GRAQ – Grupo de Reacção e Análises Químicas

ANNUAL REPORT

2010

isep Instituto Superior de Engenharia do Porto

GRAQ – Grupo de Reacção e Análises Químicas

ANNUAL REPORT

2010 – *Light version*

Porto, January 10, 2011

HIGHLIGHTS

PROJECTS	
FCT-funded	8
Non-FCT funded	8
PUBLICATIONS	
Papers (ISI-Web of Science)	30
Proceedings papers *(international)*	14
Ph.D. theses	3
MSc theses	15
PRESENTATIONS *(international)*	
Oral	8
Poster	62
PRESENTATIONS *(national)*	
Oral	4
Poster	36
CONFERENCES	
Organization	1

REQUIMTE-ISEP
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Scientific Coordinator: Cristina Maria Fernandes Delerue Alvim de Matos (cmm@isep.ipp.pt)

The “Grupo de Reacção e Análises Químicas” (**GRAQ**) was formed in January 1999 by researchers from the Instituto Superior de Engenharia do Porto (ISEP), and is located on the campus of ISEP. In 1999 the group joined the Centro de Química da Universidade do Porto (**CEQUP**).

GRAQ became part of REQUIMTE in 2000 through the partnership of CEQUP with the Centro de Química Fina e Biotecnologia (CQFB) da Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa.
REQUIMTE is the largest network in Chemistry and Chemical Engineering established in Portugal and was recognized as the Laboratório Associado para a Química Verde (Green Chemistry) by the Portuguese Ministério da Ciência e do Ensino Superior in November 2001.

The objectives of REQUIMTE are:

a) To encourage the use of clean products and technologies;
b) To assist industry in the design and implementation of non-aggressive chemical processes;
c) To train young researchers in interdisciplinary areas related with the practice of sustainable chemistry;
d) To publicise the principles of Green Chemistry and to alert society for the necessity of a sustainable practice in everyday life.

Research is presently focused in the following thematic areas of: (i) natural products, (ii) food quality and safety, (iii) clean production technologies and processes, (iv) environmental control and remediation and (v) catalysts, solvents and non-toxic compounds.

The sharing of multidisciplinary scientific knowledge, technology and equipment between researchers of the two centres that form the network, has significantly contributed to the development of new projects in Green Chemistry and to the enrichment and training of graduate students by facilitating the mobility of human resources.
At present the network REQUIMTE can be described as a big Laboratory that has two operating sites, one at the Universidade Nova de Lisboa and the other at the Universidade do Porto

In this concept, the GRAQ research lines mainly focus on Analytical Chemistry and Environmental Control and Remediation.

PERMANENT MEMBERS

1.	Ph.D.	Cristina Maria Fernandes Delerue Alvim de Matos	Professor Coordenador (ISEP)
2.	Ph.D.	Maria do Carmo Veiga Fernandes Vaz	Professor Coordenador (ISEP)
3.	Ph.D.	Florinda Figueiredo Martins	Professor Adjunto (ISEP)
4.	Ph.D.	Hendrikus Petrus Antonius Nouws	Professor Adjunto (ISEP)
5.	Ph.D	Maria Conceição Carvalho Benta de Oliveira Neves	Professor Adjunto (ISEP)
6.	Ph.D.	Maria Goreti Ferreira Sales	Professor Adjunto (ISEP)
7.	Ph.D.	Maria Teresa Pereira de Oliva Teles Moreira	Professor Adjunto (ISEP)
8.	Ph.D.	Maria Manuela Barbosa Correia	Professor Adjunto (ISEP)
9.	Ph.D.	Mónica Alexandra de Oliveira Dias Teixeira	Professor Auxiliar conv. (CESPU)
10.	Ph.D.	Olga Manuela Matos de Freitas	Professor Adjunto (ISEP)
11.	Ph.D.	Simone Barreira Morais	Professor Adjunto (ISEP)
12.	Ph.D.	Sónia Adriana Ribeiro da Cunha Figueiredo	Professor Adjunto (ISEP)
13.	Ph.D.	Susana Maria Ribeiro e Sousa Mendes de Freitas	Professor Adjunto (ISEP)
14.	Ph.D.	Valentina Maria Fernandes Domingues	Professor Adjunto (ISEP)
15.	Ph.D.	Subramanian Viswanathan	Auxiliary Investigator (REQUIMTE)
16.	MSc	Abel José Assunção Duarte	eq. Assistante (ISEP)
17.	MSc	Maria João Dantas Ramalhosa Ferreira	eq. Assistante (ISEP) (50% FFUP)
18.	MSc	Salomé Sousa Teixeira	eq. Assistante (ISEP)
19.	MSc	José Tomás Veiga Soares de Albergaria	Técnico Superior (ISEP)
20.	MSc	Maria Aurora Soares da Silva	Técnico Superior (ISEP)
21.	MSc	Bruno José Rocha Pereira	Técnico Superior (ISEP)
22.	MSc	Paula Celeste Baptista Paíga	Técnico Superior 2ª (REQUIMTE)
23.	BEng	Maria Isabel Viana de Brito Limpo de Serra	Técnico Superior (ISEP)

NON-PERMANENT MEMBERS

Grant holders (projects)

1.	MSc	Joana Rafaela Lara Guerreiro	FCT project: PTDC/AGR-AAM/68359/2006
2.	MSc	António Carlos Alves Soares	FCT project: PTDC/ECM/68056/2006
3.	MSc	Marta Madalena Marques Oliveira	FCT project: PTDC/AGR-AAM/102316/2008
4.	MSc	Tânia Sofia Cardoso Ribeiro Rebelo	FCT project: PTDC/AGR-AAM/68359/2006
5.	BSc	Joana Raquel Gonçalves Botelho Teixeira	FCT project: PTDC/AGR-AAM/68359/2006
6.	–	Tatiana Teixeira Gomes Fernandes	University of Porto: IJUP 2009
7.	–	Susana Maria Garcês da Silva	University of Porto: IJUP 2009
8.	MSc	Joana Gomes Martins	University of Porto: IJUP 2009
9.	–	Joana Sofia Costa Barros Maia	University of Porto: IJUP 2009
10.	–	Maria Inês Teixeira Neves	University of Porto: IJUP 2009
11.	–	Diana Sofia Gouveia Mendes Rede	University of Porto: IJUP 2009
12.	–	Pedro Romeu da Silva Soares	University of Porto: IJUP 2009
13.	–	Sandra Ferreira de Sousa Neto	University of Porto: IJUP 2010
14.	–	Cátia Filipa Assunção de Sousa	University of Porto: IJUP 2010
15.	–	Cátia Filipa Magalhães Peixoto	University of Porto: IJUP 2010
16.	–	Ana Alexandra da Costa	University of Porto: IJUP 2010
17.	–	Ana Luísa Oliveira Monteiro	University of Porto: IJUP 2010
18.	–	Marcela de Jesus da Cunha Oliveira	FCT project: BII 2009-2010
19.	–	Isabel Patrícia Ribeiro Moreira	FCT project: BII 2009-2010
20.	–	Irene Cristina de Sousa Azevedo	FCT project: BII 2009-2010

Ph.D. students

1.	BEng	Díonisia Maria Oliveira Castro		Grant: FCT-SFRH/BD/23605/2005
2.	MSc	Maria de Fátima de Sá Barroso	50% FF/UP	Grant: FCT-SFRH/BD/29440/2006
3.	MSc	Sofia Alexandra Alves Almeida	50% FF/UP	Grant: FCT-SFRH/BD/42509/2007
4.	MSc	Marta Maria Pereira da Silva Neves		Grant: FCT-SFRH/BD/46351/2008
5.	BEng	Mónica Alexandra Oliveira Dias Teixeira		Grant: n/a
6.	Msc	Antonio Vega Y de la Fuente	75% FE/UP	Grant: n/a
7.	MSc	Maria Manuela Martins de Carvalho		Grant: n/a
8.	MSc	Virgínia Maria Monteiro Cruz Fernandes		Grant: FCT-SFRH/BD/47200/2008
9.	MSc	Raquel Barbosa Queirós	75% FC/UP	Grant: FCT-SFRH/BD/49072/2008
10.	MSc	Felismina Teixeira Coelho Moreira		Grant: FCT-SFRH/BD/
11.	MSc	Sérgio Alberto Morais		Grant: FCT-SFRH/BD/64599/2009
12.	MSc	José Luis Vera		Grant: n/a

MSc students

1.	Alexandra Patrícia Rego Plácido	FF/UP
2.	Ana Isabel Gonçalves Pereira	IPP/ISEP/DEQ
3.	Ana Isabel Ribeiro de Pinho	FF/UP
4.	Ana Sofia Grade Pereira da Silva	IPP/ISEP/DEQ
5.	Ana Sofia Oliveira Dias Teixeira	IPP/ISEP/DEQ
6.	Carlos Miguel Moreira da Mota	IPP/ISEP/DEQ
7.	Diogo da Cunha Conde de Pinho	IPP/ISEP/DEQ
8.	Hugo Rafael de Oliveira Lacerda	IPP/ISEP/DEQ
9.	Isabel Cristina Meneses Monteiro da Silva	CESPU
10.	Joanna Dziedzic	Tech. Univ. Lodz (PL)
11.	João Manuel Fernandes Baía	IPP/ISEP/DEQ
12.	José Camilo Carvalinho Sousa Pinto	IPP/ISEP/DEQ
13.	Manuel Joaquim Vilariça	IPP/ISEP/DEQ
14.	Maria Teresa de Oliveira Pinho	IPP/ISEP/DEQ
15.	Marta Marcinek	Wrocław Univ. Technology (PL)
16.	Moisés Oliveira da Silva	IPP/ISEP/DEQ
17.	Raquel Filipa Moutinho Vieira	IPP/ISEP/DEQ
18.	Sílvia Marina Gomes da Silva	IPP/ISEP/DEQ
19.	Tâmara Isabel Barbosa da Silva	IPP/ISEP/DEQ

BEng / BSc students

1.	Ana Isabel Malhão Garcia	FC/UP
2.	Cédric Do Rego Curto	IUT Orsay (FR)
3.	Laura Troussicot	IUT Orsay (FR)
4.	Rui Daniel Barbosa Duarte	IPP/ISEP/EEC

Volunteers

1. Ana Filipa Teixeira da Silva
2. Andreia Marlene Castro Rocha
3. Ivo Emanuel Moreira Rodrigues
4. Maria José Mendes Passeira
5. Pedro Romeu da Silva Soares
6. Susana Margarida Leite Machado
7. Susana Natércia Oliveira Ribeiro

1. ANALYTICAL CHEMISTRY

TEAM MEMBERS

PERMANENT MEMBERS

Cristina Maria Fernandes Delerue Alvim de Matos
Maria do Carmo Veiga Fernandes Vaz
Hendrikus Petrus Antonius Nouws
Maria Goreti Ferreira Sales
Maria Teresa Pereira de Oliva Teles Moreira
Maria Manuela Barbosa Correia
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Subramanian Viswanathan
Abel José Assunção Duarte
Maria João Dantas Ramalhosa Ferreira
Salomé Sousa Teixeira
José Tomás Veiga Soares de Albergaria
Paula Celeste Baptista Paíga

GRANT HOLDERS

Ana Alexandra da Costa
Ana Luísa Oliveira Monteiro
Cátia Filipa Magalhães Peixoto
Diana Sofia Gouveia Mendes Rede
Isabel Patrícia Ribeiro Moreira
Joana Gomes Martins
Joana Rafaela Lara Guerreiro
Joana Raquel Gonçalves Botelho Teixeira
Joana Sofia Costa Barros Maia
Marcela de Jesus da Cunha Oliveira
Maria Inês Teixeira Neves
Marta Madalena Marques Oliveira
Tânia Sofia Cardoso Ribeiro Rebelo
Tatiana Teixeira Gomes Fernandes
Susana Maria Garcês da Silva

Ph.D. STUDENTS

Dionísia Maria Oliveira Castro
Felismina Teixeira Coelho Moreira
José Luis Vera
Maria de Fátima de Sá Barroso
Marta Maria Pereira da Silva Neves
Mónica Alexandra de Oliveira Dias Teixeira
Raquel Barbosa Queirós
Sofia Alexandra Alves Almeida
Virgínia Maria Monteiro da Cruz Fernandes

MSc. STUDENTS

Alexandra Patrícia Rego Plácido
Ana Isabel Gonçalves Pereira
Ana Isabel Ribeiro de Pinho
Ana Sofia Oliveira Dias Teixeira
Isabel Cristina Meneses Monteiro da Silva
Joana da Silva Sampaio
Joanna Dziedzic
João Manuel Fernandes Baía
José Camilo Carvalinho Sousa Pinto
Marta Marcinek
Moisés Oliveira da Silva
Sílvia Marina Gomes da Silva
Tâmara Isabel Barbosa da Silva

BEng/Bsc

Ana Isabel Malhão Garcia
Cédric Do Rego Curto
Laura Troussicot
Rui Daniel Barbosa Duarte

VOLUNTEERS

Ana Filipa Teixeira da Silva
Andreia Marlene Castro Rocha
Susana Margarida Leite Machado
Susana Natércia Oliveira Ribeiro

OUTPUT INDICATORS (SUMMARY)

PROJECTS	
FCT-funded	5
Non-FCT funded	5
PUBLICATIONS	
Papers (ISI-Web of Science)	20
Proceedings papers *(international)*	4
Ph.D. theses	2
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PRESENTATIONS *(international)*	
Oral	6
Poster	47
PRESENTATIONS *(national)*	
Oral	3
Poster	32
CONFERENCES	
Organization	1

1.1. SUB-AREAS IN ANALYTICAL CHEMISTRY

In the subsequent sections a summary of some of the achievements in analytical chemistry in 2010 are presented, for further reading the consultation of the published papers (section 1.2.2.) is recommended.

1.1.1. Quality control and authenticity of food products

Monitoring of ochratoxin A exposure of the Portuguese population through a nationwide urine survey – Winter 2007

Ochratoxin A (OTA) is a mycotoxin produced by a variety of fungi, such as Penicillium verrucosum and Aspergillium spp., which has been found to have a wide number of potentially deadly toxic effects, and can enter the human organism through a variety of means. It then finds its way into the bloodstream and, after a lengthy process, is eventually excreted through the urine. It can thus be detected in its original form not only in blood samples but also in this biological medium. As such, and in an attempt to evaluate the exposure of the Portuguese population to this mycotoxin, morning urine samples were collected during the Winter of 2007, from each of five geographically distinct Portuguese locations — Bragança, Porto, Coimbra, Alentejo, and Algarve — and subjected to extraction by immunoaffinity columns and to OTA quantification through liquid chromatography coupled with fluorescence detection. Prevalent incidence was higher than 95% with Coimbra being the exception (incidence of 73.3%). In nearly all locations, the OTA content of most samples was found to be above the limit of quantification (LOQ) of 0.008 ng/ml. Indeed, excluding Coimbra, with an OTA content level of 0.014 ng/ml, all regions featured content values over 0.021 ng/ml.

Published in: *Science of the Total Environment 408 (5) (2010) 1195-1198.*

Contribution of different vegetable types to exogenous nitrate and nitrite exposure

This study reports the levels of nitrate and nitrite of 34 vegetable samples, including different varieties of cabbage, lettuce, spinaches, parsley and turnips, collected in several locations of an intensive agricultural area (Modivas, Vila do Conde, northern Portugal). Nitrate levels ranged between 54 and 2440 mg NO_3^- kg^{-1}, while nitrite levels ranged between 1.1 and 57 mg NO_2^- kg^{-1}. The maximum residue levels established for nitrate in spinach and lettuce samples were not exceeded. Nitrate and nitrite levels reported in the literature for the same type of samples are reviewed, as well as the contribution of vegetables to nitrate and nitrite dietary exposure of populations.

Published in: *Food Chemistry 120 (4) (2010) 960-966.*

1.1.2. Environmental analysis

Quantification of endocrine disruptors and pesticides in water by gas chromatography–tandem mass spectrometry, Method validation using weighted linear regression schemes.

A multi-residue methodology based on a solid phase extraction followed by gas chromatography–tandem mass spectrometry was developed for trace analysis of 32 compounds in water matrices, including estrogens and several pesticides from different chemical families, some of them with endocrine disrupting properties. Matrix standard calibration solutions were prepared by adding known amounts of the analytes to a residue-free sample to compensate matrix-induced chromatographic response enhancement observed for certain pesticides. Validation was done mainly according to the International Conference on Harmonisation recommendations, as well as some European and American validation guidelines with specifications for pesticides analysis and/or GC–MS methodology. As the assumption of homoscedasticity was not met for analytical data, weighted least squares linear regression procedure was applied as a simple and effective way to counteract the greater influence of the greater concentrations on the fitted regression line, improving accuracy at the lower end of the calibration curve. The method was considered validated for 31 compounds after consistent evaluation of the key analytical parameters: specificity, linearity, limit of detection and quantification, range, precision, accuracy, extraction efficiency, stability and robustness.

Published in: *Journal of Chromatography A 1217 (43) (2010) 6681-6691.*

Influence of Traffic Emissions on the Carcinogenic Polycyclic Aromatic Hydrocarbons in Outdoor Breathable Particles

Because polycyclic aromatic hydrocarbons (PAHs) have been proven to be toxic, mutagenic, and/or carcinogenic, there is widespread interest in analyzing and evaluating exposure to PAHs in atmospheric environments influenced by different emission sources. Because traffic emissions are one of the biggest sources of fine particles, more information on carcinogenic PAHs associated with fine particles needs to be provided. Aiming to further understand the impact of traffic particulate matter (PM) on human health, this study evaluated the influence of traffic on PM_{10} (PM with aerodynamic diameter <10 µm) and $PM_{2.5}$ (PM with aerodynamic diameter <2.5 µm), considering their concentrations and compositions in carcinogenic PAHs. Samples were collected at one site influenced by traffic emissions and at one reference site using low-volume samplers. Analysis of PAHs was performed by microwave-assisted extraction combined with liquid chromatography (MAE-LC); 17 PAHs, including 9 carcinogenic ones, were quantified. At the site influenced by traffic emissions, PM_{10} and $PM_{2.5}$ concentrations were, respectively, 380 and 390% higher than at the background site. When influenced by traffic emissions, the total concentration of nine carcinogenic compounds (naphthalene, chrysene, benzo(a)anthracene, benzo(b) fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, and dibenzo(a,l)pyrene) was increased by 2400 and 3000% in PM_{10} and $PM_{2.5}$, respectively; these nine carcinogenic compounds represented 68 and 74% of total PAHs (Σ_{PAHs}) for PM10 and PM2.5, respectively. All PAHs, including the carcinogenic compounds, were mainly present in fine particles. Considering the strong influence of these fine particles on human health, these conclusions are relevant for the development of strategies to protect public health.

Published in: *Journal of the Air & Waste Management Association 60 (4) (2010), 393-401*.

1.1.3. Health and pharmaceutical analysis

Sensors for the Detection and Quantification of Bacterial Contamination in Water for Human Use

The deterioration of water quality by Cyanobacteria cause outbreaks and epidemics associated with harmful diseases in Humans and animals because of the toxins that they release. Microcystin-LR is one of the hepatotoxins most widely studied and the World Health Organization, recommend a maximum value of 1 µg L^{-1} in drinking water. Highly specific recognition molecules, such as molecular imprinted polymers are developed to quantify microcystins in waters for human use and shown to be of great potential in the analysis of these kinds of samples. The obtained results were auspicious, the detection limit found, 1.5 µg L^{-1}, being of the same order of magnitude as the guideline limit recommended by the WHO. This technology is very promising because the sensors are stable and specific, and the technology is inexpensive and allows for rapid on-site monitoring.

Published in: *Advanced Engineering Materials 12 (5) (2010) B175-B178*.

Optical fiber sensor for Hg(II) based on carbon dots

An optical fiber sensor for Hg(II) in aqueous solution based on sol–gel immobilized carbon dots nanoparticles functionalized with PEG_{200} and N-acetyl-L-cysteine is described. This sol–gel method generated a thin (about 750 nm), homogenous and smooth (roughness of 2.7±0.7 å) film that immobilizes the carbon dots and allows reversible sensing of Hg(II) in aqueous solution. A fast (less than 10 s), reversible and stable (the fluorescence intensity measurements oscillate less than 1% after several calibration cycles) sensor system was obtained. The sensor allow the detection of submicron molar concentrations of Hg(II) in aqueous solution. The fluorescence intensity of the immobilized carbon dots is quenched by the presence of Hg(II) with a Stern-Volmer constant (pH = 6.8) of 5.3×10^{5} M^{-1}.

Published in: *Biosensors and Bioelectronics 26(4) (2010) 1302-1306*.

1.2. OUTPUT INDICATORS

1.2.1. Projects

1.2.1.1. FCT-funded projects *(includes collaborations with other institutions)*

1

Reference	PTDC/AGR-ALI/65528/2006
Title	Evaluation of ochratoxin A exposure level of Portuguese population: bread consumption and urine levels
Responsible investigator	Celeste Matos Lino (UC)
Principal contractor	Universidade de Coimbra (UC)
Participating institution(s)	Instituto de Ciências e Tecnologias Agrárias e Agro-Alimentares-Porto (ICETA-Porto/UP) Instituto Politécnico de Bragança (IPBragança)
Duration	36 months
Starting date	June 1, 2007
Funding source	Fundação para a Ciência e Tecnologia (FCT)
Amount (total)	€ 74 866
Amount (ICETA)	**€** 12 977

2

Reference	PTDC/AGR-AAM/68359/2006
Title	Detection and quantification of antimicrobials in fish and in waters from aquaculture
Responsible investigator	Maria Goreti Fereira Sales
Principal contractor	Instituto de Ciências e Tecnologias Agrárias e Agro-Alimentares-Porto (ICETA-Porto/UP)
Participating institution(s)	Instituto Nacional de Recursos Biológicos, I.P. (INRB/MADRP)
Duration	36 months
Starting date	July 1, 2007
Funding source	Fundação para a Ciência e Tecnologia (FCT)
Amount (total)	€ 131 553
Amount (ICETA)	**€** 64 664

3

Reference	PTDC/QUI/71001/2006
Title	SenRONS - Development of optical fiber sensors for the determination of reactive oxygen (ROS) and nitrogen (RNS) species in biological systems
Responsible investigator	Joaquim Carlos Gomes Esteves da Silva (FC/UP)
Principal contractor	Associação para o Desenvolvimento da Faculdade de Ciências (ADFC/FC/UP)
Participating institution(s)	Instituto de Ciências e Tecnologias Agrárias e Agro-Alimentares-Porto (ICETA-Porto/UP) Universidade de Coimbra (UC) Instituto de Engenharia de Sistemas e Computadores do Porto (INESC Porto/FE/UP)
Duration	36 months
Starting date	January 1, 2008
Funding source	Fundação para a Ciência e Tecnologia (FCT)
Amount (total)	€ 104 200
Amount (ICETA)	**€** 3 900

4

Reference	PTDC/AGR-AAM/102316/2008
Title	Cephalopods: -Benefits and risks of consumption; -Evaluation of biomarkers responses to organic pollution
Responsible investigator	Simone Barreira Morais
Principal contractor	Instituto de Ciências e Tecnologias Agrárias e Agro-Alimentares-Porto (ICETA-Porto/UP)
Participating institution(s)	Centro Interdisciplinar de Investigação Marinha e Ambiental (CIIMAR/CIMAR) Universidade de Coimbra (UC)
Duration	36 months
Starting date	February 5, 2010
Funding source	Fundação para a Ciência e Tecnologia (FCT)
Amount (total)	€ 153 790
Amount (ICETA)	€ 80 296

5

Reference	PTDC/AGR-AAM/102447/2008
Title	Spent coffee grounds: horticultural recovering program and implications in the vegetables quality and safety
Responsible investigator	Susana Isabel Pereira Casal Vicente (FF/UP)
Principal contractor	Instituto de Ciências e Tecnologias Agrárias e Agro-Alimentares-Porto (ICETA-Porto/UP)
Participating institution(s)	Instituto Politécnico de Bragança (IPBragança) LIPOR - Serviço Intermunicipalizado de Gestão de Resíduos do Grande Porto (LIPOR)
Duration	36 months
Starting date	April 1, 2010
Funding source	Fundação para a Ciência e Tecnologia (FCT)
Amount (total)	€ 129 570
Amount (ICETA)	€ 64 548

1.2.1.2. Non-FCT funded projects *(includes collaborations with other institutions)*

1

Reference	CESPU01
Title	Monitorização de triazinas em águas e no homem. Mecanismo patogénico.
Responsible investigator	Mónica Alexandra de Oliveira Dias Teixeira
Principal contractor	Cooperativa de Ensino Superior, Politécnico e Universitário
Participating institution(s)	Instituto de Ciências e Tecnologias Agrárias e Agro-Alimentares-Porto (ICETA-Porto/UP)
Duration	24 months
Starting date	January 1, 2009
Funding source	CESPU
Amount (total)	€ 5 000
Amount (ICETA)	€ 5 000

2

Reference	Projectos Pluridisciplinares - Iniciação à Investigação na Universidade do Porto (IJUP) - Edição de 2009
Title	Componentes da fracção azotada do leite - influência na qualidade e implicações na saúde dos consumidores
Responsible investigator	Maria Beatriz Prior Pinto Oliveira (FF/UP)
Principal contractor	Faculdade de Farmácia da Universidade do Porto (FF/UP)
Participating institution(s)	Instituto de Ciências e Tecnologias Agrárias e Agro-Alimentares-Porto (ICETA-Porto/UP)
Duration	12 months
Starting date	October 1, 2009
Funding source	Universidade do Porto
Amount (total)	€ 4 000
Amount (ICETA)	€ 4 000

3

Reference	Projectos Pluridisciplinares - Iniciação à Investigação na Universidade do Porto (IJUP) - Edição de 2009
Title	Avaliação da Contaminação de Águas Residuais Hospitalares
Responsible investigator	Maria da Conceição Branco da Silva de Mendonça Montenegro (FF/UP)
Principal contractor	Faculdade de Farmácia da Universidade do Porto (FF/UP)
Participating institution(s)	Instituto de Ciências e Tecnologias Agrárias e Agro-Alimentares-Porto (ICETA-Porto/UP)
Duration	12 months
Starting date	October 1, 2009
Funding source	Universidade do Porto
Amount (total)	€ 4 000
Amount (ICETA)	€ 4 000

4

Reference	Projectos Pluridisciplinares - Iniciação à Investigação na Universidade do Porto (IJUP) - Edição de 2010 (#187)
Title	Suplementos alimentares ricos em selénio: estudo comparativo entre produtos, origens e aplicações
Responsible investigator	Maria Beatriz Prior Pinto Oliveira (FF/UP)
Principal contractor	Faculdade de Farmácia da Universidade do Porto (FF/UP)
Participating institution(s)	Instituto de Ciências e Tecnologias Agrárias e Agro-Alimentares-Porto (ICETA-Porto/UP)
Duration	12 months
Starting date	December 1, 2010
Funding source	Universidade do Porto
Amount (total)	€ 3 500
Amount (ICETA)	€ 3 500

5

Reference	Projectos Pluridisciplinares - Iniciação à Investigação na Universidade do Porto (IJUP) - Edição de 2010 (#150)
Title	Quantificação de poluentes orgânicos persistentes em amostras biológicas humanas - relação com a síndrome metabólica
Responsible investigator	Rosário Monteiro (FM/UP)
Principal contractor	Faculdade de Medicina da Universidade do Porto (FM/UP)
Participating institution(s)	Instituto de Ciências e Tecnologias Agrárias e Agro-Alimentares-Porto (ICETA-Porto/UP)
Duration	12 months
Starting date	December 1, 2010
Funding source	Universidade do Porto
Amount (total)	€ 3 500
Amount (ICETA)	€ 1 750

1.2.2. Publications

1.2.2.1. Papers in peer-reviewed Journals *(ISI – Web of Science)*

1

Authors	S. Duarte, J. Bento, A. Pena, C.M. Lino, C. Delerue-Matos, T. Oliva-Teles, S. Morais, M. Correia, M.B.P.P. Oliveira, M.R. Alves, J.A. Pereira
Title	Monitoring of ochratoxin A exposure of the Portuguese population through a nationwide urine survey – Winter 2007
Journal	Science of the Total Environment 408 (5) (2010) 1195-1198
Abstract	Ochratoxin A (OTA) is a mycotoxin produced by a variety of fungi, such as Penicillium verrucosum and Aspergillium spp., which has been found to have a wide number of potentially deadly toxic effects, and can enter the human organism through a variety of means. It then finds its way into the bloodstream and, after a lengthy process, is eventually excreted through the urine. It can thus be detected in its original form not only in blood samples but also in this biological medium. As such, and in an attempt to evaluate the exposure of the Portuguese population to this mycotoxin, morning urine samples were collected during the Winter of 2007, from each of five geographically distinct Portuguese locations — Bragança, Porto, Coimbra, Alentejo, and Algarve — and subjected to extraction by immunoaffinity columns and to OTA quantification through liquid chromatography coupled with fluorescence detection. Prevalent incidence was higher than 95% with Coimbra being the exception (incidence of 73.3%). In nearly all locations, the OTA content of most samples was found to be above the limit of quantification (LOQ) of 0.008 ng/ml. Indeed, excluding Coimbra, with an OTA content level of 0.014 ng/ml, all regions featured content values over 0.021 ng/ml.

2

Authors	S.C. Duarte, A. Tanello, A. Pena, C.M. Lino, C.D. Matos, M.B.P.P. Oliveira, M.R. Alves
Title	Evaluation of ochratoxin A exposure degree in two Portuguese cities through wheat and maize bread consumption during the winter 2007
Journal	Food Control 21 (2010) 702-707
Abstract	The occurrence of OTA in fresh and packed wheat and in maize bread and the evaluation of the exposure degree through their consumption in two Portuguese populations from Porto and Coimbra, during the winter of 2007, were studied. One hundred and sixty eight bread samples, 61 maize and 107 wheat, were analysed by liquid chromatography–fluorescence detection (LC–FD). The results showed that 84% of samples were contaminated, with a maximum level of 3.85 ng/g (above the EU maximum limit, 3 ng/g). Fresh wheat bread presented higher levels than packed wheat bread. Moreover, the traditional maize bread, in either city, was consistently more contaminated than wheat bread, 0.25 vs 0.19 ng/g, and 0.48 vs 0.34 ng/g for Porto and Coimbra, respectively. Avintes maize bread showed the highest mean contamination and maximum levels. The higher estimated daily intake of OTA from both types of bread in the population of Coimbra compared to Porto reflects the higher average contamination of bread in the first city.

3

Authors J. Rafaela L. Guerreiro, Ayman H. Kamel, M. Goreti F. Sales
Title FIA potentiometric system based on periodate polymeric membrane sensors for the assessment of ascorbic acid in commercial drinks
Journal Food Chemistry 120 (3) (2010) 934-939
Abstract Ascorbic acid is found in many food samples. Its clinical and technological importance demands an easy-to-use, rapid, robust and inexpensive method of analysis. For this purpose, this work proposes a new flow procedure based on the oxidation of ascorbic acid by periodate. A new potentiometric periodate sensorwas constructed to monitor this reaction. The selective membranes were of PVC with porphyrin-basedsensing systems and a lipophilic cation as additive. The sensor displayed a near-Nernstian response for periodate over 1.0×10^{-2} – 6.0×10^{-6} M, with an anionic slope of 73.9 ± 0.9 mV $decade^{-1}$. It was pH independent in acidic media and presented good selectivity features towards several inorganic anions. The flow set-up operated in double-channel, carrying a 5.0×10^{-4} M IO_4^- solution and a suitable buffer; these were mixed in a 50-cm reaction coil. The overall flow rate was 7 ml min^{-1} and the injection volume 70 µl. Under these conditions, a linear behaviour against concentration was observed for 17.7–194.0 µg ml^{-1}, presenting slopes of 0.169 mV $(mg/l)^{-1}$, a reproducibility of ±1.1 mV (n = 5), and a sampling rate of ~96 samples h^{-1}. The proposed method was applied to the analysis of beverages and pharmaceuticals.

4

Authors A.M.M. Sousa, V.D. Alves, S. Morais, C. Delerue-Matos, M.P. Gonçalves
Title Agar extraction from integrated multitrophic aquacultured Gracilaria vermiculophylla: Evaluation of a microwave-assisted process using response surface methodology
Journal Bioresource Technology 101 (9) (2010) 3258-3267
Abstract Microwave-assisted extraction (MAE) of agar from Gracilaria vermiculophylla, produced in an integrated multitrophic aquaculture (IMTA) system, from Ria de Aveiro (northwestern Portugal), was tested and optimized using response surface methodology. The influence of the MAE operational parameters (extraction time, temperature, solvent volume and stirring speed) on the physical and chemical properties of agar (yield, gel strength, gelling and melting temperatures, as well as, sulphate and 3,6-anhydro-Lgalactose contents) was evaluated in a 2^4 orthogonal composite design. The quality of the extracted agar compared favorably with the attained using traditional extraction (2 h at 85 ºC) while reducing drastically extraction time, solvent consumption and waste disposal requirements. Agar MAE optimum results were: an yield of 14.4 ± 0.4%, a gel strength of 1331 ± 51 g/cm^2, 40.7 ± 0.2 ºC gelling temperature, 93.1 ± 0.5 ºC melting temperature, 1.73 ± 0.13% sulfate content and 39.4 ± 0.3% 3,6-anhydro-L-galactose content. Furthermore, this study suggests the feasibility of the exploitation of G. vermiculophylla grew in IMTA systems for agar production.

5

Authors M. Correia, Â. Barroso, M.F. Barroso, D. Soares, M.B.P.P. Oliveira, C. Delerue-Matos
Title Contribution of different vegetable types to exogenous nitrate and nitrite exposure
Journal Food Chemistry 120 (4) (2010) 960-966
Abstract This study reports the levels of nitrate and nitrite of 34 vegetable samples, including different varieties of cabbage, lettuce, spinaches, parsley and turnips, collected in several locations of an intensive agricultural area (Modivas, Vila do Conde, northern Portugal). Nitrate levels ranged between 54 and 2440 mg NO_3^- kg^{-1}, while nitrite levels ranged between 1.1 and 57 mg NO_2^- kg^{-1}. The maximum residue levels established for nitrate in spinach and lettuce samples were not exceeded. Nitrate and nitrite levels reported in the literature for the same type of samples are reviewed, as well as the contribution of vegetables to nitrate and nitrite dietary exposure of populations.

6

Authors A.J. Duarte, J.C.G. Esteves da Silva
Title Reduced Fluoresceinamine as a Fluorescent Sensor for Nitric Oxide
Journal Sensors 10 (3) (2010) 1661-1669
Abstract A new fluorescent sensor for nitric oxide (NO) is presented that is based on its reaction with a non fluorescent substance, reduced fluoresceinamine, producing the highly fluorescent fluoresceinamine. Using a portable homemade stabilized light source consisting of 450 nm LED and fiber optics to guide the light, the sensor responds linearly within seconds in the NO concentration range between about 10–750 µM with a limit of detection (LOD) of about 1 µM. The system generated precise intensity readings, with a relative standard deviation of less than 1%. The suitability of the sensor was assessed by monitoring the NO generated by either the nitrous acid decomposition reaction or from a NO-releasing compound. Using relatively high incubation times, the sensor also responds quantitatively to hydrogen peroxide and potassium superoxide, however, using transient signal measurements results in no interfering species.

7

Authors K. Slezakova, D. Castro, M.C. Pereira, S. Morais, C. Delerue-Matos, M.C. Alvim-Ferraz
Title Influence of Traffic Emissions on the Carcinogenic Polycyclic Aromatic Hydrocarbons in Outdoor Breathable Particles
Journal Journal of the Air & Waste Management Association 60 (4) (2010), 393-401
Abstract Because polycyclic aromatic hydrocarbons (PAHs) have been proven to be toxic, mutagenic, and/or carcinogenic, there is widespread interest in analyzing and evaluating exposure to PAHs in atmospheric environments influenced by different emission sources. Because traffic emissions are one of the biggest sources of fine particles, more information on carcinogenic PAHs associated with fine particles needs to be provided. Aiming to further understand the impact of traffic particulate matter (PM) on human health, this study evaluated the influence of traffic on PM_{10} (PM with aerodynamic diameter <10 µm) and $PM_{2.5}$ (PM with aerodynamic diameter <2.5 µm), considering their concentrations

and compositions in carcinogenic PAHs. Samples were collected at one site influenced by traffic emissions and at one reference site using low-volume samplers. Analysis of PAHs was performed by microwave-assisted extraction combined with liquid chromatography (MAE-LC); 17 PAHs, including 9 carcinogenic ones, were quantified. At the site influenced by traffic emissions, PM_{10} and $PM_{2.5}$ concentrations were, respectively, 380 and 390% higher than at the background site. When influenced by traffic emissions, the total concentration of nine carcinogenic compounds (naphthalene, chrysene, benzo(a)anthracene, benzo(b) fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, and dibenzo(a,l)pyrene) was increased by 2400 and 3000% in PM_{10} and $PM_{2.5}$, respectively; these nine carcinogenic compounds represented 68 and 74% of total PAHs (Σ_{PAHs}) for PM_{10} and $PM_{2.5}$, respectively. All PAHs, including the carcinogenic compounds, were mainly present in fine particles. Considering the strong influence of these fine particles on human health, these conclusions are relevant for the development of strategies to protect public health.

8

Authors R.C. Matos, C.Vieira, S.Morais, M.L.Pereira, J.Pedrosa
Title Toxicity of chromated copper arsenate: A study in mice
Journal Environmental Research 110 (5) (2010) 424-427
Abstract Chromated copper arsenate (CCA) was widespread used as a chemical wood preservative with application in the construction of playground equipment, fences, jetties, and naval. Environmental protection agency (EPA) had limited the use of CCA-treated wood on 2002, due to probable implications on both human and environmental health. Although this fact, several industries pursue the use of this product within their manufactories. In addition, the durability of this wood for 60 years, makes these treated products an hazard to the public health. In the present work, studies were explored exposing mice to CCA, during 14, 24, 48, and 96 h for the assessment of acute toxicity of CCA. Kidney and liver were removed, prepared for histology and for metalloid, and copper content evaluation by high resolution inductively coupled plasma mass spectroscopy. The histological results evidenced apparently normal structures for control animals and group exposed to As_2O_5. On the contrary, the renal sections of the animals treated with CCA revealed epithelium cells desquamation, hyaline, and granular casts in renal tubules lumen. Furthermore, high levels of arsenic were detected in the kidney of animals treated with CCA over 14 and 48 h, being significantly greater than controls. Although this approach underlines the potential hazard of CCA on some vital organs, further testing may be required to establish the impacts on other functions.

9

Authors M.M.P.S. Neves, M.B. González-Garcia, H.P.A. Nouws, C. Delerue-Matos, A. Santos-Silva, A. Costa-García
Title Celiac disease diagnosis and gluten-free food analytical control
Journal Analytical and Bioanalytical Chemistry 397 (5) (2010) 1743-1753
Abstract Celiac disease (CD) is an autoimmune enteropathy, characterized by an inappropriate T-cell-mediated immune response to the ingestion of certain dietary cereal proteins in genetically susceptible individuals. This disorder presents environmental, genetic, and immunological components. CD presents a prevalence of up to 1% in populations of European ancestry, yet a high percentage of cases remain underdiagnosed. The diagnosis and treatment should be made early since untreated disease causes growth retardation and atypical symptoms, like infertility or neurological disorders. The diagnostic criteria for CD, which requires endoscopy with small bowel biopsy, have been changing over the last few decades, especially due to the advent of serological tests with higher sensitivity and specificity. The use of serological markers can be very useful to rule out clinical suspicious cases and also to help monitor the patients, after adherence to a gluten-free diet. Since the current treatment consists of a life-long glutenfree diet, which leads to significant clinical and histological improvement, the standardization of an assay to assess in an unequivocal way gluten in gluten-free foodstuff is of major importance.

10

Authors R.B. Queirós, J.P. Noronha, M.G.F. Sales, G.G. Aguilar
Title Sensors for the Detection and Quantification of Bacterial Contamination in Water for Human Use
Journal Advanced Engineering Materials 12 (5) (2010) B175-B178
Abstract The deterioration of water quality by Cyanobacteria cause outbreaks and epidemics associated with harmful diseases in Humans and animals because of the toxins that they release. Microcystin-LR is one of the hepatotoxins most widely studied and the World Health Organization, recommend a maximum value of 1 $\mu g\ L^{-1}$ in drinking water. Highly specific recognition molecules, such as molecular imprinted polymers are developed to quantify microcystins in waters for human use and shown to be of great potential in the analysis of these kinds of samples. The obtained results were auspicious, the detection limit found, 1.5 $\mu g\ L^{-1}$, being of the same order of magnitude as the guideline limit recommended by the WHO. This technology is very promising because the sensors are stable and specific, and the technology is inexpensive and allows for rapid on-site monitoring.

11

Authors S.C. Duarte, J. Bento, A. Pena, C.M. Lino, C. Delerue-Matos, M.B.P.P. Oliveira, M.R. Alves, J.A. Pereira
Title Influencing factors on bread-derived exposure to ochratoxin A: type, origin and composition
Journal Food and Chemical Toxicology 48 (8-9) (2010) 2139-2147
Abstract The nearly ubiquitous consumption of cereals all over the world renders them an important position in international nutrition, but concurrently allocates exposure to possible contained contaminants. Mycotoxins are natural food contaminants, difficult to predict, evade, and reduce, so it is important to establish the real contribution of each contaminated food product, with the aim to evaluate mycotoxin exposure. This was the key objective of this survey and analysis for ochratoxin A content on 274 samples of commercialized bread in the Portuguese market, during the winter 2007. Different bread products were analyzed through an HPLC-FD method, including traditional types, novel

segments, and different grain based bread products. A wide-ranging low level contamination was observed in all regions and types of bread products analyzed, especially in the Porto and Coimbra regions, and in the maize and whole-grain or fiber-enriched bread. Nevertheless, the exposure through contaminated wheat bread continues to be the most significant, given its high consumption and dominance in relation to the other types of bread.

12

Authors P.A.R. Tafulo, R.B. Queirós, C.M. Delerue-Matos, M.G.F. Sales
Title Control and comparison of the antioxidant capacity of beers
Journal Food Research International 43 (6) (2010) 1702-1709
Abstract The purpose of the present work is to determine the antioxidant capacity (AC) of 27 commercial beers. The AC indicates the degree of protection of a certain organism against oxidative damage provoked by reactive oxygen and nitrogen species. Assays were carried out by the following methods: (i) total radical trapping antioxidant parameter (TRAP); (ii) trolox equivalent antioxidant capacity (TEAC); (iii) trolox equivalent antioxidant capacity (DPPH); (iv) ferric-ion reducing antioxidant parameter (FRAP); (v) cupric reducing antioxidant capacity (CUPRAC); (vi) oxygen radical absorbance capacity (ORAC). Ascorbic acid (AA), gallic acid (GA) and trolox (TR) were used as standards. All beers showed antioxidant power, but a wide range of ACs was observed. The effect of several factors upon these differences was studied. Statistical differences were found between ACs of beers of different colours. ORAC method provided always higher experimental ACs, of significant statistical differences to other assays.

13

Authors F.T.C. Moreira, A.H. Kamel, J.R.L. Guerreiro, M.G.F. Sales
Title Man-tailored biomimetic sensor of molecularly imprinted materials for the potentiometric measurement of oxytetracycline
Journal Biosensors and Bioelectronics 26 (2) (2010) 566-574
Abstract A novel biomimetic sensor for the potentiometric transduction of oxytetracycline is presented. The artificial host was imprinted in methacrylic acid and/or acrylamide based polymers. Different amounts of molecularly imprinted and non-imprinted polymers were dispersed in different plasticizing solvents and entrapped in a poly(vinyl chloride) matrix. Only molecularly imprinted based sensors allowed a potentiometric transduction, suggesting the existence of host–guest interactions. These sensors exhibited a near-Nernstian response in steady state evaluations; slopes and detection limits ranged 42–63 mV/decade and 2.5–31.3 μg/mL, respectively. Sensors were independent from the pH of test solutions within 2–5. Good selectivity was observed towards glycine, ciprofloxacin, creatinine, acid nalidixic, sulfadiazine, cysteine, hydroxylamine and lactose. In flowing media, the biomimetic sensors presented good reproducibility (RSD of ±0.7%), fast response, good sensitivity (65 mV/decade), wide linear range (5.0×10^{-5} to 1.0×10^{-2} mol/L), low detection limit (19.8 μg/mL), and a stable baseline for a 5×10^{-3} M citrate buffer (pH 2.5) carrier. The sensors were successfully applied to the analysis of drugs and urine. This work confirms the possibility of using molecularly imprinted polymers as ionophores for organic ion recognition in potentiometric transduction.

14

Authors C. Mansilha, A. Melo, H. Rebelo, I.M.P.L.V.O. Ferreira, O. Pinho, V. Domingues, C. Pinho, P. Gameiro
Title Quantification of endocrine disruptors and pesticides in water by gas chromatography–tandem mass spectrometry, Method validation using weighted linear regression schemes
Journal Journal of Chromatography A 1217 (43) (2010) 6681-6691
Abstract A multi-residue methodology based on a solid phase extraction followed by gas chromatography–tandem mass spectrometry was developed for trace analysis of 32 compounds in water matrices, including estrogens and several pesticides from different chemical families, some of them with endocrine disrupting properties. Matrix standard calibration solutions were prepared by adding known amounts of the analytes to a residue-free sample to compensate matrix-induced chromatographic response enhancement observed for certain pesticides. Validation was done mainly according to the International Conference on Harmonisation recommendations, as well as some European and American validation guidelines with specifications for pesticides analysis and/or GC–MS methodology. As the assumption of homoscedasticity was not met for analytical data, weighted least squares linear regression procedure was applied as a simple and effective way to counteract the greater influence of the greater concentrations on the fitted regression line, improving accuracy at the lower end of the calibration curve. The method was considered validated for 31 compounds after consistent evaluation of the key analytical parameters: specificity, linearity, limit of detection and quantification, range, precision, accuracy, extraction efficiency, stability and robustness.

15

Authors D. Castro, K. Slezakova, C. Delerue-Matos, M.C. Alvim-Ferraz, S. Morais, M.C. Pereira
Title Contribution of traffic and tobacco smoke in the distribution of polycyclic aromatic hydrocarbons on outdoor and indoor $PM_{2.5}$
Journal Global NEST Journal 12 (1) (2010) 3-11
Abstract Traffic emissions and tobacco smoke are considered two main sources of polycyclic aromatic hydrocarbons (PAHs) in indoor and outdoor air. In this study, the impact of these sources on the level of fine particulate matter ($PM_{2.5}$) and on the distribution of 15 PAHs regarded as priority pollutants by the US-EPA on $PM_{2.5}$ were evaluated and compared. Outdoor and indoor $PM_{2.5}$ samples were collected during winter 2008 in Oporto city in Portugal, for sampling periods of 12 and 24 hours, respectively. The outdoor $PM_{2.5}$ were sampled at one site directly influenced by traffic emissions and the indoor $PM_{2.5}$ samples were collected at one home directly influenced by tobacco smoke and another one without smoke. A methodology based on microwave-assisted extraction and liquid chromatography with fluorescence detection was applied for the efficient PAHs determination in indoor and outdoor $PM_{2.5}$. PAHs in indoor $PM_{2.5}$ concentrations were significantly influenced by the presence of traffic and tobacco smoking emissions. The mean of

ΣPAHs in the outdoor traffic $PM_{2.5}$ was not significantly different from the value attained in the indoor without smoking site. The tobacco smoke increased significantly PAHs concentrations on average about 1000 times more, when compared with the outdoor profile samples suggesting that tobacco smoking may be the most important source of indoor PAHs pollution.

16

Authors M.M.P.S. Neves, H.P.A. Nouws, C. Delerue-Matos
Title Carbon surfaces for the oxidative quantification of pravastatin: glassy-carbon vs. screen-printed carbon electrodes
Journal Journal of Food and Drug Analysis 18 (5) (2010) 353-358
Abstract The electrooxidative behavior of pravastatin (PRV) in aqueous media was studied by square-wave voltammetry at a glassy-carbon electrode (GCE) and at a screen-printed carbon electrode (SPCE). Maximum peak current intensities in a pH 5.0 buffer were obtained at +1.3 V vs. AgCl/Ag and +1.0 V vs. Ag for the GCE and SPCE surface respectively. Validation of the developed methodologies revealed good performance characteristics and confirmed their applicability to the quantification of PRV in pharmaceutical products, without significant sample pretreatment. A comparative analysis between the two electrode types showed that SPCEs are preferred as an electrode surface because of their higher sensitivity and the elimination of the need to clean the electrode's surface for its renewal, which frequently is, if not always, the rate-limiting step in voltammetric analysis.

17

Authors M.M.S. Silva, I.T. Cavalcanti, M.F. Barroso, M.G.F Sales, R.F. Dutra
Title Gold electrode modified by self-assembled monolayers of thiols to determine DNA sequences hybridization
Journal Journal of Chemical Sciences 122(6) (2010) 911-917
Abstract The process of immobilization of biological molecules is one of the most important steps in the construction of a biosensor. In the case of DNA, the way it exposes its bases can result in electrochemical signals to acceptable levels. The use of self-assembled monolayer that allows a connection to the gold thiol group and DNA binding to an aldehydic ligand resulted in the possibility of determining DNA hybridization. Immobilized single strand of DNA (ssDNA) from calf thymus pre-formed from alkanethiol film was formed by incubating a solution of 2-aminoethanothiol (Cys) followed by glutaraldehyde (Glu). Cyclic voltammetry (CV) was used to characterize the self-assembled monolayer on the gold electrode and, also, to study the immobilization of ssDNA probe and hybridization with the complementary sequence (target ssDNA). The ssDNA probe presents a well-defined oxidation peak at +0.158 V. When the hybridization occurs, this peak disappears which confirms the efficacy of the annealing and the DNA double helix performing without the presence of electroactive indicators. The use of SAM resulted in a stable immobilization of the ssDNA probe, enabling the hybridization detection without labels. This study represents a promising approach for molecular biosensor with sensible and reproducible results.

18

Authors H.M.R. Gonçalves, A.J. Duarte, J.C.G. Esteves da Silva
Title Optical fiber sensor for Hg(II) based on carbon dots
Journal Biosensors and Bioelectronics 26(4) (2010) 1302-1306
Abstract An optical fiber sensor for Hg(II) in aqueous solution based on sol–gel immobilized carbon dots nanoparticles functionalized with PEG_{200} and N-acetyl-L-cysteine is described. This sol–gel method generated a thin (about 750 nm), homogenous and smooth (roughness of 2.7±0.7 å) film that immobilizes the carbon dots and allows reversible sensing of Hg(II) in aqueous solution. A fast (less than 10 s), reversible and stable (the fluorescence intensity measurements oscillate less than 1% after several calibration cycles) sensor system was obtained. The sensor allow the detection of submicron molar concentrations of Hg(II) in aqueous solution. The fluorescence intensity of the immobilized carbon dots is quenched by the presence of Hg(II) with a Stern-Volmer constant (pH = 6.8) of $5.3\times10^{5}M^{-1}$.

19

Authors A.J. Duarte, C. Rocha, F. Silveira, G.G. Aguilar, P.A.S. Jorge, J.M.M. Leitão, M. Algarra, J.C.G. Esteves da Silva
Title Luminol-doped nanostructured composite materials for chemiluminescent sensing of hydrogen peroxide
Journal Analytical Letters 43(17) (2010) 2762-2772
Abstract Silica based nanostructured composite materials doped with luminol and cobalt(II) ion were synthesized and characterized, resulting in a highly chemiluminescent material in the presence of hydrogen peroxide. A detection system with the CL light guided from the reaction tube to the photomultiplier tube using a one millimeter glass optical fiber was developed and assessed. A linear response was observed using a semi-logarithm calibration between 50–2000 µM hydrogen peroxide with 1 µM as the limit of detection.

20

Authors S.A.A. Almeida, T.S.C.R. Rebelo, A.M. Heitor, M.B.P.P. Oliveira, M.G.F. Sales
Title Flow-Injection Potentiometric Method for the Routine Determination of Chloride: Application to Bread Analysis
Journal Current Analytical Chemistry 6(4) (2010) 277-287
Abstract Bread is consumed worldwide by man, thus contributing to the regular ingestion of certain inorganic species such as chloride. It controls the blood pressure if associated to a sodium intake and may increase the incidence of stomach ulcer. Its routine control should thus be established by means of quick and low cost procedures. This work reports a double-channel flow injection analysis (FIA) system with a new chloride sensor for the analysis of bread. All solutions are prepared in water and necessary ionic strength adjustments are made on-line. The body of the indicating electrode is made from a silver needle of 0.8 mm i.d. with an external layer of silver chloride. These devices were constructed with different lengths. Electrodes of 1.0 to 3.0 cm presented better analytical performance. The calibration curves under optimum conditions displayed Nernstian behaviour, with average slopes of 56 mV $decade^{-1}$, with sampling rates

of 60 samples h^{-1}. The method was applied to analyze several kinds of bread, namely pão de trigo, pão integral, pão de centeio, pão de mistura, broa de milho, pão sem sal, pão meio sal, pão-de-leite, and pão de água. The accuracy and precision of the potentiometric method were ascertained by comparison to a spectrophotometric method of continuous segmented flow. These methods were validated against ion-chromatography procedures.

1.2.2.2. Proceedings papers *(international conferences)*

1

Author(s)	K. Slezakova, D. Castro, M.C. Alvim-Ferraz, C. Delerue-Matos, S. Morais, M.C. Pereira
Title	Levels and Phase Distribution of Ten Carcinogenic Polycyclic Aromatic Hydrocarbons in Smoking and Non-smoking Residences
Conference	International Congress on Environmental Health
City,Country	Coimbra, Portugal
Date(s)	November 4-6, 2010
Page(s)	Electronic publication (oral 14)

2

Author(s)	C. Vieira, S. Morais, C. Delerue-Matos, M.B.P.P. Oliveira
Title	Human Health Risks from Mercury, Cadmium, Lead and Arsenic Through Portuguese Commonly Consumed Pelagic Fish Species
Conference	International Congress on Environmental Health
City,Country	Coimbra, Portugal
Date(s)	November 4-6, 2010
Page(s)	Electronic publication (poster 31)

3

Author(s)	M. Dias-Teixeira, R. Rangel, A. Dias-Teixeira, V. Domingues, S. Abajo Olea, C. Delerue-Matos,
Title	Perception and risk of exposure to xylene by pathologic anatomy students
Conference	XXI Congress of the International Academy of Legal Medicine (IALM)
City,Country	Lisbon, Portugal
Date(s)	May 28-30, 2009
Page(s)	Acta Medicinae Legalis et Socialis (2010) 185-192 (published in September 2010)

4

Author(s)	A. Dias-Teixeira, M. Dias-Teixeira, R. Rangel, S. Tarelho, V. Domingues, S. de Abajo Olea, C. Delerue-Matos
Title	Development and validation of HPLC-UV method to determine creatinine and metabolites of xylene in urine
Conference	XXI Congress of the International Academy of Legal Medicine (IALM)
City,Country	Lisbon, Portugal
Date(s)	May 28-30, 2009
Page(s)	Acta Medicinae Legalis et Socialis (2010) 319-324 (published in September 2010)

1.2.2.3. Ph.D. theses

1

Author	Mónica Alexandra de Oliveira Dias Teixeira
Title	Percepção e risco de exposição ocupacional ao xileno e ao formaldeído por estudantes de anatomia patológica, citológica e tanatológica
Institution	Universidade de Léon (Spain)
Date	February 19, 2010
Supervisor(s)	Valentina Maria Fernandes Domingues, Serafín Olea (Univ. Léon, Spain)

2

Author	Dionísia Maria Oliveira Castro
Title	Hidrocarbonetos aromáticos policíclicos no ar ambiente
Institution	FE/UP, Doutoramento em Engenharia do Ambiente
Date	December 21, 2010
Supervisor(s)	Maria do Carmo Pereira (FE/UP, DEQ), Simone Barreira Morais

1.2.2.4. MSc theses

1

Author	Tâmara Isabel Barbosa da Silva
Title	Desenvolvimento de um sensor óptico para determinação de Norfloxacina
Institution	IPP/ISEP/DEQ, Mestrado em Engenharia Química – Optimização Energética na Industria Química
Date	July 29, 2010
Supervisor(s)	Maria Goreti Ferreira Sales

2

Author	Moisés Oliveira da Silva
Title	Development of an analytical method for the determination of germanium in food
Institution	IPP/ISEP/DEQ, Mestrado em Engenharia Química – Optimização Energética na Industria Química
Date	October 8, 2010
Supervisor(s)	Pavel Divis (Brno University of Technologies, CZ), Hendrikus Petrus Antonius Nouws

3

Author	Ana Sofia Oliveira Dias Teixeira
Title	Monitorização de Pesticidas em Águas de Esposende
Institution	IPP/ISEP/DEQ, Mestrado em Engenharia Química – Tecnologias de Protecção Ambiental
Date	November 22, 2010
Supervisor(s)	Valentina Maria Fernandes Domingues, Mónica Alexandra de Oliveira Dias Teixeira, Rui Rangel

4

Author	João Manuel Fernandes Baía
Title	Monitorização do adoçante ciclamato de sódio através de sensor óptico
Institution	IPP/ISEP/DEQ, Mestrado em Engenharia Química – Optimização Energética na Industria Química
Date	November 25, 2010
Supervisor(s)	Maria Goreti Ferreira Sales, Maria do Carmo Veiga Fernandes Vaz

5

Author	Sílvia Marina Gomes da Silva
Title	Monitorização de Cobre em Vinhos Verdes
Institution	IPP/ISEP/DEQ, Mestrado em Engenharia Química – Tecnologias de Protecção Ambiental
Date	November 25, 2010
Supervisor(s)	Maria Goreti Ferreira Sales

6

Author	José Camilo Carvalhinho Sousa Pinto
Title	Análise de metais em infusões de chás e ervas aromáticas por espectrofotometria de Absorção Atómica de Alta Resolução com fonte contínua
Institution	IPP/ISEP/DEQ, Mestrado em Engenharia Química – Tecnologias de Protecção Ambiental
Date	November 29, 2010
Supervisor(s)	Maria Teresa Pereira de Oliva Teles Moreira, Susana Maria Ribeiro e Sousa Mendes de Freitas

7

Author	Ana Isabel Gonçalves Pereira
Title	Monitorização de desreguladores endócrinos em águas
Institution	IPP/ISEP/DEQ, Mestrado em Engenharia Química – Tecnologias de Protecção Ambiental
Date	November 29, 2010
Supervisor(s)	Valentina Maria Fernandes Domingues, Virgínia Maria Monteiro da Cruz Fernandes, Catarina Mansilha (Inst. Ricardo Jorge)

8

Author	Ana Isabel Ribeiro de Pinho
Title	Electrochemical biosensor for phenols and catecholamines based on tyrosinase immobilized on gold nanoelectrode ensembles
Institution	FF/UP, Controlo de Qualidade, área de especialização em Águas e Alimentos
Date	December 17, 2010
Supervisor(s)	Subramanian Viswanathan, Cristina Maria Fernandes Delerue Alvim de Matos, Maria Beatriz Prior Pinto Oliveira (FF/UP)

1.2.3. Presentations in international conferences

1.2.3.1. Oral

1

Author(s)	M.M.P.S. Neves, M.B. González-García, H.P.A. Nouws, A. Santos-Silva, C. Delerue-Matos, A. Costa-García
Title	Nanohybrid Materials as Transducer Surfaces for Electrochemical Sensing Applications
Conference	13th International Conference on Electroanalysis – ESEAC2010
City,Country	Gijón, Spain
Date(s)	June 20-24, 2010
Page(s)	75

2

Author(s)	V. Domingues, V.C. Fernandes, N. Mateus, C. Delerue-Matos
Title	Organochlorine Pesticides Determination in Strawberries and Jam using QuEChERS Extraction and GC-MS/MS
Conference	47th Annual Florida Pesticide Residue Workshop
City,Country	TradeWinds Island Grand, St. Pete Beach, Florida, USA
Date(s)	July 18-21, 2010
Page(s)	35

3

Author(s)	K. Slezakova, D. Castro, M.C. Alvim-Ferraz, C. Delerue-Matos, S. Morais, M.C. Pereira
Title	Levels and Phase Distribution of Ten Carcinogenic Polycyclic Aromatic Hydrocarbons in Smoking and Non-smoking Residences
Conference	International Congress on Environmental Health
City,Country	Coimbra, Portugal
Date(s)	November 4-6, 2010
Page(s)	77

4

Author(s)	J.R.G. Botelho, C.D. Matos, M.G.F. Sales
Title	Optical sensor for the rapid screening of antibiotics in aquaculture
Conference	7th Ibero-American Congress on Sensors-IBERSENSOR 2010
City,Country	Lisbon, Portugal
Date(s)	November 9-11, 2010
Page(s)	Electronic publication (Ibersensor131)

5

Author(s)	S.C. Duarte, J. Bento, C. Delerue-Matos, B. Oliveira, J. Pereira, A. Pena, C.M. Lino
Title	Bio-monitoring of Ochratoxin A in Portuguese North Inhabitants
Conference	XVI Encontro Luso-Galego de Química
City,Country	Aveiro, Portugal
Date(s)	November 10-12, 2010
Page(s)	102

6

Author(s)	L.H.M.L.M. Santos, A.N. Araújo, C. Delerue-Matos, A. Pena, M.C.B.S.M. Montenegro
Title	Ecotoxicological risks of antibiotic drugs
Conference	XVI Encontro Luso-Galego de Química
City,Country	Aveiro, Portugal
Date(s)	November 10-12, 2010
Page(s)	124

1.2.3.2. Poster

1

Author(s)	J. Sousa, V. Domingues, M. Rosas, S. Ribeiro, C. Alvim-Ferraz, C. Delerue-Matos
Title	Outdoor and indoor benzene evaluation by GC-FID and GC-MS/
Conference	International Symposium on Hyphenated Techniques in Chromatography and Hyphenated Chromatographic Analyzers (HTC-11) and Second International Symposium on Hyphenated Techniques for Sample Preparation (HTSP-2)
City,Country	Bruges, Belgium
Date(s)	January 25-29, 2010
Page(s)	Electronic publication (Env-4)

2

Author(s)	J. Ferreira, V. Domingues, N. Mateus, C. Delerue-Matos
Title	Determination of pesticides in irrigation water
Conference	International Symposium on Hyphenated Techniques in Chromatography and Hyphenated Chromatographic Analyzers (HTC-11) and Second International Symposium on Hyphenated Techniques for Sample Preparation (HTSP-2)
City,Country	Bruges, Belgium
Date(s)	January 25-29, 2010
Page(s)	Electronic publication (Env-5)

3

Author(s)	V.C. Fernandes, V.F. Domingues, N. Mateus, C. Delerue-Matos
Title	Optimization of GC-MS system parameters for the determination of organochlorine pesticides
Conference	International Symposium on Hyphenated Techniques in Chromatography and Hyphenated Chromatographic Analyzers (HTC-11) and Second International Symposium on Hyphenated Techniques for Sample Preparation (HTSP-2)
City,Country	Bruges, Belgium
Date(s)	January 25-29, 2010
Page(s)	Electronic publication (Env-6)

4

Author(s)	C. Mansilha, V. Domingues, T. Oliva-Teles, P. Gameiro, C. Delerue-Matos
Title	Analysis of some endocrine disruptors in environmental water by GC-MS
Conference	International Symposium on Hyphenated Techniques in Chromatography and Hyphenated Chromatographic Analyzers (HTC-11) and Second International Symposium on Hyphenated Techniques for Sample Preparation (HTSP-2)
City,Country	Bruges, Belgium
Date(s)	January 25-29, 2010
Page(s)	Electronic publication (Env-7)

5

Author(s)	M.D. Teixeira, R. Rangel, A.D. Teixeira, S.A. Olea, C. Delerue-Matos, V. Domingues
Title	Risk of exposure to xylene in pathological anatomy laboratory
Conference	International Symposium on Hyphenated Techniques in Chromatography and Hyphenated Chromatographic Analyzers (HTC-11) and Second International Symposium on Hyphenated Techniques for Sample Preparation (HTSP-2)
City,Country	Bruges, Belgium
Date(s)	January 25-29, 2010
Page(s)	Electronic publication (Env-19)

6

Author(s)	R. Rangel, M. Teixeira, A. Teixeira, S. Abajo, V. Domingues
Title	Validation of a direct analytical method for Methanol in urine by GC-FID
Conference	The Society of Environmental Toxicology and Chemistry (SETAC) Europe: 20th Annual Meeting 2010
City,Country	Seville, Spain
Date(s)	May 23-27, 2010
Page(s)	Electronic publication (TH 249)

7

Author(s)	A. Teixeira, M. Teixeira, R. Rangel, E. Tiritan, V. Gonçalves, V. Domingues
Title	Development and validation of HPLC-DAD method for the simultaneous determination of creatinine and metabolites of Xylene, Toluene and Ethylbenzene in urine
Conference	The Society of Environmental Toxicology and Chemistry (SETAC) Europe: 20th Annual Meeting 2010
City,Country	Seville, Spain
Date(s)	May 23-27, 2010
Page(s)	Electronic publication (TH 255)

8

Author(s)	M. Teixeira, R. Rangel, A. Teixeira, S. Abajo, V. Domingues
Title	Validation of a GC-FID method for quantification of methanol in air
Conference	The Society of Environmental Toxicology and Chemistry (SETAC) Europe: 20th Annual Meeting 2010
City,Country	Seville, Spain
Date(s)	May 23-27, 2010
Page(s)	Electronic publication (WE 037)

9

Author(s)	H.P.A. Nouws, C. Delerue-Matos, F.O.G. Pereira, J.T.V.S. Albergaria
Title	Voltammetric Analysis of Ciprofloxacin – Application to Pharmaceutical Products and Remediation
Conference	13th International Conference on Electroanalysis – ESEAC2010
City,Country	Gijón, Spain
Date(s)	June 20-24, 2010
Page(s)	179

10

Author(s)	M.F. Barroso, M.G. Sales, C. Delerue-Matos, M.B.P.P. Oliveira
Title	Antioxidant capacity of flavoured waters by electrochemical DNA-Biosensor
Conference	13th International Conference on Electroanalysis – ESEAC2010
City,Country	Gijón, Spain
Date(s)	June 20-24, 2010
Page(s)	348

11

Author(s)	M.F. Barroso, M.G. Sales, C. Delerue-Matos, M.B.P.P. Oliveira
Title	DNA damage generated by a sulphate radical and the protective effect of dietary antioxidants using an electrochemical DNA biosensors
Conference	13th International Conference on Electroanalysis – ESEAC2010
City,Country	Gijón, Spain
Date(s)	June 20-24, 2010
Page(s)	349

12

Author(s)	M.J.C. Oliveira, A. Garcia, S. Viswanathan, M.F. Barroso, J.A.M. Rodrigues, C. Delerue-Matos
Title	Enzymatic biosensor for the quantification of molinate in water
Conference	13th International Conference on Electroanalysis – ESEAC2010
City,Country	Gijón, Spain
Date(s)	June 20-24, 2010
Page(s)	350

13

Author(s)	M. Oliveira, S. Viswanathan, S. Morais, C. Delerue-Matos
Title	Polyaniline Microarray Screen Printed Electrodes for Trace Determination of Cadmium
Conference	13th International Conference on Electroanalysis – ESEAC2010
City,Country	Gijón, Spain
Date(s)	June 20-24, 2010
Page(s)	351

14

Author(s)	D. Pestana, V. Fernandes, D. Faria, R. Monteiro, V. Domingues, C. Delerue-Matos, C. Calhau
Title	Evaluation of organochlorine pesticides levels in human visceral and subcutaneous adipose tissue of residents in Portugal
Conference	11th International Congress on Obesity, ICO 2010
Date(s)	July 11-15, 2010
City,Country	Stockholm, Sweden
Page(s)	Obesity Reviews 11(S1) (2010) 328-329

15

Author(s)	A.M.M. Sousa, S. Morais, C. Delerue-Matos, M.P. Gonçalves
Title	Study of an Environmentally Friendly Alternative Method for Agar Extraction From Commercial *Gelidium sesquipedale*
Conference	Macro 2010: 43rd IUPAC World Polymer Congress
City,Country	Glasgow, United Kingdom
Date(s)	July 11-16, 2010
Page(s)	Electronic publication (F20_P17)

16

Author(s)	A.I. Pereira, V.C. Fernandes, C. Mansilha, C. Delerue-Matos, V. Domingues
Title	Determination of endocrine disruptors in Portuguese rivers
Conference	47th Annual Florida Pesticide Residue Workshop
City,Country	TradeWinds Island Grand, St. Pete Beach, Florida, USA
Date(s)	July 18-21, 2010
Page(s)	P-29; p. 47

17

Author(s)	V.C. Fernandes, V. Domingues, N. Mateus, C. Delerue-Matos
Title	Determination of organochlorine pesticides from organic and integrated pest management farming strawberries using QuEChERS
Conference	47th Annual Florida Pesticide Residue Workshop
City,Country	TradeWinds Island Grand, St. Pete Beach, Florida, USA
Date(s)	July 18-21, 2010
Page(s)	P-27; p. 46

18

Author(s)	D. Pestana, V. Fernandes, D. Teixeira, A. Faria, R. Monteiro, V. Domingues, C. Delerue-Matos, C. Calhau
Title	Accumulation of organochlorine pesticides in human visceral and subcutaneous adipose tissue—The Portuguese scenario
Conference	XII International Congress of Toxicology
Date(s)	July 19–23, 2010
City,Country	Barcelona, Spain
Page(s)	Toxicology Letters 196S (2010) S43

19

Author(s)	D. Pestana, D. Teixeira, A. Faria, V. Domingues, R. Monteiro, C. Calhau
Title	Effects of the environmental pesticide DDT and its metabolites on the human breast cancer cell line MCF-7
Conference	XII International Congress of Toxicology
Date(s)	July 19–23, 2010
City,Country	Barcelona, Spain
Page(s)	Toxicology Letters 196S (2010) S180

20

Author(s)	D. Castro, K. Slezakova, S. Morais, C. Delerue-Matos, M. C. Alvim-Ferraz, M. C. Pereira
Title	Polycyclic Aromatic Hydrocarbons Associated with Particulate and Gas Phase in Outdoor Air in Oporto Portugal
Conference	International Aerosol Conference 2010
City,Country	Helsinki, Finland
Date(s)	August 29 - September 3, 2010
Page(s)	p3V12

21

Author(s)	F.T.C. Moreira, A.H. Kamel, R.L. Guerreiro, V. Azevedo, M.G.F. Sales
Title	New Potentiometric Sensors Based on Two Competitive Recognition Sites for Determining Tetracycline Residues Using Flow-Through System
Conference	Eurosensors XXIV
City,Country	Linz, Austria
Date(s)	September, 5-8, 2010
Page(s)	Procedia Engineering 5 (2010) 1200-1203

22

Author(s)	M.J. Ramalhosa, P. Paíga, S. Morais, M.B.P.P. Oliveira, C. Delerue-Matos
Title	Polycyclic Aromatic Hydrocarbons & Fatty Fish Safety: Application of Microwave-assisted Extraction and Liquid Chromatography With Fluorescence Detection
Conference	16th International Symposium on Separation Sciences
City,Country	Rome, Italy
Date(s)	September 6-10, 2010
Page(s)	132 (P57)

23

Author(s)	A.J. Duarte, M.C.V.F. Vaz, J.C.G. Esteves da Silva
Title	CdTe quantum dots based chemical nanosensors
Conference	Trends in Nanotechnology International Conference (TNT2010)
City,Country	Braga, Portugal
Date(s)	September 6-10, 2010
Page(s)	Electronic publication (http://www.tntconf.org/2010/abstracts_TNT2010/TNT2010_Duarte.pdf)

24

Author(s)	M.M.P.S. Nevesa, M.B. González-García, H.P.A. Nouws; A. Santos-Silva; C. Delerue-Matos; A. Costa-García
Title	An electrochemical immunosensor for the detection of autoantibodies directed against gliadins using nanostructured surfaces
Conference	IV Workshop Nanociencia y Nanotecnología Analíticas 2010
City,Country	Zaragoza, Spain
Date(s)	September 7-9, 2010
Page(s)	Electronic Publication (PO-21)

25

Author(s)	J.C. Pinto, S.R. Sousa, C. Delerue-Matos, M.T. Oliva-Teles
Title	Análise de chumbo e cobre em chás por Espectrofotometria de absorção atómica de alta resolução com fonte contínua por atomização electrotérmica
Conference	VI Congresso Ibérico de Espectroscopía - XXII Reunión Nacional de Espectroscopía (VI CIE - XXII RNE)
City,Country	Porto, Portugal
Date(s)	September 8-10, 2010
Page(s)	21-22

26

Author(s)	J. Ferreira, I. Seguro, T. Oliva Teles, C. Delerue Matos, A. Vega, J. Teixeira, H. Chaminé
Title	Mercury concentrations assessment in bottled and spring waters (n portugal): hydrochemical approach
Conference	XXXVIII International Association Hydrogeologists Congress
City,Country	Krakow, Poland
Date(s)	September 12-17, 2010
Page(s)	Vol. II, 637-638

27

Author(s)	S. Viswanathan, A. Pinho, C. Delerue-Matos
Title	Microfluidic Biosensor Based on Cotton Thread and Polyaniline for Pesticides determination
Conference	61st Annual Meeting of the International Society of Electrochemistry
City,Country	Nice, France
Date(s)	September 26 - October 1, 2010
Page(s)	187

28

Author(s)	S. Viswanathan, A. Pinho, S. Morais, C. Delerue-Matos
Title	Electrochemical Immunosensor For Label Free Determination of Benzo[a]pyrene in Environmental Samples
Conference	61st Annual Meeting of the International Society of Electrochemistry
City,Country	Nice, France
Date(s)	September 26 - October 1, 2010
Page(s)	110

29

Author(s)	S.A.A. Almeida, A.M. Heitor, M.C.B.S.M. Montenegro, M.G.F. Sales
Title	Monitoring sulfamethoxazole in aquaculture water
Conference	36th International Symposium on Environmental Analytical Chemistry – ISEAC 36
City,Country	Rome, italy
Date(s)	October 5-9, 2010
Page(s)	P-49

30

Author(s)	S.A.A. Almeida, T.S.C.R. Rebelo, M.G.F. Sales
Title	Trimethropim - imprinted materials for potentiometric determination in aquaculture water
Conference	36th International Symposium on Environmental Analytical Chemistry – ISEAC 36
City,Country	Rome, italy
Date(s)	October 5-9, 2010
Page(s)	P-81

31

Author(s)	S. Viswanathan, S. Machado, C. Delerue-Matos
Title	Dopamine Sensor Based On Molecularly Imprinted Electro Synthesized Polymers on Carbon Nanotube Screen Printed Electrode
Conference	NanotechItaly 2010
City,Country	Venice, Italy
Date(s)	October 20-22, 2010
Page(s)	283

32

Author(s)	A. Pinho, S. Viswanathan, M.B.P.P. Oliveira, C. Delerue-Matos
Title	Electrochemical biosensor for L-Dopa Using Tyrosinase -Modified Gold Nanoarray electrodes
Conference	NanotechItaly 2010
City,Country	Venice, Italy
Date(s)	October 20-22, 2010
Page(s)	284

33

Author(s)	C. Vieira, S. Morais, C. Delerue-Matos, M.B.P.P. Oliveira
Title	Human Health Risks from Mercury, Cadmium, Lead and Arsenic Through Portuguese Commonly Consumed Pelagic Fish Species
Conference	International Congress on Environmental Health
City,Country	Coimbra, Portugal
Date(s)	November 4-6, 2010
Page(s)	125

34

Author(s)	F.T.C. Moreira, R.A. F. Dutra, G.G. Aguilar, J.P.C. Noronha, M.G.F. Sales
Title	Molecular Imprinting of Myoglobin on Silica Surfaces using silanes in Potentiometric Transduction
Conference	7th Ibero-American Congress on Sensors-IBERSENSOR 2010
City,Country	Lisbon, Portugal
Date(s)	November 9-11, 2010
Page(s)	Electronic publication (Ibersensor126)

35

Author(s)	T.I.B. Silva, F.T.C. Moreira, M.G.F. Sales
Title	Rapid screening of Norfloxacin in water
Conference	7th Ibero-American Congress on Sensors-IBERSENSOR 2010
City,Country	Lisbon, Portugal
Date(s)	November 9-11, 2010
Page(s)	Electronic publication (Ibersensor127)

36

Author(s)	Rafaela L. Guerreiro, Victor Freitas, M.G. F. Sales
Title	New optical sensor for astringency in wine
Conference	7th Ibero-American Congress on Sensors-IBERSENSOR 2010
City,Country	Lisbon, Portugal
Date(s)	November 9-11, 2010
Page(s)	Electronic publication (Ibersensor128)

37

Author(s)	S.A.A. Almeida, T.R. Rebelo, A.M. Heitor, M.C.B.S.M. Montenegro, M.G.F. Sales
Title	Sol-gel membrane with imprinted sulfamethoxazole: potentiometric transduction and application to the analysis of water samples
Conference	7th Ibero-American Congress on Sensors-IBERSENSOR 2010
City,Country	Lisbon, Portugal
Date(s)	November 9-11, 2010
Page(s)	Electronic publication (Ibersensor129)

38

Author(s)	R.L. Guerreiro, C.D. Matos, M.G.F. Sales
Title	Colorimetric Sensor for Chlopromazine in aquaculture samples
Conference	7th Ibero-American Congress on Sensors-IBERSENSOR 2010
City,Country	Lisbon, Portugal
Date(s)	November 9-11, 2010
Page(s)	Electronic publication (Ibersensor130)

39

Author(s)	A.J. Duarte, M.C.V.F. Vaz, J.C.G. Esteves da Silva
Title	Quantum dots com núcleo de CdTe como sensores de pH
Conference	7th Ibero-American Congress on Sensors-IBERSENSOR 2010
City,Country	Lisbon, Portugal
Date(s)	November 9-11, 2010
Page(s)	Electronic publication (Ibersensor134)

40

Author(s)	V.C. Fernandes, V. Domingues, N. Mateus, C. Delerue-Matos
Title	Evaluation of the QuEChERS sample preparation approach for the analysis of organochlorine pesticides in strawberry jams
Conference	XVI Encontro Luso-Galego de Química
City,Country	Aveiro, Portugal
Date(s)	November 10-12, 2010
Page(s)	159

41

Author(s)	M. Oliveira, C. Curto, S. Morais, C. Delerue-Matos
Title	Differentiation of pure origin coffees by high resolution continuum source atomic absorption spectrometry
Conference	XVI Encontro Luso-Galego de Química
City,Country	Aveiro, Portugal
Date(s)	November 10-12, 2010
Page(s)	199

42

Author(s)	A. Plácido, P. Paíga, H. Carrelhas, C. Delerue-Matos, M.B.P.P. Oliveira
Title	Sal no Pão: Monitorização dos teores de sódio em massa de pão, antes e após cozedura
Conference	XVI Encontro Luso-Galego de Química
City,Country	Aveiro, Portugal
Date(s)	November 10-12, 2010
Page(s)	208

43

Author(s)	S. Rocha, C. Mansilha, C. Pinho, V. Domingues, P. Gameiro,
Title	Survey of bisphenol A in plastic bottles by gas chromatography tandem mass spectrometry
Conference	XVI Encontro Luso-Galego de Química
City,Country	Aveiro, Portugal
Date(s)	November 10-12, 2010
Page(s)	214

44

Author(s)	A. Sousa, S. Morais, C. Delerue-Matos, M.P. Gonçalves
Title	Traditional vs. microwave-assisted extraction of native agar from the invasive seaweed *Gracilaria vermiculophylla*
Conference	XVI Encontro Luso-Galego de Química
City,Country	Aveiro, Portugal
Date(s)	November 10-12, 2010
Page(s)	238

45

Author(s)	M.J. Ramalhosa, P. Paíga, S. Morais, C. Delerue-Matos, M.B.P.P. Oliveira
Title	Dietary exposure to polycyclic aromatic hydrocarbons from chub mackerel (S*comber japonicus*)
Conference	European Federation of Food Science & Technology 2010
City,Country	Dublin, Ireland
Date(s)	November 10-12, 2010
Page(s)	PS3.9

46

Author(s)	M.J. Ramalhosa, P. Paíga, E. Mendes, S. Casal, S. Morais, C. Delerue-Matos, M.B.P.P. Oliveira
Title	Effect of freezing on the fatty acids composition of *Sardina pilchardus*
Conference	European Federation of Food Science & Technology 2010
City,Country	Dublin, Ireland
Date(s)	November 10-12, 2010
Page(s)	PS1.1

47

Author(s)	M.M.P.S. Neves, M.B. González-García, H.P.A. Nouws, A. Santos-Silva, C. Delerue-Matos, A. Costa-García
Title	Hybrid nanomaterials as immunosensors transducers for the detection of human antibodies directed against gliadins
Conference	NANOJASP2010
City,Country	Barcelona, Spain
Date(s)	November 29-30, 2010
Page(s)	*(tbc)*

1.2.4. Presentations in national conferences

1.2.4.1. Oral

1

Author(s)	M.J. Ramalhosa, S. Morais, M.B.P.P. Oliveira, C. Delerue-Matos
Title	Controlo de Hidrocarbonetos Aromáticos Policíclicos em Pescado
Conference	Curso de Produção e Tecnologia do Pescado
City,Country	Bragança, Portugal
Date(s)	April 23-24, 2010
Page(s)	n/a

2

Author(s)	V. Domingues
Title	Os organoclorados na cadeia trófica
Conference	14º Congresso Português de Obesidade
City,Country	Porto, Portugal
Date(s)	November 26-28, 2010
Page(s)	S14.4

3

Author(s)	J.C.G. Esteves da Silva, H. Gonçalves, A. Duarte
Title	Synthesis of Fluorescent Nanomaterials as Nanosensors
Conference	10th National Meeting on Photochemistry
City,Country	Porto, Portugal
Date(s)	December 9-10, 2010
Page(s)	OC3

1.2.4.2. Poster

1

Author(s)	S.A.A. Almeida, M.C.B.S.M. Montenegro, M.G.F. Sales
Title	Effect of dimethyldioctadecylammonium bromide on the potenciometric determination of sulfamethoxazole
Conference	IJUP 10, 3rd meeting of young researchers at UP
City,Country	Porto, Portugal
Date(s)	February 17-19, 2010
Page(s)	243

2

Author(s)	T.S.C.R. Rebelo, M.G.F. Sales
Title	Trimethoprim molecularly-imprinted polymers for potentiometric sensing units
Conference	IJUP 10, 3rd meeting of young researchers at UP
City,Country	Porto, Portugal
Date(s)	February 17-19, 2010
Page(s)	244

3

Author(s)	S. Silva, T. Fernandes, P. Paíga, C. Delerue-Matos, M. Conceição Branco
Title	Determination of ibuprofen in water using solid-phase extraction (SPE) and liquid chromatography (LC)
Conference	IJUP 10, 3rd meeting of young researchers at UP
City,Country	Porto, Portugal
Date(s)	February 17-19, 2010
Page(s)	245

4

Author(s)	S. Rocha, C. Pinho, V.F. Domingues, C. Mansilha, P. Gameiro
Title	Determination of endocrine-disrupting compounds in water by gas chromatography with mass spectrometric detection
Conference	IJUP 10, 3rd meeting of young researchers at UP
City,Country	Porto, Portugal
Date(s)	February 17-19, 2010
Page(s)	252

5

Author(s)	F. Dias, C. Alves, S. Morais, S. Casal, C. Delerue-Matos, M.B.P.P. Oliveira
Title	Contribution of instant coffee substitutes to chromium daily intake
Conference	IJUP 10, 3rd meeting of young researchers at UP
City,Country	Porto, Portugal
Date(s)	February 17-19, 2010
Page(s)	276

6

Author(s)	C. Alves, F. Dias, S. Morais, S. Casal, C. Delerue-Matos, M.B.P.P. Oliveira
Title	Nickel analysis of coffee substitutes by high resolution continuum source graphite furnace atomic absorption spectrometry
Conference	IJUP 10, 3rd meeting of young researchers at UP
City,Country	Porto, Portugal
Date(s)	February 17-19, 2010
Page(s)	279

7

Author(s)	M. Machado, M.J. Ramalhosa, P. Paíga, S. Morais, C. Delerue-Matos, M.B.P.P. Oliveira
Title	Selection of solvent for polycyclic aromatic hydrocarbons microwave-assisted extraction from fish
Conference	IJUP 10, 3rd meeting of young researchers at UP
City,Country	Porto, Portugal
Date(s)	February 17-19, 2010
Page(s)	328

8

Author(s)	M. Machado, A. Silva, S. Casal, M.J. Ramalhosa, E. Mendes, P. Paíga, S. Morais, C. Delerue-Matos, M.B.P.P. Oliveira
Title	Fatty acid profile of horse mackerel (Trachurus trachurus) from the Atlantic north-eastern coast
Conference	IJUP 10, 3rd meeting of young researchers at UP
City,Country	Porto, Portugal
Date(s)	February 17-19, 2010
Page(s)	330

9

Author(s)	C. Cunha, E. Moura, L. Santos, A. Araújo, C. Delerue-Matos, M. Montenegro
Title	Development of a multicommutated flow system with chemiluminometric detection for the analysis of paracetamol
Conference	IJUP 10, 3rd meeting of young researchers at UP
City,Country	Porto, Portugal
Date(s)	February 17-19, 2010
Page(s)	373

10

Author(s)	R.B. Queirós, P.A.R. Tafulo, M.C.D. Matos, M.G.F. Sales
Title	Antioxidant Capacity of Commecial Drinks: comparison of beers, soft drinks and wines
Conference	IJUP 10, 3rd meeting of young researchers at UP
City,Country	Porto, Portugal
Date(s)	February 17-19, 2010
Page(s)	385

11

Author(s)	R.M.B. Castro, M.G.F. Sales
Title	Host-tailored sensors for Dopamine potentiometric measurements
Conference	IJUP 10, 3rd meeting of young researchers at UP
City,Country	Porto, Portugal
Date(s)	February 17-19, 2010
Page(s)	429

12

Author(s)	T.I.B. Silva, F.T.C. Moreira, M.G F. Sales
Title	Screening stick for norfloxacin detection
Conference	IJUP 10, 3rd meeting of young researchers at UP
City,Country	Porto, Portugal
Date(s)	February 17-19, 2010
Page(s)	430

13

Author(s)	I.P.R. Moreira, F.T.C. Moreira, C. Delerue-Matos, M.G.F. Sales
Title	Antioxidant capacity of energy drinks
Conference	IJUP 10, 3rd meeting of young researchers at UP
City,Country	Porto, Portugal
Date(s)	February 17-19, 2010
Page(s)	432

14

Author(s)	L.A.A.N.A. Truta, J.R.L. Guerreiro, C.D. Matos, M.G F. Sales
Title	FIA spectrophotometric system for the assessment of antioxidant capacity of commercial drinks by TRAP method
Conference	IJUP 10, 3rd meeting of young researchers at UP
City,Country	Porto, Portugal
Date(s)	February 17-19, 2010
Page(s)	433

15

Author(s)	P.A.R.Tafulo, R.B. Queirós, M.C.D. Matos, M.G.F. Sales
Title	Antioxidant capacity of commercial beers: effect of the method
Conference	IJUP 10, 3rd meeting of young researchers at UP
City,Country	Porto, Portugal
Date(s)	February 17-19, 2010
Page(s)	442

16

Author(s)	C. Coelho, S. Freitas, A. Costa, D. Rede, J. Maia, M.I. Neves, M. Correia, C. Delerue-Matos, M.B.P.P. Oliveira
Title	Protein and non-protein nitrogen fractions of commercial milk samples
Conference	IJUP 10, 3rd meeting of young researchers at UP
City,Country	Porto, Portugal
Date(s)	February 17-19, 2010
Page(s)	450

17

Author(s)	C. Coelho, S. Freitas, A. Costa, M. Correia, C. Delerue-Matos, M.B.P.P. Oliveira
Title	Teores de azoto proteico e não proteico em amostra de leite comercial
Conference	I Encontro em Técnicas de Caracterização e Análise Química
City,Country	Braga, Portugal
Date(s)	May 7, 2010
Page(s)	P1

18

Author(s)	D. Rede, J. Maia, M.I. Neves, M. Correia, C. Delerue-Matos, M.B.P.P. Oliveira
Title	Avaliação dos teores de nitratos e nitritos em amostras de leite
Conference	I Encontro em Técnicas de Caracterização e Análise Química
City,Country	Braga, Portugal
Date(s)	May 7, 2010
Page(s)	P2

19

Author(s)	I.M.C. Almeida, R.S. Pinho, S.I. Silva, C. Delerue-Matos, M.T. Oliva-Teles, M.B.P.P. Oliveira
Title	Análise mineral das sementes oleaginosas de cinco espécies vegetais da região nordeste do Brasil por espectroscopia de absorção atómica com fonte contínua
Conference	I Encontro em Técnicas de Caracterização e Análise Química
City,Country	Braga, Portugal
Date(s)	May 7, 2010
Page(s)	P4

20

Author(s)	F. Dias, C. Alves, S. Morais, S. Casal, C. Delerue-Matos, M.B.P.P. Oliveira
Title	Aplicação da Espectrometria de Absorção Atómica de Fonte de Luz Contínua e de Alta Resolução à Determinação de Metais Pesados em Café Solúvel e Sucedâneos
Conference	I Encontro em Técnicas de Caracterização e Análise Química
City,Country	Braga, Portugal
Date(s)	May 7, 2010
Page(s)	P5

21

Author(s)	J.C. Pinto, S.R. Sousa, C. Delerue-Matos, M.T. Oliva-Teles
Title	Espectrofotometria de absorção atómica de alta resolução com fonte contínua em análise vestigiária de metais em chás
Conference	I Encontro em Técnicas de Caracterização e Análise Química
City,Country	Braga, Portugal
Date(s)	May 7, 2010
Page(s)	P6

22

Author(s)	S. Silva, M.G.F. Sales
Title	Monitorização de cobre em vinhos verdes
Conference	I Encontro em Técnicas de Caracterização e Análise Química
City,Country	Braga, Portugal
Date(s)	May 7, 2010
Page(s)	P7

23

Author(s)	L.A.A.N.A. Truta, J.R.L. Guerreiro, C.D. Matos, M.G.F. Sales
Title	Determinação rápida da capacidade antioxidante pelo método TRAP: preparação em linha do reagente
Conference	I Encontro em Técnicas de Caracterização e Análise Química
City,Country	Braga, Portugal
Date(s)	May 7, 2010
Page(s)	P15

24

Author(s)	R.M.B. Castro, M.G.F. Sales
Title	Host-tailored sensors for dopamine potentiometric measurements
Conference	I Encontro em Técnicas de Caracterização e Análise Química
City,Country	Braga, Portugal
Date(s)	May 7, 2010
Page(s)	P16

25

Author(s)	T.I.B. Silva, F.T.C. Moreira, M.G.F. Sales
Title	Screening stick for norfloxacin detection
Conference	I Encontro em Técnicas de Caracterização e Análise Química
City,Country	Braga, Portugal
Date(s)	May 7, 2010
Page(s)	P17

26

Author(s)	F.T.C. Moreira, M.G.F. Sales
Title	Screening stick for tetracycin detection
Conference	I Encontro em Técnicas de Caracterização e Análise Química
City,Country	Braga, Portugal
Date(s)	May 7, 2010
Page(s)	P18

27

Author(s)	J.R.G. Botelho, M.G.F. Sales
Title	A cheaper method for tetracycline's detection in aquaculture
Conference	I Encontro em Técnicas de Caracterização e Análise Química
City,Country	Braga, Portugal
Date(s)	May 7, 2010
Page(s)	P19

28

Author(s)	J.R.L. Guerreiro, M.G.F. Sales
Title	Determinação colorimétrica de clorpromazina em amostras de aquacultura
Conference	I Encontro em Técnicas de Caracterização e Análise Química
City,Country	Braga, Portugal
Date(s)	May 7, 2010
Page(s)	P20

29

Author(s)	S. Viswanathan, C. Delerue-Matos
Title	Development of a gold nanoparticle tethered self assembled monolayers for electrochemical biosensors
Conference	I Encontro em Técnicas de Caracterização e Análise Química
City,Country	Braga, Portugal
Date(s)	May 7, 2010
Page(s)	P23

30

Author(s)	T.S.C.R. Rebelo, M.G.F. Sales
Title	Efeito do aditivo aniónico na resposta potenciométrica ao trimetropim
Conference	I Encontro em Técnicas de Caracterização e Análise Química
City,Country	Braga, Portugal
Date(s)	May 7, 2010
Page(s)	P25

31

Author(s)	T. Fernandes, S. Silva, P. Paíga, C. Delerue-Matos, M.C.B. Montenegro
Title	Development of a method for determination of ibuprofen in water resource by solid-phase extraction and liquid chromatography
Conference	I Encontro em Técnicas de Caracterização e Análise Química
City,Country	Braga, Portugal
Date(s)	May 7, 2010
Page(s)	P30

32

Author(s)	A.J. Duarte, M.C.V.F. Vaz, J.C.G. Esteves da Silva
Title	Quantum dots synthesis and functionalization as luminescent nanosensors
Conference	10th National Meeting on Photochemistry
City,Country	Porto, Portugal
Date(s)	December 9-10, 2010
Page(s)	P16

1.3. OTHER ACTIVITIES

Organization of conferences

On the 15th of March 2010 a seminar entitled "Mycotoxins in Food and biological fluids" ("Micotoxinas em Alimentos e Fluídos biológicos") was organized at ISEP with around 200 participants.

Internationalization

Co-orientation with the University of Léon (Spain) of the PhD studies of Mónica Alexandra Oliveira Dias Teixeira.

Co-orientation with the University of Oviedo (Spain) of the PhD studies of Marta Maria Pereira da Silva Neves.

Collaboration with the University of Oviedo (Spain) and the University of Pernambuco (Brasil) of the PhD studies of Maria de Fátima de Sá Barroso (FF/UP).

Governmental funding (pre-graduation)

In 2009, 2 grants with the duration of one year (October 2009 - September 2010) from the "Concurso de Bolsas de Integração na Investigação para 5000 estudantes do Ensino Superior" (FCT) were given to the following students:

1. Marcela de Jesus da Cunha Oliveira, "*Estudo electroquímico de pesticidas".*
2. Isabel Patrícia Ribeiro Moreira, *"Determinação potenciométrica de antimicrobianos em amostras de aquaculture"*.

Launched in June 1996, the Ciência Viva programme is the contribution of the Ministry of Science and Technology to the promotion of a scientific and technological culture among the Portuguese population. In the sub-category "Science in the Holidays" 3 programs, with the duration of 1 week (20 or 40 hours), were organized: "Segurança à tua mesa" and "Crime Sob Investigação no ISEP" (organized twice).

In cooperation with a local professional high school (AESBUC – Universidade Católica), 1 student realized a professional training period of 730 hours:

1. Liliana Filipa Sousa Barros, *"Determinação de minerais em amostras alimentares"*.

In cooperation with a local professional high school (Escola Secundária Infante D. Henrique), 4 students realized a professional training period of 260 hours:

1. Patrícia Alexandra Santos Pacheco, *"Determinação de pesticidas organoclorados em solos utilizados em agricultura biológica e protecção integrada"*.
2. Cristiana Filipa da Silva, *"Avaliação do grau de exposição da população portuguesa à ocratoxina A: consumo de pão"*.
3. Cátia Maria Oliveira da Silva Carvalho, *"Avaliação dos Teores de Sal em Pão"*.
4. Sara Eduarda da Costa Gonçalves, *"Determinação de minerais em amostras alimentares"*.

1.4. FUTURE RESEARCH

Goals for 2011

Based on future research funding the following proposals will be executed during the period of three years.

1. Project title: *Nanobiosensor for rapid detection of brucella in milk and other dairy products*

In this proposal; we interest to develop electrochemical immunosensor (based on antibodyantigen) and genosensors (based on DNA hybridization specific interactions). Our proposed biosensor design can be, in principle, classified into two types:

(i). Ion channel biosensor.

(ii). Gold nanoarrays biosensor.

The overall aim of this project is to develop an efficient, user friendly biosensor based on electrochemical transduction for rapid detection of Brucella abortus and Brucella melitensis.

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2. Project title: *Nano-electrode arrays Biosensor for Early and Decentralized Breast-Cancer Diagnosis*

The overall goal of this project is to develop and characterize an electrochemical biosensing nanosystem for the rapid point-of-care devices for breast-cancer screening. We proposed the development of gold nano electrode arrays and SIP nanoarrays based immunosensors for the detection of a cancer maker protein, namely Carcino-embryonic antigen (CEA), Cancer antigen 15-3 (CA 15-3), Human Epidermal growth factor Receptor 2 (Her-2), Progesterone receptors(PR), Estrogen receptors (ER) and circulating Tumor cells (CTCs).

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3. Project title: *Electrochemical synthesis of molecularly imprinted polymer film electrode for selective determination of pesticides*

A pesticide-templated molecularly imprinted polymer thin film will be electrodeposited onto a screen printed carbon electrode using conducting polymer or silicon precursor. The surface morphology of the imprinted film will be characterized by scanning electron microscope. The binding performance of the film with pesticide was examined with voltammetric techniques. This type of imprinted conducting polymer or sol-gel film electrode will be expected to be a versatile sensing tool for the selective determination of pesticides in real samples.

Approved funding *(projects to be started in 2011)*

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Pending funding

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2. ENVIRONMENTAL CONTROL AND REMEDIATION

TEAM MEMBERS

PERMANENT MEMBERS

Cristina Maria Fernandes Delerue Alvim de Matos
Florinda Figueiredo Martins
Maria Conceição Carvalho Benta de Oliveira Neves
Maria Teresa Pereira de Oliva Teles Moreira
Olga Manuela Matos de Freitas
Simone Barreira Morais
Sónia Adriana Ribeiro da Cunha Figueiredo
Susana Maria Ribeiro e Sousa Mendes de Freitas
Valentina Maria Fernandes Domingues
José Tomás Veiga Soares de Albergaria
Maria Aurora Soares da Silva
Bruno José Rocha Pereira
Sérgio Alberto Cruz Monteiro de Morais
Paula Celeste Baptista Paíga
Maria Isabel Viana de Brito Limpo de Serra

GRANT HOLDERS

António Carlos Alves Soares
Cátia Filipa Assunção de Sousa
Irene Cristina de Sousa Azevedo
Pedro Romeu da Silva Soares
Sandra Ferreira de Sousa Neto

Ph.D. STUDENTS

Antonio Vega Y de la Fuente
Maria Manuela Martins de Carvalho
Virgínia Maria Monteiro Cruz Fernandes
Sérgio Alberto Morais

MSc. STUDENTS

Ana Sofia Grade Pereira da Silva
Carlos Miguel Moreira da Mota
Diogo da Cunha Conde de Pinho
Hugo Rafael de Oliveira Lacerda
Manuel Joaquim Vilariça
Maria Teresa de Oliveira Pinho
Raquel Filipa Moutinho Vieira

VOLUNTEERS

Ivo Emanuel Moreira Rodrigues
Maria José Mendes Passeira
Pedro Romeu da Silva Soares

OUTPUT INDICATORS (SUMMARY)

PROJECTS	
FCT-funded	3
Non-FCT funded	3
PUBLICATIONS	
Papers (ISI-Web of Science)	10
Proceedings papers *(international)*	10
Ph.D. theses	1
MSc theses	7
PRESENTATIONS *(international)*	
Oral	2
Poster	15
PRESENTATIONS *(national)*	
Oral	1
Poster	4
CONFERENCES	
Organization	--

2.1. Sub-areas in Environmental Control and Remediation

In the subsequent sections a summary of some of the achievements in environmental control and remediation in 2010 are presented, for further reading the consultation of the published papers (section 2.2.2.) is recommended.

2.1.1. Waste management and toxicological evaluation

Simulation and life cycle assessment of process design alternatives for biodiesel production from waste vegetable oils

This study uses the process simulator ASPEN Plus® and Life Cycle Assessment (LCA) to compare three process design alternatives for biodiesel production from waste vegetable oils that are: the conventional alkali-catalyzed process including a free fatty acids (FFAs) pre-treatment, the acid-catalyzed process, and the supercritical methanol process using propane as co-solvent. Results show that the supercritical methanol process using propane as co-solvent is the most environmentally favorable alternative. Its smaller steam consumption in comparison with the other process design alternatives leads to a lower contribution to the potential environmental impacts (PEI's). The acid-catalyzed process generally shows the highest PEI's, in particular due to the high energy requirements associated with methanol recovery operations.

Published in: *Journal of Cleaner Production 18 (13) (2010) 1251-1259.*

2.1.2. Soil and groundwater remediation

Remediation of humic soils combining soil vapor extraction and bioremediation: Benzene

This work reports the study of the combination of soil vapor extraction (SVE) with bioremediation (BR) to remediate soils contaminated with benzene. Soils contaminated with benzene with different water and natural organic matter contents were studied. The main goals were: (i) evaluate the performance of SVE regarding the remediation time and the process efficiency; (ii) study the combination of both technologies in order to identify the best option capable to achieve the legal clean up goals; and (iii) evaluate the influence of soil water content (SWC) and natural organic matter (NOM) on SVE and BR. The remediation experiments performed in soils contaminated with benzene allowed concluding that: (i) SVE presented (a) efficiencies above 92% for sandy soils and above 78% for humic soils; (b) and remediation times from 2 to 45 h, depending on the soil; (ii) BR showed to be an efficient technology to complement SVE; (iii) (a) SWC showed minimum impact on SVE when high airflow rates were used and led to higher remediation times for lower flow rates; (b) NOM as source of microorganisms and nutrients enhanced BR but hindered the SVE due the limitation on the mass transfer of benzene from the soil to the gas phase.

Published in: *Chemosphere 80 (8) (2010) 823-828.*

2.1.3. Removal of toxic compounds by means of adsorption strategies

Copper, nickel and zinc removal by peanut hulls: batch and column studies in mono, tri-component systems and with real effluent

The main goal of this research study was the removal of Cu(II), Ni(II) and Zn(II) from aqueous solutions using peanut hulls. This work was mainly focused on the following aspects: chemical characterization of the biosorbent, kinetic studies, study of the pH influence in mono-component systems, equilibrium isotherms and column studies, both in mono and tri-component systems, and with a real industrial effluent from the electroplating industry. The chemical characterization of peanut hulls showed a high cellulose (44.8%) and lignin (36.1%) content, which favours biosorption of metal cations. The kinetic studies performed indicate that most of the sorption occurs in the first 30 min for all systems. In general, a pseudo-second order kinetics was followed, both in mono and tri-component systems. The equilibrium isotherms were better described by Freundlich model in all systems. Peanut hulls showed higher affinity for copper than for nickel and zinc when they are both present. The pH value between 5 and 6 was the most favourable for all systems. The sorbent capacity in column was 0.028 and 0.025 mmol g^{-1} for copper, respectively in mono and tri-component systems. A decrease of capacity for copper (50%) was observed when dealing with the real effluent. The Yoon-Nelson, Thomas and Yan's models were fitted to the experimental data, being the latter the best fit.

Published in: *Global NEST Journal 12 (2) (2010) 206-214.*

2.2. OUTPUT INDICATORS

2.2.1. Projects

2.2.1.1. FCT-funded projects *(includes collaborations with other institutions)*

1

Reference	PTDC/ECM/68056/2006
Title	Remediation of contaminated soils combining vapour extraction and biological processes: time and efficiency forecasting
Responsible investigator	Cristina Maria Fernandes Delerue Alvim de Matos
Principal contractor	Instituto de Ciências e Tecnologias Agrárias e Agro-Alimentares-Porto (ICETA-Porto/UP)
Participating institution(s)	Faculdade de Engenharia da Universidade do Porto (FE/UP)
Duration	36 months
Starting date	January 1, 2008
Funding source	Fundação para a Ciência e Tecnologia
Amount (total)	€ 52 555
Amount (ICETA)	€ 39 955

2

Reference	PTDC/ECM/103141/2008
Title	Rehabilitation of pharmaceuticals-contaminated soils
Responsible investigator	Cristina Maria Fernandes Delerue Alvim de Matos
Principal contractor	Instituto de Ciências e Tecnologias Agrárias e Agro-Alimentares-Porto (ICETA-Porto/UP)
Participating institution(s)	Universidade de Coimbra (UC) Faculdade de Engenharia da Universidade do Porto (FE/UP)
Duration	36 months
Starting date	April 1, 2010
Funding source	Fundação para a Ciência e Tecnologia
Amount (total)	€ 124 389
Amount (ICETA)	€ 98 764

3

Reference	PTDC/AAC-AMB/102796/2008
Title	Effects of atmospheric non-biological pollutants on pollen grains
Responsible investigator	Joaquim Carlos Gomes Esteves da Silva (FC/UP))
Principal contractor	Associação para o Desenvolvimento da Faculdade de Ciências (ADFC/FC/UP)
Participating institution(s)	Laboratório Nacional de Energia e Geologia, I.P. (LNEG) Centro de Geologia da Universidade do Porto (CG/FC/UP)
Duration	36 months
Starting date	February 8, 2010
Funding source	Fundação para a Ciência e Tecnologia (FCT)
Amount (total)	€ 167 000

2.2.1.2. Non-FCT funded projects *(includes collaborations with other institutions)*

1

Reference	SI IDT - 5551/2009
Title	Development of keratin films from gallinaceous and bovine wastes
Responsible investigator	António Alfredo Crispim Ribeiro (IPP/ISEP/DEQ)
Principal contractor	Curtumes Aveneda, Lda
Participating institution(s)	Instituto Superior de Engenharia do Porto (ISEP/IPP) Faculdade de Engenharia da Universidade do Porto (FE/UP)
Duration	24 months
Starting date	April 1, 2009
Funding source	Agência de Inovação, S.A. (ADI)
Amount (total)	€ 261 049,1
Amount (ICETA)	€ € 78 137 (divided with CIETI-ISEP)

2

Reference	Projectos Pluridisciplinares - Iniciação à Investigação na Universidade do Porto (IJUP) - Edição de 2009 (#74)
Title	Efficiency evaluation of a vegetable source coagulant/flocculant in the treatment of waters and wastewaters
Responsible investigator	Rui Alfredo da Rocha Boaventura (FE/UP)
Principal contractor	Faculdade de Engenharia da Universidade do Porto (FE/UP)
Participating institution(s)	Instituto de Ciências e Tecnologias Agrárias e Agro-Alimentares-Porto (ICETA-Porto/UP)
Duration	12 months
Starting date	November 1, 2009
Funding source	Universidade do Porto
Amount (total)	€ 4 000
Amount (ICETA)	€ 2 000

3

Reference	Projectos Pluridisciplinares - Iniciação à Investigação na Universidade do Porto (IJUP) - Edição de 2010 (#24)
Title	Utilização de queratina de pêlo, penas e cabelo para produção de filmes com aplicação na agricultura
Responsible investigator	Maria do Pilar Figueroa Gonçalves (FE/UP)
Principal contractor	Faculdade de Engenharia da Universidade do Porto (FE/UP)
Participating institution(s)	Instituto de Ciências e Tecnologias Agrárias e Agro-Alimentares-Porto (ICETA-Porto/UP)
Duration	12 months
Starting date	December 1, 2010
Funding source	Universidade do Porto
Amount (total)	€ 3 500
Amount (ICETA)	€ 3 500

2.2.2. Publications

2.2.2.1. Papers in peer-reviewed Journals *(ISI – Web of Science)*

1

Authors	S.A. Morais, C. Delerue-Matos
Title	A Perspective on LCA Application in Site Remediation Services: Critical Review of Challenges
Journal	Journal of Harzardous Materials 175 (1-3) (2010) 12-22
Abstract	The remediation of contaminated sites supports the goal of sustainable development but may also have environmental impacts at a local, regional and global scale. Life cycle assessment (LCA) has increasingly been used in order to support site remediation decision-making. This review article discusses existing LCA methods and proposed models focusing on critical decisions and assumptions of the LCA application to site remediation activities. It is concluded that LCA has limitations as an adequate holistic decision-making tool since spatial and temporal differentiation of non-global impacts assessment is a major hurdle in site remediation LCA. Moreover, a consequential LCA perspective should be adopted when the different remediation services to be compared generate different site's physical states, displacing alternative post-remediation scenarios. The environmental effects of the post-remediation stage of the site is generally disregarded in the past site remediation LCA studies and such exclusion may produce misleading conclusions and misdirected decision-making. In addition, clear guidance accepted by all stakeholders on remediation capital equipment exclusion and on dealing with multifunctional processes should be developed for site remediation LCA applications.

2

Authors	L.H.M.L.M. Santos, A.N. Araújo, A. Fachini, A. Pena, C. Delerue-Matos, M.C.B.S.M. Montenegro
Title	Ecotoxicological Aspects related to the presence of Pharmaceuticals in the Aquatic Environment
Journal	Journal of Harzardous Materials 175 (1-3) (2010) 45-95
Abstract	Pharmaceuticals are biologically active and persistent substances which have been recognized as a continuing threat to environmental stability. Chronic ecotoxicity data as well as information on the current distribution levels in different environmental compartments continue to be sparse and are focused on those therapeutic classes that are more frequently prescribed and consumed. Nevertheless, they indicate the negative impact that these chemical contaminants may have on living organisms, ecosystems and ultimately, public health. This article reviews the different contamination sources as well as fate and both acute and chronic effects on non-target organisms. An extensive review of existing data in the form of tables, encompassing many therapeutic classes is presented.

3

Authors A. Fiúza, A. Silva, G. Carvalho, A.V. de la Fuente, C. Delerue-Matos
Title Heterogeneous kinetics of the reduction of chromium (VI) by elemental iron
Journal Journal of Harzardous Materials 175 (1-3) (2010) 1042-1047
Abstract Zero valent iron (ZVI) has been extensively used as a reactive medium for the reduction of Cr(VI) to Cr(III) in reactive permeable barriers. The kinetic rate depends strongly on the superficial oxidation of the iron particles used and the preliminary washing of ZVI increases the rate. The reaction has been primarily modelled using a pseudo-first-order kinetics which is inappropriate for a heterogeneous reaction. We assumed a shrinking particle type model where the kinetic rate is proportional to the available iron surface area, to the initial volume of solution and to the chromium concentration raised to a power α which is the order of the chemical reaction occurring at surface. We assumed α = 2/3 based on the likeness to the shrinking particle models with spherical symmetry. Kinetics studies were performed in order to evaluate the suitability of this approach. The influence of the following parameters was experimentally studied: initial available surface area, chromium concentration, temperature and pH. The assumed order for the reaction was confirmed. In addition, the rate constant was calculated from data obtained in different operating conditions. Digital pictures of iron balls were periodically taken and the image treatment allowed for establishing the time evolution of their size distribution.

4

Authors F. Martins, C.A.V. Costa
Title Economic, environmental and mixed objective functions in non-linear process optimization using simulated annealing and tabu search
Journal Computers and Chemical Engineering 34 (3) (2010) 306-317
Abstract Screening of topologies developed by hierarchical heuristic procedures can be carried out by comparing their optimal performance. In this work we will be exploiting mono-objective process optimization using two algorithms, simulated annealing and tabu search, and four different objective functions: two of the net present value type, one of them including environmental costs and two of the global potential impact type. The hydrodealkylation of toluene to produce benzene was used as case study, considering five topologies with different complexities mainly obtained by including or not liquid recycling and heat integration. The performance of the algorithms together with the objective functions was observed, analyzed and discussed from various perspectives: average deviation of results for each algorithm, capacity for producing high purity product, screening of topologies, objective functions robustness in screening of topologies, trade-offs between economic and environmental type objective functions and variability of optimum solutions.

5

Authors S. Morais, A.A. Martins, T.M. Mata
Title Comparison of Allocation Approaches in Soybean Biodiesel Life Cycle Assessment
Journal Journal of the Energy Institute 83 (1) (2010) 48-55
Abstract This work shows the influence of using different allocation approaches when modelling the inventory analysis in a soybean biodiesel life cycle assessment (LCA). Results obtained using mass, energy and economic based allocations are compared, focusing on the following aspects: normalised potential environmental impact (PEI) categories, total PEI and relative contributions to the total PEI from each life cycle stage and environmental impact category. Similar results are obtained either using economic and energy based allocations. However, different results are obtained when mass based allocation is used when compared with the other two. This study also illustrates that using different allocation approaches in biodiesel LCA may influence the final conclusions, especially in comparative assertions, emphasising the need to perform a sensitivity analysis in the LCA interpretation step.

6

Authors S. Morais, T.M. Mata, A.A. Martins, G.A. Pinto, C.A.V. Costa
Title Simulation and life cycle assessment of process design alternatives for biodiesel production from waste vegetable oils
Journal Journal of Cleaner Production 18 (13) (2010) 1251-1259
Abstract This study uses the process simulator ASPEN Plus® and Life Cycle Assessment (LCA) to compare three process design alternatives for biodiesel production from waste vegetable oils that are: the conventional alkali-catalyzed process including a free fatty acids (FFAs) pre-treatment, the acid-catalyzed process, and the supercritical methanol process using propane as co-solvent. Results show that the supercritical methanol process using propane as co-solvent is the most environmentally favorable alternative. Its smaller steam consumption in comparison with the other process design alternatives leads to a lower contribution to the potential environmental impacts (PEI's). The acid-catalyzed process generally shows the highest PEI's, in particular due to the high energy requirements associated with methanol recovery operations.

7

Authors A.A. Soares, J.T. Albergaria, V.F. Domingues, M.C.M. Alvim-Ferraz, C. Delerue-Matos
Title Remediation of humic soils combining soil vapor extraction and bioremediation: Benzene
Journal Chemosphere 80 (8) (2010) 823-828
Abstract This work reports the study of the combination of soil vapor extraction (SVE) with bioremediation (BR) to remediate soils contaminated with benzene. Soils contaminated with benzene with different water and natural organic matter contents were studied. The main goals were: (i) evaluate the performance of SVE regarding the remediation time and the process efficiency; (ii) study the combination of both technologies in order to identify the best option capable to achieve the legal clean up goals; and (iii) evaluate the influence of soil water content (SWC) and natural organic matter

(NOM) on SVE and BR. The remediation experiments performed in soils contaminated with benzene allowed concluding that: (i) SVE presented (a) efficiencies above 92% for sandy soils and above 78% for humic soils; (b) and remediation times from 2 to 45 h, depending on the soil; (ii) BR showed to be an efficient technology to complement SVE; (iii) (a) SWC showed minimum impact on SVE when high airflow rates were used and led to higher remediation times for lower flow rates; (b) NOM as source of microorganisms and nutrients enhanced BR but hindered the SVE due the limitation on the mass transfer of benzene from the soil to the gas phase.

8

Authors N. Ribeiro, S.R. Sousa, F.J. Monteiro

Title Influence of crystallite size of nanophased hydroxyapatite on fibronectin and osteonectin adsorption and on MC3T3-E1 osteoblast adhesion and morphology

Journal Journal of Colloid and Interface Science 351 (2) (2010) 398-406

Abstract The characteristic topographical features (crystallite dimensions, surface morphology and roughness) of bioceramics may influence the adsorption of proteins relevant to bone regeneration. This work aims at analyzing the influence of two distinct nanophased hydroxyapatite (HA) ceramics, HA725 and HA1000 on fibronectin (FN) and osteonectin (ON) adsorption and MC3T3-E1 osteoblast adhesion and morphology. Both substrates were obtained using the same hydroxyapatite nanocrystals aggregates and applying the sintering temperatures of 725 ºC and 1000 ºC, respectively. The two proteins used in this work, FN as an adhesive glycoprotein and ON as a counter-adhesive protein, are known to be involved in the early stages of osteogenesis (cell adhesion, mobility and proliferation). The properties of the nanoHA substrates had an important role in the adsorption behavior of the two studied proteins and clearly affected the MC3T3-E1 morphology, distribution and metabolic activity. HA1000 surfaces presenting slightly larger grain size, higher root-mean-square roughness (Rq), lower surface area and porosity, allowed for higher amounts of both proteins adsorbed. These substrates also revealed increased number of exposed FN cell-binding domains as well as higher affinity for osteonectin. Regarding the osteoblast adhesion results, improved viability and cell number were found for HA1000 surfaces as compared to HA725 ones, independently of the presence or type of adsorbed protein. Therefore the osteoblast adhesion and metabolic activity seemed to be more sensitive to surfaces morphology and roughness than to the type of adsorbed proteins.

9

Authors F.D. Oliveira, A.C. Soares, O.M. Freitas, S.A. Figueiredo

Title Copper, nickel and zinc removal by peanut hulls: batch and column studies in mono, tri-component systems and with real effluent

Journal Global NEST Journal 12 (2) (2010) 206-214

Abstract The main goal of this research study was the removal of Cu(II), Ni(II) and Zn(II) from aqueous solutions using peanut hulls. This work was mainly focused on the following aspects: chemical characterization of the biosorbent, kinetic studies, study of the pH influence in mono-component systems, equilibrium isotherms and column studies, both in mono and tri-component systems, and with a real industrial effluent from the electroplating industry. The chemical characterization of peanut hulls showed a high cellulose (44.8%) and lignin (36.1%) content, which favours biosorption of metal cations. The kinetic studies performed indicate that most of the sorption occurs in the first 30 min for all systems. In general, a pseudo-second order kinetics was followed, both in mono and tri-component systems. The equilibrium isotherms were better described by Freundlich model in all systems. Peanut hulls showed higher affinity for copper than for nickel and zinc when they are both present. The pH value between 5 and 6 was the most favourable for all systems. The sorbent capacity in column was 0.028 and 0.025 mmol g-1 for copper, respectively in mono and tri-component systems. A decrease of capacity for copper (50%) was observed when dealing with the real effluent. The Yoon-Nelson, Thomas and Yan's models were fitted to the experimental data, being the latter the best fit.

10

Authors J.T. Albergaria, M.C.M. Alvim-Ferraz, M.C.F. Delerue-Matos

Title Estimation of pollutant partition in sandy soils with different water contents

Journal Environmental Monitoring and Assessment 171 (1-4) (2010) 171-180

Abstract The objectives of this work were: (1) to identify an isotherm model to relate the contaminant contents in the gas phase with those in the solid and non-aqueous liquid phases; (2) to develop a methodology for the estimation of the contaminant distribution in the different phases of the soil; and (3) to evaluate the influence of soil water content on the contaminant distribution in soil. For sandy soils with negligible contents of clay and natural organic matter, contaminated with benzene, toluene, ethylbenzene, xylene, trichloroethylene (TCE), and perchloroethylene (PCE), it was concluded that: (1) Freundlich's model showed to be adequate to relate the contaminant contents in the gas phase with those in the solid and non-aqueous liquid phases; (2) the distribution of the contaminants in the different phases present in the soil could be estimated with differences lower than 10% for 83% of the cases; and (3) an increase of the soil water content led to a decrease of the amount of contaminant in the solid and non-aqueous liquid phases, increasing the amount in the other phases.

2.2.2.2. Proceedings papers *(international conferences)*

1

Author(s)	F. Martins, C.A.V. Costa
Title	Multiobjective optimization with economic and environmental objective functions using Modified Simulated Annealing
Conference	ESCAPE-20 European Symposium on Computer Aided Process Engineering
City/Country	Ischia, Naples, Italy
Date(s)	June 6-9, 2010
Page(s)	919-924

2

Author(s)	O. Freitas, C. Delerue-Matos, R. Boaventura
Title	Biosorption on brown marine algae for methylene blue removal
Conference	19th International Congress of Chemical and Process Engineering - CHISA 2010
City,Country	Prague, Czech Republic
Date(s)	August 28 – September 1, 2010
Page(s)	Electronic publication (1094)

3

Author(s)	A. Silva, O. Freitas, S. Figueiredo, I. Azevedo, A. Ferreira, A. Fiúza
Title	Treatment of groundwater contaminated by arsenic: study of operation conditions
Conference	19th International Congress of Chemical and Process Engineering - CHISA 2010
City,Country	Prague, Czech Republic
Date(s)	August 28 - September 1, 2010
Page(s)	Electronic publication (1288)

4

Author(s)	M. Carvalho, M.C. Vila, J. Soeiro Carvalho, V. Domingues, C. Delerue-Matos, M.T. Oliva-Teles, A. Fiúza
Title	Extensive methodology for preliminary bioventing tests – Application to a residual granitic soil contaminated with xylenes
Conference	11th International UFZ- Deltares/TNO Conference on Management of Soil, Groundwater and Sediment - ConSoil 2010
City,Country	Salzburg, Austria
Date(s)	September 22-24, 2010
Page(s)	Electronic publication (Theme 1A – Environmental footprint, A1-03)

5

Author(s)	A.C.M. Castro, J.P. Meixedo, T. Albergaria, C. Matos, S. Ribeiro, J. Gomes, J. Ribeiro, C. Fernandes, B. Rocha
Title	Soil sampling design and sampling techniques for soil properties monitoring – Common difficulties related to forest soils
Conference	11th International UFZ- Deltares/TNO Conference on Management of Soil, Groundwater and Sediment - ConSoil 2010
City,Country	Salzburg, Austria
Date(s)	September 22-24, 2010
Page(s)	Electronic publication (Theme A2 – Site Investigation: Monitoring & Screening, A2-17)

6

Author(s)	J.T. Albergaria, C.M. Delerue Matos, M.C.M. Alvim Ferraz
Title	Soil vapor extraction in soils contaminated with halogenated and non-halogenated hydrocarbons
Conference	11th International UFZ- Deltares/TNO Conference on Management of Soil, Groundwater and Sediment - ConSoil 2010
City,Country	Salzburg, Austria
Date(s)	September 22-24, 2010
Page(s)	Electronic publication (Theme A3 – Remediation Concepts & Technologies, A3-01)

7

Author(s)	A. Soares, J.T. Albergaria, V. Domingues, P. de Marco, C. Delerue-Matos
Title	Bioremediation of soils contaminated with benzene previously treated by soil vapour extraction
Conference	11th International UFZ- Deltares/TNO Conference on Management of Soil, Groundwater and Sediment - ConSoil 2010
City,Country	Salzburg, Austria
Date(s)	September 22-24, 2010
Page(s)	Electronic publication (Theme A3 – Remediation Concepts & Technologies, A3-68)

8

Author(s)	A. Fiúza, A. Cavalheiro, A. Silva, C. Coelho, F. Costa
Title	A strategie for remediating a deep contamination of TCE
Conference	11th International UFZ- Deltares/TNO Conference on Management of Soil, Groundwater and Sediment - ConSoil 2010
City,Country	Salzburg, Austria
Date(s)	September 22-24, 2010
Page(s)	Electronic publication (Theme A4 – Complete Cases of Restoration of Sites, A4-03)

9

Author(s)	P. Soares, F. Duarte, O. Freitas, C. Delerue-Matos, S. Figueiredo, R. Boaventura
Title	Evaluating the efficiency of a vegetal coagulant in the treatment of industrial effluents
Conference	Second International Symposium on Green Chemistry for Environment and Health
City/Country	Mykonos, Greece
Date(s)	September 27-29, 2010
Page(s)	Electronic publication (84)

10

Author(s)	J. Costa, P.R. Pitrez, C. Rocha, O.M. Freitas, A. Crispim, C. Delerue-Matos, M.P. Gonçalves
Title	Influence of the pre-treatments on the properties of biodegradable films from bovine hair
Conference	Second International Symposium on Green Chemistry for Environment and Health
City/Country	Mykonos, Greece
Date(s)	September 27-29, 2010
Page(s)	Electronic publication (88, E08)

2.2.2.3. Ph.D. theses

1

Author	José Tomás Veiga Soares de Albergaria
Title	Previsão do tempo de remediação de solos contaminados usando a Extracção de Vapor
Institution	FE/UP, Doutoramento em Engenharia do Ambiente
Date	December 21, 2010
Supervisor(s)	Maria da Conceição Machado Alvim Ferraz (FE/UP), Cristina Maria Fernandes Delerue Alvim de Matos

2.2.2.4. MSc theses

1

Author	Carlos Miguel Moreira da Mota
Title	Metal deposition using ionic liquids
Institution	IPP/ISEP/DEQ, Mestrado em Engenharia Química – Tecnologias de Protecção Ambiental
Date	July 29, 2010
Supervisor(s)	Edward Matthijs (KAHO – Gent, BE), Hendrikus Petrus Antonius Nouws

2

Author	Diogo Cunha Conde Pinho
Title	Application of Wetland Systems in the Treatment of Acid Rock Mine Drainage
Institution	IPP/ISEP/DEQ, Mestrado em Engenharia Química – Tecnologias de Protecção Ambiental
Date	October 29, 2010
Supervisor(s)	Susana Maria Ribeiro e Sousa Mendes de Freitas

3

Author	Manuel Joaquim Vilariça
Title	Estudo electroquímico de compostos naturais e semicondutores com possível utilização em células foto voltaicas
Institution	IPP/ISEP/DEQ, Mestrado em Engenharia Química – Optimização Energética na Industria Química
Date	November 5, 2010
Supervisor(s)	Maria Goreti Ferreira Sales, Gerardo Aguilar

4

Author	Maria Teresa de Oliveira Pinho
Title	Biorremediação de solos contaminados com compostos petrolíferos
Institution	IPP/ISEP/DEQ, Mestrado em Engenharia Química – Tecnologias de Protecção Ambiental
Date	November 19, 2010
Supervisor(s)	Cristina Maria Fernandes Delerue Alvim de Matos, José Tomás Veiga Soares de Albergaria

5

Author	Ana Sofia Grade Pereira da Silva
Title	HACCP numa Indústria Corticeira: implementação, identificação de pontos críticos e proposta de acções correctivas
Institution	IPP/ISEP/DEQ, Mestrado em Engenharia Química – Tecnologias de Protecção Ambiental
Date	November 22, 2010
Supervisor(s)	Simone Barreira Morais, Anabela Maria Fonseca de Moura Guedes (IPP/ISEP/DEQ)

6

Author	Raquel Filipa Moutinho Vieira
Title	Characterisation of organic mater in water for human consumption
Institution	IPP/ISEP/DEQ, Mestrado em Engenharia Química – Tecnologias de Protecção Ambiental
Date	November 25, 2010
Supervisor(s)	Sónia Adriana Ribeiro da Cunha Figueiredo, Valentina Maria Fernandes Domingues

7

Author	Hugo Rafael de Oliveira Lacerda
Title	Optimização energética das estufas de secagem de uma indústria de cerâmica
Institution	IPP/ISEP/DEQ, Mestrado em Engenharia Química – Optimização Energética na Industria Química
Date	November 30, 2010
Supervisor(s)	Simone Barreira Morais, Anabela Maria Fonseca de Moura Guedes (IPP/ISEP/DEQ)

2.2.3. Presentations in international conferences

2.2.3.1. Oral

1

Author(s)	F. Martins, C.A.V. Costa
Title	Multiobjective optimization with economic and environmental objective functions using Modified Simulated Annealing
Conference	ESCAPE-20 European Symposium on Computer Aided Process Engineering
City/Country	Ischia, Naples, Italy
Date(s)	June 6-9, 2010
Page(s)	919-924

2

Author(s)	P. Soares, F. Duarte, O. Freitas, C. Delerue-Matos, S. Figueiredo, R. Boaventura
Title	Evaluating the efficiency of a vegetal coagulant in the treatment of industrial effluents
Conference	Second International Symposium on Green Chemistry for Environment and Health
City/Country	Mykonos, Greece
Date(s)	September 27-29, 2010
Page(s)	Electronic publication (84)

2.2.3.2. Poster

1

Author(s)	F.D. Oliveira, A.C. Soares, O.M. Freitas, S.A. Figueiredo
Title	Copper removal from a real industrial wastewater using peanut hulls
Conference	S2Small2010 International IWA Conference on: Sustainable Solutions for Small Water and Wastewater Treatment Systems
City,Country	Girona, Spain
Date(s)	April 19-22, 2010
Page(s)	Electronic publication

2

Author(s)	P.R. Soares, O.M. Freitas, S.A. Figueiredo
Title	Cadmium, zinc and nickel removal using low cost materials
Conference	S2Small2010 International IWA Conference on: Sustainable Solutions for Small Water and Wastewater Treatment Systems
City,Country	Girona, Spain
Date(s)	April 19-22, 2010
Page(s)	Electronic publication

3

Author(s)	P.R. Pitrez, J. Costa, C. Rocha, O.M. Freitas, A. Crispim, C. Delerue-Matos, M.P. Gonçalves
Title	The effect of granulometry, glycerol concentration and presence of fat in the properties of films from feathers and bovine hair
Conference	Macro 2010: 43rd IUPAC World Polymer Congress
City,Country	Glasgow, United Kingdom
Date(s)	July 11-16, 2010
Page(s)	Electronic publication (B5_P11)

4

Author(s)	O. Freitas, C. Delerue-Matos, R. Boaventura
Title	Biosorption on brown marine algae for methylene blue removal
Conference	19th International Congress of Chemical and Process Engineering - CHISA 2010

City,Country Prague, Czech Republic
Date(s) August 28 – September 1, 2010
Page(s) Electronic publication (1094)

5

Author(s) A. Silva, O. Freitas, S. Figueiredo, I. Azevedo, A. Ferreira, A. Fiúza
Title Treatment of groundwater contaminated by arsenic: study of operation conditions
Conference 19th International Congress of Chemical and Process Engineering - CHISA 2010
City,Country Prague, Czech Republic
Date(s) August 28 – September 1, 2010
Page(s) Electronic publication (1288)

6

Author(s) M.M. Carvalho, M.C. Vila, J.S. Carvalho, V. Domingues, C. Delerue-Matos, M.T. Oliva-Teles, A. Fiúza
Title Bioventing tests in contaminated residual granitic soils
Conference 14th International Biotechnology Symposium and Exhibition Biotechnology for the Sustainability of Human Society
City,Country Rimini, Italy
Date(s) September 14-18, 2010
Page(s) P-E.189

7

Author(s) M. Carvalho, M.C. Vila, J. Soeiro Carvalho, V. Domingues, C. Delerue-Matos, M.T. Oliva-Teles, A. Fiúza
Title Extensive methodology for preliminary bioventing tests–Application to a residual granitic soil contaminated with xylenes
Conference 11th International UFZ- Deltares/TNO Conference on Management of Soil, Groundwater and Sediment - ConSoil 2010
City,Country Salzburg, Austria
Date(s) September 22-24, 2010
Page(s) Electronic publication (Theme 1A – Environmental footprint, A1-03)

8

Author(s) A.C.M. Castro, J.P. Meixedo, T. Albergaria, C. Matos, S. Ribeiro, J. Gomes, J. Ribeiro, C. Fernandes, B. Rocha
Title Soil sampling design and sampling techniques for soil properties monitoring – Common difficulties related to forest soils
Conference 11th International UFZ- Deltares/TNO Conference on Management of Soil, Groundwater and Sediment - ConSoil 2010
City,Country Salzburg, Austria
Date(s) September 22-24, 2010
Page(s) Electronic publication (Theme A2 – Site Investigation: Monitoring & Screening, A2-17)

9

Author(s) J.T. Albergaria, C.M. Delerue Matos, M.C.M. Alvim Ferraz
Title Soil vapor extraction in soils contaminated with halogenated and non-halogenated hydrocarbons
Conference 11th International UFZ- Deltares/TNO Conference on Management of Soil, Groundwater and Sediment - ConSoil 2010
City,Country Salzburg, Austria
Date(s) September 22-24, 2010
Page(s) Electronic publication (Theme A3 – Remediation Concepts & Technologies, A3-01)

10

Author(s) A. Soares, J.T. Albergaria, V. Domingues, P. de Marco, C. Delerue-Matos
Title Bioremediation of soils contaminated with benzene previously treated by soil vapour extraction
Conference 11th International UFZ- Deltares/TNO Conference on Management of Soil, Groundwater and Sediment - ConSoil 2010
City,Country Salzburg, Austria
Date(s) September 22-24, 2010
Page(s) Electronic publication (Theme A3 – Remediation Concepts & Technologies, A3-68)

11

Author(s) A. Fiúza, A. Cavalheiro, A. Silva, C. Coelho, F. Costa
Title A strategie for remediating a deep contamination of TCE
Conference 11th International UFZ- Deltares/TNO Conference on Management of Soil, Groundwater and Sediment - ConSoil 2010
City,Country Salzburg, Austria
Date(s) September 22-24, 2010
Page(s) Electronic publication (Theme A4 – Complete Cases of Restoration of Sites, A4-03)

12

Author(s) J. Costa, P.R. Pitrez, C. Rocha, O.M. Freitas, A. Crispim, C. Delerue-Matos, M.P. Gonçalves
Title Influence of the pre-treatments on the properties of biodegradable films from bovine hair
Conference Second International Symposium on Green Chemistry for Environment and Health
City/Country Mykonos, Greece
Date(s) September 27-29, 2010
Page(s) Electronic publication (88, E08)

13

Author(s)	L. Barbosa, J. Costa, C. Rocha, O.M. Freitas, C. Delerue-Matos, F. Crispim, A. Crispim, M.P. Gonçalves
Title	Preparation of keratin hydrolysate from bovine hair for film formulation
Conference	XVI Encontro Luso-Galego de Química
City,Country	Aveiro, Portugal
Date(s)	November 10-12, 2010
Page(s)	138

14

Author(s)	J. Costa, P.R. Pitrez, C. Rocha, O.M. Freitas, A. Crispim, C. Delerue-Matos, M.P. Gonçalves
Title	Properties of biofilms from keratin based materials
Conference	The 11th European Meeting on Environmental Chemistry - EMEC 11
City,Country	Portorož, Slovenia
Date(s)	December, 8-11
Page(s)	176

15

Author(s)	S. Astorga, D. Barbosa, A. Pinto, J.T. Albergaria, M.I. Serra, M.C. Neves, C.M. Delerue Matos
Title	Information systems supporting sustainable laboratories
Conference	The 11th European Meeting on Environmental Chemistry - EMEC 11
City,Country	Portorož, Slovenia
Date(s)	December, 8-11
Page(s)	215

2.2.4. Presentations in national conferences

2.2.4.1. Oral

1

Author(s)	V. Domingues
Title	Microbiologia em águas de piscinas e pavimentos
Conference	IV Congresso Nacional da APP (Associação Portuguesa de Profissionais de Piscinas, Instalações Desportivas e Lazer)
City,Country	Porto, Portugal
Date(s)	September 28, 2010
Page(s)	n/a

2.2.4.2. Poster

1

Author(s)	S. Couto, S. Morais, T. Mata, A. Martins
Title	Design and Simulation of Biodiesel Production Processes
Conference	IJUP 10, 3rd meeting of young researchers at UP
City,Country	Porto, Portugal
Date(s)	February 17-19
Page(s)	104

2

Author(s)	A.A. Soares, J.T. Albergaria, C. Delerue-Matos, V. Domingues, M.C.M. Alvim-Ferraz
Title	Bioremediation with soils contaminated with benzene
Conference	IJUP 10, 3rd meeting of young researchers at UP
City,Country	Porto, Portugal
Date(s)	February 17-19
Page(s)	257

3

Author(s)	S. Ribeiro, C. Delerue-Matos, A.C.M. Castro, J.T. Albergaria
Title	Study on the changes of soil chemical characteristics as result of prescribed fire
Conference	IJUP 10, 3rd meeting of young researchers at UP
City,Country	Porto, Portugal
Date(s)	February 17-19
Page(s)	265

4

Author(s)	M.T. Pinho, A.A. Soares, J.T. Albergaria, V.F. Fernandes, C.M. Delerue-Matos
Title	Bioremediação de solos contaminados por tolueno
Conference	I Encontro em Técnicas de Caracterização e Análise Química

City,Country Braga, Portugal
Date(s) May 7, 2010
Page(s) 26

2.3. OTHER ACTIVITIES

Internationalization

Co-orientation with the Autonomous University of Barcelona (Spain) of the PhD studies of Sérgio Alberto Morais.

Governmental funding (pre-graduation)

In 2009, 1 grant with the duration of one year (October 2009 - September 2010) from the "Concurso de Bolsas de Integração na Investigação para 5000 estudantes do Ensino Superior" (FCT) was given to the following student:

1. Irene Cristina de Sousa Azevedo, *"Adsorção de Micropoluentes nas Águas Subterrâneas"*

Launched in June 1996, the Ciência Viva program is the contribution of the Ministry of Science and Technology to the promotion of a scientific and technological culture among the Portuguese population. In the sub-category "Science in the Holidays" 4 programs, with the duration of 1 week (20 or 40 hours), were organized: "Tratamento de efluentes usando extractos vegetais", "Resíduo trata resíduo?", "Vamos procurar processos mais sustentáveis usando a Química Verde!", "Química Verde no laboratório".

In cooperation with a local professional high school (Escola Secundária Infante D. Henrique), 5 students realized a professional training period of 260 hours:

1. Ivo Emanuel Moreira Rodrigues Gestão de Resíduos de Laboratório
2. Joana Alves Gestão de Resíduos de Laboratório
3. Lisandra Rosa Pereira Bastos Biorremediação de solos contaminados
4. Ana Cláudia Jesus Rodrigues Santos da Silva Contaminação de Solos
5. Telma Cristiana Carvalho Magalhães Contaminação de Solos

In cooperation with a local professional high school (Escola Secundária Infante D. Henrique), 5 students realized a professional training period of 420 hours:

1. Ana Raquel Rodrigues Alves
2. Daniela Filipa Gomes Silva
3. Eliana Filipa Alvim da Silva
4. Carina Filipa Henriques Pinho

2.4. FUTURE RESEARCH

Goals for 2011

- to proceed in the same research subject and aims at exploring the application of natural materials (chicken feathers, a waste from the poultry industry) in the treatment of real industrial wastewaters;
- to develop an optimum process of keratin extraction from bull's hair (a waste from the leather industry);
- to perform ecotoxicity studies using microalgae in contaminated wastewaters;
- to develop a new line of investigation concerning chemical soil oxidation.

Approved funding in 2010 *(projects to be started in 2011)*

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Pending funding

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Although there is no clear trend, the number of papers published in peer-reviewed scientific journals included in the ISI Web of Science database in 2010 was by far the highest for GRAQ in the period 2001-2010 (Figure 4.1). However, the observed annual increase from 2007 is believed to continue in 2011 because 10 papers have already been accepted for publishing in 2011 (as of December 14th 2010).

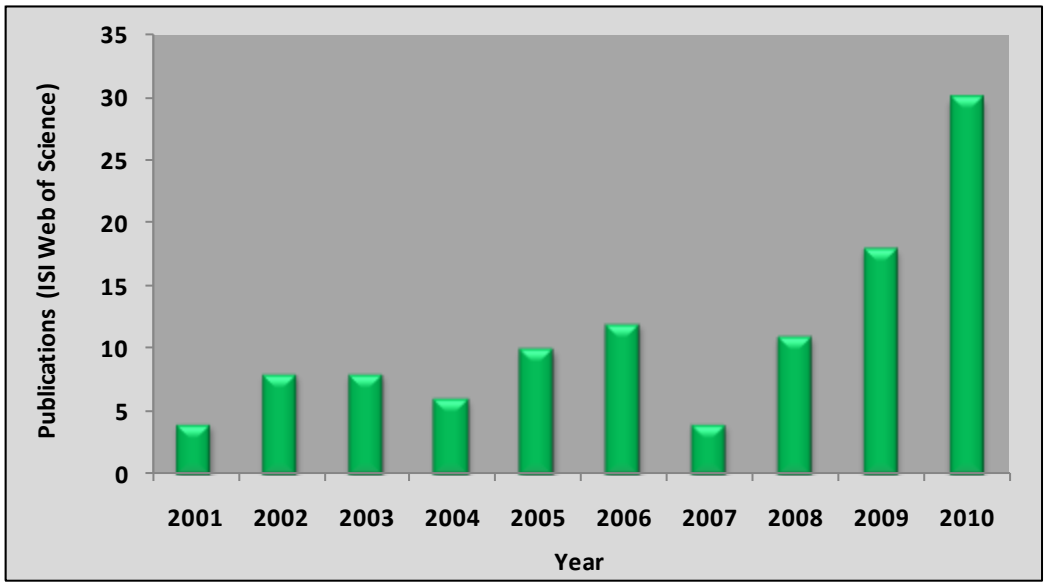

Figure 4.1 Number of papers published in peer-reviewed scientific journals (ISI Web of Science) by GRAQ members (2001-2010)

The number of papers published per Ph.D. member of the permanent staff (Figure 4.2) varies between 0.3 and 1.9. The same tendency is observed as for the number of papers: a steady increase from 2007.

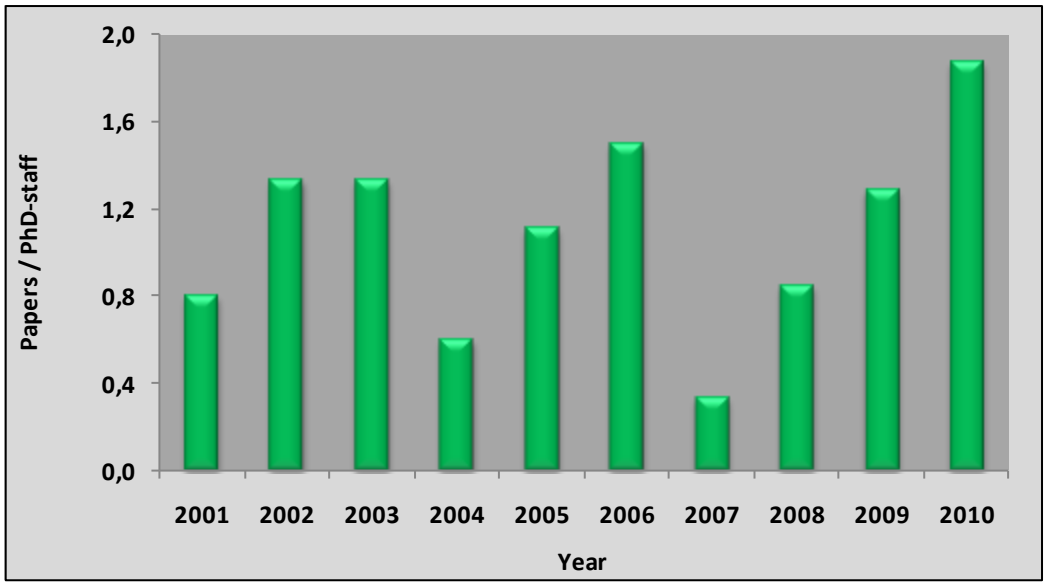

Figure 4.2 Number of papers published in peer-reviewed scientific journals (ISI Web of Science) per Ph.D. member of the permanent staff (2001-2010)

A citation analysis was performed (December 14th 2010) for the period 2001-2009 (Figure 4.3). An obvious decrease in citations per paper is observed because of (i) the low number of papers and (ii) the short time period. The average citation per paper is 4.5 and the Hirsch index (*h*-index) is 10.

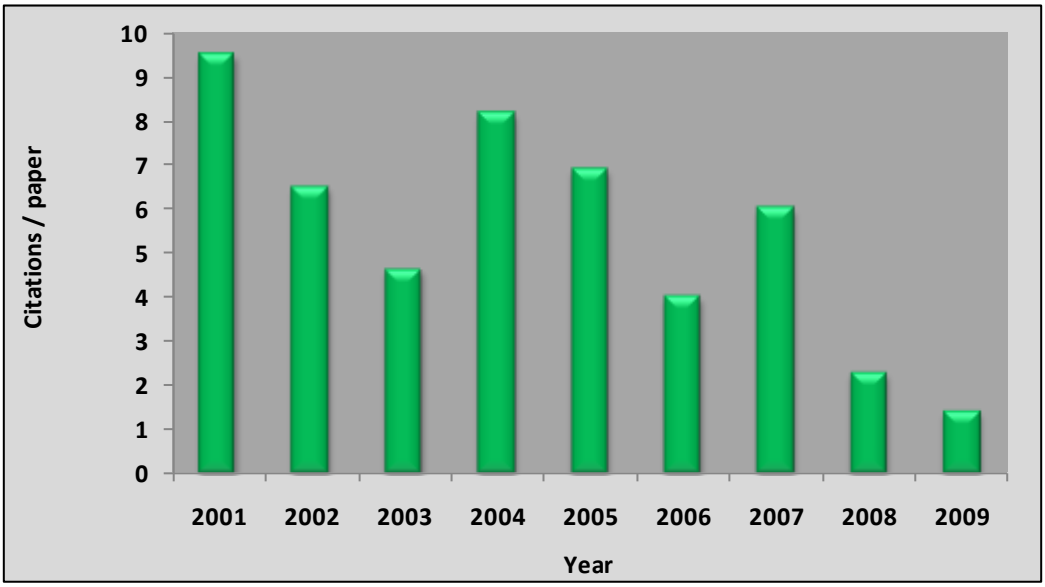

Figure 4.3 Citation analysis (2001-2009)