



SÃO PAULO RESEARCH FOUNDATION

# FAPESP'S ENGINEERING RESEARCH CENTERS



## FAPESP'S ENGINEERING RESEARCH CENTERS

Partnerships between FAPESP and private enterprise to create research centers in strategic areas with long-term funding combine advanced science and applications for technological development. Building on the solid foundation offered by university-business interaction in São Paulo, the strategy stimulates research with ambitious objectives and teams that include company researchers.

FAPESP enters into cooperation agreements with companies and issues calls for proposals to establish the centers, where researchers from universities and research institutions in São Paulo work with researchers from the companies concerned. FAPESP and the partner companies share the investment for a period of five to ten years. The institutions that host the centers also contribute to the investment in the form of operating expenses and salaries.

FAPESP extends funding for these centers through its FAPESP Program for Research Collaboration for Technology Innovation (PITE).

[www.fapesp.br/cpe/home](http://www.fapesp.br/cpe/home)

São Paulo Advanced  
Research Center for Biological  
Control (SPARCBio)

Energy Production  
and Innovation  
Center (EPIC)

Engineering Research  
Center 'Prof. Urbano  
Ernesto Stumpf'

Centre of Excellence for  
Research in Sustainable  
Chemistry (CERSusChem)

Center of Excellence  
in New Target Discovery  
(CENTD)

Research Centre  
for Gas Innovation  
(RCGI)

Center for Applied  
Research in Human  
Wellbeing and Behavior

New Energy  
Innovation Center  
(CINE)

Genomics for  
Climate Change Research  
Center (GCCRC)



## SÃO PAULO ADVANCED RESEARCH CENTER FOR BIOLOGICAL CONTROL (SPARCBIO)



José Roberto Postali Parra

Department of Entomological and Acarology / "Luiz de Queiroz" College of Agriculture, University of São Paulo (ESALQ/USP)

Business partner: Koppert Biological Systems

[www.sparcbio.com.br](http://www.sparcbio.com.br)

*Center for Excellence in Biological Control*

FAPESP Process 2018/02317-5  
Term: Oct 2019 to Sept 2024

+55 19 3429-4199  
rmorelli@sparcbio.com.br

FAPESP Funding: R\$ 6,849,263.59

Koppert Funding: R\$ 5,000,000.00

ESALQ/USP Funding: R\$ 10,419,807.44

SPARCBio appears as a world centre for advanced studies on biological control in Brazil. The center is the result of FAPESP partnerships within Koppert Biological Systems and Universidade de São Paulo ESALQ/USP in support of high-level scientific research for the development of the sustainable agriculture technologies.

The center's aim to establish a new model to control pests and diseases for tropical agriculture with mission of develop research projects, products and technologies that will result in a strong relationship with this novel integrated pest management and their adoption in a modern and sustainable agriculture.

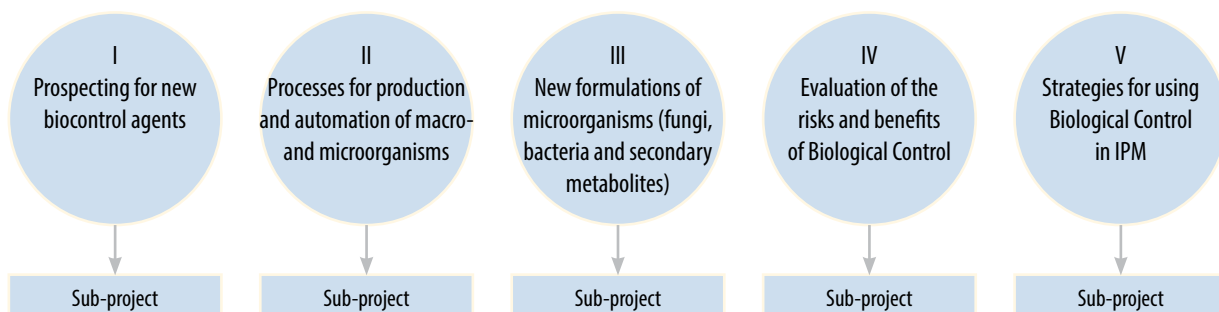
Those products and technologies that comes from researchers has challenges as to improve brazilian farmers point of view in relation of biotech competitiveness and responsibilities.

SPARCBio organizationally placed under the Department of Entomological and Acarology at Universidade de São Paulo, located in ESALQ/USP and a research team led by PhD José Roberto Postali Parra as Director of the Center and Renata Morelli, agronomic engineer, as Executive vice-diretor.

Other professors from brazilian universities as Unesp, UFSCar, UFES, UFV and internationals partners as University of California, Davis and University of Minnesota, USA, as well as researches from Embrapa and international researches from INRA, Sophia Antipolis (France), USDA and ARS (both USA) and UCPH from Denmark also are integrants of the advanced research center.

Research projects are listed according to priorities, in soybean, corn, sugar cane, cotton, coffee and fruit crops. These are short, medium and long-term research in Biological Control meeting sector demands. Currently, the biodefensives market generates around US\$ 100 million annually, growing an average of 20% per year. The prospecting of new macro and microorganisms combined with the biological agents currently under study, should increase the biological control agents portfolio in Brazil.

Ultimately, SPARCBio is developing research to generate products and technologies allowing the vast insertion of Biological Control as part of Integrated Pest and Disease Management, towards sustainable agriculture.





## ENGINEERING RESEARCH CENTRE IN ENERGY PRODUCTION AND INNOVATION



Antonio Carlos Bannwart

Faculty of Mechanical Engineering/University of Campinas (FEM/UNICAMP)

Business partner: Equinor

[www.epic.cepetro.unicamp.br](http://www.epic.cepetro.unicamp.br)

*Engineering Research Centre  
in Reservoir and Production  
Management*

FAPESP Process 2017/15736-3  
Term: Feb 2019 to Jan 2024

+55 19 3521-1201  
[epic@unicamp.br](mailto:epic@unicamp.br)

FAPESP Funding: R\$ 16,682,561.96

Equinor Funding: R\$ 12,426,591.45

UNICAMP Funding: R\$ 52,265,975.79

FAPESP and Equinor (former Statoil), a Norwegian multinational energy company, support the partnership among researchers from universities and research institutes in the State of São Paulo and from the Energy Production and Innovation Center (EPIC), in Brazil.

As a result of the cooperation agreement between FAPESP and Equinor, signed in 2016, EPIC aims to seek innovative solutions to optimize energy production, especially aiming at oil well efficiency, reservoir recovery and better water management withdrawal from oil during drilling and extraction activities.

Funding from FAPESP and Equinor is not expected to be the sole and exclusive support of the Center. Partnerships with governmental or non-governmental agencies that are responsible for public policies are foreseen, as well as the creation of startups to be supported by FAPESP's Innovative Research in Small Business Program (PIPE).





## ENGINEERING RESEARCH CENTER 'PROF. URBANO ERNESTO STUMPF'



Francisco Emílio Baccaro Nigro

Engineering School of Maua (EEM). Instituto Mauá de Tecnologia

Business partner: PSA Group

<http://cpebio.com.br>

*Conceptual study of an  
advanced ethanol-fueled  
engine*

FAPESP Process 2013/50238-3  
Term: Nov 2014 to Oct 2021

+55 11 4239-3184  
motor@maua.br

FAPESP Funding: R\$ 8.534.592,55

PSA Funding: R\$ 5.617.094,11

USP/ITA/MIT/Unicamp Funding:  
R\$ 10.651.738,56

The Engineering Research Center 'Prof. Urbano Ernesto Stumpf' is dedicated to develop researches in biofuel engines under the sponsorship of the FAPESP – PSA Agreement.

The ERC was born from a call for proposals launched in December of 2012 by FAPESP, from a cooperation agreement with the Peugeot-Citroën (PSA) which has the objective do create a Center dedicated to study biofuel applications in engines. FAPESP and PSA undertake to finance the CPE for up to ten years. This initiative by FAPESP and PSA was motivated by the need to create a "locus" where state-of-the-art and multidisciplinary research in the area of biofuels could put Brazil at the forefront of technological knowledge in the area.

The researches in vehicle powertrains adopting biofuels require a comprehensive approach. The topics addressed range from basic research on the phenomenology of the formation and evolution of sprays of ethanol and its combustion, to architectures linking powertrain and vehicle. Tribology, fluid mechanics, thermodynamics, heat transfer, mechanical design of parts and components, noise and vibration analysis, sensors, actuators and control are also themes to be dealt with. These themes are so diverse and simultaneously so interconnected that only an articulated pool of research groups with different skills can carry out the intended goals and face these challenges.

To attain its objectives, the ERC 'Prof. Urbano Ernesto Stumpf' must seek for new projects, incorporate other companies, other research groups and other sources of funding besides the FAPESP/PCBA budget since the beginning of its activities. The Center will also establish contacts and collaborations with other Brazilian and international institutions working in the area of internal combustion engines.

This proposal uses a concept named "backbone research project" – a research project capable to give coherence and common goals for diverse research groups while the Center is in its initial construction phase. Thus, the research plan for the first four years of the ERC is aimed to study the concept of an advanced ethanol-fueled engine, which explores the specificities and positive characteristics of ethanol as fuel. The expected result is a conceptual proposal to present an ethanol engine with better performance and simultaneously better efficiency than that of flex-fuel engines.

## AREAS AND RESEARCH THEMES

### **EXPLORATORY EXPERIMENTAL TESTS FOR AN ETHANOL ENGINE**

---

Principal Researcher: Prof. Dr. Francisco Emilio Baccaro Nigro  
Division of Engines and Vehicles (DMV) – Mauá Institute of Technology (IMT)

### **FUNDAMENTAL STUDIES ON MIXTURE PREPARATION AND TURBULENT COMBUSTION OF ETHANOL IN ENGINES**

---

Principal Researcher: Prof. Dr. Guenther Carlos Krieger Filho  
Laboratory of Environmental and Thermal Engineering - (LETE/EPUSP) – University of São Paulo (USP)

### **SPRAY COMBUSTION OF HYDRATED ETHANOL FOR MPFI ENGINES**

---

Principal Researcher: Prof. Dr. Pedro Teixeira Lacava  
Laboratory of Combustion, Propulsion and Energy – ITA

### **THERMODYNAMIC SIMULATION OF INDICATED PERFORMANCE FOR ETHANOL ENGINES**

---

Main researcher: Prof. Dr. Waldyr Luiz Ribeiro Gallo – DE/FEM/UNICAMP  
Biofuel Engine Laboratory – LMB/UNICAMP

### **INNOVATIVE MECHANICAL SOLUTIONS FOR ETHANOL ENGINES**

---

Main researcher: Prof. Dr. Janito Vaqueiro Ferreira – DMC/FEM/UNICAMP  
Biofuel Engine Laboratory – LMB/UNICAMP

### **DYNAMIC SIMULATION, STRESS ANALYSIS, LOW WEIGHT COMPONENTS DESIGN AND ESSAYS**

---

Principal researcher: Prof. Dr. Marco Lucio Bittencourt – DPM/FEM/UNICAMP  
Biofuel Engine Laboratory – LMB/UNICAMP

## CENTRE OF EXCELLENCE FOR RESEARCH IN SUSTAINABLE CHEMISTRY



Arlene Gonçalves Corrêa

Center of Exact Sciences and Technology / Federal University of São Carlos (UFSCar)

Business partner: GlaxoSmithKline Brasil Ltda (GSK)

[www.cersuschem.ufscar.br](http://www.cersuschem.ufscar.br)

*Green chemistry: sustainable synthetic methods employing benign solvents, safer reagents, and bio-renewable feedstock*

FAPESP Process 2014/50249-8

Term: Apr 2016 to Mar 2021

+55 16 3351-8281  
agcorrea@ufscar.br

FAPESP Funding: R\$ 5,759,666.14

GSK Funding: R\$ 5,614,123.31

UFSCAR Funding: R\$ 20,378,752.10

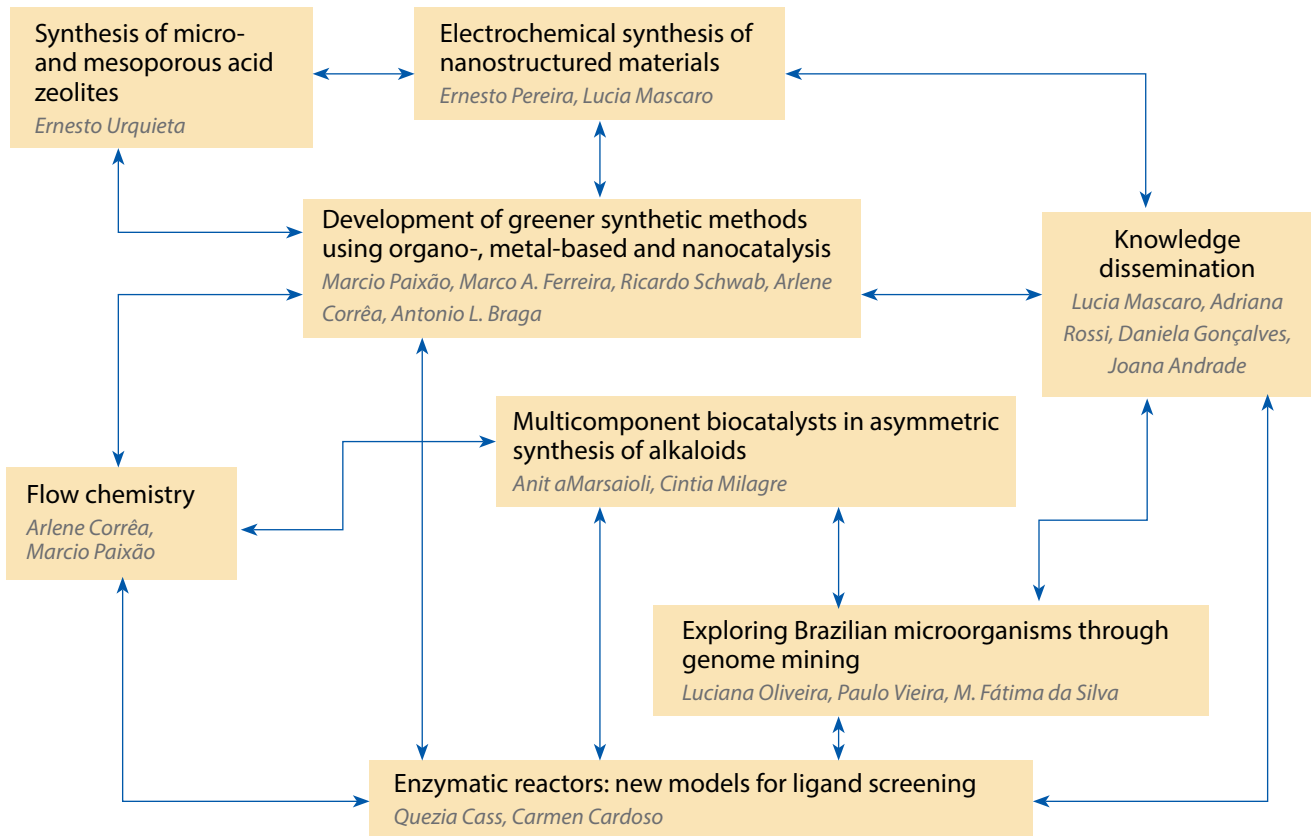
The Centre of Excellence for Research in Sustainable Chemistry (CERSusChem) is part of the Engineering Research Centers Program (CPE) financed by FAPESP and GSK

The Centre is formed by 18 faculty members of 5 different Public Universities – UFSCar, UNICAMP, USP-Ribeirão Preto, UNESP and UFSC –, with ongoing projects in the area and with well-established national and international research collaborations. The expertise in the area by this team has allowed a continuous work production at the state of the art and justified the creation of the Centre. The members of the CERSusChem have come together and defined a series of challenges, over-arching goals as long-term directions of research and integrative activities of the Centre.

The research features novel strategies from across pharma, biotech and academia to meet current challenges in organic synthesis focused in the principles of sustainable chemistry, such as: cascade organocatalytic/multicomponent reactions, nanomaterials, solvent free approach or bio-solvents, biocatalysis, flow chemistry and new models for protein ligand assays.

The education and knowledge dissemination action plan encompasses changing approaches focused in all segment of society. A special attention is given in producing experimental training focused in qualified industry worker and secondary school teacher.

Technology transfer is an integrated part of this proposal and a master goal of this Centre. To meet this aim collaborative work with industrial partner is pursued in a flexible manner in order to respond to our partners' necessities. Our final goal is the development of a tool box for operating catalytic reactions and assays which will afford practical applications impacting in the way of manufacturing new or well-established products with more environmental and economic returns, addressing social well-being and government legislation regarding environmental approaches.



Flow char demonstrating the interaction between team members of the CERSusChem

## CENTRE OF EXCELLENCE FOR RESEARCH IN TARGET DISCOVERY



Ana Marisa Chudzinski Tavassi

Butantan Institute / São Paulo State Secretariat of Health

Business partner: GlaxoSmithKline Brasil Ltda (GSK)

<http://centd.butantan.gov.br>

*Rational approach for searching molecular targets involved in inflammatory events and cell survival*

FAPESP Process 2015/50040-4  
Term: Dec 2015 to Nov 2020

+55 11 2627-3727  
centd@butantan.gov.br

FAPESP Funding: R\$ 12,731,369.84

GSK Funding: R\$ 11,361,576.90

Butantan Institute Funding:  
R\$ 33,343,991.30

The goal of CENTD is to identify molecular targets and signaling pathways involved in inflammatory-based diseases such as osteoarthritis, rheumatoid arthritis, cancer, and neurodegenerative diseases.

Poisons, toxins, molecules isolated from various animal secretions as well as their peptide derivatives are used for the identification of these molecular targets. The discovery of new targets and their validation can pave the way for the development of new drugs.

CENTD is already developing integrative research, with the collaboration of several scientists. There are six main lines of research that unfold in others, involving about 35 researchers.

High performance equipment was purchased for high impact experiments, revealing critical cellular phenomena for the identification of structures responsible for different phenotypes.

Among them is the High-Content Screening (HCS) equipment, which in addition to enabling screening of molecules of interest rapidly, evaluates phenotypes in pre-defined models in a multiparametric way. It is possible, for example, to check how cells migrate - crucial information for the treatment of cancer.

The pharmaceutical industry can use the information generated through this research for development and production of new drugs.

It is intended to stimulate the advance of basic and applied research, with high technology equipment and bioinformatics.

### RESEARCH GROUPS

Poisons, toxins and cytoprotective molecules as tools for searching new molecular targets

Studies of the inflammatory effect induced by metalloproteinases of snake venoms and other bioactive molecules in the articulation using culture of cellular tissue

Pro-inflammatory effects of animal poisons on cells involved in joint diseases and tissue remodelling

Investigating the effect of toxins in osteoclastogenesis and activation of lymphocytes: seeking therapeutic targets

Genetically selected mouse lines (AIRmax / AIRmin)

Molecular mechanisms of pain in arthritis: identifying new targets for drug development



## RESEARCH CENTRE FOR GAS INNOVATION



Julio Romano Meneghini

Polytechnic School / University of São Paulo (Poli/USP)

Business partner: BG E&P Brasil (Shell Group)

[www.rcgi.poli.usp.br](http://www.rcgi.poli.usp.br)

*Brazil Research Centre  
for Gas Innovation*

FAPESP Process 2014/50279-4  
Term: Dec 2015 to Nov 2020

+55 11 2648-6226  
rcgi@usp.br

FAPESP Funding: R\$ 20,932,901.99

BG/Shell Funding: R\$ 28,823,306.08

Poli/USP Funding: R\$ 18,972,000.00

The RCGI – Research Centre for Gas Innovation appears as a world centre for advanced studies on energy transition for the sustainable use of natural gas, biogas, hydrogen and management, transport, storage and usage of CO<sub>2</sub>. The center, based at the University of São Paulo, is the result of FAPESP partnerships in support of high-level scientific research for the development of the energy sector. Its activities are based on three pillars: research, innovation and dissemination of knowledge.

The RCGI brings together a team of researchers from various fields of science and technology for the development of the gas and energy industries. The projects are structured in five research programmes: Engineering, Physical-Chemistry, Energy Policies & Economics, CO<sub>2</sub> Abatement and Geophysics. With the integration of researchers and the complementarity of their programmes, the RCGI offers innovative solutions to the technological problems on energy transition related to natural gas, biogas, hydrogen and CO<sub>2</sub> emissions as well as providing support for the improvement of energy policies in the State of São Paulo, in Brazil and worldwide. In particular, it intends to increase the competitiveness of the industry of São Paulo and inform society of the enormous economic potential in the use of natural gas, biogas and hydrogen as sources of energy in the years to come.

### ENGINEERING PROGRAMME

RCGI includes projects that investigate the technological, scientific and market to a greater use of natural gas in the Brazilian energy matrix and as fuel for transportation. It concerns the development of new-generation thermal power plants, problems involving the transportation and storage of natural gas, as well as key topics for the success of gas as a premium fuel for the 21<sup>st</sup> century.

### PHYSICAL CHEMISTRY PROGRAMME

RCGI gathers projects focused on natural gas conversion into chemicals with high added value. The research projects in this area are focused on chemical and biochemical synthesis routes, proofs of concept, development of catalysts, modeling and process optimization. Also technological applications will be considered, such as development of fuel cells, solar energy and ceramic membranes. Associate researches are related to the production of biogas from biomass derived from ethanol production.

## CO<sub>2</sub> ABATEMENT PROGRAMME

Projects of RCGI aim to produce elements to support and encourage federal, state and municipal policies for an effective insertion of natural gas in the energy systems. First focusing on the Brazilian context, the research scope will also expand to the global context, in particular to emerging countries.

## ENERGY POLICIES AND ECONOMICS PROGRAMME

RCGI includes projects that investigate management, transport, storage and usage of CO<sub>2</sub>.



## CENTER FOR APPLIED RESEARCH IN HUMAN WELLBEING AND BEHAVIOR



Emma Otta

Psychology Institute / University of São Paulo (USP)

Business partner: Natura

<https://cpbec.org.br>

*Positive psychology and neuroscience: translational research to promote well-being and emotional regulation*

FAPESP Process 2014/50282-5

Term: Aug 2016 to Jul 2021

+55 11 3818-4448/1934

emmaotta@usp.br

FAPESP Funding: R\$ 4,509,626.28

Natura Funding: R\$ 4,710,843.98

USP Funding: R\$ 10,918,851.90

The Center's team is made up of a network of researchers in psychology and neuroscience from the University of São Paulo (USP), the Federal University of São Paulo (UNIFESP) and Mackenzie Presbyterian University (UPM).

Their mission is to build a solid knowledge base on human wellbeing by integrating several areas, such as neuroscience, positive psychology, social psychology, and health, human and applied social sciences. As Brazil's largest scientific wellbeing research center, it will aim to grow knowledge in these fields on the basis of multidisciplinary research activities.

Natura and FAPESP will invest up to BRL 20 million (BRL 10 million each) in ten years. The partner universities will also contribute by providing institutional and administrative support for the researchers involved.

The projects are designed and developed jointly by Natura's researchers and scientists affiliated with the universities. The Center will not have dedicated physical premises but will use the partners' infrastructure. The knowledge areas involved are neuroscience, psychology, and health, human and applied social sciences.

The initiative is unique in the domestic and international spheres in its combination of cutting-edge science, application, innovation, and the desire to have a positive impact in society by understanding wellbeing through collaboration between private enterprise and a network of partners in academia, government and elsewhere.

This is the first center for research in humanities created on the basis of a shared funding model between a private company and a public research support agency.

The Center will create intersections with applied human and social sciences, generating new opportunities for innovative research in this field. Above all the Center rests on two pillars: psychology, emphasizing positive psychology and its notion of wellbeing, including the objective conditions of life, health, nutrition, and housing; and neuroscience.

The Center's researchers will conduct 11 projects focusing on the development of wellbeing indicators through studies on the recognition and regulation of emotions, and the influence of the family context and society on human relationships. Themes linked to the cosmetics industry, such as how fragrances and makeup can change mood and self-esteem, will also be studied.

The Center has shared governance. Its director is Professor Emma Otta, and its Vice Director is Patricia Tobo, Scientific Manager, Wellbeing Sciences, Natura.



## CENTER OF INNOVATION OF NEW ENERGIES

Rubens Maciel Filho

School of Chemical Engineering / University of Campinas (FEQ/UNICAMP)

Business partner: BG E&P Brasil (Shell Group)



[www.cine.org.br](http://www.cine.org.br)

*Advanced energy storage  
division*

FAPESP Process 2017/11958-1

Term: Aug 2018 to Jul 2023

+55 19 3521-4605

maciel@feq.unicamp.br

FAPESP Funding: R\$ 6,470,732.22

Shell Funding: R\$ 10,050,251.20

UNICAMP Funding: R\$ 20,091,701.20

The Center for Innovation on New Energies (CINE) was launched by FAPESP (São Paulo Research Foundation), Shell Brazil, University of Campinas (UNICAMP), University of São Paulo (USP) and the Energy & Nuclear Research Institute (IPEN) in May 2018.

A total of BRL 110 million (34.7-Shell; 23.14-FAPESP; 53- Unicamp| USP | IPEN) is the investment in CINE over a five-year period under the aegis of FAPESP's Engineering Research Centers Program, to fund the development of new energy storage devices with zero or close-to-zero greenhouse gas emissions using renewable fuels and novel technological routes to convert methane into chemicals, among other goals. The Center's mission is to produce knowledge at the research frontier, and in parallel to transfer technology to the business sector.

Therefore, CINE has four research Programs:

- PROGRAM 1** Dense Energy Carriers, hosted by UNICAMP
- PROGRAM 2** Advanced Energy Storage, hosted by UNICAMP
- PROGRAM 3** Methane to Products, hosted by IPEN
- PROGRAM 4** Computacional Material Science & Chemistry, hosted by USP

All together, the research program develop a total of 20 research projects. Activities area coordinated by a Hub, hosted by UNICAMP, at the School of Chemical Engineering.

### **DEC - DENSE ENERGY CARRIERS RESEARCH PROGRAM 1**

Coordinator:

Ana Flavia Nogueira  
anafla@unicamp.br

Institute of Chemistry,  
UNICAMP

DEC was proposed to make use of the solar energy, a clean and abundant source of energy, in benefits of the humankind. We intend to achieve this very noble objective through the development of efficient and low cost processes able to convert sunlight into solar fuels (as hydrogen, methanol etc.) and electricity. The focus DEC is the development of efficient solar driven routes to synthesize relevant solar fuels from molecules that are widely available in the environment. DEC Program has also proposed to study the fundamentals of perovskite materials and develop large area solar cells based on perovskite to bias the PEC systems.

### **AES - ADVANCED ENERGY STORAGE RESEARCH PROGRAM 2**

Coordinator:

Rubens Maciel Filho  
rmaciel@unicamp.br

School of Chemical  
Engineering, UNICAMP

By 2050, it is expected that electricity will move from 18% to 50% of the world energy matrix. In order to effectively store and supply energy, advancement of batteries and supercapacitors is vital to make them economically more viable for applications that go from communications to transport. AES studies state-of-the-art batteries and supercapacitors under dynamic conditions by Raman and FTIR spectroscopies and high-intensity synchrotron X-ray, in order to have insights into the operation and to development of new and more efficient materials and electrolytes for devices.

### **M2P - METHANE TO PRODUCTS RESEARCH PROGRAM 3**

Coordinator:

Fabio Coral Fonseca  
fabiofc@usp.br

Nuclear and Energy Research  
Institute (IPEN)

Addressing one of the biggest challenges faced by the modern chemical industry, M2P aims for the development of new, sustainable routes for production of chemicals and fuels is potentially the most significant. Natural gas has been and will continue to be, in the near future, one of the main sources of hydrocarbons for energy generation. Natural gas, with its major component being  $\text{CH}_4$ , has become significantly cheaper and with availability well beyond the current and future predicted demand. Such a scenario has renewed scientific interest in technologies that can efficiently and sustainably convert such abundant feedstock into useful products.

### **CMSC - DENSE ENERGY CARRIERS RESEARCH PROGRAM 4**

Coordinator:

Juarez L. F. da Silva,  
juarez\_dasilva@iqsc.usp.br

São Carlos Institute  
of Chemistry, UNICAMP

CMSC combines the expertise of young researchers located in the most prestigious institutions of São Paulo state to deliver cutting-edge solutions for for the field of new energies. It focuses mainly on four research lines, namely, (a) methane conversion to new products, (b)  $\text{CO}_2$  capture and reduction to new products, (c) photons to electrons based on photovoltaics materials and (d) energy storage based on batteries and supercapacitors.

## GENOMICS FOR CLIMATE CHANGE RESEARCH CENTER (GCCRC)




Paulo Arruda

Center for Molecular Biology and Genetic Engineering/University of Campinas (CBMEG/UNICAMP)

Business partner: EMBRAPA

[www.gccrc.unicamp.br](http://www.gccrc.unicamp.br)

*The Genomics for Climate  
Change Research Center*

FAPESP Process 2016/23218-0

Term: Aug 2018 to Jul 2028

+55 19 3521-2933  
gccrc@unicamp.br

FAPESP Funding: R\$ 25,164,491.84

EMBRAPA Funding: R\$ 32,960,645.96

UNICAMP Funding: R\$ 44,666,463.21

The Center's mission is to develop biotechnological solutions that increase plant resistance to drought and heat, and to transfer technology to the productive sector. Using genomics and genome editing, genetics and genetic engineering, as well as research on microbiomes, it will create and manage genetic improvement and agricultural biotechnology pipelines for the creation of genetically edited transgenic plant varieties, among other activities.

It will also develop competencies in regulation and patents to ensure that its operations comply with biosafety rules and laws governing access to biodiversity.

The GCCRC research program is built upon a platform called "From Gene to Trait". This platform uses modern bioinformatics and computational tools to interrogate omics data from a wide variety of sources to identify novel genes, pathways, and microbes to develop biotechnologies to face a threat imposed by climate changes.

The GCCRC science is especially interested in the genomes and microbiomes of plants growing in biodiverse ecosystems exposed to severe water deficit and acidic and nutrient-poor soils.

Robust state of the art tools is used to unravel new cellular, molecular, and metabolic mechanisms associated with drought and high temperature stress response and nutrient acquisition. Proof of concepts for genes and microbes are obtained in maize as a model plant using molecular tools, including transformation and genome editing. Modern plant physiology phenotyping helps characterize plant response to stress, and the technologies are then incorporated in elite maize germplasm to scale field trials and robust proof of concept.

