ANDERSON HOFF, Ph.D.

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PROFILE SUMMARY

My primary interest is in Physics research and dissemination. Particularly, my research is on nanotechnology, mainly on electronic devices fabrication and characterization. Over the past few years, I have worked on different problems in thin-film solar cells and also on electronic circuits, which includes programming and using computational routines. My laboratory skills are related to the design, fabrication and characterization of organic and hybrid organic/inorganic optoelectronic devices. I am focused on characterization techniques that can give information about morphology and mismatch at interfaces between the films, and possible solutions related to materials and structures that can increase the device efficiency. My career objective is connected to my research and with the possibility to work as a member in innovative research, to build relations and connections that improve my knowledge and open opportunities to be part of the technology revolution.

EDUCATION

Doctorate in Physics 2014 - 2017
Federal University of Paraná (UFPR), Curitiba, PR – Brazil
Advisor: Prof. Ivo A. Hümmelgen
Thesis: Development and characterization of Ga_xS_{10-x} thin-film based solar cells

Design, development and characterization of thin-film solar cells, by employing a variety of organic and inorganic materials and a wide range of characterization techniques, to understand the limiting factors and possibilities for improvements of the devices.

Master in Physics 2012 - 2014
Santa Catarina State University (UDESC), Joinville, SC – Brazil
Advisor: Prof. Holokx A. Albuquerque
Dissertation: Bifurcation structures in 4-d dynamical systems

Numerical simulations of electronic and neuronal chaotic systems, by using computational tools written in Fortran and C++, and a theoretical analysis based on Chaos Theory fundamentals. The main results are related to mapping the abrupt transitions between the different behaviour of the systems (constant, periodic and chaotic).

Bachelor in Physics 2003 - 2007
Santa Catarina State University, Joinville, SC – Brazil

TECHNICAL SKILLS

- Deep knowledge about the physics of solar cells and organic electronics.
- Strong background of solar cell parameters and characterization techniques.
- Exceptional ability in lab operations, equipment management and thin-film deposition.
- Proficient with programming languages as R and Fortran, and experienced in Linux, GnuPlot and Microsoft Office.

RESEARCH EXPERIENCE

Postdoctoral Researcher September 2018 – August 2019
Department of Physics, Santa Catarina State University
Capes PNPD Fellowship Award
Joinville, SC – Brazil.

- Design and built electronic circuits with non-linear and chaotic patterns.
- Analysis of representative behaviour in chaotic circuits through time-series collection of voltage measurements, and characterization by Chaos Theory fundamentals.
- Developed computational routines in R and Fortran for numerical simulations and data analysis.
- Worked on Bifurcation Theory through MatCont (a Matlab package).
- Collaborated with researchers to advance the understanding of chaotic systems behaviour, with three publications on scientific journals.
- Co-supervised Master and Graduating students from the research group.

Research Assistant (Ph.D. Candidate) March 2014 – December 2017
Department of Physics, Federal University of Parana
Capes Scholarship Award
Curitiba, PR – Brazil.

- Research on design, development and characterization of thin-film solar cells.
- Experience with a wide range of organic and inorganic materials (photoabsorbers, selenium alloys, perovskites, P3HT, C60, graphene, ZnO nanoparticles, Cs_2O, TiO_2, transparent conductors and metal contacts).
- Planned and executed a variety of techniques, as AFM, SEM, XRD, UV-vis and cyclic voltammetry for thin-film analysis, and *I-V*, *EQE*, *C-V* profiling and impedance spectroscopy for device characterization.
- Outstanding knowledge of deposition techniques, laboratory equipment and procedures.
- Prepared materials for reports, presentations and submission to peer-reviewed journal publications, with four publications in high-impact scientific journals.

Mechanic 1999 – 2012
Joinville, SC – Brazil.

- Experience with equipment, tools and procedures in mechanical maintenance of cars.

TEACHING EXPERIENCE

Physics I Instructor March 2018 – August 2018
UniSociesc University
Jaraguá do Sul, SC – Brazil.

- Defined the curriculum of Physics for engineering classes.
- Taught lecture and lab classes of Physics I.

On-line Instructor February 2018 – August 2018
Catolica de Santa Catarina University
Jaraguá do Sul, SC – Brazil.

- Online support for students in Math, Calculus I and II, Algebra, and Physics.

PUBLICATIONS

Google Scholar: https://scholar.google.ca/citations?user=oV62NPgAAAAJ&hl=en

[1] A. Hoff, I. Cruz-cruz, M.C. Siqueira, K.D. Machado, I.A. Hümmelgen, GaxSe10-x based solar cells : Some alternatives for the improvement in their performance parameters, *Sol. Energy Mater. Sol. Cells*. **193** (2019) 141–148. doi:10.1016/j.solmat.2019.01.002.

[2] A. Hoff, I. Cruz-Cruz, M.C. Siqueira, K.D. Machado, I.A. Hümmelgen, Influence of an interfacial cesium oxide thin layer in the performance and internal dynamic processes of GaSe9 solar cells, *Sol. Energy Mater. Sol. Cells*. **171** (2017) 1–7. doi:10.1016/j.solmat.2017.06.014.

[3] A. Hoff, I. Cruz-Cruz, M.C. Siqueira, K.D. Machado, I.A. Hümmelgen, Morphological, optical and electrical properties of GaSe9 films and its application in photovoltaic devices, *J. Mater. Sci. Mater. Electron*. **28** (2016) 2241–2249. doi:10.1007/s10854-016-5794-5.

[4] M.C. Siqueira, A. Hoff, C. De Col, K.D. Machado, I.A. Hümmelgen, J.P.M. Serbena, Enhancement of P3HT organic photodiodes by the addition of a GaSe9 alloy thin layer, *Semicond. Sci. Technol.* **32** (2017). doi:10.1088/1361-6641/aa74fe.

[5] Lucas A.S. Rosa, Flavio Prebianca, Anderson Hoff, Cesar Manchein, Holokx A. Albuquerque, Characterizing the Dynamics of the Watt Governor System Under Harmonic Perturbation and Gaussian Noise, *Int. J. Bifurc. Chaos*. **30** (2020). doi:10.1142/S0218127420300013.

[6] Nathan S. Nicolau, Tulio M. Oliveira, Anderson Hoff, Holokx A. Albuquerque, Cesar Manchein, Tracking multistability in the parameter space of a Chua's circuit model, *Eur. Phys. J. B*. **92** (2019). doi: 10.1140/epjb/e2019-90749-x.

[7] D.W.C. Marcondes, G.F. Comassetto, B.G. Pedro, J.C.C. Vieira, A. Hoff, F. Prebianca, C. Manchein, H.A. Albuquerque, Extensive Numerical Study and Circuitry Implementation of the Watt Governor Model, *Int. J. Bifurc. Chaos*. **27** (2017). doi:10.1142/S0218127417501759.

[8] A. Hoff, J.V. dos Santos, C. Manchein, H.A. Albuquerque, Numerical bifurcation analysis of two coupled FitzHugh-Nagumo oscillators, *Eur. Phys. J. B*. **87** (2014) 1–9. doi:10.1140/epjb/e2014-50170-9.

[9] A. Hoff, D.T. Da Silva, C. Manchein, H.A. Albuquerque, Bifurcation structures and transient chaos in a four-dimensional Chua model, *Phys. Lett. A* **378** (2014) 171–177. doi:10.1016/j.physleta.2013.11.003.

[10] Vinicius Antunes, Luis Fernando Mello, Anderson Hoff, Cesar Manchein, Holokx A. Albuquerque, Nonlinear dynamics and analog circuit implementation of a 4-dimensional system model. (*to be submitted*).