZIKAV).
Supervisor: Prof. Anderson Stevens Leônidas Gomes

- Postdoctoral Scholarship with CAPES (Procad) (2017)
Projects: "*Aplicações da Fotônica em Nano-Odontologia e no diagnóstico precoce de Hemangiomas*" (Applications of Photonics in Nano-Dentistry and Early Diagnosis of Haemangiomas).
Supervisors: Prof. Denise Maria Zezell and Prof. Anderson Stevens Leônidas Gomes

University of Durham
Department of Physics, Durham, UK.
- Academic Visitor with CNPq Postdoctoral scholarship (2015 – 2016)
Project: "Development of a novel Selective Plane Imaging Microscopy (SPIM) optical system".
Supervisor: Prof. John M. Girkin

SKILLS

Languages

- Portuguese: native speaker
- English: Fluent. TOEFL Certificate (2004), lived in USA (2004-2005), and lived in the UK (2015-2016).
- Spanish: Good understanding.

Computer

- Software: Microsoft Office (Windows and Apple platforms), Keynote, Pages, Numbers, Origin (OriginLab scientific graphing and data analysis software), Zemax (ray tracing program for lens design), ZEN (Zeiss image software), Mathcad.
- Programming (basic knowledge): Python, C/C++, MatLab, Mathematica and LabVIEW.

RESEARCH SKILLS

Extensive knowledge and manual skills on: optical alignment, optical fibre alignment, linear and nonlinear optical characterization techniques assemble, microscopy (assemble, alignment and use) and interferometric technique (assemble, alignment and use).
Although familiar to programming, it is not a strong skill.

TEACHING EXPERIENCE

- Department of Physics, UFPE, Recife – PE, Brazil. Volunteer lecturer. Experimental Physics L1 (Instrumentation for Education 1), from April to October 2014.
- Maurício de Nassau University, Recife – PE, Brazil. Hired Professor. Integrating Topics: Dynamic, from September to December 2013.
- Biotechnology department, Universidade Federal de São Carlos, São Carlos – SP, Brazil. Examiner for the undergraduate dissertation from Monize Caiado Decarli, supervised by Prof. Clovis Souza, about phototoxicity of visible light on microorganisms as microbiological control measure, 2013.
- Department of Physics, UFPE, Recife – PE, Brazil. Teaching stage of 12 months (requirement for CAPES doctoral scholarship), under supervision of Prof. Anderson Stevens Leonidas Gomes. Physics for computing, first academic semester of 2004 and second academic semester of 2005
- Department of Physics, UFPE, Recife – PE, Brazil. Teaching stage of 6 months (requirement for CAPES master scholarship), under supervision of Prof. Lucius Hora Acioli. Experimental Physics 1, first academic semester of 2002.
- Department of Physics, UFPE, Recife – PE, Brazil. Teaching assistant for Prof. Erivaldo M. Rodrigues Lima. Experimental physics 1, first academic semester of 2000.

RESERCH AREAS

- ***Current:*** Microscopy (SPIM, confocal, Bright-field, Fluorescence, non-linear). Interferometric techniques. Low coherence interferometry (OCT). Bio-nano-photonics.
- ***Main research areas, past and present activities***: Interferometric techniques for material characterization. Low coherence interferometry. Microscopy – confocal and multiphoton microscopy. Spectroscopy and fluorescence imaging. Nonlinear spectroscopy. Optical diagnosis. Photodynamic therapy. Optical Communications. Biophotonics. Nanoplasmonics. Nonlinear optics. Random Lasers. Interaction of light with matter.
- ***Research projects:***
  - **MSc (2001-2002):** Thulium Doped Fiber Amplifier Characterization by Coherent Optical Frequency Domain Reflectometry. Advisor: Prof. Anderson Gomes.
  - **DSc (2002-2006):** Optical Interferometry techniques applied to medicine, dentistry and Optical Communications. Advisor: Prof. Anderson Gomes. With internship period at MIT - Massachusetts Institute of Technology (Supervisor: Prof. James G. Fujimoto).
  - **Opto Eletrônica S.A. (2007-2009):** Development of a device for generating tomographic images of the human retina. Development of MUX camera for satellites CBERS 3 and 4 of INPE. Development of the Optical-Mechanical block of WFI camera for satellites CBERS 3 and 4 of INPE. Development of the ground supporting equipment system for characterization and testing of cameras for aerospace use. Development of AWFI camera for Multi Mission Platform of INPE. Development of a system for making interferometric thin films with specific spectral geometry for aerospace use.
  - **Postdoctoral Project (2010-2013):** Development and studies of multiphoton techniques for diagnosis and photodynamic treatment. FAPESP Postdoc scholarship holder. Coordinators: Prof. Cristina Kurachi and Prof. Vanderlei Bagnato.
  - **Postdoctoral Project (2013-2015):** New processes and applications for random lasers. Characterization and applications of random lasers in media with high nonlinearity, including the use of different techniques for material characterization. Nanophotonics in disordered media and doped glasses with rare earth ions applied to the development of new concepts for solar cells. CNPq/FACEPE scholarship holder. Coordinator: Prof. Anderson Gomes.
  - **Postdoctoral Project (2015-2016):** Development of a novel Selective Plane Imaging Microscopy (SPIM) optical system. Development of a novel SPIM optical delivery system. The possibilities include using structured light microscopy (SLM) and adaptive optics (AO). CNPq/SWB Postdoc scholarship holder. Coordinator: Prof. John M. Girkin.
  - **Postdoctoral Project (2016-2017):** Development and applications of silver nanolarvicides for vector control of Aedes aegypti in the transmission area of ZIKAV, Applications of Photonics in Nano-Dentistry and Early Diagnosis of Hemangiomas. PROCAD/CAPES Postdoc scholarship holder. Coordinators: Prof. Anderson Gomes and Prof. Denise Zezell.
  - **INL Research Project (current):** Probe-based Imaging Diagnostic Tool for In vivo Atherosclerotic Biomarker Detection. Development of in vivo imaging tools based on the identification and validation of inflammatory biomarkers as indicators of cardiovascular diseases. Coordinator: Marina Brito.

SCIENTIFIC PRODUCTION - PUBLICATIONS

For a complete list of publications, access: http://lattes.cnpq.br/8922957984518214

ORCID: https://orcid.org/0000-0002-4281-5799

ResearchID: http://www.researcherid.com/rid/J-7610-2012

Google Scholar: https://scholar.google.com.br/citations?user=5IC_gEMAAAAJ&hl=en&oi=ao