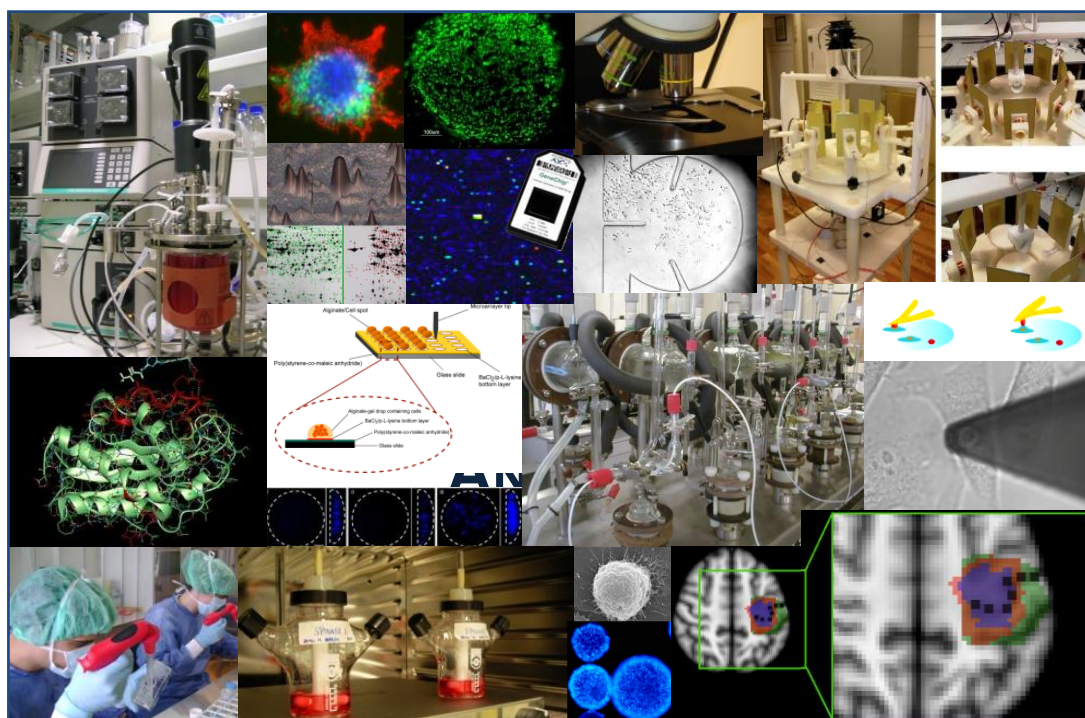




**INSTITUTO SUPERIOR TÉCNICO
UNIVERSIDADE TÉCNICA DE LISBOA**

DEPARTMENT OF BIOENGINEERING



ANNUAL REPORT 2011

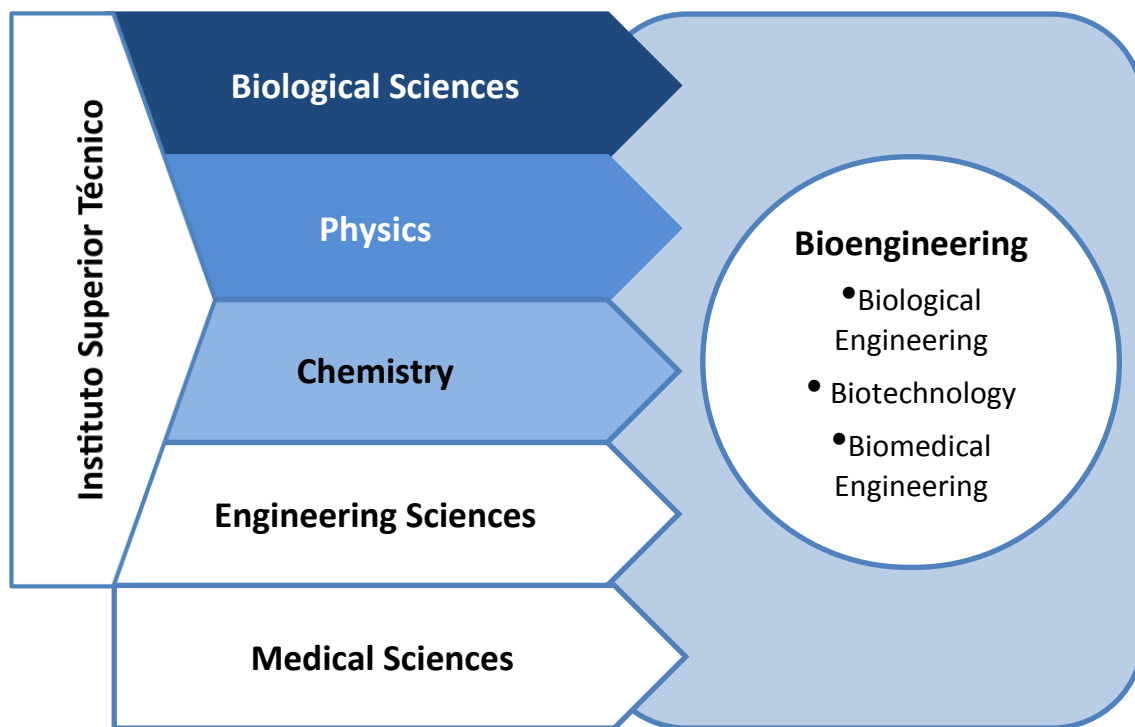


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<https://fenix.ist.utl.pt/departamentos/dbe/>

1. Welcome letter



The Department of Bioengineering (DBE), the newest Academic Unit of Instituto Superior Técnico, initiated its activities in January 2011, one hundred years after the creation of IST. This department is very unique in Portugal and brings together faculty members with expertises in different areas of Life Sciences, Biological Engineering and Biomedical Engineering. The DBE mission is to provide an advanced and high-level education in bioengineering and to promote science and technological development in the fields of biological and biomedical sciences and engineering.

After one year of initiating its activities, the DBE main achievements consist of the integration of the faculty, teaching, and research, the coordination of the different cycles of study on Biological Engineering, Biomedical Engineering and Biotechnology, and of the proposal of a new M.Sc. degree on Biomedical Sciences and Technologies in collaboration with the Faculty of Medicine of the University of Lisbon.

The highest priorities of DBE are to contribute to the new paradigm of the convergence of Life Sciences and Engineering and to reinforce the pioneer role and leadership of IST in bioengineering and biotechnology education and research in Portugal, focusing on the translation of knowledge to the industrial and clinical applications, the creation of intellectual property, and formation of spin-offs. The DBE plans to establish a new institutional platform at doctoral level, with the Faculty of Medicine of the University of Lisbon, on Life and Biomedical Sciences and Engineering and the corresponding Advanced Institute for Life and Biomedical Sciences and Engineering.

We welcome the scientific community interested to know our department to attend the Bioengineering Seminars, which will start in 2012! These seminars give an overview of the teaching and research activities of our faculty. Prospective students and potential faculty are also very welcome to join an ambitious and active Department of the XXI century!

Joaquim M.S. Cabral
President of DBE

2. The Department of Bioengineering – DBE - at IST

Bioengineering is a new scientific field in which an engineering approach is applied to life sciences, namely biology and medicine. Bioengineering applies the methods of engineering to biological and medical systems to answer some of the most challenging problems currently facing modern society. Likewise, Bioengineering takes inspiration in biological and medical systems to discover new methodologies for engineering practice. This integration of engineering and life sciences constitutes a new paradigm for engineering and is currently the area of engineering research and education undergoing the most explosive growth both in terms of student enrolment, course offerings, and research development worldwide.

The formation of the Department of Bioengineering of Instituto Superior Técnico (IST) was approved by the School Council of IST on December 13, 2010. The objective of DBE is to achieve an integrated coordination of the scientific research, teaching activities, and extension services of IST in the fields of Biological Engineering, Biomedical Engineering, Biotechnology and Biological Sciences. DBE aims at giving higher visibility and at reinforcing the pioneering and the leadership role that IST has had in these subjects, as well as leading the expansion to novel and strategic areas of Bioengineering, such as neuroengineering. The creation of the DBE is the keystone of the strategic development of IST in the area of Life Sciences and is currently supported by a faculty of 28, with additional 7 doctorate research Scientists and 12 post-doc researchers. 4 staff members support the administrative, computational, and laboratorial infrastructures. The planned development includes an important participation of the DBE in the formation of a new institutional platform between IST and Faculties of Medicine and related institutions so that the participation of IST in formation related to medical sciences is reinforced and to consolidate and expand the formation currently offered in Biomedical Engineering.

The mission of DBE is the advanced formation of human resources with in the principles and methods of Engineering Sciences and Biological and Biomedical Sciences and Technologies and to support its translation into new products, processes and services that may contribute to the sustainable development and to the improve quality of life of our society. It is the DBE objective to achieve international recognition as one of the top departments of bioengineering at European level in 10 years, based on its indexes of scientific productivity, industrial translation, and ability to attract top 2nd and 3rd cycle international students.

Further information can be found in the DBE website: <https://fenix.ist.utl.pt/departamentos/dbe/>

3. The activities of the DBE

Developed in 2011

- Organization of the administration and management of the new department: secretariat office, 1st and 2nd cycle undergraduate support office; 3rd cycle graduate support office, computer laboratory.
- Organization and publication of the internet page of the DBE.
- Integration of faculty, teaching, and research, organization of new teaching laboratories.
- Coordination of 1st and 2nd cycle on Biological Engineering
- Coordination of 2nd cycles on Biotechnology; and Bioengineering and Nanosystems
- Coordination at IST of the Erasmus Mundus Master's Programme in Systems Biology - euSYSBIO
- Coordination of 3rd cycle on Biotechnology
- Participation in the Coordination of 1st, 2nd and 3rd cycles on Biomedical Engineering
- Participation in the Coordination of 2nd cycle on Pharmaceutical Engineering
- Participation in the Coordination of 3rd cycle on Bioengineering (MIT-Portugal Program)
- Proposal of a new M.Sc. degree on Biomedical Sciences and Technologies in collaboration with the Faculty of Medicine of the University of Lisbon.

Planned for 2012

- Formation and organization of the first meeting of the International Advisory Board of the DBE.
- Participation in the Interdisciplinary Platforms launched by IST: *Nanotechnology and Materials Engineering, Energy, and Environment*.
- Proposal of a new institutional platform (foreseen at doctoral level) with the Faculty of Medicine of the University of Lisbon: *Life and BioMedical Sciences and Engineering*
- Starting of the Bioengineering Seminar Series.
- Continuation of the integration of faculty, teaching, and research, organization of new teaching laboratories (Biomaterials, Bioinstrumentation, Biomedical Imagiology).
- Development of a human resources/faculty recruiting plan.
- Review teaching offers of the DBE (1st, 2nd, and 3rd cycle).

Long-term planned activities

- New departmental building.
- Initiative in Neuroengineering.
- Creation of the Advanced Institute for Life and Biomedical Sciences and Technologies (and Biomedicine) which may take the form of an Associated Laboratory

4. Education

The Department of Bioengineering is currently coordinating the following degree courses:

- Integrated Masters in Biological Engineering (fenix.ist.utl.pt/cursos/mebiol) (1st and 2nd cycle, 300 ECTS)
- Masters in Biotechnology (fenix.ist.utl.pt/cursos/mbiotec) (2nd cycle, 120 ECTS)
- Masters in Bioengineering and Nanosystems (fenix.ist.utl.pt/cursos/mbionano) (2nd cycle, with collaboration of the Physics and the Electrical Engineering Departments of IST, 120 ECTS)
- Doctorate in Biotechnology (<https://fenix.ist.utl.pt/cursos/dbiotec>) (3rd cycle, includes the Advanced Specialization Diploma in Biotechnology, 30 ECTS)

The Department of Bioengineering participates in the coordination of the following degree courses:

- Integrated Masters in Biomedical Engineering (fenix.ist.utl.pt/cursos/mebiom) (1st and 2nd cycle)
- Masters in Pharmaceutical Engineering (fenix.ist.utl.pt/cursos/MEFarm) (2nd cycle, in collaboration with the Faculty of Pharmacy of the University of Lisbon)
- Erasmus Mundus Master's Programme in Systems Biology - euSYSBIO (in collaboration with KTH, Stockholm, Sweden and Finland's Aalto University)
- Doctorate in Biomedical Engineering (fenix.ist.utl.pt/cursos/debiom) (3rd cycle,)
- Doctorate in Bioengineering (fenix.ist.utl.pt/cursos/dbioeng) (3rd cycle, offered in association with the New University of Lisbon and the University of Minho, and in collaboration with the MIT (MIT-Portugal Program))

In addition, the Department of Bioengineering participates in the following degree programs:

- Joint Doctoral Program IST-EPFL in the area of Biomedical Imaging.

The Department of Bioengineering exchanges students and staff in the framework of the Erasmus and other programmes with European and Latin American Universities, in the fields of Biological Engineering, Biomedical Engineering, Biotechnology and Bio/Nanotechnology. Highlights in 2011:

- Active Erasmus bilateral agreements (Country/No. of Universities): Austria/2; Belgium/4; Czech Republic/4; Finland/1; Germany/2; Denmark/3; Spain/2; France/3; Italy/5; Latvia/1; Norway/1; Netherlands/4; Poland/3; Sweden/1; Switzerland/1; UK/1.
- Erasmus student exchanges in 2011: outgoing 29; incoming 34.
- Hosted Staff Missions (domain/guest staff University/duration): Food Biochemistry/TU Graz, Austria/1 week; Biosensors and Metallomics/Yıldız TU Istanbul, Turkey/1 week; Enzyme Engineering/University of Osijek, Croatia/1 month.

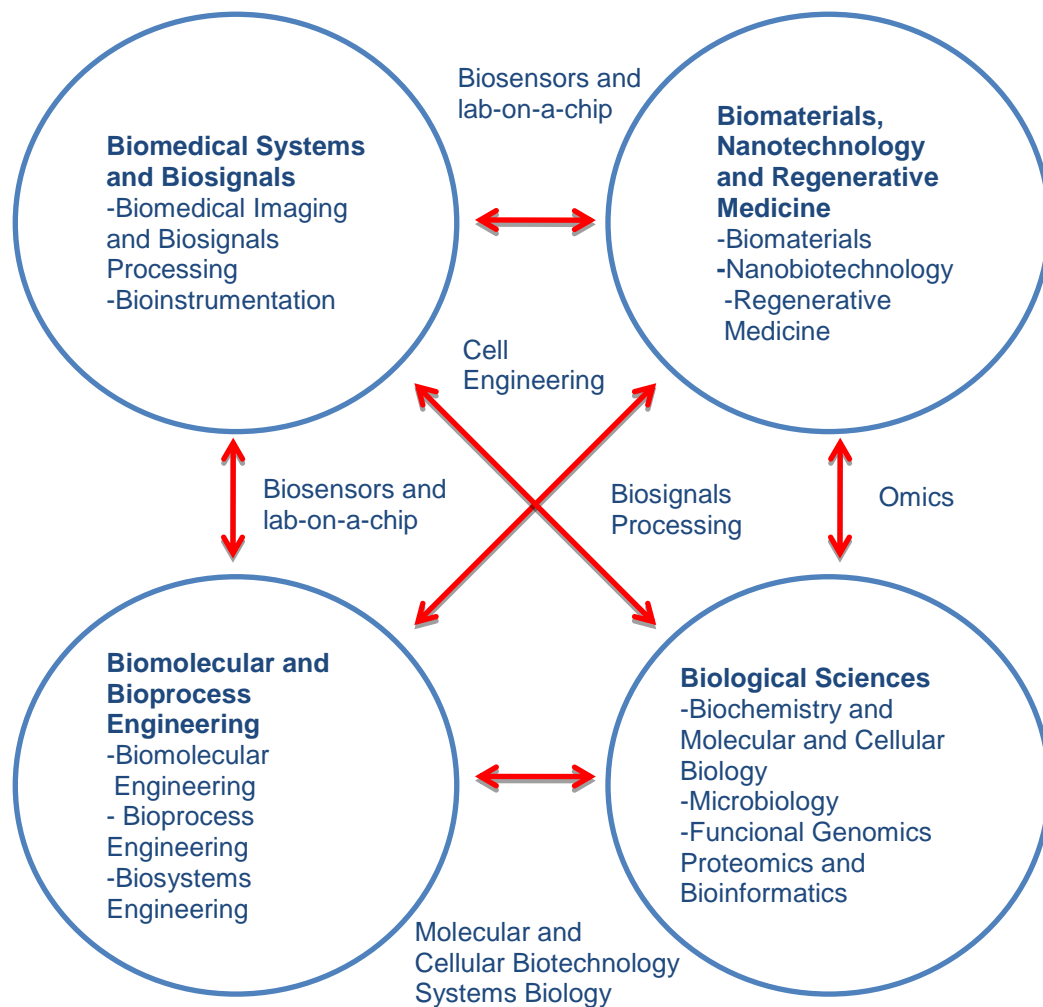
5. Research Activities

Scientific Areas

Bioengineering covers a wide domain. It is positioned in the overlap of three fundamental sciences: biology, engineering and medicine. This property provides the substrate for Health Science. The Department of Bioengineering **has four scientific areas** that cover the valences required for a solid development and human resource formation in Health Sciences. These are desired to interoperate fostering new approaches. These areas are:

- Biological Sciences
- Biomaterials, Nanotechnology and Regenerative Medicine
- Biomedical Systems and Biosignals
- Biomolecular and Bioprocess Engineering

The following graphical representation depicts some of the already existing synergies between the different scientific areas.



Biological Sciences

Biological Sciences is an exciting and rapidly developing scientific area. The explosion of available genetic and genomic information and the development of a number of post-genomic technologies and 'omics' approaches have enabled an extraordinary increase in capacity for analysis of the complexity of living systems and the molecular responses to changes in their environment and their genes. Systems Biology is an integrated interdisciplinary approach to obtain a 'global' view of the physiology of a cell that relies on the simultaneous identification and quantification of thousands of different molecules (proteins, nucleic acids, metabolites....) and on the use of predictive and explanatory computer models. The ability to manipulate life is today the promise of Synthetic Biology. Recent advances of modern Biology, including Synthetic and Systems Biology, would not have been possible without the use of model microorganisms. Microorganisms are also a truly inexhaustible source of renewable resources. Microbiology is therefore essential to understand and exploit their biotechnological potential as well as to prevent or control their negative effects. The understanding of the fundamental mechanisms of life and all the new developments have carried biological science into applications not even thought possible a decade ago, in human health, industrial biotechnology, environmental restoration and energy production.

Biomaterials, Nanotechnology and Regenerative Medicine

This scientific area integrates a set of technologies which have as a common point the controlled interaction, at the micro and nanoscale, of complex artificial constructs with biomolecules, cells and tissues. High impact applications in biotechnology and medicine are the goal, in particular in the development of novel strategies for biodiagnostics and regenerative medicine.

Biomaterials: although biomaterials are primarily used for medical applications, they are also used to grow cells in culture, to assay for blood proteins in the clinical laboratory, in processing biomolecules in biotechnology, for fertility regulation implants in cattle, in diagnostic gene arrays, in the aquaculture of oysters and for investigational cell-silicon "biochips." The commonality of these applications is the interaction between biological systems and synthetic or modified natural materials.

Nanotechnology: the engineering of functional systems at the molecular scale. Nanotechnology is the understanding and control of matter at dimensions between approximately 1 and 100 nanometers, where unique phenomena enable novel applications. Nanobiotechnology consists on the application of nanotechnology concepts to bioengineering and biological sciences, in lab-on-a-chip systems, novel biosensors, nanoparticles for drug delivery, surface functionalization, etc. Bionanotechnology consists in the translation of biological concepts for engineering applications, namely taken from neural sciences, systems biology, biomaterials and biomimetics.

Regenerative Medicine: regenerative medicine is an interdisciplinary field of research and clinical applications focused on the repair, replacement or regeneration of cells, tissues or organs to restore impaired function resulting from any cause, including congenital defects, disease, trauma and ageing. It uses a combination of several converging technological approaches, both existing and newly emerging, that moves it beyond traditional transplantation and replacement therapies. The approaches often stimulate and support the body's own self-healing capacity. These approaches may include, but are not limited to, the use of soluble molecules, gene therapy, stem and progenitor cell therapy, tissue engineering and the reprogramming of cell and tissue types.

Biomedical Systems and Biosignals is an area with a broad scope, covering a very long list of topics. Roughly subdividing we can say that Biomedical Systems encompasses all hardware implementations and physical interaction with biological beings while Biosignals relate to the signal processing associated with interpretation, representation and modelling of biological functional systems, both with a medical and engineering emphasis, actually bridging the two. Further reasoning along these lines of thought leads to a non-exhaustive topic subdivision as follows

Biomedical Systems

Bioinstrumentation
Biosensors & Bioactuators
Medical & Implantable Devices
Bionics
Bioelectromagnetism
Biomechanics
Biotransport

Biosignals

Medical Imaging
Biometrics
Neural Engineering
Modelling of Biological Systems
Biostatistics

The area of **Biomolecular and Bioprocess Engineering** aims at the development of biological processes to obtain value-added products with potential applications in key areas such as the pharmaceutical, food, cosmetics and fine chemicals as well as in biofuels production and processing effluent and pollution control. This area covers the Biological Technologies, including Biocatalysis, Fermentation, Biological Reactors, Process Separation and Purification of Biomolecules, Monitoring and Control of Bioprocess and Biosystems Engineering. One of the areas of greatest impact is the production, purification and stabilization of proteins / enzymes and the "design" of improved bioconversion processes of substrates and waste to obtain compounds with high added value.

Research

Most of the research performed by the DBE faculty is in laboratories/institutions supported by the FCT (Fundação para a Ciência e a Tecnologia).

Research

- *Laboratories of Biological Sciences and Bioengineering at Centre for Biological and Chemical Engineering/ Associated Laboratory Institute for Biotechnology and Bioengineering (www.ibb.pt)*
- *Laboratories of INESC-MN (www.inesc-mn.pt)*
- *NanoLab (nanolab.ist.utl.pt)*
- *Laboratories of Biomedical Imaging and Biosignals Processing at Associated Laboratory Institute of System (www.isr.ist.utl.pt)*

Illustrative examples of the research carried on at the DBE can be found in the faculty pages that follow.

6. Staff

The DBE staff includes 28 faculty members, 7 researchers, 2 secretaries, and 3 laboratory technicians.

Secretariate

Santos, Rosa Maria
Department secretary, 3rd cycle coordination office secretary
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Venâncio, Maria da Conceição
1st and 2nd cycle coordination office secretary
Master dissertation office secretary
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Faculty members and researchers

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Raquel Aires-Barros

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Professor

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Research Areas and Interests

Responsible for the Bioprocess Engineering Laboratory (BEL) of the Bioengineering Research Group (BERG) of Centre for Biological and Chemical Engineering, leader research unit of the Associate Laboratory Institute for Biotechnology and Bioengineering (IBB). Current research interests include bioseparation of antibodies and cells through aqueous two-phase systems, magnetic nano-particles and chromatography, and application of lab-on-a-chip microfluidic devices to biopharmaceuticals separation and process integration

Selected Publications in 2011

Rosa, P.A.J. Azevedo, A.M., Sommerfeld, S., Baecker, W., Aires-Barros, M.R., “Aqueous two-phase extraction as a platform in the biomanufacturing industry: Economical and environmental sustainability”, *Biotechnol. Adv.*, 29(6), 559-567. (DOI.org/10.1016/j.biotechadv.2011.03.006)

Borlido, L., Azevedo, A.M., Roque, A.C.A., Aires-Barros, M.R., “Potential of boronic acid functionalized magnetic particles in the adsorption of human antibodies under mammalian cell culture conditions”, *J. Chromatogr. A*, 1218(43), 7821-7827 (DOI:10.1016/j.chroma.2011.08.084).

Sousa, A.G., Andrade, P.Z., Pirzgalska, R.M., Galhoz, T.M., Azevedo, A.M., da Silva, C.L., Aires-Barros, M.R., Cabral, J.M.S., “A novel method for human hematopoietic stem/progenitor cell isolation from umbilical cord blood based on immunoaffinity aqueous two-phase partitioning”, *Biotechnol. Lett.*, 33, 2373-2377. (DOI 10.1007/s10529-011-0727-0)

Nascimento, K.S., Yelo, S., Cavada, B.S., Azevedo, A.M., Aires-Barros, M.R., “Liquid-Liquid equilibrium data for aqueous two-phase systems composed of ethylene oxide propylene oxide copolymers”, *J. Chem. Eng. Data*, 56(2), 190-194 (DOI: 10.1021/je1006532)

Azevedo, A.M., Aires-Barros, M.R., “New platforms for the downstream processing of biopharmaceuticals”, *Proceedings of the 1st Portuguese Meeting in Bioengineering: Bioengineering and Medical Sciences - The Challenge of the XXI century | ENBENG 2011, Oeiras, Portugal*, March, R. Martins (ed), pp 80-83

Academic Info

President of the Centre for Biological and Chemical Engineering (CEBQ)
Responsible of the Academic Affairs of the DBE
Coordinator of the Integrated Master of Biological Engineering
Classes in 2010/11: Separation and Purification of Biological Products (1st semester); Biotechnology (2nd semester)

Ana Margarida Azevedo

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Research Scientist

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Research Areas and Interests

Responsible for the Bioseparation Laboratory of the Bioengineering Research Group (member of the Associated Laboratory IBB – Institute for Biotechnology and Bioengineering). Current research interests include production of monoclonal antibodies by animal cell culture and design of novel downstream processes for the purification of biological products.

Selected Publications in 2011

P.A.J. Rosa, A.M. Azevedo, S. Sommerfeld, W. Bäcker, M.R. Aires-Barros, "Aqueous two-phase extraction as a platform in the biomanufacturing industry: Economical and environmental sustainability", *Biotechnol. Adv.* **29**, 559-567 (2011)

L. Borlido, A.M. Azevedo, A.C.A. Roque, M.R. Aires-Barros, "Potential of boronic acid functionalized magnetic particles in the adsorption of human antibodies under mammalian cell culture conditions", *J. Chromatogr. A* **1218**, 7821-7827 (2011)

A.G. Gomes, A.M. Azevedo, M.R. Aires-Barros, D.M.F. Prazeres, "Studies on the adsorption of cell impurities from plasmid-containing lysates to phenyl boronic acid chromatographic beads", *J. Chromatogr. A* **1218**, 8629-8637 (2011)

K.S. Nascimento, S. Yelo, B.S. Cavada, A.M. Azevedo, M.R. Aires-Barros, "Liquid-liquid equilibrium data for aqueous two-phase systems composed of ethylene oxide propylene oxide copolymers", *J. Chem. Eng. Data* **56**, 190-194 (2011)

D.P.C de Barros, A.M. Azevedo, J. M.S., Cabral, L.P. Fonseca, "Optimisation of flavour esters synthesis by *Fusarium solani* pisi cutinase", *J. Food Biochem.* **58**, 545-556 (2011)

A.G. Sousa, P.Z. Andrade, R.M. Pirzgalska, T.M. Galhoz, A.M. Azevedo, C.L. da Silva, M.R. Aires-Barros, J.M.S. Cabral, "A novel method for human hematopoietic stem/progenitor cell isolation from umbilical cord blood based on immunoaffinity aqueous two-phase partitioning", *Biotechnol. Lett.* **33**, 2373-2377 (2011)

Academic Info

Classes in 2010/11: Separation and Purification of Biological Products, Bioengineering Laboratories, Biomolecular and Cellular Engineering (1st semester); Biological Engineering Laboratory I, Biotechnology Laboratories II (2nd semester)

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1982

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Research Areas and Interests

Director of the Associated Laboratory Institute for Biotechnology and Bioengineering, Responsible of the BioEngineering Research Group. Current research interests include Stem Cells Research for Tissue Engineering and Regenerative Medicine; Stem Cell Bioprocessing, namely the development of novel bioreactors and bioseparation processes.

Selected Publications in 2011

Andrade, P.Z., da Silva, C.L., dos Santos, F., Almeida-Porada, G., Cabral, J.M.S., “Initial CD34(+) Cell-Enrichment of Cord Blood Determines Hematopoietic Stem/Progenitor Cell Yield Upon *Ex Vivo* Expansion”, J. Cell. Biochem., 112(7), 1822-1831

Fernandes-Platzgummer, A., Diogo, M.M., Baptista, R.P., Silva, C.L., Cabral, J.M.S., “Scale-Up of Mouse Embryonic Stem Cell Expansion in Stirred Bioreactors”, Biotechnol. Progr., 27(5), 1421-1432

Madeira, C., Ribeiro, S.C., Pinheiro, I.S.M., Martins, S.A.M., Andrade, P.Z., da Silva, C.L., Cabral, J.M.S., “Gene Delivery to Human Bone Marrow Mesenchymal Stem Cells by Microporation”, J. Biotechnol., 151(1), 130-136

Rodrigues, C.A.V., Fernandes, T.G., Diogo, M.M., da Silva, C.L., Cabral, J.M.S., “Stem Cell Cultivation in Bioreactors”, Biotechnol. Adv., 29(6), 815-829

dos Santos, F.; Andrade, P.Z.; Abecasis, M.M.; Gimble, J.M.; Chase, L.G.; Campbell, A.M.; Boucher, S.; Vemuri, M.C.; da Silva, C.L., Cabral, J.M.S. “Toward a Clinical-Grade Expansion of Mesenchymal Stem Cells from Human Sources: A Microcarrier-Based Culture System Under Xeno-Free Conditions” Tissue Eng.: Part C, 17 (12) 1201-1210

Sousa, A.G., Andrade, P.Z., Pirzgalska, R.M., Galhoz, T.M., Azevedo, A.M., da Silva, C.L., Aires-Barros, M.R., Cabral, J.M.S., “A Novel Method for Human Hematopoietic Stem/Progenitor Cell Isolation from Umbilical Cord Blood based on Immunoaffinity Aqueous Two-Phase Partitioning”, Biotechnol. Lett., 33, 2373-2377

Academic Info

President of the DBE

Coordinator of the 3rd cycle on Bioengineering (MIT-Portugal Program)

Classes in 2011/12 (1st semester): Bioprocess Engineering Principles; Chemical Engineering, Biotechnology and Society

Carla C.C.R. de Carvalho

PhD - IST, Universidade Técnica de Lisboa, 2003

MSc – IST, UTL, 1999

Degree in Chem Eng. – IST, UTL, 1998

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Research Areas and Interests

Effect of toxic compounds and stressful conditions on cellular membranes and cell surface properties of bacteria and mechanisms of bacterial adaptation. Prevention and identification of biofilms. Fluorescence microscopy and image analysis to assess cell physiology and morphology. Production of compounds with marine bacteria. Biotransformation and design of bioreactors for the production of high-value compounds from low-value substrates in organic:aqueous systems using whole cells.

Selected Publications in 2011

de Carvalho, C.C.C.R., “Enzymatic and whole cell catalysis: finding new strategies for old processes”, *Biotechnology Advances*, 29(1), 75-83, 2011 (DOI: 10.1016/j.biotechadv.2010.09.001)

de Carvalho, C.C.C.R., Cruz, P.A., da Fonseca, M.M.R., Xavier-Filho, L., “Antimicrobial properties of the extract of *Abelmoschus esculentus*”, *Biotechnology and Bioprocess Engineering*, 16(5), 971-977 (DOI: 10.1007/s12257-011-0050-6)

de Carvalho C.C.C.R., Marques, M.P.C., Fernandes, P., “Recent achievements on siderophore production and application”, *Recent Patents on Biotechnology*, 5(3), 183-198

Coutinho, C.P., de Carvalho, C.C.C.R., Madeira, A., Pinto-de-Oliveira, A., Sá-Correia, I., “*Burkholderia cenocepacia* clonal phenotypic variation during three and a half years of residence in the lungs of a cystic fibrosis patient”, *Infection and Immunity*. 79(7), 2950-2960 (DOI:10.1128/IAI.01366-10)

Tyagi, M., da Fonseca, M.M.R., de Carvalho, C.C.C.R., “Bioaugmentation and biostimulation strategies to improve the effectiveness of bioremediation processes”, *Biodegradation*, 22(2), 231-241 (DOI: 10.1007/s10532-010-9394-4)

de Carvalho, C.C.C.R., da Fonseca, M.M.R. (2011) Bioreactions and Bioreactor Operation | Biotransformations. In: Volume 2: Engineering Fundamentals in Biotechnology (Collin Webb, Ed.), *Comprehensive Biotechnology*, 2nd Edition (Editor-in-Chief: Murray Moo-Young). Elsevier

Academic Info

Classes in 2010/11: Biotechnology Laboratories II

Classes in 2011/2012: Biological Engineering Laboratory II (LEB-II), Biofuels

Awards

Distinguished with an Honourable Mention at the UTL/Santander Totta Scientific Awards 2011, in the Biological Engineering area.

Patrícia Almeida Carvalho

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Research Areas and Interests

The areas of scientific interest are currently centred on the advanced characterization of nanostructured materials and mechanical characterization of biological materials at the micro/nano/pico scales. Namely: Molecular and cell mechanics; Structural characterization of salivary calculi; Characterization of Au, Pd and Pt nanoparticles and nanowires produced by photochemical synthesis; Development and characterization of nanostructured materials.

Selected Publications in 2011

- D. Nunes, V. Livramento, N. Shohoji, H. Fernandes, C. Silva, J.B. Correia, P.A. Carvalho, Copper-microdiamond nanostructured composites, *Scripta Physica*, T145 (2011) 014069, DOI:10.1088/0031-8949/2011/T145/014069
- D. Nunes, V. Livramento, R. Mateus, J.B. Correia, L.C. Alves, M. Vilarigues, P.A. Carvalho, Mechanical synthesis of copper-carbon nanocomposites: Structural changes, strengthening and thermal stabilization, *Materials Science and Engineering A* 528 (2011) 8610-8620, DOI: 10.1016/j.msea.2011.08.048
- A.C.G.M. Manso, S. González-Lopez, V. Bolaños-Carmona, P.J.B.T.D. Maurício, S.A. Félix, P.A. Carvalho, Regional Bond Strength to Lateral Walls in Class I and II Ceramic Inlays Luted with Four Resin Cements and Glass-Ionomer Luting Agent, *Journal of adhesive dentistry* 13 (2011) 455–465 DOI:10.3290/j.jad.a19816
- D. Nunes, A.P. Gonçalves, L.C.J. Pereira, R. Colaço, P.A. Carvalho, Magnetic microstructure of NdFe₁₁Ti and Nd₂(Fe,Ti)₁₇ aggregates, *Applied Physics A* 104 (2011) 1053–1060, DOI: 10.1007/s00339-011-6365-5
- A. Miranda, E. Malheiro, P.Eaton, P.A. Carvalho, B. de Castro, E. Pereira, Synthesis of gold nanocubes in aqueous solution with remarkable shape-selectivity, *Journal of Porphyrins and Phtalocyanins* 15 (2011) 441-448, DOI: 10.1142/S1088424611003367

Academic Info

Member of the DBE Executive Committee

Classes in 2010/11: Essays and materials characterization (1st semester); Materials characterization (2nd semester)

Rogério Colaço

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Research Areas and Interests

Researcher of CQE - Centro de Química Estrutural (CQE) and, currently, the co-responsible of the NanoLab - The Nanostructured Materials and Nanotechnologies Laboratory of DBE. Current scientific interest are centred on nanotribological studies the advanced characterization of engineering materials and systems, namely for biomedical applications, by using Atomic Force Microscopy based techniques.

Publications in 2011

B. Nunes, A.P. Serro, B. Saramago, E. Alves, V. Oliveira, R. Colaco, Ageing effects on the wettability behavior of laser textured silicon, *Applied Surface Science* 257 (2011) 2604–2609.

M. Tariq, A. P. Serro, R. Colaço, B. Saramago, J. N. Canongia Lopes, L. P. N. Rebelo, Effect of alkyl chain length on the adsorption and frictional behaviour of 1-alkyl-3-methylimidazolium chloride ionic liquid surfactants on gold surfaces, *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, 377 (2011) 361–366

D. Nunes, R. Colaço, A.P. Gonçalves, L.C.J. Pereira, P.A. Carvalho, Microstructures and magnetic domain configurations of NdFe₁₁Ti and Nd₂(Fe,Ti)₁₇ aggregates, *Applied Physics A – Materials Science and Processing Appl Phys A*, 104 (2011) 1053–1060.

S. Graça, R. Colaço, On the influence of indentation size effect on the wear of metallic alloys, *Int. J. of Surface Science and Engineering*, 5(5/6), (2011) 457-462.

S. Graça, P. A. Carvalho, R. Colaço, Dislocation structures in nanoindented ductile metals – a TEM direct observation, *J. Physics D: Applied Physics* 44 (2011) 335402.

Academic Info

Member of the Executive Board of IST - Responsible for the Academic Affairs
(on release from teaching in 2011)

João Pedro Conde

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Professor

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Research Areas and Interests

Co-responsible for the Thin Film MEMS and BioMEMS research group of INESC Microsystems and Nanotechnologies (a laboratory member of the Associated Laboratory IN-Institute of Nanoscience and Nanotechnology). Current research interests include novel thin film devices such as thin film silicon and polymer MEMS and lab-on-a-chip microfluidic devices with integrated biosensors using cells, proteins, and nucleic acids.

Selected Publications in 2011

A.T. Pereira, P. Novo, D.M.F. Prazeres, V. Chu, J.P. Conde, “Heterogeneous Immunoassays in Microfluidic Format Using Fluorescence Detection with Integrated Amorphous Silicon Photodiodes”, *Biomicrofluidics* **5**, 014102 (2011) (DOI:10.1063/1.3553014).

A. Jóskowiak, M.S. Santos, D.M.F. Prazeres, V. Chu, J.P. Conde, “Integration of thin film amorphous silicon photodetector with lab-on-chip for monitoring protein fluorescence in solution and in live microbial cells”, *Sensors and Actuators B: Chemical* **156**, 662-667 (2011). (DOI:10.1016/j.snb.2011.02.015).

F. Dong, V. Chu, J.P. Conde, “Submicron thin-film amorphous silicon photoconductive light sensors”, *Sensors and Actuators A: Physical* **170**, 32-35 (2011) (DOI information: <http://dx.doi.org/10.1016/j.sna.2011.05.018>).

P. M. Sousa, M. Gutiérrez, E. Mendoza, A. Llobera, V. Chu, J. P. Conde, “Microelectromechanical resonators based on an all polymer / carbon nanotube composite structural material”, *Appl. Phys. Lett.* **99**, 044104 (011). (DOI information: <http://dx.doi.org/10.1063/1.3621861>).

P. Novo, D.M.F. Prazeres, V. Chu, J.P. Conde, “Microspot-based ELISA in microfluidics: chemiluminescence and colorimetry detection using integrated thin-film hydrogenated amorphous silicon photodiodes”, *Lab Chip* **11**, 4063 (2011). DOI:10.1039/C1LC20362B.

D.C. Martins, V. Chu, D.M.F. Prazeres, J.P. Conde, “Electrical detection of DNA immobilization and hybridization by streaming current measurements in microchannels”, *Appl. Phys. Lett.* **99**, 183702 (2011). DOI: 10.1063/1.3658457.

Academic Info

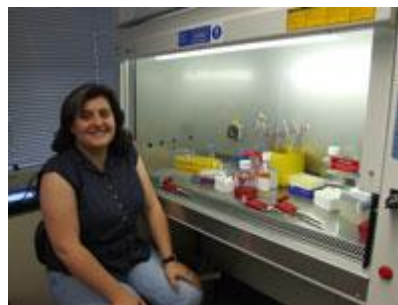
Vice-President of the DBE for Post-Graduation and Research
Coordinator of the 2nd cycle Masters Degree in Bioengineering and Nanosystems
Classes in 2010/11: Nanotechnology (1st semester); Materials (2nd semester)

Maria Margarida Diogo

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Research Scientist

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Research Areas and Interests

Current research interests include bioprocessing strategies for expansion and neuronal differentiation of pluripotent and neural stem cells envisaging applications in regenerative medicine and drug discovery and their integration with microscale culture systems to explore the effect of microenvironmental factors on pluripotent and neural stem cell fate.

Selected Publications in 2011

A.M. Fernandes-Platzgummer, M.M. Diogo, C. Lobato da Silva C, J.M.S. Cabral, “Large-scale expansion of mouse embryonic stem cells on microcarriers”, In *Methods in Molecular Biology* (N.z. Nieden, Editor) Humana Press, Totowa, NJ, Vol 690, 121-134 (2011) (DOI: [10.1007/978-1-60761-962-8_8](https://doi.org/10.1007/978-1-60761-962-8_8)).

C.A.V. Rodrigues, M.M. Diogo, C. Lobato da Silva, J.M.S. Cabral, “Microcarrier Expansion of Mouse Embryonic Stem Cell-Derived Neural Stem Cells in Stirred Bioreactors”, *Biotech. Appl. Biochem.*, **58**(4):231-42 (2011) (DOI: [doi: 10.1002/bab.37](https://doi.org/10.1002/bab.37))

A.M. Fernandes-Platzgummer, M.M. Diogo, R.P. Batista, C. Lobato da Silva, J.M.S. Cabral, “Scale-up of mouse embryonic stem cell expansion in stirred bioreactors”, *Biotech. Prog.*, **27**(5):1421-32 (2011) (DOI: [10.1002/btpr.658](https://doi.org/10.1002/btpr.658). Epub 2011 Jul 25)

C.A.V. Rodrigues, T.G. Fernandes, M.M. Diogo, C Lobato da Silva, J.M.S. Cabral, “Stem Cell Cultivation in Bioreactors”, *Biotech. Adv.*, **29**(6):815-29 (2011)
(DOI: doi.org/10.1016/j.biotechadv.2011.06.009)

Academic Info

Classes in 2010/11: Stem Cell Bioengineering (1st semester)

Pedro Fernandes

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Research Scientist

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Research Areas and Interests

Pedro is a member of the Bioprocess Engineering and Biocatalysis Laboratory (a laboratory member of the Associated Laboratory IBB- Institute for Biotechnology and Bioengineering). Current research interests focus on bioprocess intensification through miniaturization. Particular emphasis is given in the development of enzymatic and whole cell based processes within the pharmaceutical and food areas, and in the production of chemicals from renewable resources.

Selected Publications in 2011

M.P.C. Marques, P. Fernandes, “Microfluidic Devices: Useful Tools for Bioprocess Intensification”, *Molecules* **16**, 8368-8401 (2011) (DOI:10.3390/molecules16108368).

P. Fernandes, F. Carvalho, F., M.P.C. Marques, “Miniaturization in Biotechnology: speeding up the development of bioprocesses”, *Recent Pat. Biotechnol.* **5**, 160-173 (2011).

J.A. Figueira, F.F.G. Dias, H.H. Sato, P. Fernandes, “Screening of Supports for the Immobilization of β -Glucosidase”, *Enzyme Res.* **2011**, 642460 (2011) (DOI:10.4061/2011/642460).

G.L.M. Santa, S.M.S.A. Bernardino, S. Magalhães, V. Mendes, M.P.C. Marques, L.P. Fonseca, P. Fernandes, “From Inulin to Fructose Syrups Using Sol–Gel Immobilized Inulinase”, *Appl Biochem Biotechnol.* **165**, 1-12 (2011) (DOI 10.1007/s12010-011-9228-9).

D.P.C. de Barros, P. Fernandes, J.M.S. Cabral, L.P. Fonseca, “Synthetic application and activity of cutinase in an aqueous, miniemulsion model system: Hexyl octanoate synthesis”, *Catal. Today* **173**, 95-102 (DOI:10.1016/j.cattod.2011.05.039).

C.C.C.R. de Carvalho, M.P.C. Marques, P. Fernandes, “Recent Achievements on Siderophore Production and Application”. *Recent Pat. Biotechnol.* **5**, 183-198 (2011)

Academic Info

Pedro Fernandes was distinguished with the UTL/Santander Totta Scientific Award 2011, in the Biological Engineering area

Frederico Castelo Ferreira

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Invited Assistant Professor

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Research Areas and Interests

Invited Assistant Professor at the Department of Bioengineering; scientific area of Biomaterials, Nanotechnology and Regenerative Medicine. Member of the BioEngineering Research Group at Institute for Biotechnology and Bioengineering. Current research interests include tailoring materials for stem cells applications, namely mimicking the natural extracellular matrix using nanofiber based polymeric 3D matrices and development of stimulus responsive systems for stem cell ex-vivo cultivation; engineering processes towards production of platelets from human stem cells; study fermentation based routes for jet biofuel production; and development of new efficient and sustainable hybrid systems for purification of pharmaceuticals, namely through membrane separations.

Selected Publications in 2011

G. Székely, J. Bandarra, W. Heggie, F.C. Ferreira B. Sellergren “Design, preparation and characterization of novel molecularly imprinted polymers for removal of potentially genotoxic 1,3-diisopropylurea from API solutions”, Separation and Purification Technology, 86 (1), 190–198, DOI: 10.1016/j.seppur.2011.11.004)

G. Székely, J. Bandarra, W. Heggie, B. Sellergren, F.C. Ferreira “A hybrid approach to reach stringent low genotoxic impurity contents in active pharmaceutical ingredients: Combining molecularly imprinted polymers and organic solvent nanofiltration for removal of 1,3-diisopropylurea”, Separation and Purification Technology, 86 (15) 79–87, (doi:10.1016/j.seppur.2011.10.023)

G. Székely, J. Bandarra, W. Heggie, B. Sellergren, F.C. Ferreira “Organic solvent nanofiltration: A platform for removal of genotoxins from active pharmaceutical ingredients”, Journal of Membrane Science, Journal of Membrane Science 381 (1-2) 21-23 (10.1016/j.memsci.2011.07.007)

Academic Info

Contact Point for Industrial Affiliates - MIT Portugal Program (Bioengineering Focus Area).
Classes in 2011: Entrepreneurship in Bioengineering; Innovation in Bioengineering; Bioprocess Engineering Principles; Chemical Engineering, Biotechnology and Society; Biological Engineering Laboratory II; Stem Cell Bioengineering (1st semester, 2011/2012); Green Technologies and Strategic Management; Bioteams- Innovation Teams; Biotechnology (2nd semester, 2010/2011).

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Research Areas and Interests

His current scientific interests, in the field of Molecular and Cellular Microbiology, are centered on the study of bacterial proteins, such as cupredoxins, as novel drug candidates with anticancer activity. Studies aiming to elucidate the cellular and molecular effects of treating cancer cell models with azurin, a particular cupredoxin produced by *Pseudomonas aeruginosa*. His research interests are also focused on the study of trimeric autotransporter adhesins as novel and key virulence determinants in members of the Burkholderia cepacia complex, a group of bacteria prevalent in the natural environment that can cause serious infections in patients suffering from Cystic Fibrosis.

Selected Publications in 2011

Mil-Homens D., Bernardes N., Fialho A.M. “The antibacterial properties of docosahexaenoic omega-3 fatty acid against the Cystic Fibrosis multi-resistant pathogen Burkholderia cenocepacia” FEMS Microbiology Letters DOI: 10.1111/j.1574-6968.2011.02476.x (2011)

Mil-Homens D., Fialho A.M. “Trimeric autotransporter adhesins in members of the Burkholderia cepacia complex: a multifunctional family of proteins implicated in virulence” Frontiers in Cellular and Infection Microbiology DOI: 10.3389/fcimb.2011.00013 (2011)

Fialho A.M., Salunkhe P., Manna S.K., Mahali S., Chakrabarty A.M. “Glioblastoma Multiforme: Novel Therapeutic Approaches” ISRN Neurology: 000-000, 2011

Rocha J., Popescu A.O., Borges P., Mil-Homens D, Sá-Correia I., Fialho A.M., Frazão C. “Burkholderia cepacia UDP-glucose dehydrogenase (BceC) structure and the role of Tyr10 in the final hydrolysis of UGDs thioester intermediate” Journal of Bacteriology , 193: 3978-3987, 2011

Academic Info

Member of the Students Training Committee of the DBE
Classes in 2010/11: Biochemistry and Molecular Biology (1st and 2nd semester); Functional Genomics and Bioinformatics (2nd semester)

Patrícia Figueiredo

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Research Areas and Interests

Quantitative functional neuroimaging using BOLD and ASL fMRI. Non-invasive brain perfusion imaging using ASL MRI. Dynamic neuroimaging by simultaneous EEG-fMRI. Modelling and estimation of brain haemodynamics and functional connectivity. Clinical applications of fMRI. Brain decoding based on fMRI.

Selected Publications in 2011

Cabral C, Silveira M, Figueiredo P (2011) Decoding visual brain states from fMRI using an ensemble of classifiers. *Pattern Recognition* 44: 2983–2993.

Santos N, Sanches J, Sousa I, Figueiredo P (2011) Bayesian Optimization of Sampling and Estimation in PASL-MRI Perfusion Imaging. *IEEE Transactions on Biomedical Engineering*. 58(11): 3165-3174.

Pimentel M, Vilela P, Sousa I, Figueiredo P (2011) Localization of the hand motor area by ASL and BOLD fMRI. *Human Brain Mapping* [Epub ahead of print].

Pereira C, Teixeira J, Figueiredo P, Xavier J, Luís Castro S, Brattico E (2011) Music and Emotions in the Brain: Familiarity Matters. *PLoS One*. 6(11):e27241. Epub 2011 Nov 16.

Lemos R, Figueiredo P, Santana I, Simões MR, Castelo-Branco M (2011) Temporal integration of 3D coherent motion cues defining simple objects of unknown orientation is impaired in amnesic Mild Cognitive Impairment and Alzheimer's Disease. *Journal of Alzheimer's Disease* [Epub ahead of print].

Academic Info

Coordinator of the 1st cycle Masters Degree in Biomedical Engineering at IST.

Mobility coordinator of the Masters Degree in Biomedical Engineering at IST.

Member of DBE's Executive Committee.

Classes in 2010/2011: Introduction to Biomedical Engineering (1st semester); Imaging techniques (2nd semester) and Biophysics (2nd semester).

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Research Areas and Interests

Research Scientist at the BioEngineering Research Group (BERG), Institute for Biotechnology and Bioengineering (IBB), Centre for Biological and Chemical Engineering at I.S.T. His research areas focus on the development of bioanalytical methods and biosensors integrated in FIA systems and lab-on-a-chip devices for monitoring pathogens, toxic pollutants, and biological compounds, and development of nano/micro-biocatalysts (biocomposites) mostly based on hydrogels containing protein/cell assemblies and encapsulating nano-magnetic particles. The resulting biocomposites are intended to be used as nano/micro-bioreactors.

Selected Publications in 2011

de Barros, D.P.C., Azevedo, A.M., Cabral, J.M.S., Fonseca, L.P. (2011) "Optimisation of flavour esters synthesis by *Fusarium solani* pisi cutinase", *J. Food Biochem.*, 58(2), 545-556

Bernardino, S., Estrela, N., Ochoa-Mendes, V., Fernandes, P., Fonseca, L.P. (2011) "Optimization in the immobilization of penicillin G acylase by entrapment in xerogel particles with magnetic properties", *J. Sol-Gel Sci. Technol.*, 58(2), 545-556.

Santa, G.L.M., Bernardino, S.M.S.A., Magalhães, S., Mendes, V., Marques, M.P.C., Fonseca, L.P., Fernandes, P. (2011), From Inulin to Fructose Syrups Using Sol–Gel Immobilized Inulinase. *Appl Biochem Biotechnol.*, 165, 1-12.

de Barros, D.P.C., Fernandes, P., Cabral, J.M.S., Fonseca, L.P. (2011) Synthetic application and activity of cutinase in an aqueous, miniemulsion model system: Hexyl octanoate synthesis. *Catal. Today*, 173, 95-102.

Academic Info

Sabbatical period in the Universidade Federal do Rio Grande do Sul in Porto Alegre, Brazil as Visiting Professor, teaching the curricular unit of "Biocatalysis and Enzymatic Technology" for MSc and PhD student.

Maria Manuela R. da Fonseca

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webpage: <http://enverg.ist.utl.pt/members/ManuelaFonseca.htm>

Research Areas and Interests

Production of polyhydroxyalkanoates (PHAs) from industrial by-products and ligno-cellulosic hydrolysates by bacterial cultures. Optimization of cultivation conditions to obtain tailor-made co-polymers for use in specific areas (eg., scaffolds for cell culture, composite materials for houseware applications).

Implementation of two-phase systems for the degradation of xenobiotics by adapted bacterial species.

Lipase selection and immobilization for the production of structured triglycerides.

Selected Publications in 2011

C.C.C.R. de Carvalho and M.M.R. da Fonseca (2011) Bioreactions and Bioreactor Operation - Biotransformations. In: "Engineering Fundamentals in Biotechnology", Comprehensive Biotechnology, M Moo-Young (Ed.) Second Edition, volume 2, pp. 451–460. Elsevier, The Netherlands (ISBN: 978-0-444-53352-4).

M. Tyagi, M.M. R. da Fonseca and C. C. C. R. de Carvalho (2011), Bioaugmentation and biostimulation strategies to improve the effectiveness of bioremediation processes, *Biodegradation* **22**, 231-241- DOI 10.1007/s10532-010-9394-4.

C. C.C.R. de Carvalho, P Almeida Cruz, M. M R. da Fonseca, L. Xavier-Filho, (2011) "Antibacterial properties of the extract of *Abelmoschus esculentus*" *Biotechnology and Bioprocess Engineering* **16**, 971-977 - DOI: 10.1007/s12257-011-0050-6.

J.M. Cavalheiro, R. S. Raposo, C. DiasAlmeida, M.T. Cesário, C. Sevrin, C. Grandfils, M.M.R. da Fonseca, "Effect of Cultivation Parameters on the Production of Poly(3-Hydroxybutyrate-co-4-Hydroxybutyrate) and Poly(3-Hydroxybutyrate-4-Hydroxybutyrate-3-Hydroxyvalerate) by *Cupriavidus necator* using Waste Glycerol", *Bioresource Technology* (accepted)

A.C. Correia, M. M. R. da Fonseca, S. Ferreira-Dias, (2011). Produção de Emulsionantes através da Glicerólise de Óleo de Bagaço de Azeitona Catalisada pela Lipase da *Candida rugosa* Imobilizada em Espumas de Poliuretano. *Millenium*, **41**, 7-15.

Academic Info

Classes in 2010-11: Biological Reactors (in the syllabus of MSc in Biol Eng. and option for other MSc courses, 1st semester); Biological Eng. Processes (MSc in Environmental Eng., 1st semester).

Jorge Humberto Gomes Leitão

Ph.D. Instituto Superior Técnico, 1996
Assistant Professor

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Research Areas and Interests

Member of the IBB – Institute for Biotechnology and Bioengineering (Associate Laboratory), and of Centre for Biological and Chemical Engineering. Current research interests include the characterization of virulence factors and of novel small non-coding RNAs from bacteria of the *Burkholderia cepacia* complex.

Selected Publications in 2011

Ramos CG, Sousa SA, Grilo AM, Feliciano JR, Leitão JH. The second RNA chaperone, Hfq2, is also required for survival under stress and full virulence of *Burkholderia cenocepacia* J2315. *Journal of Bacteriology* 2011 193(7):1515-1126 (2011). DOI: 10.1128/JB.01375-10.

Mendes S, Farinha A, Ramos CG, Leitão JH, Viegas CA, Martins LO. “Synergistic action of azoreductase and laccase leads to maximal decolourization and detoxification of model dye-containing wastewaters”. *Bioresource Technology* 102(21):9852-9859 (2011). DOI: 10.1016/j.biortech.2011.07.108

Sousa SA, Ramos CG, Leitão JH. “*Burkholderia cepacia* Complex: Emerging Multihost Pathogens Equipped with a Wide Range of Virulence Factors and Determinants”. *International Journal of Microbiology* 2011. pii: 607575. DOI: 10.1128/JB.01375-10

Ramos GC, Grilo AM, da Costa JP, Nadais H, Leitão JH. “Extraction and purification of DNA from UASB reactors sludge samples”. In: *DNA Binding and DNA Extraction: Methods, Applications and Limitations* (C Zhou and X Ling Editors). Nova Publishers, New York, 2011. ISBN: 978-1-61470-958-9

Sousa SA, Feliciano JR, Leitão JH. “Activated sugar precursors: biosynthetic pathways and biological roles of an important class of intermediate metabolites in bacteria”. In: *Biotechnology of Biopolymers* (ed. M Elnashar). InTech, Rijeka, 2011. ISBN 978-953-307-179-4

Academic Info

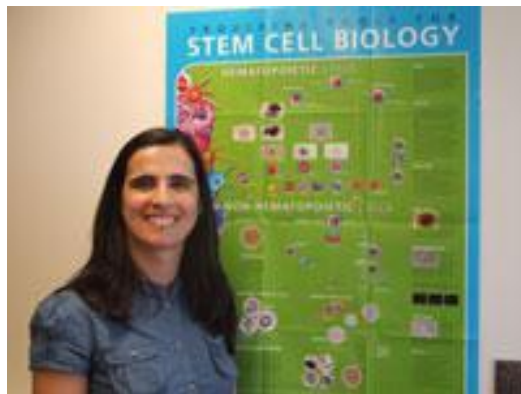
Classes in 2010/11: Biochemistry and Molecular Biology, Genetic Engineering, Molecular Biotechnology, Molecular and Cellular Microbiology (1st semester); Biochemistry and Microbial Physiology (2nd semester)

Cláudia Lobato da Silva

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Research Areas and Interests

Current research interests include: (i) the *ex-vivo* expansion of human stem cells for use in Cellular Therapy settings, namely by using robust and fully controlled bioreactor systems; also (ii) the purification of target stem cell populations and its integration in bioreactor systems.

Selected Publications in 2011

Santos F, Andrade PZ, Abecasis MM, Gimble JM, Chase LG, Campbell AM, Boucher S, Vemuri MC, Silva CL, Cabral JMS. Toward a clinical-grade expansion of mesenchymal stem cells from human sources: a microcarrier-based culture system under xeno-free conditions. *Tissue Eng Part C Methods*. 2011 Dec;17(12):1201-10.

Sousa AF, Andrade PZ, Pirzgalska RM, Galhoz TM, Azevedo AM, da Silva CL, Aires-Barros MR, Cabral JMS. A novel method for human hematopoietic stem/progenitor cell isolation from umbilical cord blood based on immunoaffinity aqueous two-phase partitioning. *Biotechnol Lett*. 2011 Dec;33(12):2373-7.

Rodrigues CA, Diogo MM, da Silva CL, Cabral JMS. Microcarrier expansion of mouse embryonic stem cell-derived neural stem cells in stirred bioreactors. *Biotechnol Appl Biochem*. 2011 Jul Aug;58(4):231-42. doi: 10.1002/bab.37.

Fernandes-Platzgummer A, Diogo MM, Baptista RP, da Silva CL, Cabral JMS. Scale-up of mouse embryonic stem cell expansion in stirred bioreactors. *Biotechnol Prog*. 2011 Sep-Oct;27(5):1421-32. doi: 10.1002/btpr.658.

Rodrigues CA, Fernandes TG, Diogo MM, da Silva CL, Cabral JMS. Stem cell cultivation in bioreactors. *Biotechnol Adv*. 2011 Nov-Dec;29(6):815-29.

Andrade PZ, da Silva CL, dos Santos F, Almeida-Porada G, Cabral JM. Initial CD34+ cell-enrichment of cord blood determines hematopoietic stem/progenitor cell yield upon ex vivo expansion. *J Cell Biochem*. 2011 Jul;112(7):1822-31. doi: 10.1002/jcb.23099.

dos Santos F, Andrade PZ, Eibes G, da Silva CL, Cabral JM. Ex vivo expansion of human mesenchymal stem cells on microcarriers. *Methods Mol Biol*. 2011;698:189-98.

Academic Info

Member of the Coordination of the 2nd cycle Masters Degree in Bioengineering and Nanosystems Classes in 2010/11: Stem Cell Bioengineering, Cell and Tissue Engineering, Biomolecular and Cellular Engineering (1st semester); Cell and Tissue Engineering (2nd semester)

Fernando H. Lopes da Silva

M.D. Faculty of Medicine, University of Lisbon. Portugal;
Ph.D. University of Utrecht, The Netherlands.



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Emeritus Professor, Center of Neuroscience, Swammerdam Institute for Life Sciences, Science Park 904, Kamer C 3-274, 1098XH Amsterdam, The Netherlands
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Research Areas and Interests

His research interests are mainly the study of the electrophysiology and biophysics of brain systems, in particular the origin and organization of rhythmic activities of the brain, and the origin of epileptic phenomena especially of absence seizures. Furthermore he researches the functional organization of neuronal networks in relation to cognitive processes and has an active interest in computational modeling of the dynamics of neuronal networks, under normal and pathological conditions.

3 of the most Cited Publications

- Pfurtscheller G, Lopes da Silva FH. Event-related EEG/MEG synchronization and desynchronization: basic principles. *Clin Neurophysiol.* 1999 Nov;110(11):1842-57. – (1124 citations).
- Steriade, M., Gloor, P., Llinás, R.R., Lopes da Silva, F.H. and Mesulam M.-. Basic mechanisms of cerebral rhythmic activities. *Electroenceph. clin. Neurophysiol.* 1990, 76: 481-508. – (640 citations).
- Meeren HKM; Pijn JPM; Van Luijcklaar ELJM; Coenen, AM, Lopes da Silva, FH. Cortical focus drives widespread corticothalamic networks during spontaneous absence seizures in rats. *Journal of Neuroscience*, 2002. 22 (4): 1480-1495.- (321 citations).

Most cited book: - Niedermeyer E, **Lopes da Silva F**, (eds.) *Electroencephalography. Basic Principles, clinical applications, and related fields.* Lippincott Williams & Wilkins, 1256 pp. 6th Edition 2011. - (1325 citations).

5 recent publications:

- Pfurtscheller G, Bauernfeind G, Neuper C, Lopes da Silva FH. Does conscious intention to perform a motor act depend on slow prefrontal (de)oxyhemoglobin oscillations in the resting brain? *Neurosci Lett.* 2012 Feb 6;508(2):89-94.
- Koppert MM, Kalitzin S, Lopes da Silva FH, Viergever MA. Plasticity-modulated seizure dynamics for seizure termination in realistic neuronal models. *J Neural Eng.* 2011 Aug;8(4):046027.
- de Munck JC, Gonçalves SI, Mammoliti R, Heethaar RM, Lopes da Silva FH. Interactions between different EEG frequency bands and their effect on alpha-fMRI correlations. *Neuroimage.* 2009 Aug 1;47(1):69-76.
- de Munck JC, Gonçalves SI, Faes TJ, Kuijer JP, Pouwels PJ, Heethaar RM, Lopes da Silva FH. A study of the brain's resting state based on alpha band power, heart rate and fMRI. *Neuroimage.* 2008 Aug 1;42(1):112-21.
- Lopes da Silva FH. The Impact of EEG/MEG Signal Processing and Modeling in the Diagnostic and Management of Epilepsy. *IEEE Rev Biomed Eng.* 2008;1:143-56.

Academic Info

Classes in 2010-11 (1st semester): Co-Coordinator: Introduction to Biomedical Engineering, Integrated Master Degree, IST – FML.

Catarina Madeira

Ph.D. Instituto Superior Técnico, 2005
Research Scientist

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Research Areas and Interests

Research Scientist at Stem Cell Bioengineering Laboratory.

Current research interest is focused on setting-up gene delivery strategies for stem cells expansion, differentiation or for being used as drug delivery vehicles, specially using non-viral vectors such as plasmids or minicircles associated with cationic liposomes or physical methods.

Selected publications in 2011

-Madeira, C., Ribeiro, S.C., Pinheiro, I.S.M., Martins, S.A.M., Andrade, P.Z., da Silva, C.L., Cabral, J.M.S. Gene Delivery to human bone marrow mesenchymal stem cells by microporation. J. Biotechnol. (2011), 151(1), 130-136.

-Madeira, C., Loura, L.M.S., Aires-Barros, M.R.; Prieto, M. Fluorescence methods for lipoplex characterization. BBA-Biomembranes (2011), 1808(11):2694-705

Academic Info

Classes in 2010-11 (1st semester): Stem Cell Bioengineering

Raul Carneiro Martins

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Research Areas and Interests

Electromagnetic imaging in biological tissues. Biomedical instrumentation. Biopotential electric field caption. Sensors and actuators in biomedical applications. Electromagnetic Sensors. Electromagnetic power transfer in biological mediums.

Selected Publications in 2011

R. C. Martins; D. Primor; T. Paiva; "High-Performance Groundless EEG/ECG Capacitive Electrodes", *Proc IEEE International Symp. on Medical Measurements and Applications - MeMeA*, Bari, Italy, Vol. 1, pp. 503 - 506, May, 2011.

Caeiros, J.M.S.; Martins, R.C.; , "Electromagnetic tomography: Real-time imaging using linear approaches," *Bioengineering (ENBENG)*, 2011. *ENBENG 2011. 1st Portuguese Meeting in* , vol., no., pp.1-7, 1-4 March 2011 - doi: 10.1109/ENBENG.2011.6026096

Academic Info

Member of DBE's Executive Committee.

Classes in 2010/2011: Instrumentation and Signal Acquisition in Bioengineering (1st semester);.

Marília Mateus

Ph.D. Technical University of Lisbon, 1994
Assistant Professor

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Research Areas and Interests

My research interests focus mainly on the application of synthetic membranes to bioengineering fields. These entail membrane processing, namely membrane crossflow filtration and membrane chromatography, the modification of the surface of membranes, namely for biocompatibility and selective adsorption capacity, and membrane bioreactors.

Scientific Communications in 2011

Mateus, M., Raiado-Pereira, L., Prazeres, M., “Membrane chromatography for therapeutic DNA production: Adsorption membranes development”, Proceedings of the 1st Portuguese Meeting in Bioengineering: Bioengineering and Medical Sciences - The Challenge of the XXI century | ENBENG 2011, Oeiras, Portugal, March, R. Martins (ed.), pp 68-71.

Raiado-Pereira, L., Carapeto, A., Mateus, M., Botelho-do-Rego, A.M., “Grafting hydrophobic and affinity interaction ligands on membrane adsorbers: a close-up "view" by X-ray Photoelectron Spectroscopy”, 11th International Chemical and Biological Engineering Conference | CHEMPOR 2011, Lisbon, Portugal, September.

Martins, A.I.F., Brogueira, P., Mateus, M., “On the development of a plasmid DNA probe for interaction force measurements and characterization of membrane adsorbers by AFM”, 4th Joint National Congress of Microbiology and Biotechnology | Microbiotec11, Braga, Portugal, December.

Monteiro, M.E., Raiado-Pereira, L., Mateus, M., Prazeres, D.M.F., “Design of a liposome-based chromatographic membrane and its use for final plasmid DNA purification from *Escherichia coli* lysate contaminants”, 4th Joint National Congress of Microbiology and Biotechnology | Microbiotec11, Braga, Portugal, December.

Academic Info

Member of the M.Sc. Dissertation Office of DBE

Member of the School Assembly (substitute)

Classes in 2010/11: ‘Design Project (Biological Engineering)’ and ‘Food Technology’ (1st semester); ‘Biotechnology Laboratories II’ (2nd semester)

José Cardoso de Menezes

Ph.D. Technical University of Lisbon, 1996
Assistant Professor with Habilitation

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Research Areas and Interests

Dr. Menezes is Professor at IST (Technical University of Lisbon, 2005) and a senior researcher at the Institute for Biotechnology and Bioengineering (IBB, TUL). His work deals with the development and use of several systems engineering tools in diverse processing industries with a stronger focus in the bio/pharmaceutical areas, namely Process Analytical Technologies (PAT), Industrial Chemometrics (IC), Multivariate Data Analysis (MVDA), Multivariate Statistics Process Control (MSPC) and Quality by Design (QbD). Main research areas are: Process Analytical Technology; Whole Process/Product Design; Systems Engineering Applied to Manufacturing; and Pharmaceutical Engineering.

Selected Publications in 2011

PAT Applied in Biopharmaceutical Process Development and Manufacturing An Enabling Tool for Quality-by-Design. Eds C. Undey, D. Low, J.C. Menezes, M. Koch, CRC Press (2011).

Strauss U, Hakemeyer C, Werz S, Folque F, Menezes JC (2011) At-line NIR Spectroscopy as Effective PAT Monitoring Technique in Mab Cultivations During Process Development and Manufacturing. *Talanta* (in press – available on-line).

Menezes JC, Process Analytical Technology and Quality by Design in Bioprocess Development and Manufacturing. pp 501-509 in Vol.3 Industrial Biotechnology, Ed. A. Moreira, in *Comprehensive Biotechnology* (2nd Ed), Ed. M. Moo-Young, Elsevier (2011).

Lourenco V, Herdling T, Reich G, Menezes JC, Schewitz J (2011). Combining Microwave Resonance Technology to Multivariate Data Analysis As a Novel PAT Tool to Improve Process Understanding In Fluid Bed Granulation. *AIChE Annual Meeting*, Minneapolis, USA, October 16-21, 2011.

Jose GE, Folque F, Menezes JC, Werz S, Strauss U, Hakemeyer C (2011). Predicting Mab Product Yields from Cultivation Media Components Using NIR and 2D-Fluorescence Spectroscopies, *Biotechnol. Prog.* **27**(5),1339–1346.

Nuno P. Mira

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Research Areas and Interests

Current research interests are focused on: *i)* Physiology and molecular biology of *Saccharomyces cerevisiae* and *Zygosaccharomyces bailii*; *ii)* Regulation of gene and genomic expression of *S. cerevisiae* and *Z. bailii* under stress imposed by weak acid food preservatives; *iii)* Molecular mechanisms of antibiotic resistance in *Burkholderia cenocepacia*; *iv)* Transcriptomics, Proteomics and Bioinformatics;

Selected Publications in 2011

Nuno P. Mira, Sílvia Henriques, Greg Keller, Miguel C. Teixeira, Rute G. Matos, Cecília M. Arraiano, Dennis R. Winge and Isabel Sá-Correia, “Identification of a DNA binding site for the transcription factor Haa1p, required for *Saccharomyces cerevisiae* response to acetic acid stress”, *Nucleic Acids Research*, 16, 6896-907, (2011)

Teixeira MC, Mira NP and Isabel Sá-Correia, “A genome-wide perspective on food-relevant stress responses in yeast”, *Current Opinion in Biotechnology*, 22:150-6, (2011)

Nuno P Mira, Andreia Madeira, Carla Coutinho, Ana Sílvia Moreira and Isabel Sá-Correia, “Genomic expression analysis reveals strategies of *Burkholderia cenocepacia* to adapt to cystic fibrosis patients airways and antimicrobial therapy”, *PLoS One*, 6, e28831 (2011)

Coutinho C, Santos SC, Madeira AM, Mira NP, Moreira AS, Sá-Correia I, “Long-term colonization of the cystic fibrosis lung by *Burkholderia cepacia* complex bacteria: epidemiology, clonal variation and genome-wide expression alterations”, *Frontiers in Cellular and Infection Microbiology*, 1, article 12 (2011)

Gonçalves JP, Francisco A, Mira NP, Teixeira MC, Sá-Correia, Oliveira AL and Madeira SC, “TFRank: network-based prioritization of regulatory associations underlying transcriptional responses”, *Bioinformatics*, 27:22, 3149-57, (2011)

Awards

- Honorable Mention in the UTL/Delloitte Scientific Research Awards for Young Researchers in the scientific area of Biological Engineering and Biotechnology, 2011

Gabriel A. Monteiro

Diploma in Biology, Un. Coimbra, 1988
Msc Biotechnology (2 years), IST 1991
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Research Areas and Interests

Development, production and purification of plasmids to DNA vaccination and gene therapy.

Selected Publications in 2011

Lança, A. S. C., Sousa, K. P., Atouguia, J., Prazeres, D. M. F., Monteiro, G. A., Silva, M. S. (2011) *Trypanosoma brucei*: Immunisation with plasmid DNA encoding Invariant Surface Glycoprotein gene is able to induce partial protection in experimental African trypanosomiasis, Exp. Parasitol. 127, 18-24, doi:10.1016/j.exppara.2010.06.017

Oliveira, P.H., Prather, K.J., Prazeres, D.M.F., Monteiro, G.A. (2011) Mutation detection in plasmid-based biopharmaceuticals, Biotechnol. J., 2011, 6, 378-391, doi:10.1002/biot.201000372

Gonçalves, G. A. L., Bower, D. M., Prazeres, D. M. F., Monteiro, G. A., Prather, K. L. J. (2011) Rational engineering of *Escherichia coli* strains for plasmid biopharmaceutical manufacturing, Biotechnol. J., doi:10.1002/biot.201100062

Lewis, L. A., Umekubo, P. T., Alvi, S., Saby, R., Afrose, J., Astatke, M., Oliveira, P. H., Monteiro, G. A., Prazeres, D. M. F. (2011) Protein-DNA interactions define the mechanistic aspects of circle formation and insertion reactions in IS2 transposition, Mobile DNA, doi:10.1186/1759-8753-3-1

Toledo, M.A.S., Janissen, R., Favaro, M.T.P., Cotta, M.A., Monteiro, G.A., Prazeres, D.M.F., Souza, A.P., Azzoni, A.R., (2011) Development of a recombinant fusion protein based on the dynein light chain LC8 for non-viral gene delivery, J Control. Release, doi:10.1016/j.jconrel.2012.01.011

Academic Info

Member of the DBE Executive Committee
Classes in 2010/11: Ecology, Biomolecular and Cell Engineering (1st semester); Cell and Tissue Engineering; Biomimicry (2nd semester)

Leonilde Morais Moreira

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Research Areas and Interests

- Functional characterization of *Sinorhizobium meliloti* proteins with role in nitrogen fixation symbiosis with legume plants
- Exopolysaccharide biosynthesis and regulation in *Burkholderia*
- Role of protein tyrosine phosphorylation in *Burkholderia* virulence
- Genomics and transcriptomics in clinical isolates of *Burkholderia cepacia* complex

Selected Publications in 2011

Silva IN, Ferreira AS, Becker JD, Zlosnik JEA, Speert DP, He J, Mil-Homens D, and Moreira LM. (2011). Mucoïd morphotype variation of *Burkholderia multivorans* during chronic cystic fibrosis lung infection is correlated with changes in metabolism, motility, biofilm formation and virulence. *Microbiology*. 157:3124-3137.

Ferreira AS, Silva IN, Oliveira VH, Cunha R, and Moreira LM. (2011). Insights into the role of extracellular polysaccharides in *Burkholderia* adaptation to different environments. *Frontiers in Cellular and Infection Microbiology*. 1:16, 1-9. doi: 10.3389/fcimb.2011.00016.

Rocha J, Popescu AO, Borges P, Mil-Homens D, Moreira LM, Sá-Correia I, Fialho AM, Frazão C. (2011). *Burkholderia cepacia* UDP-glucose dehydrogenase (BceC) structure and the role of Tyr10 in the final hydrolysis of UGDs thioester intermediate. *Journal of Bacteriology*. 193:3978-3987.

Ferreira AS, Silva IN, and Moreira LM. (2011). Mechanisms controlling the expression of the exopolysaccharide of *Burkholderia* and role in niche adaptation. In "Biotechnology of Biopolymers" (M Elnashar Ed) INTECH, Vienna, Austria (ISBN 978-953-307-179-4).

Academic Info

Classes in 2010/11: (1st semester)- Molecular Biotechnology, Genetic Engineering, Molecular and Cellular Microbiology; (2nd semester)- Functional Genomics and Bioinformatics, Microbiology.

Jorge Morgado

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Associate Professor with Habilitation

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Research Areas and Interests

The research is carried out within the organic electronics group at Instituto de Telecomunicações-Lisboa, an Associated Laboratory. Current research interests range from conjugated polymers and low molecular weight systems synthesis and their applications in various devices (light-emitting diodes, photovoltaic cells, thin-film transistors, memories and electrochromic displays). In addition, there is also a research line devoted to the “unimolecular” electronics, encompassing the self-organization of molecular systems on conducting substrates and their electrical characterization.

Selected Publications in 2011

A. Charas, A. L. Mendonça, J. Clark, L. Bazzana, A. Nocivelli, G. Lanzani, J. Morgado, “Stimulated emission and ultra-fast optical switching in a ter(9,9'-spirobifluorene)-*co*-methylmethacrylate copolymer”, *J. Polymer Science B: Polymer Physics*, 49, 52-61 (2011).

R. I. S. Romão, Q. Ferreira, J. Morgado, J. M. G. Martinho, A. M. P. S. Gonçalves da Silva, “Nanopatterning in Langmuir-Blodgett Monolayers of a Thermoresponsive Double Hydrophilic Block Copolymer Studied by Atomic Force Microscopy”, *Journal of Nanoscience and Nanotechnology*, 11, 3151-3161 (2011).

J. Farinhas, Q. Ferreira, R. E. Di Paolo, L. Alcácer, J. Morgado, A. Charas, “Nanostructured donor/acceptor interfaces in photovoltaic cells using columnar-grain films of a cross-linked poly(fluorene-*alt*-bithiophene)”, *J. Mater. Chem.* 21, 12511 (2011).

Q. Ferreira, L. Alcácer, J. Morgado, “Stepwise preparation and characterization of molecular wires made of zinc octaethylporphyrin complexes bridged by 4,4'-bipyridine on HOPG”, *Nanotechnology*, 22, 435604 (2011).

G. E. Khalil, A. M. Adawi, B. Robinson, A. J. Cadby, W. C. Tsoi, J.-S. Kim, A. Charas, J. Morgado, D. G. Lidzey, “Spectroscopy and Single-Molecule Emission of a Fluorene-Terthiophene Oligomer”, *J. Phys. Chem. B* 11, 12028 (2011).

Academic Info

Classes in 2010/11: Chemistry (Mechanical Eng, 1st semester); Science and Technology of Polymers (2nd semester)

Helena M. Pinheiro

PhD, Instituto Superior Técnico, 1992
Assistant Professor

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Research Areas and Interests

Current research interests include the biological wastewaters with emphasis on the biodegradation of recalcitrant pollutants with mixed cultures in sequencing-batch bioreactors. Interests extend to wastewater quality monitoring using spectral (UV-Vis, NIR and MIR) data and chemometrics and its application in supervision and diagnosis of wastewater treatment systems bioreactors.

Scientific Communications in 2011

Mata, A. M. T. , Lourenço, N. D., Pinheiro, H. M. (2011), Does activated sludge starvation enhance dye bioconversion in the presence of inhibitory compounds?, in: *8th IWA Leading-Edge Conference on Water and Wastewater Technologies*, Amsterdam, The Netherlands, 6-10 June. [Best Poster Award]

Ribeiro, R., Pinheiro, C. C., Pinheiro, H. M., Almeida, M. C. (2011), Monitorização e controlo do funcionamento de ETAR descentralizadas, in: *Proceedings of the 6^o Congresso Luso - Moçambicano de Engenharia (CLME 2011)*, Maputo, Moçambique, 29 August - 2 September, Edições INEGI , 749-750. [oral communication]

Ribeiro, R., Pinheiro, C. C., Pinheiro, H. M., Almeida, M. C. (2011), Respirometric characterization of a small community wastewater for decentralized biological treatment, in: *11th International Chemical and Biological Engineering Conference CHEMPOR 2011*, Caparica, Portugal, 5-7 September.

Mata, A. M. T., Lourenço, N. D., Pinheiro, H. M. (2011), Granulation of activated sludge in a laboratory SBR, in: *MicroBiotec'11*, Braga, 1-3 December.

Moreira, M. A., Lourenço, N. D., Pinheiro, H. M. (2011), Microbial population dynamics in aerobic and anaerobic/aerobic sequencing batch reactors, in: *MicroBiotec'11*, Braga, 1-3 December.

Academic Info 2011

Member of the Executive Committee of the DBE for External Relations
International Mobility Coordinator in the scientific area of Biotechnology/Biological Engineering
Coordinator for MSc dissertation placements (Biological Engineering)
Elected member of the School Assembly of IST
Teaching: Design Project (Biological Engineering); Design Project (Bioindustry); Environmental Biotechnology; Biotechnology & the Environment; Integrated Biological Engineering I.

Duarte Miguel Prazeres

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Associate Professor with Habilitation

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Research Areas and Interests

Responsible for the Nucleic Acids Bioengineering Lab of the Bioengineering Research Group at IBB-Institute for Biotechnology and Bioengineering. Current research interests include nucleic acid engineering (development of plasmid biopharmaceuticals and diagnostics) and nanobiotechnology (lab-on-a-chip microfluidic devices with integrated biosensors using cells, proteins, and nucleic acids).

Selected Publications in 2011

D.M.F. Prazeres, "Plasmid Biopharmaceuticals: Basics, Applications and Manufacturing", John Wiley & Sons, Inc. (2011) ISBN: 978-0-470-23292-7.

Gomes, G.A., Azevedo, A.M., Aires-Barros, M.R., Prazeres, D.M.F., "Studies on the Adsorption of Cell Impurities from Plasmid-Containing Lysates to Phenyl-Boronic Acid Chromatographic Beads", J. Chromatogr. A, **1218**, 8629-8637 (2011). (DOI: 10.1016/j.chroma.2011.10.004).

Oliveira, P.H., Prather, K.L.J., Prazeres, D.M.F., Monteiro, G.A., "Mutation Detection in Plasmid Biopharmaceuticals", Biotechnol. J. **6**, 378-391 (2011). (DOI: 10.1002/biot.201000372).

A.T. Pereira, P. Novo, D.M.F. Prazeres, V. Chu, J.P. Conde, "Heterogeneous Immunoassays in Microfluidic Format Using Fluorescence Detection with Integrated Amorphous Silicon Photodiodes", Biomicrofluidics **5**, 014102 (2011) (DOI:10.1063/1.3553014).

A. Jóskowiak, M.S. Santos, D.M.F. Prazeres, V. Chu, J.P. Conde, "Integration of thin film amorphous silicon photodetector with lab-on-chip for monitoring protein fluorescence in solution and in live microbial cells", Sensors and Actuators B: Chemical **156**, 662-667 (2011). (DOI:10.1016/j.snb.2011.02.015).

P. Novo, D.M.F. Prazeres, V. Chu, J.P. Conde, "Microspot-based ELISA in microfluidics: chemiluminescence and colorimetry detection using integrated thin-film hydrogenated amorphous silicon photodiodes", Lab Chip **11**, 4063 (2011). (DOI:10.1039/C1LC20362B).

D.C. Martins, V. Chu, D.M.F. Prazeres, J.P. Conde, "Electrical detection of DNA immobilization and hybridization by streaming current measurements in microchannels", Appl. Phys. Lett. **99**, 183702 (2011). (DOI: 10.1063/1.3658457).

Academic Info

Coordinator of the 1st cycle Masters Degree in Biological Engineering
Classes in 2010/11: Biological Engineering Laboratories (1st semester); Biomimicry, Bioengineering and Market (2nd semester)

Agostinho Claudio da Rosa

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Research Areas and Interests

Head and researcher of Evolutionary Systems and Biomedical Engineering Lab (LaSEEB) at Systems and Robotics Institute (ISR). Current research interests are Human Sleep Analysis, Neuro-Feedback Training, EEG analysis, Medical Image Processing, Evolutionary Algorithms Theory and Applications, Artificial Life Modelling and Simulations.

Selected Publications in 2011

C.M. Fernandes, J. J. Merelo A.C. Rosa. A comparative study on the performance of dissortative mating and immigrants' strategies for evolutionary dynamic optimization", Special Issue on Interpretable Fuzzy Systems, Information Sciences, Vol 181, issue 20, pp 4428-4459, 2011
doi:10.1016/j.ins.2011.05.022

C Isidoro, N Fachada, F Barata, AC Rosa. An Agent Based Model of Dengue Disease Transmission by *Aedes aegypti* Populations. Lecture Notes in Computer Sciences, Artificial Life, Part II, pp 339-346 Springer 2011.

AC Rosa and JP Rodrigues. Dream therapy: correlation of dream contents with encephalographic and cardiovascular activations. In "States of Consciousness: Experimental Insights into Meditation, Waking, Sleep and Dreams", Dean Cvetkovic and Irena Cosic (eds), Springer, The Frontiers Collection, ISBN 9-78-3-642- 18046-0, pp 109-132, 2011.

CM Fernandes, CF Lima, JLJ Gimenez, AC Rosa, JJ Merelo. An Ant-based Rule for UMDA's update Strategy. Lectures Notes in Computer Sciences, Artificial Life, Part I, pp 339-346 Springer, 2011.

Isabel Sá-Correia

Ph.D., IST, 1984 (Microbiology Lab,
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Research Areas and Interests

Coordinator of the Biological Sciences Research Group (BSRG), Institute for Biotechnology and Bioengineering, Centre for Biological and Chemical Engineering. Research areas: Molecular and Cellular Microbiology; Functional Genomics; Systems and Synthetic Biology. Current research interests: Chemical stress response and defence in Yeast (gene and genomic expression regulation; drug efflux pumps; design and engineering of more robust strains); Expression Proteomics; Toxicogenomics; *Burkholderia cepacia* complex bacteria in cystic fibrosis: epidemiology, pathogenesis and pathogenomics.

Selected Publications in 2011

Cabrito TR, Teixeira MC, Singh A, Prasad R, Sá-Correia I, The yeast ABC transporter Pdr18 (ORF YNR070*m*) controls plasma membrane sterol composition, playing a role in multidrug resistance, *Biochemical Journal*, 440, 195-202, 2011.

Coutinho CP, de Carvalho CCCR, Madeira A, Pinto-de-Oliveira A, Sá-Correia I, *Burkholderia cenocepacia* phenotypic clonal variation during three and a half years of residence in the lungs of a cystic fibrosis patient, *Infection and Immunity*, 79: 2950-60, 2011.

Madeira A, Santos PM, Coutinho CP, Pinto-de-Oliveira A, Sá-Correia I, Quantitative proteomics (2-D-DIGE) reveals molecular strategies employed by *Burkholderia cenocepacia* to adapt to the airways of cystic fibrosis patients under antimicrobial therapy, *Proteomics*, 11, 1313-1328, 2011.

Mira NP, Henriques SF, Keller G, Matos R, Arraiano C, Teixeira MC, Winge DR Sá-Correia I, Identification of a DNA-binding site for the transcription factor Haa1, required for *Saccharomyces cerevisiae* response to acetic acid stress, *Nucleic Acids Research*, 16, 6896-907, 2011.

Mira NP, Madeira A, Moreira AS, Coutinho CP, Sá-Correia I, Genomic expression analysis reveals strategies of *Burkholderia cenocepacia* to adapt to the airways of cystic fibrosis patients and antimicrobial therapy, *PLOS One*, 6:12, e28831, doi:10.1371/journal.pone.0028831, 2011.

Teixeira MC, Mira NP, Sá-Correia I, A genome-wide perspective on the response and tolerance to food-relevant stresses in *S. cerevisiae*, *Current Opinion in Biotechnology*, 22:150-156, 2011.

Academic Info

Vice-President of the DBE for International Affairs; Coordinator of the scientific area of Biological Sciences; Coordinator: Master's Programme in Biotechnology, Erasmus Mundus EuSYSBIO Master's Programme in Systems Biology, PhD Programme in Biotechnology.
Classes in 2010/11: Molecular and Cellular Microbiology (1st semester); Functional Genomics and Bioinformatics (2nd semester)

João Miguel Sanches

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Research Areas and Interests

In the last years my work has been focused in Biomedical Engineering, namely, in Biomedical Imaging Processing and Physiological Modeling of Biological Systems. At this moment, my research activity is mainly in Bayesian Reconstruction Algorithms with Ultrasound (US), functional Magnetic Resonance Imaging (fMRI) and Fluorescence Confocal Microscopy (FCM) Imaging. I'm also working with physiological data for sleep disorders diagnosis. Almost all of my research activity is in collaboration with the Medical School of Lisbon (Faculdade de Medicina de Lisboa) and with the Instituto de Medicina Molecular at the Santa Maria Hospital in Lisbon.

I'm Senior member of the IEEE Engineering in Medicine and Biology Society and Member of the Bio Imaging and Signal Processing Technical Committee (BISP-TC) of the IEEE Signal Processing Society and president of the Portuguese Association of Pattern Recognition (APRP) a member of the International Association of Pattern Recognition (IAPR).

Selected Publications in 2011

Ultrasound Imaging: Advances and Applications, Editors: J. Miguel Sanches,, Andrew F. Laine, Jasjit S. Suri, Springer, 2011, ISBN:1461411793, 9781461411796

Seabra, J.C.; Ciompi, F.; Pujol, O.; Mauri, J.; Radeva, P.; Sanches, J. , "Rayleigh Mixture Model for Plaque Characterization in Intravascular Ultrasound," Biomedical Engineering, IEEE Transactions on , vol.58, no.5, pp.1314-1324, May 2011.

Santos, N.; Sanches, J. M.; Sousa, I.; Figueiredo, P. , Optimal Sampling and Estimation in PASL Perfusion Imaging, Biomedical Engineering, IEEE Transactions on , vol.58, no.11, pp.3165-3174, Nov. 2011.

I. SOUSA, N. SANTOS, J. SANCHES, P. VILELA, P. FIGUEIREDO, Challenges for Non-Invasive Brain Perfusion Quantification Using Arterial Spin Labeling, NRJ Digital - The Neuroradiology Journal 1: 44-50, 2011.

Isabel Rodrigues and João Sanches, Convex Total Variation Denoising of Poisson Fluorescence Confocal Images with anisotropic filtering, IEEE TRANSACTIONS ON IMAGE PROCESSING, VOL. 20, NO. 1, JANUARY 2011.

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Research Areas and Interests

Bioprocessing Engineering
Biomolecules (proteins, enzymes and plasmid DNA) separation and purification
Membrane processes (ultra and microfiltration)

Scientific Communications in 2011

Gomes, A.G., Azevedo, A.M., Santos, J.A.L., Aires-Barros, M.R., Prazeres, D.M.F., “A novel integrated plasmid purification process based on phenyl-boronate adsorption”, 16th International Conference on Biopartitioning and Purification | BPP2011, Puerto Vallarta, Mexico, September

Gomes, A.M.P., Prazeres, D.M.F., Santos, J.A.L., “Plasmid DNA recovery and purification by tangential flow filtration”, ICOM2011 – International Congress on Membranes and Membranes Processes, Amsterdam, Netherlands, July

Marques, S., Alves, L., Matos, C.T., Roseiro, J.C., Santos, J.A.L., “Development of a membrane-recycle bioreactor for lactic acid production from recycled paper sludge”, ICOM2011 – International Congress on Membranes and Membranes Processes, Amsterdam, Netherlands, July

Martins, J.D., Tavares, E., Gomes, A.M.P., Prazeres, D.M.F., Santos, J.A.L., “Mechanical cell lysis technique for plasmid DNA release”, 8th European Congress of Chemical Engineering (ECCE) / 1st European Congress of Applied Biotechnology (ECAB), Berlin, Germany, September

Academic Info

Classes in 2010/11)

1 st semester:	Chemical and Biological Process Engineering I (responsible)
	Chemical and Biological Process Engineering II (responsible)
2 nd semester:	Chemical and Biological Process Engineering II (responsible)
	Physical Chemistry and Processes Laboratory (responsible)

M. Ângela Taipa

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Research Areas and Interests

Biomolecular Engineering

Biomimetics: Combinatorial approaches; molecular recognition; synthetic mimic affinity ligands for identification, separation and stabilization of biomolecules (eg. enzymes, immunoglobulins, DNA)

Nanobiotechnology: Bio-inspired affinity nanoparticles for antibody recognition

Scientific Communications in 2011

Silva C.S.O., Garcia J., Lansalot M., Afonso C.A.M., Martinho J.M.G., Taipa M.A., “Biomimetic nanoparticles for antibody Recognition”. *19th Biennial Meeting of the International Society for Molecular Recognition*, Affinity 2011, Tavira, Algarve, Portugal, 16-19th June.

Sousa I.T., Lourenço N.M.T., Afonso C.A.M., Taipa M.A. “Triazine-scaffolded affinity ligands as a novel tool to improve protein stability”. *19th Biennial Meeting of the International Society for Molecular Recognition*, Affinity 2011, Tavira, Algarve, Portugal, 16-19th June.

Academic Info

Classes in 2010/11: Biological Engineering Laboratory I (1st semester); Biomolecular and Cellular Engineering; Biological Engineering Laboratory II (2nd semester)

Miguel Cacho Teixeira

Ph.D. Instituto Superior Técnico, 2004
Assistant Professor

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Research Areas and Interests

Mechanisms of antifungal drug resistance in *Candida glabrata*
Yeast physiology and Molecular Biology
Environmental stress response
Proteomics and Transcriptomics
Systems biology tools for the study of transcriptional regulatory networks

Selected Publications in 2011

Cabrito, T.R., Teixeira, M.C., Singh, A., Prasad, R., Sá-Correia, I., The yeast ABC transporter Pdr18 (ORF YNR070n) controls plasma membrane sterol composition, playing a role in multidrug resistance, *Biochemical Journal*, 440, 195-202, 2011

Teixeira, M.C., Cabrito, T.R., Hanif, Z.M., Vargas, R.C., Tenreiro, S., Sá-Correia, I., Yeast response and tolerance to polyamine toxicity involving the drug:H⁺ antiporter Qdr3 and the transcription factors Yap1 and Gcn4. *Microbiology*, 157, 945-956, 2011

Teixeira M.C., Mira N.P., Sá-Correia I., A genome-wide perspective on the response and tolerance to food-relevant stresses in *Saccharomyces cerevisiae*. *Current Opinion in Biotechnology*, 22:150-156, 2011

Abdulrehman D., Monteiro P.T., Teixeira M.C., Mira N.P., Lourenço A.B., dos Santos S.C., Cabrito T.R., Francisco A., Madeira S.C., Santos R., Oliveira, A.L., Sá-Correia I., Freitas A. T., "YEASTRACT: Providing a programmatic access to curated transcriptional regulatory associations in *Saccharomyces cerevisiae* through a web services interface". *Nucleic Acids Research*, 39, D136-140, 2011

Monteiro P.T., Dias J.P., Ropers D., Oliveira A.L., Sá-Correia I., Teixeira M.C., Freitas A.T., "Qualitative modeling and formal verification of the *FLR1* gene mancozeb response in *Saccharomyces cerevisiae*", *IET Systems Biology*, 5, 308-316, 2011.

Awards in 2011

Researcher award UTL/Santander (honourable mention in the field of Biological Engineering)

Academic Info

Assistant Professor.

Member of the coordination team and scientific committee of the Masters Degree in Bioengineering and Nanosystems.

Classes in 2010/11: Biotechnology Lab I (as coordinator); Functional Genomics and Bioinformatics; Molecular and Cellular Microbiology; Biochemistry and Molecular Biology; Genetic Engineering; Microbiology; Molecular Biotechnology; Microbial Biochemistry and Physiology; Dissertation in Bioengineering and Nanosystems; Biosystems Science and Engineering; Computational Biology.

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Research Areas and Interests

Current research interests include the biodegradation and toxicity of *s*-triazine herbicides and their degradation products in soil microcosms, optimization of bioremediation strategies for soils contaminated with *s*-triazine herbicides, and development of yeast-based bioassays for the assessment of the toxicity of xenobiotics (e.g. herbicides, synthetic dyes).

Selected Publications in 2011

F.N. Gil, A.C. Gonçalves, M.J. Jacinto, J.D. Becker, C.A. Viegas, "Transcriptional profiling in *Saccharomyces cerevisiae* relevant for predicting alachlor mechanisms of toxicity", *Environmental Toxicology and Chemistry*, **30**, 2506-2518 (2011) (DOI: 10.1002/etc.640).

S. Mendes, A. Farinha, C.G. Ramos, J.H. Leitão, C.A. Viegas, L.O. Martins, "Synergistic action of azoreductase and laccase leads to maximal decolourisation and detoxification of model dye-containing wastewaters", *Bioresource Technology*, **102**, 9852-9859 (2011) (doi:10.1016/j.biortech.2011.07.108).

Academic Info

Responsible for the Biological Sciences Teaching Laboratory.

Classes in 2010/11: Environmental Biotechnology/Biotechnology and Environment, Genetic Engineering/Molecular Biotechnology (1st semester); Microbiology, Biotechnology (2nd semester)



Contacts

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