Department of Chemistry
Federal University of Paraná

Luiz Pereira Ramos

Research Center in Applied Chemistry

Institute of Scientific and Technological Innovation in Renewable Energy

December, 2015

CEPESQ
Química - UFPR

PRESENT POSITION

- Full Professor in Analytical Organic Chemistry at UFPR (admitted in 1986)
- Permanent staff
  - Graduate Studies in Chemistry (1995)
  - Graduate Studies in Bioenergy (2009)
- CNPq Productivity Research Fellow – Level 1B, CA RF
- H factor of 31 in the ISI Webofknowledge (108 entries)
- Leadership in research groups
  - Research Center in Applied Chemistry (registered in the CNPq Directory since 1994)
  - Institute of Scientific and Technological Innovation in Renewable Energy (created in 2013 as part of the UFPR CT-Infra project)

RESEARCH EXPERTISE

Biomass chemistry

- Analytical methods for biomass characterization: cellulose, hemicelluloses, lignin, extractives, starch and inorganic materials (ashes).

Cellulosic ethanol

- Production of cellulosic ethanol from energy crops, biomass wastes and agro-industrial residues using pretreatment methods such as auto-hydrolysis, alkaline extraction, steam explosion, supercritical extraction and ionic liquids, aiming at the complete utilization of process streams under the biorefinery concept.

CELLULOSIC ETHANOL

BIOMASS PREPARATION

PRETREATMENT

ENZYME PRODUCTION

SSCF

WASHING

Liquid

Solids

ENZYMATIC HYDROLYSIS

CF

Liquid

Solids

FERMENTATION OF PENTOSES

FERMENTATION OF HEXOSES

SSF

ETHANOL

ETHANOL RECOVERY

COGENERATION OR PYROLYSIS

RESEARCH EXPERTISE

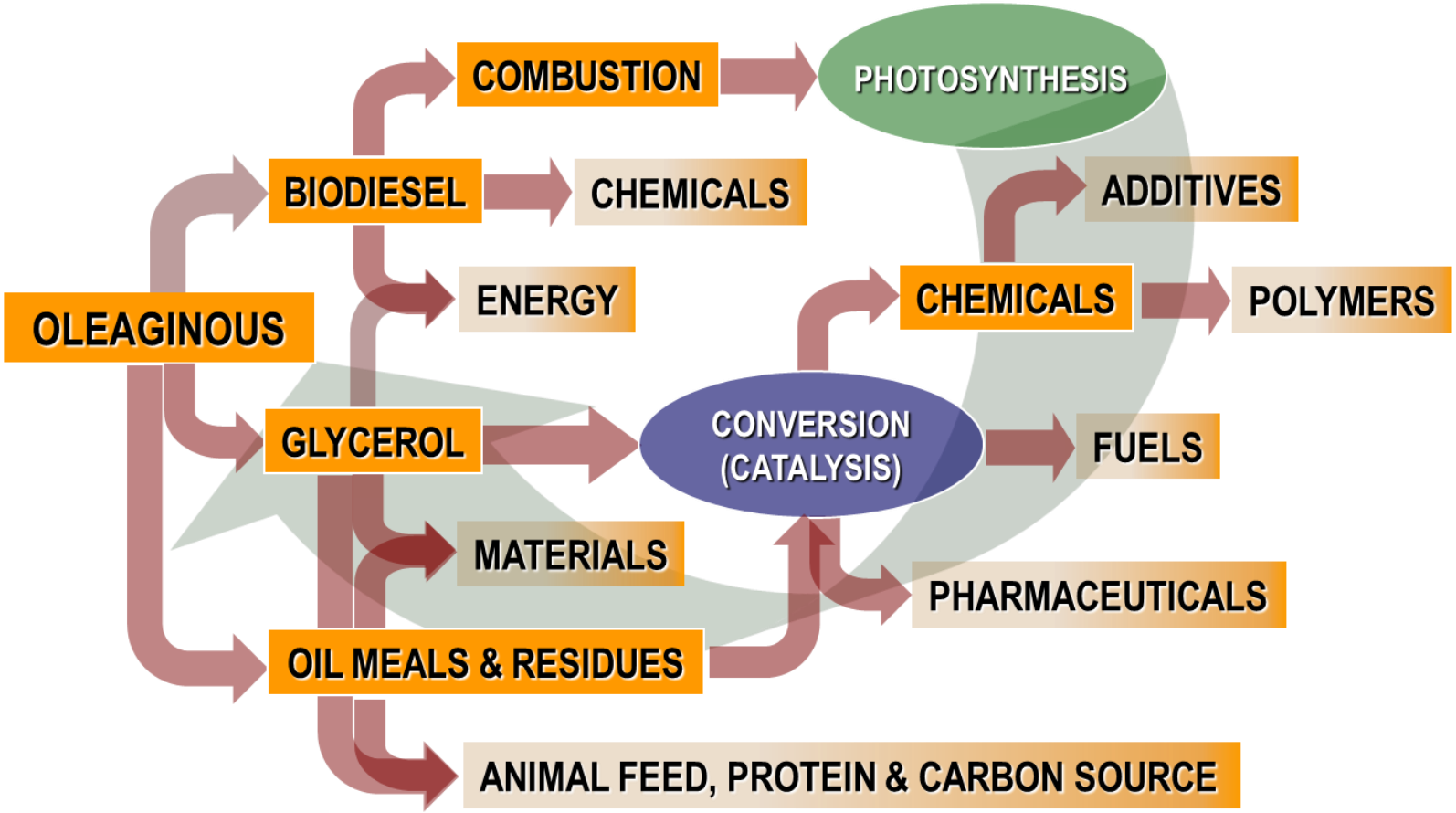
Technologies for biodiesel production and use

- Processes and products related to the biodiesel production chain employing vegetable oils, animal fat, spent greases, used frying oil and microalgae through heterogeneous catalysis, reactive distillation, reactive extraction, super/subcritical fluids and ionic liquids.

Use of coproducts derived from the liquid biofuels production chain

- Use of glycerin, oil cakes and cellulosic residues for the production of plasticizers, surfactants, biodegradable polymers, antioxidants, enzymes, composites and fuel additives (cold flow improvers and octane boosters)

BIODIESEL PRODUCTION CHAIN



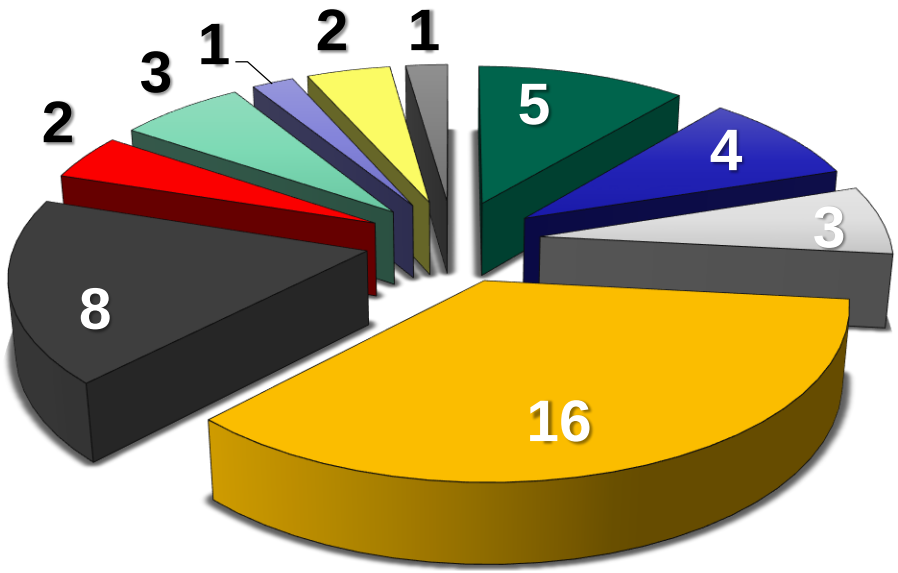






PATENTS PENDING

IP claimed in Brazil since 2005



Research staff:

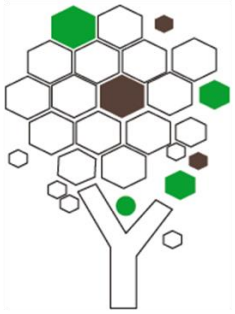
Dr. Luiz Pereira Ramos
Dr. Fernando Wypych

Dr. Claudiney Soares Cordeiro
Dra. Nadia Krieger
Dr. Antonio Salvio Mangrich
Dr. Marcos Lúcio Corazza
Dra. Maria A. F. César-Oliveira
Dra. Sonia Faria Zawadzki
Dra. Shirley Nakagaki
Dr. Ronilson V. Barbosa
Dr. José Viriato Correia Vargas

INTERNACIONAL NETWORK

Agency	Project
CYTED	Red Iberoamericana de Docencia e Investigación en Celulosa y Papel (RIADICYP)
USP, UNESP, UFPR, UFV, Asociación Técnica de la Celulosa y el Papel, Universidad Pontificia Bolivariana, Universidad Nacional del Litoral, Universidad de Costa Rica, Unión de Investigación Producción de la Celulosa del Bagazo Cuba, Universidad Central de Las Villas, Universidad de Girona, Universidad Complutense de Madrid, Universidad de Barcelona, Universidad de Córdoba, Universidad de Huelva, Universidad Pablo de Olavide – Sevilla, Universidad Politécnica de Cataluña, Universidad de Guadalajara, Universidade de Coimbra, Universidade de Aveiro, Instituto Politécnico de Bragança, Instituto Politécnico de Tomar, Universidade de Porto, Universidade da Beira Interior, Universidade de Aveiro, Universidad de la República, Universidad de Los Andes.	
CYTED	Productos de Valor Agregado a Partir de Residuos Agro y Forestoindustriales (Provalor)
UNaM, UNL, Argentina; INIA, UdG, Espanha; UPB, Colômbia; Universidad de la Republica, Uruguai; Universidade de Coimbra, Portugal; ESALQ-USP, UFPR, IQSC-USP, IPT, Brasil; Suzano Cia Papel e Celulose, Brasil; Fundación Cartif, Espanha; Kemira Chemicals, Brasil	
Innova	Integrated Production of Polymers and Ethanol from Forest and Sugar Cane Industries
Innventia (Suécia), Fibria (Brasil), Stora Enso (Suécia/Brasil), Novozymes Latin America (Brasil), Perstorp (Suécia), Scania (Suécia/Brasil), Sekab (Suécia), KTH (Suécia), Chalmers University (Suécia), UNICAMP, UFRJ, UFPR	
EU/FP7	Conversion of Sugar Cane Biomass into Ethanol - CaneBioFuel
Centro de Tecnologia Canavieira (CTC, Brasil), University of Lund, Novozymes Latin America, Novozymes AS, UFPR	

CURRENT PARTNERSHIPS



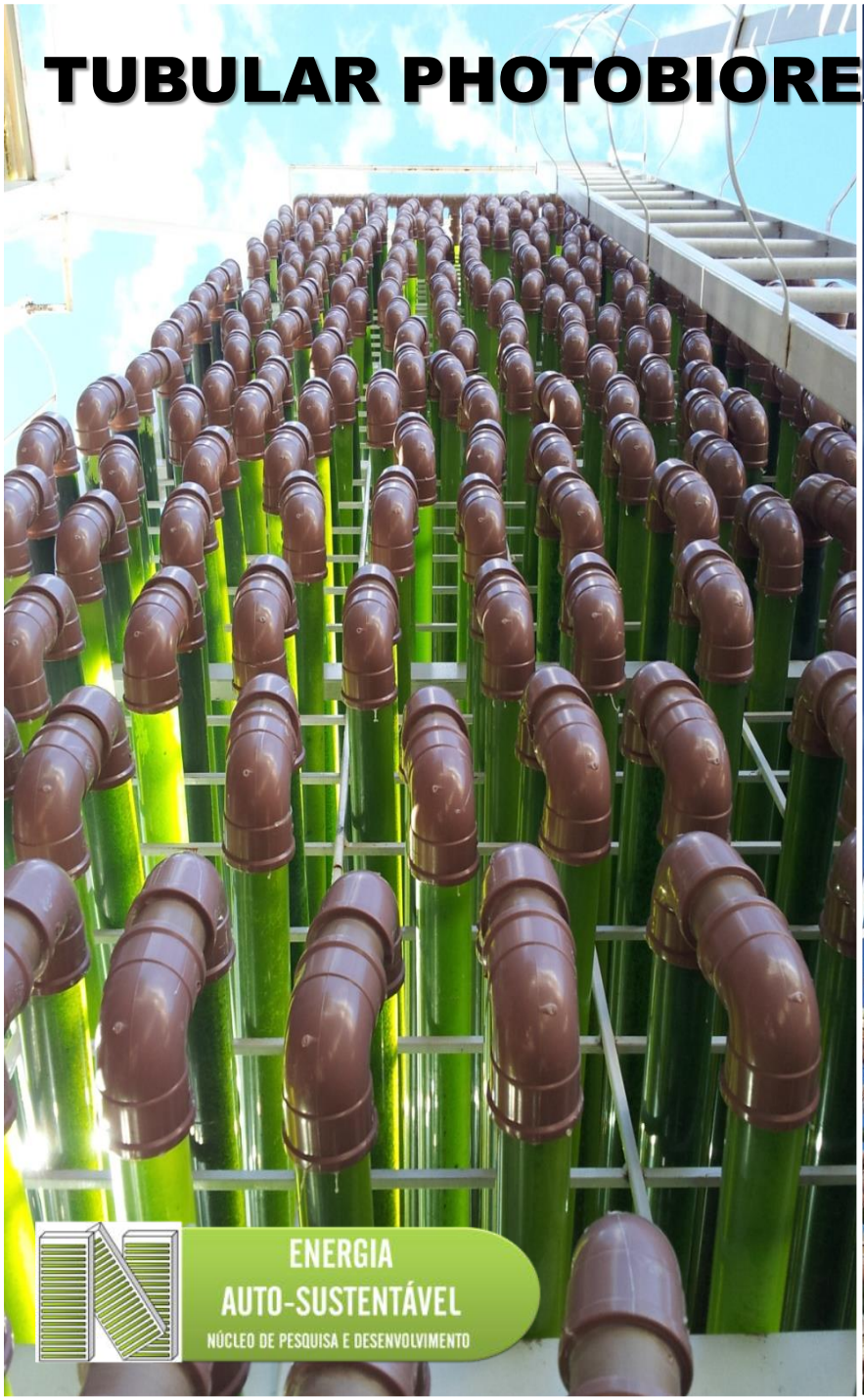
PROVALOR
CYTED

POSSIBLE INTERACTIONS

Liquid biofuels and biorefineries

1. Development and/or optimization of **pretreatment** methods for biomass fractionation
2. Characterization of **hydrolysis and fermentation inhibitors** that are formed during pretreatment of lignocellulosic materials
3. Optimization of enzymatic **hydrolysis at high total solids** using different pretreated materials and advanced enzyme systems
4. Conversion of simple and complex carbohydrates to **organic acids, fuel additives and furan compounds**
5. Production of liquid biofuels from **microalgae** biomass using green solvents, reactive distillation and heterogeneous catalysis
6. Pyrolysis of lignin-containing residues for the production of **biochar, bio-oil** and other value-added chemicals

TUBULAR PHOTOBIOREACTORS



BIODIESEL PRODUCTION UNIT


SFE

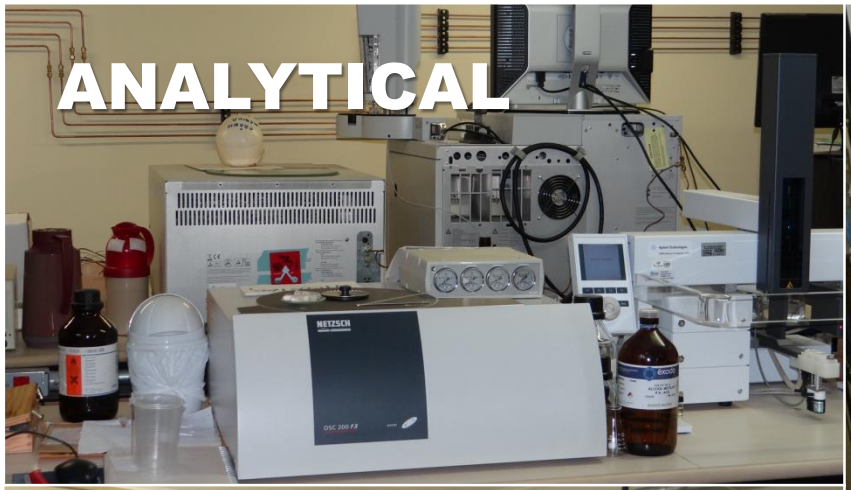

STEAM EXPLOSION


US


Sppencer

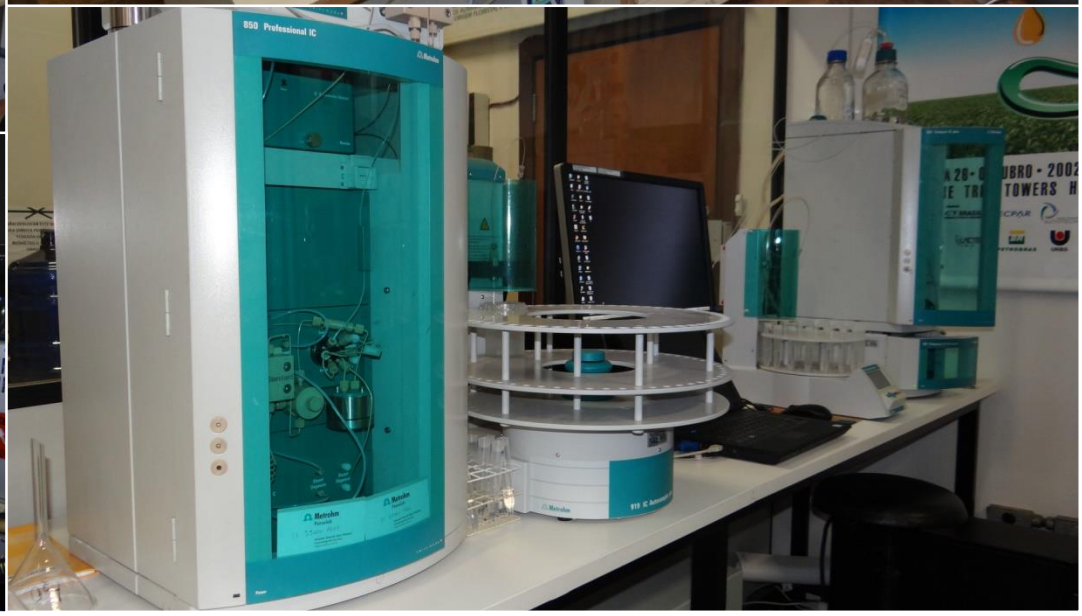
HYDROLYSIS AND FERMENTATION

ANALYTICAL


NETZSCH
DSC 200 F3


exacta


SAMSUNG


850 Professional IC
Metrohm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Thank you for your attention!
Muito obrigado!