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COLLECTION OF ABSTRACTS (AS SENT BY THE AUTHORS)

Speakers | Brazilian Academy of Sciences

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Design, synthesis and spectroscopic investigations of optical glasses and glass ceramics, and luminescent host-guest hybrid materials

The versatility and usefulness of technological glass and glass ceramics is based on the flexibility of combining their chemical and physical properties to meet specific application demands. Since 1960, and mostly after the laser invention, optical glasses (e.g. phosphates, borates, oxyfluorides) doped with trivalent rare earth ions such as Er3+, Yb3+, Nd3+, Eu3+ and Tb3+ have been largely explored as active media for laser action and light amplification in the near infrared spectral region (for telecommunications), as well as for luminescent devices in the visible. Other photonic materials of increasing interest are host-guest hybrid systems based on mesoporous silicates, alumino- and organo-silicates loaded with highly luminescent molecular species such as metallic complexes, organic dyes and quantum dots. At LEMAF, the Laboratory of Spectroscopy of Functional Materials, in IFSC/USP, we dedicate to the design, synthesis and characterization of several of these photonic materials emphasizing the elucidation of their chemical environments, which define characteristics such as excited state lifetimes and quantum yields (that are crucial for applications). Seeking for structural-properties correlations, we combine optical (PL, PLE, UV-Vis) and resonance (EPR, NMR) spectroscopic techniques and whenever possible, theoretical studies are carried out for complementation. In this presentation, an overview of LEMAF's ongoing studies and aims, in the field of optical and luminescent materials will be presented.

Andrea de Camargo is an Associate Professor at the São Carlos Physics Institute of the University of São Paulo (USP) in Brazil, a CNPq research productivity fellow 1D, an Alexander von Humboldt fellow, and an affiliated member of ABC. She has a BSc. and a MSc. in Chemistry from the São Paulo State University (UNESP), and she got her PhD in Applied Physics from USP (2003). Her broad experimental research interests, in the area of luminescence, include the design, synthesis and spectroscopic characterization of various photonic materials such as glasses, glass ceramics, host-guest hybrids and nanoscopic materials, with several applications.

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Propriedades eletrônicas e de transporte em grafeno e outros materiais bidimensionais

Desde 2004, uma série de trabalhos têm demonstrado a possibilidade de se obter uma camada de carbono de espessura atômica a partir da exfoliação de um bloco de grafite de alta qualidade. Este material bidimensional, chamado grafeno, demonstrou-se ser um semi-metal com propriedades físicas interessantíssimas, dentre elas, o fato de que elétrons de baixa energia neste material se comportam como partículas de Dirac sem massa, abrindo assim a possibilidade de se estudar fenômenos físicos antes disponíveis apenas em sistemas de altas energias. Além disso, o sistema se mostrou altamente ajustável, usando-se campos externos, tensão mecânica, interações com substrato, etc. A partir de então, seguindo-se a mesma idéia, tem se demonstrado experimentalmente a possibilidade de se exfoliar em monocamadas outros materiais com estrutura parecida com a do grafite, tais como dicalcogenetos de metais de transição, fósforo negro, entre outros. Estes materiais possuem características semicondutoras, o que possibilita aplicações futuras em dispositivos optoeletrônicos, diodos, transistores, etc. O estudo da física das interações luz-matéria nestes materiais, assim como suas propriedades de transporte eletrônico, tornam-se então de importância fundamental para o desenvolvimento de novas tecnologias baseadas nestes materiais num futuro próximo.

Andrey Chaves is graduate and master in Physics by Universidade Federal do Ceará and PhD in Physics by Universidade Federal do Ceará with an internship at Universiteit Antwerpen, Belgium. Has post-doctoral experience as Adjunct Associate Research Scientist at Columbia University, NY, and is currently Adjunct Professor at Universidade Federal do Ceará. Has research experience in condensed matter theory, working especially on quantum confinement, excitons and electronic properties of 0-2D semiconductor heterostructures, graphene and other layered 2D materials, as well as on voertices in superconductors.

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Hypercholesterolemia and obesity as a risk factor for neurocognitive impairments

Hypercholesterolemia as a risk factor for neurocognitive impairments Epidemiological findings suggest an intriguing and complex relationship between hypercholesterolemia and the development of Alzheimer disease (AD). In contrast to traditional neuroncentric views of neuropathologies, others and we propose that neurovascular dysfunction associated to hypercholesterolemia contributes to cognitive decline, depressive behavior and neurodegeneration. In this way, we are dedicated to study and propose some molecular mechanisms which can explain this association. Employing a widely used rodent model of familial hypercholesterolemia as a pre-clinical approach, we characterized a cognitive impairment and depressive like behavior in low-density lipoprotein receptor knockout (LDLr-/-) mice. These behavior impairments were associated to blood brain disruption, neuroinflammation, cerebral mitochondrial disruption and adult neurogenesis prejudice. Finally, the understanding of the role of these vascular-related conditions in AD development, would suggest possible modifiable risk factors that may serve as targets for therapeutic strategies.

Dr. Andreza de Bem has a Ph.D. in Biochemistry (2007) and is a professor of Biochemistry at the Federal University of Santa Catarina. She is a Fellow at CNPq and Affiliate Member of the Brazilian Academy of Sciences. She is an expert on mitochondrial physiology and redox biology. Her research investigates: i) the biochemistry and pharmacology of selenium compounds and; ii) the study of the relationships between metabolic disorders, such as hypercholesterolemia and obesity, and the development of neurodegenerative diseases, such as Alzheimer's disease. She also dedicates efforts for the Rede Nacional de Educação e Ciências, participating in activities related to science teaching through the interaction between scientists and students.

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From Ideas to Low Founding High Quality Research

The development of a novel class of fluorescent markers for bioimaging application was idealized and developed at the Laboratory of Medicinal & Technological Chemistry at the UnB. The 2,1,3-benzothiadiazole (BTD) core is virtually non-fluorescent, but with a few modification it may afford highly fluorescent compounds.
The use of designed and modified BTDs allowed their test as fluorescent markers returning impressive cellular responses. Highly selective probes could be developed and applied as a new class of markers.
Important organelles and cell components such as nuclear dsDNA, mitochondria, lipid droplets, and others have already been successfully labelled by fluorescent small-molecule BTD derivatives. New technological systems that use BTDs as the fluorophores for bioimaging experiments have been described in recent scientific literature. The successful application of BTDs as selective bioprobes has led some groups to explore their potential for use in studying membrane pores or tumour cells under hypoxic conditions. Finally, BTDs have also been used as fluorescent tags to investigate the action mechanism of some antitumor compounds. The attractive photophysical data typically observed for π-extended BTD derivatives is fostering interest in the use of this new class of bioprobes. Large Stokes shifts, large molar extinction coefficients, high quantum yields, high stability when stored in solution or as pure solids, no fading even after long periods of irradiation, bright emissions with no blinking, good signal-to-noise ratios, efficiency to transpose the cell membrane, and irradiation preferentially in the visible-light region are just some features noted by using BTDs. The current status of BTD bioprobes is transitioning from the proof-of-principle stage to widespread adoption by the scientific community.

Brenno A. D. Neto is associated Professor at the University of Brasilia. 7 Ph.D., 10 M.Sc. and several undergraduate students have successfully graduated under his guidance. He published nearly 80 articles and 15 patents underpinning therefore his research independence. His h-index is 29-34 (WOS, Scopus, Google Scholar) and has more than 2000 citations. He is Associate Editor of RSC Advances and of the JBCS.
Highlight awards:

1. *Brazilian Academy of Sciences: Young Affiliated (2014-2018)*
2. *BMOS/RSC Young Investigator Award 2013*
3. *Honourable Mention – Best Brazilian Thesis in Chemistry 2013 (Advisor).*
4. *Petrobras Inventor Award for the best-filed patent in 2008.*

Bruno Anderson Matias da Rocha

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Structural characterization of Canavalia brasiliensis (ConBr) lectin complexed with indole-3-acetic acid

Lectins are a diverse group of carbohydrate-binding proteins that can be found in many organisms. Plant lectins are divided into several classes due to the diverse quaternary arrangements. They play a vital role in the resistance of plants against insect pests and their activity against viruses, bacteria, fungi, insects and animals has also been observed. As well as the involvement in symbiotic interactions between host plants and symbiotic microorganisms, including mycorrhizal fungi and Rizhobium nitrogen fixers. Lectins of plant origin, especially those extracted from seeds of Diocleinae legumes, are the most studied and despite the conservation of their primary, tertiary and quaternary structures, the biological activities related to carbohydrate recognition reported are diverse. In addition, new functions have been attributed to conforming lectins are presented new interactions with hydrophobic compounds and plant hormones such as indole-3-acetic acid (AIA). Thus, the present work demonstrates a resolution of the crystallographic structure of a lectin isolated from seeds of the leguminous Canavalia brasiliensis (ConBr) in complex with the AIA. The binding of the hormone is established through interactions with the conserved residues previously describer for Canavalia maritima lectin (ConM), Ser108 and Asn131. These amino acids are coordinated in the cavity formed by the association between canonical dimers, hypothesizing that a lectin would be a new form of storage and/or sequestration of this phytormonium, modulating the behavior of the lectin and its role without plant development.

Bruno Rocha began to study biochemistry in 1999 at State University of Ceara at Biological Sciences undergraduation. He started MPhill study in 2003 and PhD was from 2005 to 2007, both at Department of Biochemistry and Molecular Biology at Federal University of Ceara (UFC). In that time, he dedicated his efforts to improve his knowledge in Structural Biology. For two years, he worked in Federal University of Alagoas. Nowadays, he is professor in UFC where coordinate the Post-graduation Program of Biochemistry. Since 2015 he is an affiliated member of Brazilian Academy of Sciences (2015-2019).

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In silico platforms for prediction of toxicity properties of drug candidates and chemicals

Computational models have earned recognition as reliable, fast, and inexpensive alternative methods for toxicity and safety evaluation of chemicals. Likewise, the development of quantitative structure-activity relationships (QSAR) models from chemical and biological data, and then, if predictive models are obtained, one can use then to filter out compounds with desirable properties and remove those compounds unsuitable. Therefore, QSAR models could be useful in early stages of drug discovery and environmental safety assessment. In this regard, will present the development of two innovative and freely accessible web-based and mobile application for prediction of cardiac toxicity, regarding the blockage of hERG channels as well as for the identification of potential skin sensitizers. The applications are based on robust and predictive QSAR models developed using the largest publicly available

datasets of structurally diverse compounds including a variety of drug classes and chemical compounds. The freely available Pred-hERG and Pred-Skin web apps (http://labmol.com.br/predherg and http://labmol.com.br/predskin/) combine quantitative toxicity prediction with a visualization output, ensuring both high predictivity and interpretability of models, which allows users to perform rapid virtual screening of large chemical libraries aiming to identify putative hERG blockers and skin sensitizers.

Adjunct Professor at Faculty of Pharmacy of Federal University of Goias. Graduated in Pharmacy (UFG) and Doctor of Philosophy (Ph.D.) in Drugs and Medicines from University of Sao Paulo. Her research focuses on Medicinal Chemistry, mainly at the Computer-Aided Drug Design for discovering new drug candidates for Neglected Tropical Diseases and Cancer. Moreover, she also focuses on the development and application of cheminformatics tools and QSAR models, for the prediction of toxicity properties of chemical compounds. She is CNPq productivity research fellow. In 2014, she was awarded with the "For Women in Science" award from L'Oréal-ABC-UNESCO and in 2015 she received the "International Rising Talents" from L'Oréal – UNESCO. In 2016, she was elected Affiliated member of the Brazilian Academy of Sciences (2016-2020). Currently, she is vice-director of the Medicinal Chemistry division of the Brazilian Chemical Society.

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THEORETICAL-EXPERIMENTAL ANALYSIS OF MICROREACTORS FOR BIODIESEL SYNTHESIS WITH REJECTED HEAT RECOVERY

The present work deals with the analysis of the continuous synthesis of biodiesel in microreactors using the rejected heat of a thermal source and has as objective to obtain the maximum efficiency of the biodiesel production using multiple microreactors, aiming at the scheduling of the production, coupled to micro heat exchangers that allow The utilization of the rejected heat of a secondary process to increase the reaction temperature, and consequent improvement in the conversion rates. The experimental analysis is done in a device composed of multiple metal microreactors coupled to micro heat exchanger, manufactured by the additive manufacturing technique that allows the construction of these components in the same substrate, reducing the thermal resistance of contact. The production of biodiesel was carried out using the ethanol route and high conversion rates of triglyceride (99,9%) into biodiesel (99,6%) were reached for low residence times, 34,9s. A diffusive-convective-reactive three-dimensional mathematical model that describes the physico-chemical behavior of the species involved in the biodiesel synthesis is reformulated using the CIEA technique, resulting in a mathematical model non-linear and coupled compound of first-order ODE's which enables for simulations with reduced computational costs. The Markov Chain Monte Carlo method (MCMC) is used to estimate the kinetic constants using real experimental data with low conversion rates, which maximizes the presence of intermediary species, and increases the sensitivity of the problem to the parameters.

Graduated in (2004), with master's degree (2006) and PhD (2009) in Mechanical Engineering by Federal University of Rio de Janeiro. Since 2011 she has been an Associated Professor at the Mechanical and Nanotechnology Engineering Program at UFRJ, coordinating the Nano and Microfluidics and Microsystems Lab.. Dr Naveira-Cotta was elected an Affiliate Member of the Brazilian Academy of Sciences (ABC) in 2014. She has published more them 125 papers. She has experience in Transport Phenomena in Micro and Nano-scales, working mainly on: microfluidics, inverse problems, hybrid methods, infrared thermography and thermal intensification with nanofluids, nanocomposites and thermal microsystems.

Claudia Figueiredo

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Zika virus infects adult human brain tissue and impacts synapses and memory in adult mice

Zika virus (ZIKV) infects the developing human brain and causes neurological disorders in newborns. Infection has further been associated to neurological manifestations in adults, but whether and how ZIKV impacts the adult brain remain largely unknown. We report that ZIKV replicates and triggers expression/release of proinflammatory cytokines in cortical tissue from adult human temporal lobe. Injected into the lateral cerebral ventricle of adult mice, ZIKV diffuses in the brain and preferentially targets the hippocampus and frontal cortex, key memory centers. Infection causes brain inflammation, synapse damage, blunted cAMP responsive element binding protein (CREB) signaling, and impaired memory in mice. Results establish that ZIKV impacts the adult brain and exhibits tropism for structures involved in cognition, and identify mechanisms likely underlying memory dysfunction and other neurological complications induced by ZIKV. Current findings further highlight the need to carefully evaluate cognition as a potential significant comorbidity of ZIKV infection in adults.

Claudia Pinto Figueiredo is an assistant professor at the School of Pharmacy - Federal University of Rio de Janeiro (UFRJ). She graduated in Pharmacy and Biochemistry (2001), earned her Master's degree in Biotechnology (2005), and PhD in Neurosciences (2009), all by the Federal University of Santa Catarina (UFSC). She has extensive experience in Neuroscience, Neuropsychopharmacology and Morphological Sciences. Her research group is interested in the understanding of mechanisms related to cognition and emotional symptoms of neurodegenerative diseases such as Alzheimer's, Parkinson's, post-septic or viral encephalopathies.

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Scalable Content Distribution: Challenges, Solutions and Perspectives

In this talk, we present challenges, solutions, and perspectives related to scalable content distribution. First, we revisit peer-to-peer systems as precursors of content oriented networks. We discuss some of the fundamental properties of such systems, initially thought of as perfectly scalable, and how they differ from content oriented networks. Then, we focus on different aspects of content oriented networks. In particular, we discuss how the concept of utility functions can be applied to the design of novel caching algorithms, possibly capturing the interactions between content distribution and content recommendation. We establish a connection between caches and timelines and show how caching models can be used to characterize timelines. Finally, we conclude with perspectives of interesting open problems in the intersection between scalable content distribution networks, recommendation systems and machine learning.

Daniel Sadoc Menasché received his MSc and PhD degrees in Computer Science from the University of Massachusetts, Amherst, in 2011. He received a BS cum laude degree in Computer Science and MSc degree in Computer and Systems Engineering from the Federal University of Rio de Janeiro (UFRJ) Brazil, in 2002 and 2005, respectively. He did internships at INRIA Sophia Antipolis, University of Avignon and Technicolor. In 2011, he joined the Department of Computer Science at the Federal University of Rio de Janeiro (UFRJ), Brazil. His main interests are in the modeling and analysis of computer systems, including computer networks, and smart grids. Daniel S Menasché was co-author of papers that were awarded best paper awards at IEEE Globecom 2007, ACM CoNext 2009, IEEE Infocom 2013 and SBC WPerformance 2017.

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Electronic, Transport and Vibrational Properties of Nanomaterials

The uprise of nanoscience and nanotechnology has opened up a diverse range of opportunities for obtaining new properties from well known starting materials. It is then necessary to investigate and understand the properties of these nanoscopic structures, paving the way for finding new applications. In our research groups we employ different experimental and theoretical techniques to study the electronic, transport and vibrational properties of nanomaterials. Our main focus is on 1D and 2D structures, such as carbon nanotubes, graphene, 2D transition metal dichalcogenides, etc. Scanning Probe Microscopy and Raman spectroscopy are some of the techniques mainly used to explore the properties of these materials. The experimental results are then compared to theoretical calculations using a range of different models (based primarily on tight-binding approximations or on the density functional theory approach).
Specifically, in this work, we show the application of kelvin probe force microscopy (KFM) and conductive atomic force microscopy (CAFM) to investigate the transverse electronic conduction through few-layer Molibdenum disulphide (MoS2) devices. For this, we deposit few-layers of MoS2 (ranging from one layer to bulk) on top of a gold substrate and use a metallic (PtIr) tip to measure the current-voltage curves for the different layer thicknesses. We also measure the surface potential differences between the gold and the MoS2 samples and our PtIr tip using the KFM technique. The experimentally obtained curves are compared to the predictions obtained for the different possible electronic transport mechanisms.

Bachelorate in Physics (2002), MSc degree in Physics (2003) and PhD. in Physics (2006) at the Universidade Federal do Ceará. Graduate visiting student at the Massachusetts Institute of Technology (MIT), U.S.A. under supervision of Prof. Mildred S. Dresselhaus (2004-2005). Post-doctoral Fellow at Tohoku University, Japan, in the group of Prof. Riichiro Saito (2007) and later at (MIT) under supervision of Prof. Mildred S. Dresselhaus. Associate Professor at the Universidade Federal do Ceará since 2009, acting on the following research topics: Carbon nanotubes, Graphene and other 2D nanomaterials, Graphitic Foams, Raman spectroscopy, Electron and Atomic Force Microscopy. Currently holds the office of Head of the Department of Physics of the Universidade Federal do Ceará. Affiliate Member of the Brazilian Academy of Sciences (ABC) for the period 2013-2017.

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C elegans as in vivo model for test Quinolinic Acid neurotoxic effects

The 2,3-Pyridinedicarboxylic acid, widely known as quinolinic acid (QA), is a metabolite of tryptophan degradation in kynurenine pathway, which acts as a NMDA receptor agonist. Within the brain, QA is produced only by microglia and activated macrophages. Furthermore, QA has been described as a potent endogenous neurotoxin, when present at high levels, related to various psychiatric disorders and neurodegenerative processes. The nematode Caenorhabditis elegans has a nervous system highly conserved with mammals and thus is an alternative animal model widely used in neurobiology research. However, there is no neurotoxin described that allows the study of glutamatergic system disturbance in C. elegans. The aim of this study was verify if QA can

induce neurotoxicity in C. elegans, due to its action in glutamatergic system. Nematodes from N2 (wild type) and transgenic strains VM487 (nmr-1), VC2623 (nmr-2), TJ356(daf-16::GFP), CL2070 (hsp-16,2::GFP), CL2166 (gst-4::GFP) and CF1553 (sod-3::GFP) at young adult stage were treated in liquid or agar containing QA in different concentrations (5, 10, 20, 50, 100 and 200 mM) or vehicle (M9 buffer) at 20oC for 1 hour. The analyses included evaluation of QA's effects on survival, behavioral parameters (pharynx pumping and locomotion), subcellular DAF-16 localization, reactive species generation and expression of superoxide dismutase 3, glutathione-S-transferase-4, and heat shock protein 16.2. When used at high concentrations (50, 100 and 200 mM) QA can induced and increase in C elegans mortality (~15%), although when used at low concentrations (10 and 20mM) QA altered some behavioral pattern of the nematodes. The QA can leave to an increase in the expression of hsp-16.2 (~15%) as well as gst-4 (~40%). However, sod-3 levels were not significantly different from control group. QA also activated DAF-16/FOXO signaling pathway and increased reactive species levels compared to control group. When used specific strains of glutamatergic system, the increase in reactive species production occur in a nmr-1-dependent manner. Our data suggests that QA might be used for neurotoxicological studies on glutamatergic system injuries associated with oxidative stress in C. elegans.

Ph.D. in Biological Sciences (Biochemistry) from the Federal University of Rio Grande do Sul. He holds a postdoctoral fellowship by CNPq in the Federal University of Santa Maria Of Santa Maria (2005) in toxicological biochemistry and from CAPES at the University of Leon in Spain in the field of molecular biology (2009). He is currently an associate professor at the Federal University of Santa Maria. He is part of the SBBq as an ordinary member and member of the International Neurotoxicology Association (INA). Affiliate Member of the Brazilian Academy of Sciences (2016-2020). Has experience in the field of biological sciences (biochemistry) working mainly on the following topics: neuroprotection and antioxidants. He also works in the area of science education in subjects related to the improvement of science education in basic education.

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Imaging and modulation of brain circuits

Over the last decades, new neuroimaging methods have fostered a tremendous advance on brain connectivity mapping and the understanding of brain the capacity to reorganize in response to internal and environmental influences (brain plasticity). These novel techniques have opened new windows for the investigation of changes in brain networks in normal and pathological conditions. I will present and discuss these new concepts and techniques, including structural and functional MRI. These will be integrated in the presentation of our recent results exemplifying the use of these techniques to map changes in human brain networks in developmental, neurological and psychiatric disorders, as well as the prospects of how these approaches can help to improve diagnostic and treatment methods.

MD degree (1999), Medical Residency in Radiology (2003) and PhD in Morphological Sciences (2007) at UFRJ. Postdoctoral Fellow at the National Institutes of Health (USA, 2004-2007).
Adjunct professor and the vice-director of the National Center of Structural Biology and Bioimaging at UFRJ and co-founder and vice-president of the D'Or Institute for Research and Education. Affiliated member of the Brazilian Academy of Sciences (2016-2020).
Research interest: clinical/translational research, employing novel in vivo imaging techniques in human and rodents to map brain circuits in order to improve the understanding of mechanisms related to brain connectivity and plasticity, in normal and pathological conditions.

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The Ability of Ex2Box4+to Interact with Guests Containing Pi-Electron-Rich and Pi-Electron-Poor Moieties

The ability of Ex2Box4+ molecule as a host, able to trap guests that contain pi-electron rich (polycyclic aromatic hydrocarbons-PAHs) and pi-electron poor (quinoid-and nitro-PAHs) moieties in investigated to shed light on the main factors that control the host-guest (HG) interaction. The nature of the HG interactions is elucidated by means of energy decomposition (EDA-NOCV), noncovalent interaction (NCI) and magnetic response analyses. EDA-NOCV reveals that dispersion contributions are the most significant to sustain the HG interaction, while electrostatic and orbital contributions are very tiny. In fact, no significant covalent character in the HG inter-actions is observed. The obtained results point strictly to noncovalent interactions, modulated by dispersion contributions. Regardless of whether the guests contain pi-electron-rich or pi-electron-poor moieties, no significant charge-transfer is observed, and all HG interactions between guests 3-14 and host 2 are predominantly modulated by van der Waals interactions, indicating that pi-pi stacking is the driving force in these HG interactions.

Dr. Giovanni F. Caramori obtained his degree in Chemistry at USP in 2002. He defended his doctoral thesis in 2006 at FFCLRP-USP (2006). He completed 3 post-doctoral internships: (i) (2006 - 2007) Philipps-Universität-Marburg, Germany, under the supervision of Prof. Gernot Frenking. (Ii) (2007 - 2008) IQ - USP in Sao Paulo, under the supervision of Prof. Ana Maria da Costa Ferreira. (Iii) (2013 - 2014) Philipps-Universität-Marburg, also with Prof. Gernot Frenking. His research focuses on computational chemistry, especially in understanding the nature of unusual chemical bonds. Since 2009 he has been teaching at the Chemistry Department of the Federal University of Santa Catarina.

Gustavo Batista Menezes

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AN INTRINSIC GEOGRAPHIC PROGRAM COORDINATES PHAGOCYTE SEEDING IN DIFFERENT LIVER COMPARTMENTS DURING DEVELOPMENT

The liver is the most important niche for immune cell maturation and development during embryogenesis and also plays an essential role in immune surveillance throughout life. Using a combination of liver confocal microscopy with metabolic approaches, we precisely characterized the changes in liver microenvironment during the whole life in mice, beginning from day 1 post-birth up 8 weeks. A massive number of immune cells (presumably hematopoietic precursors) were imaged up to 2 weeks after birth. Intravital imaging revealed that, unlike adults, the differential compartmentalization of Kupffer and dendritic cells is not found in neonates. Instead, numerous F4/80+ and CX3CR1+ cells (many of which also double positive) are found harboring similar niches within the microvasculature. However, the numbers of intravascular cells decreased over time to give rise to a new population of subcapsular cells in the adults (positive only for CX3CR1). Concomitant with changes in location, the vast majority of cells changed their shape from a predominantly amoeboid to a Kupffer-like (intravascular) and a dendritic-like (subcapsular) shape. Our data indicate that different precursors are programmed during liver post-natal development to occupy different niches within hepatic compartments, suggesting an intrinsic geographic program coordinating phagocyte seeding.

Dr Menezes has been interested in understanding leukocyte biology, specifically how leukocytes migrate to sites of cell death and how sterile inflammation damages tissues. During his Masters and PhD, he investigated mechanisms involved in leukocyte chemotaxis and started to work on visualization of leukocyte trafficking in vivo, which has been instrumental in the setting up of in vivo imaging techniques in Latin America. Nowadays, he is focused in understand how the vast immune system in the liver function to maintain body homeostasis and how it can be manipulated to treat several kinds of hepatic diseases. He is Affiliate Member of The Brazilian Academy of Sciences (2015-2019), Professor of Federal University of Minas Gerais, Founder of Center for Gastrointestinal Biology and Director of the Nikon Center of Excellence in Brazil.

Igor Luis Kaefer

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Riparian zone as a main determinant in the structure of a lizard assemblage in an upland Amazonian forest

The use of lizards as model organisms in ecological studies is based on their success in occupying a great diversity of habitats. However, the distributions of some species are closely-tied to the environment, responding to habitat heterogeneity and degradation. Changes in the Brazilian Forest Code in regard to land use make these organisms more susceptible to habitat loss, especially those species most restricted to riparian zones. We studied the distribution of a lizard species assemblage in an upland Amazonian forest along gradients related to soil, topography, vegetation, light incidence and distance from forest streams. Lizards were sampled in 41 standardized plots near Manaus, Brazil. We recorded 20 species from 10 families. We used non-metric multidimensional scaling (NMDS) to reduce the dimensionality of quantitative and qualitative compositions of species. Multiple multivariate regression models indicated that the environmental gradients studied did not significantly influence assemblage species distribution. By means of piecewise regression, the use of the riparian zone was estimated at ~ 190 m from the quantitative species composition and ~ 211 m for the qualitative composition. Several species occurred only in the riparian zone. The estimates of the effective biological size of the riparian zone shows that the current environmental legislation is insufficient to protect the total diversity recorded for this species assemblage.

PhD in Biology (Ecology) at Instituto Nacional de Pesquisas da Amazônia, Brazil (INPA, 2012). Graduated in Biological Sciences at Universidade Federal de Santa Maria, Brazil (UFSM, 2008). Currently, professor in the Department of Biology at Universidade Federal do Amazonas (UFAM), Brazil. Masters and Doctoral advisor at UFAM and INPA. Section editor of the international journals Annals of the Brazilian Academy of Sciences and Herpetology Notes. Receives a productivity grant from CNPq. The general topic of research is evolution, ecology and natural history of the Neotropical amphibians and reptiles.

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Enhanced primary productivity and magnetotactic bacterial production in response to hyperthermals events

The last 65 million years of Earth's history was characterized by abrupt climatic changes, which atmospheric CO2 concentration and temperature can change rapidly, as demonstrated by a series of events during the early Cenozoic known as hyperthermals. In marine events, changes in primary productivity are directly related to the distribution of availability of nutrients and can be tracked by several proxies. One proxy is the relative abundance of magnetofossils in pelagic sediments. Environmental magnetism is increasingly used for paleoclimate and paleoceanographic studies because, formation, transportation, depositional processes, and postdepositional alterations of magnetic minerals reflect environmental conditions. Recent development of magnetic techniques has enabled semiquantitative evolution of the occurrence of biogenic magnetite in sediments and its relationship with climatic changes. Here, we show our present research in analysing sediment magnetic properties deposited during extreme climatic events.

Jairo Francisco Savian, Ph. D. is Professor of Geophysics at the Geosciences Institute, at Federal University of Rio Grande do Sul at Porto Alegre, Brazil. Savian received Bachelor's degree from Federal University of Santa Maria (UFSM) in Physics and his Ph.D. and Master's degrees from University of São Paulo (USP) in Geophysics under the supervision of Dr. Ricardo Ivan Ferreira da Trindade. His recent research activities include remanent magnetization acquisition in sediments; variations of the Earth's magnetic field in South Hemisphere; and variations in ocean paleoproductivity during hyperthermals events using magnetofossils as proxy.

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The user involvement in medical product development

The product development process is a key process in most companies. It is estimated that 10% of company revenues are derived from new products. This process is strategic because it is during the design project that decisions about the product characteristics and functionalities, business model, environmental impact among others are taken. In particular, this process in the medical products industry has two even greater challenges. The first is to develop products with high usability. Surveys indicate that 25% of medical errors occurring in surgeries are related to problems with technology or equipment design. The second is to develop products thinking of the correct destination of its end-use, preferably, reducing environmental and social impact. The purpose of the research project is to investigate how the user involvement can aggregate value to increase the effectiveness of product development. The three research streams are: (1) propose new methods to investigate and classify the needs and requirements of the various types of users of medical products; (2) investigate the process of user involvement with the use of physical and virtual prototypes; and (3) investigate the role of users in the final phase of the product life cycle. Partial results of the project include a new method aimed at assisting the design team to identify other users of medical products and a user involvement guide for product development of eletromedical devices. A framework has also been developed to establish purposes for the use of prototypes that help the company

to define the testing and evaluation procedures. Finally, a partial survey of the reverse logistics process of electromedical products was carried out. This research project seeks empower companies with new methods and knowledge that will benefit their product development process, as result they will be able to deliver better projects, that meet market needs and their expectations.

Janaina M. H. Costa is an Assistent Professor at the Production Engineering Department at University of Sao Paulo. Previous she was a Postdoctoral Associate with the Lean Advancement Initiative (LAI) at the Massachusetts Institute of Technology (MIT), focusing her efforts in understanding what are the appropriate metrics that reveal the impact of implementing lean product development methods, tools and practices.Her currently interests span the user involvment in product development and how circular economy design projects should have the user perspective.

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New aspects on Molecular Electronics

Molecular electronics has recently attracted a lot of attention due to promising application in nanoscale electronic devices. In this presentation we highlight recent results in this field, focusing on single organic molecules working as devices and addressing important effects related with electronic transport, such as push-pull molecules, σ or π bridges, Coulomb blockage, negative differential resistance, molecular radicals, temperature dependence, environment sensibility, strong and weak coupling, quantum interference, coherent and incoherent transport, tunneling regime, switches, and a few applications will be addressed.

2004 – Associate Professor as Permanent Position at Physics Department, UFPA
2013 – 2017 Affiliated Member of Brazilian Academy of Science
2016 – 2017 Visiting Scholar at Physics Department / University of Florida.
2010 – 2011 Visiting Scholar at Département de Physique, Ecole Normale Supérieure - Paris
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2008 – 2010 Visiting Scholar at Universidade Federal do Rio de Janeiro.
2004 – Associate Professor as Permanent Position at Physics Department, Universidade Federal do Pará.
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Education
2000 –2002 Post-Doc Position at Universidade Federal de Pernambuco
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Tyrosinase inhibitory activity, molecular docking studies and antioxidant potential of chemotypes of Lippia origanoides (Verbenaceae) essential oils

The essential oils (EOs) of the aerial parts of Lippia origanoides (LiOr), collected in different localities of the Amazon region, were obtained by hydrodistillation and analyzed by GC and CG-MS. Principle component analysis (PCA) based on chemical composition grouped the oils in four chemotypes rich in mono- and sesquiterpenoids. Group I was characterized by 1,8-cineole and α-terpineol (LiOr-1 and LiOr-4) and group II by thymol (LiOr-2). The oil LiOr-3 showed β-caryophyllene, α-phellandrene and -phellandrene as predominant and LiOr-5 was rich in (E)-nerolidol and β-caryophyllene. All samples were evaluated for antioxidant activity and inhibition of tyrosinase in vitro and in silico. The highest antioxidant activity by the DPPH free radical method was observed in LiOr-2 and LiOr-5 oils (132.1 and 82.7 mg TE·mL-1, respectively). The tyrosinase inhibition potential was performed using L-tyrosine and L-DOPA as substrates and all samples were more effective in the first step of oxidation. The inhibition by samples LiOr-2 and LiOr-4 were 84.7% and 62.6%, respectively. The samples LiOr-1, LiOr-4 and LiOr-5 displayed an interaction with copper (II) ion with bathochromic shift around 15 nm. In order to elucidate the mechanism of inhibition of the main compounds, a molecular docking study was carried out. All compounds displayed an interaction between an oxygen and Cu or histidine residues with distances less than 4 Å. The best docking energies were observed with thymol and (E)-nerolidol (-79.8 kcal.mol-1), which suggested H-bonding interactions with Met281 and His263 (thymol) and His259, His263 ((E)-nerolidol).

Bachelor's (2002) and Master's in Chemistry (2006), phD. Organic Chemistry (2010) by Federal University of Pará State (PA, Brazil). Postdoctoral fellowship of Department of Chemistry of University of Alabama in Huntsville (AL, EUA). Expertise on identification of Secondary metabolites of aromatic plants, essential oils, biological activity of phytochemicals and Chemical Ecology. Professor at Federal University of Pará State and supervisor of Master and PhD students of Biotechnology Program. My research is focused on new sources of bioactive compounds of plants from Amazon region and metabolomic studies of plants during the plant-pathogen interaction.

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OSTEOHISTOLOGY ENHANCING EVOLUTIONARY KNOWLEDGE OF FOSSIL CROCODYLOMORPHA

Paleohistology has been considered an effective tool to interpret bone adaptations developed for a given taxon for its habit of life, to infer ontogeny and skeletal functionalities in fossil taxa. Especially in archosaurs, mainly composed by extinct animals, osteohistology is one of the few methods to interpret its paleobiology. The knowledge of bone microstructure was developed in parallel with the advancement of microscopy technology, with pioneering fossil studies beginning more than 150 years ago. Initially, it was mainly composed by descriptive studies, with no comparative analyzes nor paleobiological implications. Only in the early 2000s paleobiological inferences has been the focus of osteohistological studies. Through this technique was identified the existence of the first fossil dwarf crocodile, by the histological pattern present in the ulna and rib of Susisuchus anatoceps. The presence of

external lamellae in the ribs of the Guarinisuchus munizi and the tibia of the peirosaurid Pepesuchus deiseae, has expanded the existence of this structure to the Mesoeucrocodilia and Neosuchia. Also, the presence of medullary tissue in the Pepesuchus deiseae internal cortex, allowed the identification of a female with several ovogenetic cycles. These tissues are related to bone resorption, for the mobilization of calcium during the eggshell formation. A comparative analysis of a fossil Caiman sp and the recent Caiman yacare revealed three types of primary cortex in this strain, confirming that the Alligatoroidea have distinct growth rates caused by their endogenous rhythms since the Miocene to nowadays. These observations indicate that the clade Crocodylia, seems to retain the plesiomorphic characteristic observed in the basal archosaurs, forming fast growing tissue, against the hypothesis that crocodiles lost the high growth rates ability of other archosaurs in relation to some Triassic Crurotarsi.

Bachelor in Biological Sciences (2000), Master and PhD in Biological Sciences (Zoology - Federal University of Rio de Janeiro, 2003; 2007). Has experience in Paleozoology, with emphasis on Paleohistology, working mainly on Cretaceous, Archosaurs and Vertebrate Paleozoology. Is currently an Associate Professor at the Biological Sciences Center of the Federal University of Pernambuco where is responsible for lecturing General Geology and Paleontology. Is member of the Graduate Program in Geosciences of the Federal University of Pernambuco and Affiliated Member of the Brazilian Academy of Sciences in the period of 2014-2018 by the Vice-Presidency of the Northeast and Espírito Santo.

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Anti-hyperalgesic action of N-type calcium channel blockers in mice models of HIV-related pain

Pain arising from HIV-related sensory neuropathy (HIV-SN) is very difficult to manage as drugs commonly used for neuropathic pain are usually not effective. The aim of this study was investigate the possible antinociceptive effect of intrathecal (i.t.) ziconotide and CTK01512-2, two a N-type voltage-gated calcium channel (VGCC) blockers, in mice models of HIV-SN.
Methods: HIV-SN was induced by the injections of gp120 (100 ng/site, i.t, on days 0, 3 and 6) and/or stavudine (50 mg/Kg, intravenously, on days 0 and 4) in both female and male C57Bl/6 mice. Before and after treatments, von Frey test was performed and adverse effects were investigated. Animals were also i.t. treated with CTK01512-2 and ziconotide (100 nmol/site) 14 days after HIV-SN induction. N-type VGCC mRNA was detected by qRT-PCR in dorsal root ganglion.
Results: The treatment with gp120, stavudine and gp120+stavudine, but not boiled gp120 and/or saline, produced hyperalgesia both in female and male mice. At 14th day after induction, we detected the hyperalgesia peak and increased levels of N-type VGCC mRNA splicing variants e37a and b. I.t. CTK01512-2 or ziconotide was able to fully reverse gp120-, stavudine- or gp120+stavudine-induced hyperalgesia. Ziconotide, but not CTK01512-2, produced motor and sensorial adverse effects at the tested dose.
Conclusions: I.t. N-type VGCC blockers produced a marked antinociceptive effect in mice models of HIV-related pain.

I am Bachelor's in Pharmacy (UNIVALI, Brazil,1997), Master's and doctorate in Pharmacology (UFSC, Brazil, 1999-2003) and post-doc in Pharmacology and Oncology (UNIFI, Italy, 2016). Currently I am the Head and Assistant Professor of the Department of Pharmacology, Universidade Federal de Santa Catarina. I have the expertise, leadership and training in developing projects involving pre-clinical models of pain and analgesic drug discovery from natural sources, publishing more than 150 papers (h index=31). Finally, I am a researcher of productivity(CNPq, Brazil, Level 1B) and was affiliate member of the ABC (2011-2016).

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Protein aggregation as a cellular response to oxidative stress induced by heme and iron

Zika monoclonal antibody discovery by high-throughput sequencing of paired heavy and light chains from single B cells and functional sorting with virus-like particles (VLPs) Leda Castilho, Brandon DeKosky, Erica Normandin, Morgan Timm, Lingshu Wang, SungYoul Ko, Scott Speer, WingPui Kong, Julie Ledgerwood, Theodore Pierson, John Mascola, Barney Graham Zika virus is a flavivirus primarily transmitted to humans by Aedes mosquitoes, but sexual transmission is also possible. Only about 20% of infected humans are symptomatic, and symptoms are mostly mild. However, as recognized by WHO in 2016, zika is a trigger of Guillain-Barré syndrome, and infection during pregnancy can lead to fetal malformations. Monoclonal antibodies (mAbs) are important tools that can assist countermeasures as research reagents, for diagnostic purposes and as therapeutics. Thus, in the present work, we used high-throughput single B-cell sequencing for discovery of mouse and human mAbs. For mouse mAbs, Balb/C and C57/BL6 mice were immunized by electroporation with a plasmid encoding zika premembrane (prM) and envelope (E) proteins, and then boosted in the footpad with prM-E virus-like particles (VLPs) produced in HEK293 cells. CD138+ antibody-secreting cells obtained from the popliteal lymph node were then isolated. For human mAbs, peripheral blood mononuclear cells (PBMCs) from convalescent patients were used and CD27+cells were selected. Single human and mouse B cells were isolated by a high-throughput technique enabling capture of mRNA from single cells. VH:VL amplicons were then generated by reverse transcription and overlap extension PCR, and sent for next-generation sequencing. The mouse genes encoding the highest frequency VH:VL pairs identified via bioinformatics were synthetized, and mAbs were expressed in HEK293 cells. The human paired VH:VL genes were synthetized and cloned in a yeast display library, which was then sorted using labelled zika VLPs as probes to select for mAbs with desired specificity. The resulting recombinant mouse and human mAbs were then characterized by ELISA and neutralization assays. This workflow allows for the discovery of dozens of mAbs within a time frame of 4-6 months.

Leda Castilho is Professor at the Federal University of Rio de Janeiro (UFRJ). She is a Chemical Engineer and holds a PhD degree in Biochemical Engineering from the Technical University of Branschweig (Germany). She has been as a visiting scientist at the National Institutes of Health (NIH, USA) and at the University of Bielefeld. She coordinates the Cell Culture Engineering Laboratory at her university, and her research focuses on the development of technologies for the production of biopharmaceuticals, cell therapies and vaccines.

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Protein aggregation as a cellular response to oxidative stress induced by heme and iron

Hemolytic diseases include a variety of conditions with diverse etiologies in which red blood cells are destroyed and large amounts of hemeproteins are released. Heme has been described as a potent proinflammatory molecule that is able to induce multiple innate immune responses. The mechanisms by which eukaryotic cells respond to the toxic effects induced by heme to maintain homeostasis are not fully understood, however. Here we describe a previously uncharacterized cellular response induced by heme: the formation of p62/SQTM1 aggregates containing ubiquitinated proteins in structures known as aggresome-like induced structures (ALIS). This action is part of a response driven by the transcription factor NRF2 to the excessive generation of reactive oxygen species induced by heme.

Graduação em Ciências Biológicas e mestrado em bacteriologia pela UERJ (2000), Doutorado em Ciências pela UFRJ/Instituto Pasteur (2001-2005), Pós-Doutorado pela Universidade de Toronto (2006-2010) e Professor Adjunto do Instituto de Biofísica Carlos Chagas Filho. Responsável pelo Laboratório de Imunoreceptores e Sinalização e Coordenador do Programa Temático de Imunobiologia. Atua na interface patógeno-hospedeiro com foco no papel da resposta automática disparada pela infecção e mais recentemente na agregação de proteínas disparadas por estruturas microbianas ou do próprio hospedeiro.

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A low-dose doxycycline has renal protective effects in male Wistar rats subjected to acute renal ischemia/reperfusion injury

Renal ischemia-reperfusion injury (IRI) is a major cause of acute renal failure. Doxycycline (Dc) belongs to the tetracycline-class of antibiotics that has unveiled beneficial molecular effects in tissue injury, mainly through matrix metalloproteinases inhibition (MMP). We aimed to determine if low doses of Dc prevent decreases in kidney function of Wistar rats subjected to kidney I/R. The rats underwent bilateral kidney ischemia for 30 min followed by 24 h reperfusion (I/R). Dc (1, 3 and 10 mg/kg, i.p.) was administered 2 h before surgery. Untreated I/R rats presented with 250% increase in urine volume and proteinuria, 60% reduction in GFR, accumulation of urea-nitrogen in the blood and 60% decrease in the fractional Na+ excretion due to unbalanced Na+ transporter activity. Treatment with Dc 3 mg/kg maintained the control levels of urine volume, proteinuria, GFR, blood urea-nitrogen, fractional Na+ excretion, and equilibrated Na+ transporters activities. The Dc protection on renal function was associated with the preservation of kidney structure and prevention of TGF and fibronectin deposition. In vitro, total MMP activity was augmented in the I/R and inhibited by 25 and 50 μM Dc. In vivo, I/R augmented MMP-2 and MMP-9 proteins contents without changing their activities. Dc treatment downregulated total MMP activity, and MMP-2 and MMP-9 protein contents. Our results suggest that treatment with low dose Dc protects from IRI, thereby preserving kidney function.

Associate professor in Pharmacology of ICB/UFRJ, head of Renal Pharmacology Laboratory, affiliate member of the Brazilian Academy of Sciences (2013-2017) and CNPq researcher 2. Graduated in Pharmacy (1999), MSc and PhD in Biological Sciences - Physiology (2000 and 2004) from UFRJ. Visiting Professor in Physiology at Tulane University (2009-2011), Young Investigator from APS (2011) and Young Scientist of Our State (FAPERJ, 2013-2015). We aim to understand the molecular mechanism associated with acute kidney injury provoked by renal ischemia reperfusion and the progression of chronic kidney disease provoked by hypertension and high salt intake.

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Development of Catalysts for Environmental and Energy Applications

Much effort has been devoted to the development of sustainable and carbon-neutral sources of energy, to minimize the negative effects caused by the fossil fuels in the environment. Artificial photosynthesis has emerged as a technology to produce energy from the sunlight through the splitting of the water molecule, which requires the minimization of kinetic barriers and unfavorable thermodynamics of the water oxidation reaction step (eq. 1). The inspiration for the catalyst design is the Mn4CaO5 cluster (OEC, oxygen evolving complex) of the Photosystem II (PSII), present in the photosynthesizing organisms.
2H2O → O2 + 4H2 + 4e-(eq. 1)
Under this context, we have investigated molecular catalysts based in transition metal complexes with organic ligands containing nitrogenated and carboxylate groups. Copper(II), cobalt(II) and manganese(II) polynuclear complexes have been prepared and characterized. Another approach addressed was the synthesis of heterogeneous catalysts based in abundant transition metal oxides, as cobalt and manganese oxides. These catalysts were successfully applied in the chemical and electrocatalytic water oxidation reaction, leading to high turnover frequencies and recyclability.
Another problem of interest for our group concerns the environmental pollution by the improper disposal of toxic industrial wastes as dyes and pesticides. Remediation of organic pollutants wastes before disposal has been regulated by environmental protection legislations to minimize the damage. Iron has been the first choice metal for groundwater treatment due to its low toxicity, biodegradability, low cost and abundance, being considered a universal material for water treatment. Among them, iron-containing nanomaterials is widely used a heterogeneous Fenton-like catalysts to remediate contaminants such as dyes, leading to complete degradation and mineralization, moreover, allowing the catalyst recycle. We have investigated green iron nanoparticles, prepared with natural and sustainable reducing agents, as black and white tea, Yerba Mate tea and glycerol, and their application in heterogeneous Fenton degradation of pollutant dyes. Total decolourization was successfully achieved.

Assistant professor at the Department of General and Inorganic Chemistry, at the Chemistry Institute of Universidade do Estado do Rio de Janeiro (UERJ) since 2012. Affiliated Member of Brazilian Academy of Sciences (ABC) from 2017 to 2020. Bachelor (2003) and Masters (2004) degree in Chemistry, PhD (2009) in Inorganic Chemistry, by the Universidade Federal do Rio de Janeiro (UFRJ). Post-doc at MIT (2011) with professor Stephen J. Lippard. Experience in Coordination Chemistry, Catalysis and Environmental Chemistry. Major themes of studies: biomimetic catalysts for selective oxidation of hydrocarbons, remediation of organic pollutant by iron nanoparticles and development of catalysts for the water oxidation reaction. Young scientists of Rio de Janeiro State (JCNE) from FAPERJ since 2015. Awarded with the scientific productivity scholarship from CNPq – Chemistry (2015) and from Pró-ciência program - UERJ (2015). Head of the graduated program of Chemistry at UERJ (PPGQ-UERJ) from 03/2014 to 02/2016.

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Insights in Crystal Engineering of Covalent Organic Frameworks

In this contribution we will description as conformational freedom of the building blocks influence the properties of a class of nanoporous materials, called COFs. Some underlying principles for the design of such will be presented.

Carioca, from Penha neighbourhood, attended public schools until graduating from UFRJ, in chemistry, in 1994 (BSc) and 1999 (DSc), with a "sandwich" period in the University of Strasbourg, France, having Claudio J. A. Mota as thesis advisor. Post-doctorade at the Locker Hydrocarbon Research Institute of University of Southern California (USC) in 2000-2001. From there returned to Rio, to a position at the Institute of Chemistry of the UFRJ. Research interests are carbocations and reactive intermediates, reaction mechanisms, structural and reticular chemistry.

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(+)JQ1, an epigenetic compound, inhibits Gastric Cancer cell growth

Gastric cancer (GC) is the third leading cause of cancer death worldwide, mainly due to late diagnosis and therapeutically failure. Palliative chemotherapy provide the best supportive care, aimed at extending survival of the patients from 3 months with no therapy to 7–15 months with modern combination chemotherapy. Given the dire need for anticancer agents active against GC, the effect of an epigenetic inhibitor library on GC cells. Initial screening was performed in 5 patient derived GC cell lines; Three Brazilian (AGP-01: Malignant Ascites; ACP-02: Diffuse-type; ACP-03: Intestinal Type) and two Asian (Kato-III and SNU-16). (+)-JQ1 is a BET inhibitor and, interestingly, did not have an effect on proliferation of the Asian origin cell lines, but strongly inhibited the growth of Brazilian cells. We also performed qPCR on two main targets of BET inhibitors: BRD4 and MYC. No large differences were observed between the cell lines, but the ACP-02 cell line was shown to have the highest amount of BRD4, whereas KATO III had the lowest amount of BRD4, thus expression of the target did not predict inhibitor sensitivity of the studied cell lines. Moreover, there was no correlation between c-MYC expression levels and BRD4 levels. Furthermore, frequency of MYC gain in tumors of patients with advanced GC seems to be higher in the Brazilian population than in Asia. The data obtained here is in line with these previous findings as (+)JQ1 only had little if any effect in the Asian cell lines tested, but showed potent antiproliferative effects in the cells of Brazilian origin, pointing to a potential genetic and demographic factor of GC.

I am a Biochemistry professor in the Medical Faculty at Federal University of Ceará. I have a PhD in Pharmacology focusing on Pharmacogenetics of Cancer drugs. I was granted with a fellowship at Oxford University as an Academic Visitor where I stayed for two years. During my fellowship, I developed High-Troughput cell based assays, and I learned several techniques on phenotype – genotype screening. I am part of the Pharmacology and Medical Science PhD programs where I am a mentor several students. Our main interest is in drug development and Biomarkers in Cancer.

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Ion irradiation effects in antimonide films

Semiconductors are commonly implanted or irradiated with heavy ions to increase the number of defects in the matrix and enhance specific electrical and optical properties. A very peculiar effect is observed upon ion irradiation of antimonides: the formation of a porous, sponge-like structure with nanometric dimentions. The effective surface area of the material is greatly increased, producing structures suitable for gas sensing or bolometry. Only a few semiconductors can be rendered porous by ion irradiation alone.
Here we show the ion irradiation effects on binary and ternary compound films containing In, Al, Ga and Sb grown by molecular beam epitaxy and magnetron sputtering. The first stages of porosity in InSb irradiated with 17 MeV Au ions were investigated by transmission electron microscopy, revealing the formation of pores before amorphization. The atomic composition and structure of porous GaSb and InSb were probed as a function of film thickness and irradiation fluence. The ion irradiation effects on the films were characterized by Rutherford backscattering spectrometry, scanning electron microscopy and x-ray diffraction analysis. The surface chemical components and the electronic state of surface atoms were investigated by means of x-ray photoelectron spectroscopy. X-ray absorption near edge spectroscopy provided information about oxidation state of atoms at the surface of the porous materials. In addition, the formation of porous structures in antimonides due to ion irradiation was simulated using the Cellular Potts Model for wet foams, providing information about parameters not easily accessible by experiments and enabling a better understanding of the mechanisms responsible for such changes.

Raquel Giulian did her undergraduate studies in Physics (2003) and Masters degree (2005) at the Universidade Federal do Rio Grande do Sul studying the elemental concentration of mate tea leaves using ion beam techniques. In 2005 she moved to Australia to study the synthesis and modification of nanoparticles by ion beam techniques, completing her PhD in 2009, followed by a two year post-doctoral in the same area. In 2011 she moved back to Brazil to start a permanent position at UFRGS. Affiliated member of the Brazilian Academy of Science, Raquel works with semiconductors, TEM, XAFS, XPS, XRD, RBS.

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Extremum Seeking applied to Neuromuscular Electrical Stimulation under Time-Delays

Extremum seeking (ES) methodology is applied to implement adaptive Proportional-Integral-Derivative (PID) closed-loop control for neuromuscular electrical stimulation (NMES) subject to time delays. The proposed predictor-based ES strategy with a perturbation-based (averaging-based) estimate of the Hessian is designed to control the patient's arm position in order to generate elbow extension/flexion movements. This method obviates the application of initial controller tests directly to patients since the tuning procedure is automatically performed in an online fashion. ES is used to tune the parameters of a PID controller so as to minimize a given cost function which is chosen to reflect the desired performance attributes. The ultimate responses obtained in the experiments with a healthy volunteer complied with the common specifications set in terms of the steady-state error, settling time, and the percentage overshoot.

Prof. Tiago Roux Oliveira received the Ph.D. degree in Electrical Engineering (2010) from COPPE/UFRJ. He joined UERJ as an Associate Professor in the same year. He served as a Visiting Scholar at the University of California, San Diego (UCSD), USA, in 2014-2015. He received from CAPES the National Award of Best Thesis in Electrical Engineering (2011) and from FAPERJ the Rio de Janeiro Young Researcher Award (2012 and 2015 editions). In 2017, Prof. Tiago was nominated affiliate member to the Brazilian Academy of Sciences (ABC). His interests include nonlinear adaptive control, extremum seeking and time-delay systems.

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An evolutionary look at congenital Zika Syndrome

The Zika Virus (ZIKV) outbreak and epidemics in the Americas, on late 2015, activated a global alarm due to its association a congenital fetal anomalies subsequent the infection in pregnant women. Several lines of research, in a short time, yielded impressive findings. An evolutionary approach could respond some outstanding major questions: Why ZIKV does not infect and cause teratogenesis in all animal species equally? Why only 10% of the infected pregnancies end up in congenital Zika syndrome? We speculate that differences in the presence/absence of genes, regulatory elements, and variants among vertebrate genomes might play role in ZIKV infection and outcome. To verify what evolutionary event confer protection or susceptibility to teratogenesis, we are performing a genome triangulation of affected (i.e. human, rhesus macaque and chicken) vs. naturally unaffected (i.e. mouse) species from available genomes. We retrieved all genes with orthologues in species known to be affected by teratogenesis without orthologues in the mouse, and all mouse genes without orthologues in the affected species. Then, we performed a gene set enrichment analysis of these two sets of non-shared orthologs to find which genes are potentially involved in Zika infection and syndrome (i.e. Brain development, Cell Killing, Immune system process, Embryo organ development, Placenta development, and all their derivative terms). Our genomic triangulation retrieved 170 and 2546 non-shared orthologues in the affected species and mouse, respectively. We also found 24 501 human polymorphisms in the 170 non-shared genes whit a global frequency greater than 10%, indicating possible candidate variants for the susceptibility studies. These findings support an evolutionary approach as a potentially useful tool for candidate gene and variants mining in conditions known to develop differently between species.

Vanessa R Paixão-Côrtes was graduated in Biological Sciences from the Federal University of the Rio Grande do Sul (UFRGS) in 2002, and have received a Master degree (2008) and Ph.D. degree in Genetics and Molecular Biology from the same university, with the thesis "The Search for Evolutionary Patterns in Developmental Genes", written under the supervision of Profa. Maria Cátira Bortolini. She held a Post-Doc position (CNPq-PDJ) at UFRGS (2012), was a DTI-1 Fellow of Instituto Nacional de Genética Médica Populacional (INaGeMP; 2013), and was a PNPD postdoctoral fellow of the Genetics and Molecular Biology Graduate Program (PPGBM) at UFRGS. She is currently an Associate Professor position at Federal University of the Bahia, in the Biology Institute (UFBA; 2014). She has published articles in the areas of Human Genetics and Evolution, Animal Comparative Genomics and Population Genetics. She is mainly working in the following areas: Development Genes and Evolution, Human Evolution, Vertebrate Evolution, Molecular Evolution, Medical and Population Genetics, and Bioinformatics.