



Editorial

It is no novelty that R&D&I activities in higher education institutions currently face strong limitations. The significant reduction on research budgets implies the stagnation of some capital intensive projects and the loss of highly trained human (and thus knowledge) capital. However, it is also known that these same institutions carry on their shoulders the potential to contribute, in an important way, to the future development of industry, economy and therefore society in general. It is therefore with a contained enthusiasm that we report in this newsletter some achievements that CIEPQPF has been able to attain, notwithstanding the adverse environment. Examples include new projects contracted, high rate of scientific production, publications on high impact factor journals, organization of events, etc. In these times of probation, we have reasons to say “when the going gets tough, the tough get going”!

Marco Seabra

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Monthly seminars “Encontros com a Ciência”

Our monthly seminars are the main forum to get together researchers from the five groups within CIEPQPF. In 2013, we decided to include a single presentation followed by a coffee/tea break. The 2013 programme, as may be seen below, was designed to cover the wide spectrum of the research done in our Centre. We have some signs of external impact but the effective attendance has decreased, compared with last year sessions (15 to 26 participants per session). We need to improve this, starting with in-house attendance. *Get out of your box - don't miss this opportunity to enlarge your horizons.*

Data	Palestrante	Título
20/02	André Rossi	<i>Reuse of homogeneous Fenton's sludge from detergent industry as Fenton's catalyst</i>
20/03	José Gamelas	<i>Inverse gas chromatography as a powerful tool to analyze surface properties of lignocellulosic materials and polymers</i>
17/04	Mara Braga	<i>Separation and characterization of extracted bioactive phytochemicals</i>
22/05	Patricia Alves	<i>Development of new stimuli-responsive polymer-liposome complexes</i>
19/06	P. Faia, R. Silva e B. Branco	<i>2D electrical tomography for process inspection</i>
17/07	Hermínio Sousa	<i>(Some) Green and Sustainable Approaches on the Development of Pharmaceutical and Biomedical Applications</i>
18/09	José Granjo	<i>Biofuel production processes based on systematic optimization methodologies</i>
16/10	Natércia Fernandes	<i>Modeling in the biodiesel industry</i>
13/11	Ana Dias	<i>Ionic liquids as greener polymeric modifiers</i>
11/12		<i>CIEPQPF workshop 2013</i>



André Rossi

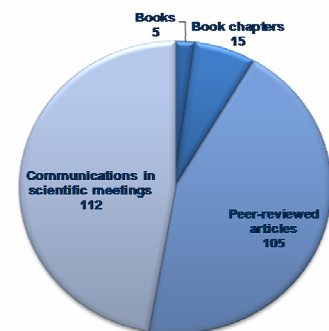


José Gamelas



Scientific publications

In 2012 CIEPQPF kept a high rate of scientific production, which translated into 237 publications, including 5 books and over one hundred of peer-reviewed articles. The CIEPQPF work has been published in reference journals in a wide range of fields, amongst which the high impact *Progress in Polymer Science* (2012 Impact Factor: 26.383), to which A. P. Duarte, J. C. Coelho, M. H. Gil and co-workers contributed with a review on surgical adhesives (A. P. Duarte *et al.*, *Prog. Polym. Sci.* 37, 1031 (2012)). In the article, the authors discuss different types of adhesives with emphasis on structure-properties relationships and outline new avenues to the development of more efficient nature-inspired products.



Scientific production in 2012

Opinion



Ciengis and CIEPQPF have enjoyed a long and mutually beneficial partnership since 2006. The cooperation opportunities with several research groups include joint R&D projects in the area of biodiesel production optimization as well as in process and controller performance monitoring. Another important point of cooperation is the participation of Ciengis' staff in academic programs pursuing PhD degrees and the in-company training programs for MSc students. We believe that the key to this success is the multidisciplinary and excellence of the Centre staff and their resolve to work on bridging the gap between academia and industry.

Andrey Romanenko, Ciengis' CEO

News

FCT funding for 2013

In 2013 FCT adopted a transition regime for the basic funding of research units ranked as Good or above in the previous evaluation. This transition funding was substantially reduced when compared to 2011/12 (around 30%) due to financial restrictions. Still, CIEPQPF was awarded a special incentive funding (€18812 in total), which was given by FCT to the research units which proved to have a good capacity of contracting additional funding, besides that given directly by FCT. Such additional funding could come directly from industry or industrial related programmes or still from international sources, namely European programmes. CIEPQPF was included in the 10% percentile of research units in the area of basic sciences and technology which demonstrated better capacity to collect extra funding relative to the basic FCT funding, according to a study developed by FCT.



CIEPQPF integrates ACE

ACE is the recently created association of Portuguese research units which have been evaluated as Excellent. CIEPQPF is a member of that association which aims at becoming the privileged interlocutor of these research units (53 in total) with FCT. ACE, which is presently governed by an "ad hoc" directive board, has already had a first meeting with FCT President to discuss the new model for funding of the R&D units.

New PhD programmes and research projects

In the first semester of 2013, CIEPQPF has been involved in four applications for doctoral programs, two of them being approved last April, each one with 6 scholarships per year in the period 2013-2017: PhD Program in advanced Materials and Processing (FCT/UNL is the proponent institution) and Doctoral Program in Refining, Petrochemical and Chemical Engineering (University of Porto). Regarding FCT projects, the situation is not that good, although well aligned with the current situation in Portuguese scientific institutions. Only two out of more than 15 submitted projects were funded, in spite of five projects graded as outstanding and several others as excellent and very good. The new funded projects are: "Biomangement strategy to control phytoparasitic nematodes of emerging importance on potato - a new threat to Europe", coordinated by IMAR – Centro do Mar e Ambiente; and "Tecnologias supercríticas para o desenvolvimento de aplicações farmacêuticas e cosméticas à base de polímeros naturais e extractos vegetais bioactivos", a FCT/CAPES (Brazil) project, coordinated by our senior researcher Mara Braga. Three other new projects in which CIEPQPF participates also worth mentioning: "EMSURE - Energy and Mobility for SUSTainable Regions", under the initiative EfS – Energy for Sustainability, University of Coimbra; "Novos Materiais Celulósicos", a QREN project promoted by Portucel, SA; and "CleanOIGel - Funcionalização de aerogéis à base de sílica para tratamento de resíduos com compostos fenólicos", also a QREN project.



News (cont.)

Organization of scientific events

In line with our research goals, some of our members participated in the organization of scientific meetings and events. The 1st workshop of the “experiment@Portugal’2012”, a project on virtual labs and e-learning, under development by an interdisciplinary team from the universities of Coimbra and Porto, took place last Feb 4, here in our Chem Eng department, joining about 60 academics and engineering professionals engaged in science and technology dissemination. Then in March 6-8, we had the 5th meeting of the European project COST FP1005 “Fibre Suspension Flow Modelling”, also in Coimbra, with researchers from more than ten European countries. We have also been involved in the organization of the 2nd International Workshop on Multivariate Image Analysis, which took place in Valencia, 23-24 May. Upcoming events where CIEPQPF is also involved are: European Network for Business and Industrial Statistics, 15-19 Set, Ankara; XXII TECNCELPA, Conferência Internacional da Floresta, Pasta e Papel, 2-4 Out, Tomar; and the Experiment@ ‘13 conference, 18-20 Set, Coimbra.



O papel da saliva na digestão do amido

Descrição

Esta experiência virtual pretende mostrar o papel da saliva na digestão do amido.

Imagem



Lab2go: a web portal within the project experiment@Portugal’2012



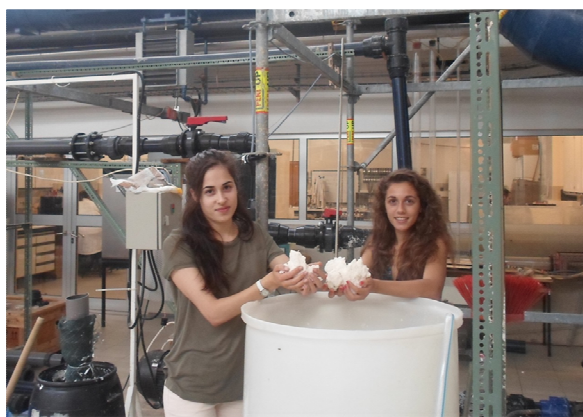
Seminar on industrial property

Patents and Intellectual Property

In 2012-2013, researchers from CIEPQPF have submitted five patents. Four of them are still under evaluation and one is preliminarily accepted (A. Brásio, A. Romanenko, N. Fernandes, A. T. Portugal, L. Santos, “Controller performance monitoring and optimization in the presence of final control element faults”). Last July 10, Hermínio Sousa, one of our researchers with experience in intellectual property, has participated in the seminar “Fazia ideia?”, organized by COTEC Portugal. In the event, the book “Manual para a protecção, gestão e valorização da propriedade intelectual”, co-coordinated by Telmo Vilela (European Patent Office), was presented and is already available in our library.

Attracting young people into science

Within the programme “Ciência Viva”, we have given in July 8-12 four 1-week internships covering different aspects of chemical engineering practice and research. Students have developed real hands-on work in our labs, along a global perspective of the chemical engineering discipline. Our research Centre has already some tradition in this kind of initiatives where the main goal is to disseminate the chemical engineering discipline and attract young people to science and technology careers. Within a more informal approach, we are also involved in the Researchers’ Night, next Sep 27, a mega event on a single night, in about 300 cities all over Europe.





Featured Projects

FiberFlow project

Coordinator - M. G. Rasteiro

Team - P. Faia, F. Garcia, D. Assendrych, P. Ferreira, A. P. Coimbra, Elena F. González, B. Branco, C. Cotas, H. Costa

Funding entity/programme - FCT/COMPETE (PTDC/EQU-EQU/112388/2009)

Funding - approx. € 100 000

Different approaches have been followed to model the hydraulic transport of solid suspensions. In the case of fibers this is altogether more complex and approaches available range from pure empirical correlations to general models based on fundamental principles. However, these models suffer from uncertainties associated with the parameters in the constitutive equations and scarcity of experimental data.

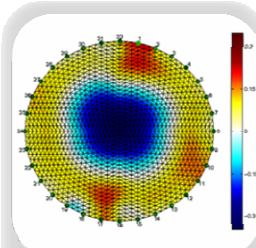
Experimental characterization of pulp suspensions behavior can lead to criteria and guidance for the design of in-line mixers and for process optimization leading to higher energetic efficiency. At present, there are several, but still not effective, methods for characterizing pulp suspensions behavior and mixing quality at the industrial scale. However, state-of-the-art monitoring systems used industrially lack the spatial and temporal resolution needed for problem identification and meaningful process control, additionally most of those systems are intrusive and slow. Electrical Impedance Tomography, EIT, besides responding to the above referred limitations, offers a vast field of possibilities due to its low cost, portability and safety of handling.

In this project, developed within CIEPQPF as a result of a collaboration between researchers from the Chemical Engineering and Electrical Engineering Departments, and also with the participation of the Czestochowa Univ. of Technology in Poland and Complutense University of Madrid in Spain, EIT will supply accurate information about the transition conditions between the different flow regimes, as a function of suspension characteristics (fibre type and consistency) and, mainly, about the flow in the plug and intermediate regimes. The EIT system developed by the team is installed in a pilot rig constructed to study multiphase systems. In addition, EIT, and particularly the new EIT system developed within the project, offers a new range of possibilities for process monitoring, namely at the industrial level. Since this project is strongly connected to the COST Action FP1005 entitled "Fibre suspension flow modelling: a key for innovation and competitiveness in the pulp & paper industry", connections established within this network have already led to the test of the new EIT system at INVENTIA AB (Sweden), a company working in close connection with the pulp and paper industry and closely linked to KTH Sweden, to evaluate the possibilities of future industrial trials. It is particularly important to stress the high definition of the images obtained with this system, as can be seen on the right for the flow of a pulp suspension (concentration of $\pm 2.8\%$ w/w, velocity 1.6 m/s). Moreover, the acquisition time has now been reduced to 1 ms, for a 32 electrode system, and the image reconstruction processing time to about 3-4 s, for the same electrode ring.

Pedro Faia, Electrical and Computers Engineering Department - FCTUC



EIT pilot plant



EIT image of pulp suspension flow

GelSpace project

Coordinator - L. Durães

Team - A. Portugal, H. Sousa, J. Coelho, M. H. Gil, M. Figueiredo, P. Simões, R. Patrício

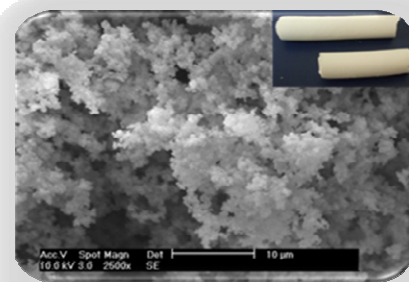
Funding entity/programme - FCT/COMPETE (PTDC/EQU-EPR/099998/2008)

Funding - approx. € 150 000 were provided by FCT (total budget of approx. € 163 000)

The objective of GelSpace is to investigate the sol-gel synthesis of tailored silica based aerogels, starting from several trifunctional alkoxysilane precursors of the type $R'-Si(OR)_3$, where R' =methyl, ethyl, vinyl, and R =methyl, ethyl. Moreover, the developed materials are being characterized for assessment of their suitability for applications in spatial devices. In this context, the best developed aerogels can be used as thermal, acoustic and structural insulators due to their unique properties, such as high porosity (96-98%), flexibility (Young's modulus of 103 Pa), hydrophobicity (contact angle of 140-150°), very low density (40-50 kg/m³) and thermal conductivity (35-40 mW/(m.K)).

The project is based on the cooperation between the Department of Chemical Engineering of the University of Coimbra (DEQ-UC) and Active Space Technologies (AST), which allows the combination of the scientific knowledge of the UC members on the synthesis and characterization of this kind of materials with the technical skills of the AST members on the applicability of these materials in Space.

Luísa Durães/Telma Matias, Department of Chemical Engineering - FCTUC



Aerogel typical aspect and microstructure