



10º Encontro Nacional de Cromatografia

Bragança 2017 – 4 a 6 de dezembro

Abstracts book / Livro de resumos



SOCIEDADE PORTUGUESA DE QUÍMICA



INSTITUTO POLITÉCNICO DE BRAGANÇA Centro de Investigação de Montanha

COM O ALTO PATROCÍNIO DE SUA EXCELÊNCIA



O Presidente da República

Title

10th Chromatography Meeting

Título

10º Encontro de Cromatografia

Authors / Autores

António M. Peres (Instituto Politécnico de Bragança, Portugal)

Lillian Barros (Instituto Politécnico de Bragança, Portugal)

Luís G. Dias (Instituto Politécnico de Bragança, Portugal)

Isabel C.F.R. Ferreira (Instituto Politécnico de Bragança, Portugal)

Edition / Edição

Instituto Politécnico de Bragança · 2017

5300-253 Bragança · Portugal

Tel. (+351) 273 303 200 · Fax (+351) 273 325 405

<http://www.ipb.pt>

Imaging services / Serviços de imagem

Atilano Suarez (Instituto Politécnico de Bragança, Portugal)

URL

<http://hdl.handle.net/10198/8896>

ISBN

978-972-745-234-7



Organizing committee / Comissão Organizadora

Isabel C.F.R. Ferreira (Instituto Politécnico de Bragança)

José Manuel F. Nogueira (Faculdade de Ciências, Universidade de Lisboa)

Anabela Martins (Instituto Politécnico de Bragança)

António Peres (Instituto Politécnico de Bragança)

Cidália Lino (Instituto Politécnico de Bragança)

Helder Gomes (Instituto Politécnico de Bragança)

Joana Amaral (Instituto Politécnico de Bragança)

João Barreira (Instituto Politécnico de Bragança)

Jorge Sá Morais (Instituto Politécnico de Bragança)

Lillian Barros (Instituto Politécnico de Bragança)

Luís Dias (Instituto Politécnico de Bragança)

Luís Pais (Instituto Politécnico de Bragança)

M. Filomena Barreiro (Instituto Politécnico de Bragança)

Miguel Vilas Boas (Instituto Politécnico de Bragança)

Sandrina A. Heleno (Instituto Politécnico de Bragança)

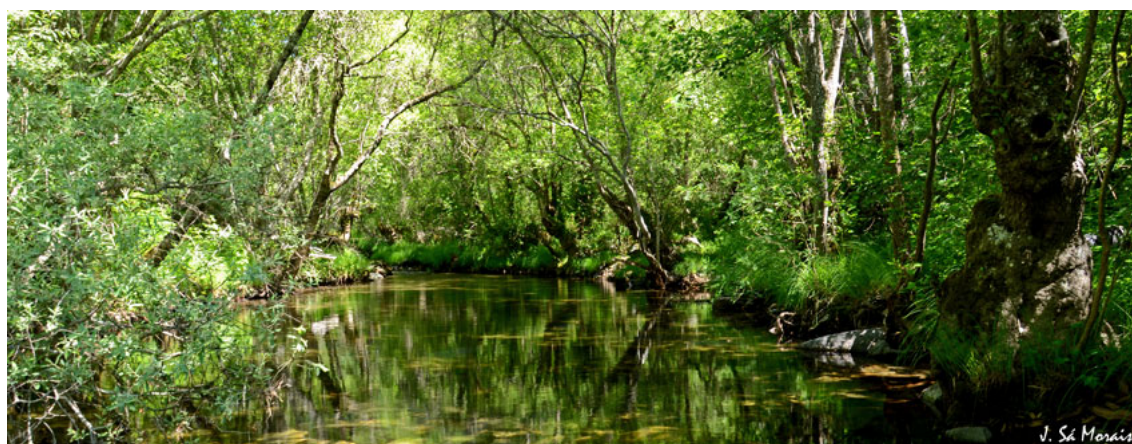
Cristina Campos (Secretariado - Sociedade Portuguesa de Química)

Leonardo Mendes (Secretariado - Sociedade Portuguesa de Química)



Scientific committee / Comissão Científica

Alírio Rodrigues (Universidade do Porto)
Ana Costa Freitas (Universidade de Évora)
Anabela Romano (Universidade do Algarve)
Armando Venâncio (Universidade do Minho)
Carlos Cavaleiro (Universidade de Coimbra)
Cristina Delerue Matos (Instituto Politécnico do Porto)
Elisabete Lima (Universidade dos Açores)
Fernando Nunes (Universidade de Trás-os-Montes)
Helena Soares Costa (Instituto Nacional de Saúde Dr. Ricardo Jorge)
Isabel C.F.R. Ferreira (Instituto Politécnico de Bragança)
Ivonne Delgadillo (Universidade de Aveiro)
João Carlos Marcos (Universidade do Minho)
João Queiroz (Universidade da Beira Interior)
José António Rodrigues (Universidade do Porto)
José Câmara (Universidade da Madeira)
José Manuel F. Nogueira (Universidade de Lisboa)
M. Beatriz Oliveira (Universidade do Porto)
Manuel António Coimbra (Universidade de Aveiro)
Manuela Pintado (Universidade Católica)
Marcela Segundo (Universidade do Porto)
Marco Gomes da Silva (Universidade Nova de Lisboa)
Maria Rosário Bronze (Universidade de Lisboa)
Nuno Mateus (Universidade do Porto)
Raquel Aires Barros (Universidade de Lisboa)
Sílvia M. Rocha (Universidade de Aveiro)



| | | |
|--|--|----|
| OC-38 | | |
| Oncolytic virus purification using multi-column chromatography | | 55 |
| <i>João Mendes, Ricardo J.S. Silva, Cristina Peixoto, Paula M. Alves, Manuel J.T. Carrondo</i> | | |
| OC-39 | | |
| Effects of e-beam irradiation on bioactive content of cherry tomatoes | | 56 |
| <i>Joana Madureira, Maria Cojocar, Silvia Garofalide, Pedro M.P. Santos, Fernanda M.A. Margaça, Sandra Cabo Verde</i> | | |
| OC-40 | | |
| Otimização da extração de antocianinas de cereja madura através da metodologia de superfície de resposta | | 57 |
| <i>Carla Pereira, Lillian Barros, Miguel A. Prieto, Isabel C.F.R. Ferreira</i> | | |
| OC-41 | | |
| Efeito da radiação gama e feixe de eletrões na concentração de ergosterol em <i>Agaricus bisporus</i> (J.E. Lange) Imbach | | 58 |
| <i>Ângela Fernandes, Rossana V.C. Cardoso, Amílcar L. Antonio, Sandra Cabo Verde, Lillian Barrosa, Isabel C.F.R. Ferreira</i> | | |
| OC-42 | | |
| Optimization of the extraction of triterpenes from <i>Ganoderma lucidum</i> | | 59 |
| <i>Oludemi Taofiq, Lillian Barros, Miguel A. Prieto, Maria Filomena Barreiro, Isabel C.F.R. Ferreira</i> | | |
| OC-43 | | |
| Unveiling the chemical composition of willow added-value lipophilic extractives by gas chromatography-mass spectrometry | | 60 |
| <i>Patrícia A.B. Ramos, Sónia A.O. Santos, Carmen S.R. Freire, Artur M.S. Silva, Armando J.D. Silvestre</i> | | |
| OC-44 | | |
| Application of anti-hail net in apple orchards: effects on fruits chemical characteristics | | 61 |
| <i>Carlos Martins-Gomes, Luís Pinto, Ermelinda Silva, Sandra Martins, Alexandre Gonçalves, Cátia Brito, José Moutinho-Pereira, M.A. Rodrigues, Carlos M. Correia, Fernando Nunes</i> | | |
| OC-45 | | |
| Characterization of the volatile composition of encapsuled coffee | | 62 |
| <i>Davide Mendes, Pedro Lisboa, Pedro Simões, Eduardo Mateus, Marco Gomes da Silva</i> | | |
| OC-46 | | |
| Increased productivity in impurity profile characterization of innovative pharmaceuticals | | 63 |
| <i>João Pereira, Antonio Serodio, Cátia Sousa</i> | | |
| OC-47 | | |
| Characterization of phospholipids, including plasmalogens, in bivalves of the Portuguese coast using solid-phase extraction followed by gas-liquid chromatography | | 64 |
| <i>Vera Faneca, Susana P. Alves, Rui J.B. Bessa</i> | | |
| OC-48 | | |
| Characterization and Identification of Four Essential Oils by GC-MS | | 65 |
| <i>Mariana Oliveira, Carlos Borges, Ana Patrícia Marques</i> | | |

PC - Panel communications / Comunicações em painel

| | | |
|---|--|----|
| PC1 | | |
| Optimization of an HPLC analysis to study the interactions between a <i>Saccharomyces cerevisiae</i> protein-rich extract and wine procyanidins | | 68 |
| <i>Abigail F. Ferreira, Telmo Francisco, Rosa Pérez-Gregorio, Susana Soares, Nuno Mateus, Victor de Freitas</i> | | |
| PC2 | | |
| Phenolic compounds from <i>Annona muricata</i> L.: HPLC-DAD analysis of the aqueous extract and nanoformulations | | 69 |
| <i>Clara Grosso, Simona Mancini, Luca Nardo, Maria Gregori, João Bernardo, Inês Ribeiro, Francesco Mantegazza, Massimo Masserini, Cristina Delerue-Matos</i> | | |

| | | |
|------|---|----|
| PC3 | Fatty acid profile of seaweeds from the North Portuguese Coast | 70 |
| | <i>Sara Sousa, Susana Machado, Cristina Soares, Elsa Vieira, Valentina F. Domingues, Ana P. Carvalho, Manuela Correia, M. João Ramalhosa, Teresa Oliva-Teles, Simone Morais, Cristina Delerue-Matos</i> | |
| PC4 | GC-MS identification of oligosaccharides produced by nonenzymatic transglycosylation reactions | 71 |
| | <i>Soraia P. Silva, Ana S.P. Moreira, M. Rosário M. Domingues, Dmitry V. Evtugin, Elisabete Coelho, Manuel A. Coimbra</i> | |
| PC5 | Chemical characterization of three <i>Thymus</i> species: <i>T. herba-barona</i>, <i>T. pseudolanuginosus</i> and <i>T. caespititius</i> | 72 |
| | <i>Andrea F. Afonso, Olívia R. Pereira, Artur M.S. Silva, Susana M. Cardoso</i> | |
| PC6 | Phytochemicals of <i>Salvia africana</i> and <i>Salvia elegans</i> and <i>Salvia officinalis</i> 'Icterina' | 73 |
| | <i>Andrea F. Afonso, Olívia R. Pereira, Artur M.S. Silva, Susana M. Cardoso</i> | |
| PC7 | Applying an API HPLC Related Substances Monograph Method to an Inhalation Drug Product | 74 |
| | <i>Andreia Costa, Rúben Chaves, Sofia Silva</i> | |
| PC8 | Perfil cromatográfico em ácidos gordos de seis génotipos de <i>Portulaca olerace</i> L.: uma fonte alternativa de ómega-3 | 75 |
| | <i>Ângela Fernandes, Spyridon A. Petropoulos, Anestis Karkanis, Lillian Barros, Georgia Ntatsi, Konstantinos Petrotos, Christos Lykas, Ebrahim Khah, Isabel C.F.R. Ferreira</i> | |
| PC9 | Fatty acids profile contribution for the discrimination of olive oil production year | 76 |
| | <i>Nuno Rodrigues, Susana Casal, António M. Peres, José A. Pereira</i> | |
| PC10 | Monitoring fructooligosaccharides production using <i>Aspergillus aculeatus</i> by HPLC-ELSD | 77 |
| | <i>Aelina Lama, Sara Silvério, Ana C.A. Veloso, Lígia R. Rodrigues, Teresa Dias, António M. Peres</i> | |
| PC11 | Selection of SPME fiber for the identification of the pheromone rhynchophorol by GC/MS | 78 |
| | <i>Arão C. Viana, Ingrid G. Ramos, Ananda M. Carvalho, Edeilza L. dos Santos, Janice I. Druzian</i> | |
| PC12 | Similaridade da farinha da casca do maracujá amarelo (<i>Passiflora edulis flavicarpa</i>) com pectina e ácido galacturônico comerciais por CLAE/IR | 79 |
| | <i>Emanuela M. Coelho, Arão C. Viana, Luciana C. de Azevedo, Janice I. Druzian</i> | |
| PC13 | Optimization of an analytical method for the determination of underivatized triclosan and related compounds by gas chromatography-triple quadrupole mass spectrometry | 80 |
| | <i>Cátia Magro, Davide Mendes, Marco Silva, Alexandra Ribeiro, Eduardo Mateus</i> | |
| PC14 | Development and validation of an HPLC method for quantification of the biocide Ecomea® | 81 |
| | <i>Cátia Vilas-Boas, Sara Cravo, Emília Sousa, Madalena Pinto, Marta Correia-da-Silva</i> | |
| PC15 | Efeito do processamento no perfil lipídico do feijão mangalô (<i>Phaseolus lunatus</i>) germinado | 82 |
| | <i>Clícia M.J. Benevides, Sónia Soares, Maria A. Nunes, Rita C. Alves, Maria Beatriz P.P. Oliveira</i> | |
| PC16 | Vitamin E profile of green (<i>in natura</i>) seeds from different species of legumes | 83 |
| | <i>Cátia Araújo, Rita C. Alves, Sílvia Bessada, Anabela S.G. Costa, Clícia M.J. Benevides, Graça Soveral, M. Beatriz P.P. Oliveira</i> | |
| PC17 | RP-HPLC analysis of 21 amino acids in edible seaweeds from the Portuguese coast after OPA/FMOC derivatization | 84 |
| | <i>Cristina Soares, Elsa Vieira, Susana Machado, Manuela Correia, M. João Ramalhosa, Valentina F. Domingues, Ana P. Carvalho, Teresa Oliva-Teles, Simone Morais, Cristina Delerue-Matos</i> | |
| PC18 | Ion source-MS parameters optimization for pharmaceuticals compounds | 85 |
| | <i>Paula Paíga, Luís M.S. Silva, Cristina Delerue-Matos</i> | |

| | | |
|------|--|----|
| PC19 | Perfil cromatográfico de ácidos gordos e açúcares em <i>cupcakes</i> funcionalizados com um extrato rico em ácido rosmarínico | 86 |
| | <i>Cristina Caleja, Lillian Barros, João C.M. Barreira, Ana Ciric, Marina Sokovic, Ricardo C. Calhelha, M. Beatriz P.P. Oliveira, Isabel C.F.R. Ferreira</i> | |
| PC20 | Monitorização cromatográfica de um extrato de <i>Melissa officinalis</i> L. obtido com diferentes técnicas | 87 |
| | <i>Cristina Caleja, Lillian Barros, Miguel A. Prieto, Maria Filomena Barreiro, M. Beatriz P.P. Oliveira, Isabel C.F.R. Ferreira</i> | |
| PC21 | Biogenic amine formation during smoking process of traditional Portuguese meat sausages <i>chouriças</i> and <i>alheiras</i> | 88 |
| | <i>Daniel O. Carvalho, Cláudia Sousa, Luís F. Guido</i> | |
| PC22 | No dilute” just shoot LC-ESI-MS/MS : feasibility and robustness of a maintenance-free source and interface for applications in low level pesticide residue analysis | 89 |
| | <i>Daniel Rocha</i> | |
| PC23 | Development and application of a fast HPLC method for dissolution evaluation of amorphous pharmaceuticals materials | 90 |
| | <i>Luísa Pena, Daniela Almeida, Pedro Serodio</i> | |
| PC24 | The effect of storage in HMF of Portuguese honey samples: a 4-year study | 91 |
| | <i>Sónia Soares, Diana Pinto, Rita C. Alves, Francisca Rodrigues, M. Beatriz P.P. Oliveira</i> | |
| PC25 | Dairy products fortified with <i>Pleurotus ostreatus</i> beta-glucans | 92 |
| | <i>Ekaterina Antontceva, Sergei Sorokin, Mark Shamtsyan</i> | |
| PC26 | Efeitos de radiação ionizante no perfil fenólico de <i>Melissa officinalis</i> L. e de <i>Melittis melissophyllum</i> L. | 93 |
| | <i>Eliana Pereira, Amílcar Antonio, João C.M. Barreira, Celestino Santos-Buelga, Lillian Barros, Isabel C.F.R. Ferreira</i> | |
| PC27 | Influência da origem geográfica no perfil fenólico de <i>Lavandula pedunculata</i> (Mill.) Cav | 94 |
| | <i>Catarina L. Lopes, Eliana Pereira, Ana Maria Carvalho, Ana Maria Barata, Violeta Lopes, Filomena Rocha, Lillian Barros, Isabel C.F.R. Ferreira</i> | |
| PC28 | Optimization of the method for determining the residual amounts of florasulam in crops by HPLC | 95 |
| | <i>Elisey Yu. Alekseev, Taisiya D. Cheremskaya, Larisa M. Karpova</i> | |
| PC29 | Caracterização fenólica da casca do fruto <i>Ficus carica</i> L. por LC-DAD-ESI/MS | 96 |
| | <i>Emanueli Backes, Carla Pereira, Maria Gabriela Leichtweis, Lillian Barros, Aziza Kamal Genena, Maria Filomena Barreiro, Isabel C.F.R. Ferreira</i> | |
| PC30 | Determinação de antocianinas no epicarpo de frutos de <i>Prunus spinosa</i> L. | 97 |
| | <i>Maria Gabriela Leichtweis, Carla Pereira, Emanueli Backes, Ana Maria Carvalho, Ilton J. Baraldi, Lillian Barros, Isabel C.F.R. Ferreira</i> | |
| PC31 | Biodiesel production through esterification using ionic liquids as catalysts | 98 |
| | <i>Arevik Tadevosyan, Fernanda Fontana Roman, Ana Queiroz, António Ribeiro, Paulo Brito</i> | |
| PC32 | Efeito do teor de etanol na composição de compostos fenólicos extraídos da casca de sementes de pinhão | 99 |
| | <i>Carlos Henrique Koslinski Santos, Maria Inês Dias, Lillian Barros, Michel Rocha Baqueta, Aline Coqueiro, Maria Filomena Barreiro, Odinei Hess Gonçalves, Evandro Bona, Marcos Vieira da Silva, Isabel C.F.R. Ferreira, Fernanda Vitoria Leimann</i> | |

| | | |
|------|--|-----|
| PC33 | Perfis cromatográficos de açúcares livres e ácidos gordos em amostras de iogurtes aditivadas com o corante natural curcumina | 100 |
| | <i>Heloísa Helena Scorsato de Almeida, Custódio Lobo Roriz, Lillian Barros, João C.M. Barreira, Fernanda Vitória Leimann, Maria Filomena Barreiro, Isabel C.F.R. Ferreira</i> | |
| PC34 | Influence of roasting on the amino acid profile of defatted almond flour | 101 |
| | <i>Filipa B. Pimentel, Anabela S.G. Costa, Rita C. Alves, Adrián Rabadán, Manuel Álvarez-Ortí, M. Beatriz P.P. Oliveira</i> | |
| PC35 | <i>Gracilaria vermiculophylla</i> : effect of preservation methods on the fatty acids profile | 102 |
| | <i>Filipa B. Pimentel, Maria A. Nunes, Anabela S.G. Costa, Rita C. Alves, M. Beatriz P.P. Oliveira</i> | |
| PC36 | Wild mushrooms as a possible source of nutraceuticals – Use of chromatographic techniques to obtain the species chemical profile | 103 |
| | <i>Filipa S. Reis, Anabela Martins, Lillian Barros, M. Helena Vasconcelos, Patricia Morales, Isabel C.F.R. Ferreira</i> | |
| PC37 | Olive oil volatile organic compounds: Single column vs. coupled columns for GC/MS identification purposes | 104 |
| | <i>Flávia Freitas, Davide Mendes, Luis Batista, Eduardo Mateus, Marco Gomes da Silva</i> | |
| PC38 | Ultrahigh-Pressure Liquid Chromatography with fluorescent detection (UPLC-FLD) method for the identification of anthocyanins from Purple Sweet Potato | 105 |
| | <i>Hélder Oliveira, Iva Fernandes, Victor de Freitas, Nuno Mateus</i> | |
| PC39 | Is thermal treatment a concern for the nutritional quality of flaxseed, chia and sunflower seeds? | 106 |
| | <i>Tânia Gonçalves Albuquerque, Mafalda Alexandra Silva, M. Beatriz P.P. Oliveira, Helena S. Costa</i> | |
| PC40 | Phenolic profile obtained by HPLC-DAD-ESI/MS and <i>in vitro</i> bioactivities of <i>Equisetum giganteum</i> L. and <i>Tilia platyphyllos</i> Scop. | 107 |
| | <i>Inês Jabeur, Natália Martins, Lillian Barros, Ricardo C. Calhelha, Josiana Vaz, Lotfi Achour, Celestino Santos-Buelga, Isabel C.F.R. Ferreira</i> | |
| PC41 | Profiling the volatile fraction of ruminal content from Holstein dry-cows fed different diets | 108 |
| | <i>Inês M. Valente, Margarida R.G. Maia, Antonia M. Carro, Rosa A. Lorenzo, António J.M. Fonseca, Ana Rita J.B. Cabrita, José A. Rodrigues</i> | |
| PC42 | The impact of pH on the impurity profile of a model drug | 109 |
| | <i>Inês F.S.Silva, Maria C. Paisana</i> | |
| PC43 | In-Tube SPME-MS/MS with hybrid silica monolith as sorbent phase to determine amino acids and neurotransmitters in plasma samples | 110 |
| | <i>Luis Felipe Cabral Miranda, Israel Donizeti de Souza, Maria Eugênia Costa Queiroz</i> | |
| PC44 | Design and optimization of a simulated moving bed unit for the separation of betulinic, oleanolic and ursolic acids mixtures: experimental and modeling studies | 111 |
| | <i>Ivo S. Azenha, José P.S. Aniceto, Fernando M.J. Domingues, Adélio Mendes, Carlos M. Silva</i> | |
| PC45 | Chromatographic measurement of eucalyptol diffusivities in compressed fluids | 112 |
| | <i>Bruno Zêzere, Ivo S. Azenha, Ana Magalhães, Adélio Mendes, Carlos M. Silva</i> | |
| PC46 | A rapid UPLC method development for <i>in vitro</i> dissolution of supersaturation drug delivery systems | 113 |
| | <i>António Serôdio, Jessica F. P. Ramos, Inês Almeida, Pedro Serôdio, Silvia Santos</i> | |
| PC47 | Avaliação da composição em ácidos gordos de folhas de urtiga (<i>Urtica dioica</i>) | 114 |
| | <i>Jacqueline Silva, Ailey Ap. C Tanamati, Joana S. Amaral</i> | |

| | | |
|------|--|-----|
| PC48 | Preparation of a new chiral stationary phase for liquid chromatography based on a small molecule | 115 |
| | <i>João Ribeiro, Carla Fernandes, Maria Elizabeth Tiritan, Artur M.S. Silva, Madalena M.M. Pinto</i> | |
| PC49 | Liquid chromatography enantioseparation of xanthone derivatives on a human serum albumin stationary phase | 116 |
| | <i>João P. do Carmo, Carla Fernandes, Maria Elizabeth Tiritan, Carlos Afonso, Madalena M.M. Pinto</i> | |
| PC50 | Caracterização do perfil carbonílico em cafés por GDME-HPLC-DAD-MS/MS para correlação com diferentes parâmetros de qualidade | 117 |
| | <i>Liliana Cordeiro, Inês M. Valente, João Rodrigo Santos, José A. Rodrigues</i> | |
| PC51 | Establishment and differentiation of the volatonic composition of juice and peel from Tahiti lime (<i>Citrus × latifolia</i>) based on HS-SPME/GC-qMS analysis | 118 |
| | <i>José A. Figueira, Priscilla Porto-Figueira, Jorge Pereira, José S. Câmara</i> | |
| PC52 | Coupling HPLC and GC-FID for the monitorization of oxidized intermediates from wet peroxide biphasic oxidation | 119 |
| | <i>Jose L. Diaz de Tuesta, Joana S. Amaral, Adrián M.T. Silva, Joaquim L. Faria, Helder T. Gomes</i> | |
| PC53 | Fingerprint targeted compounds for use in authenticity of sugarcane honey – an approach based on chromatographic and statistical data | 120 |
| | <i>Pedro Silva, Fernando M. Nunes, Jose S. Camara</i> | |
| PC54 | Caracterização química de uma coleção de germoplasma de variedades tradicionais de tomate com recurso a diferentes técnicas cromatográficas | 121 |
| | <i>César Montoya, José Pinela, Lillian Barros, Ana Maria Carvalho, Filomena Rocha, Ana Maria Barata, Isabel C.F.R. Ferreira</i> | |
| PC55 | Assessment of biogenic amines profile in biological samples from Holstein dry-cows | 122 |
| | <i>Liliana Cordeiro, Inês Maria Valente, Margarida R.G. Maia, António J.M. Fonseca, Ana Rita J.B. Cabrita, José António Rodrigues</i> | |
| PC56 | The effects of starter culture on the biogenic amine accumulation in traditional Portuguese dry-sausages | 123 |
| | <i>Dmitriy Panov, Luís G. Dias, Ana Paula Pereira, António M. Peres, Leticia M. Estevinho, Teresa Dias</i> | |
| PC57 | High-throughput method for the analysis of sterols in food samples by gas chromatography without previous fractionation steps | 124 |
| | <i>Luís M. Rodríguez-Alcalá, Lígia L. Pimentel, Manuela Pintado, Ana M. Gomes</i> | |
| PC58 | Free fatty acids profiling in olive oil and olives from the Trás-os-Montes Portuguese region | 125 |
| | <i>Luís M. Rodríguez-Alcalá, Inês F. Correia, Lígia L. Pimentel, José A. Pereira, Ana M. Gomes, Manuela Pintado</i> | |
| PC59 | Application of an HPLC method for the quality control of vitamin C content in foods for infants | 126 |
| | <i>Mafalda A. Silva, Tânia Gonçalves Albuquerque, M. Beatriz P.P. Oliveira, Helena S. Costa</i> | |
| PC60 | Valorization of apple wood wastes from traditional and exotic Portuguese varieties: phenolic profile and antioxidant activity | 127 |
| | <i>Manuela M. Moreira, Braam Devos, M. Fátima Barroso, Raul Rodrigues, Annick Boeykens, Hannes Withouck, Simone Morais, Cristina Delerue-Matos</i> | |
| PC61 | Comparison of different extraction solvents for characterization of phenolic compounds <i>Geranium robertianum</i> L. extracts | 128 |
| | <i>Marcelo D. Catarino, Micaela I. Jordão, Artur M.S. Silva, Susana M. Cardoso</i> | |

| | | |
|------|--|-----|
| PC62 | | |
| | Validação do método de aflatoxinas por cromatografia - HPLC | 129 |
| | <i>Cristiane L. Paloschi, Margaret S. Nardelli, Mariana Sbizzaro, Divair Christ, Fagner G. da Conceição, Danielle M. Rosa, Silvio C. Sampaio</i> | |
| PC63 | | |
| | Monovarietal olive pomaces: stability prediction based on fatty acid profile and oleic/linoleic ratio | 130 |
| | <i>Maria A. Nunes, Rita C. Alves, Francisca Rodrigues, Anabela S.G. Costa, Maria B.P.P. Oliveira</i> | |
| PC64 | | |
| | Influence of <i>Bactrocera oleae</i> infestation on the fatty acids profile of two Algerian olive cultivars: <i>Limli</i> and <i>Rougette de Metidja</i> | 131 |
| | <i>Lynda Medjkouh, Abderezak Tamendjari, Maria A. Nunes, Rita C. Alves, Maria B.P.P. Oliveira</i> | |
| PC65 | | |
| | Contribution of a liquid chromatographic method to evaluate if Portuguese vegetables are a good source of vitamin C? | 132 |
| | <i>Inês C. Santos, Tânia Gonçalves Albuquerque, Mafalda A. Silva, Helena S. Costa</i> | |
| PC66 | | |
| | Influência da temperatura de secagem nos compostos fenólicos e nas propriedades bioativas de folhas, caules e casca de <i>Croton urucurana</i> Bailly | 133 |
| | <i>Jáliston Júlio Lopes Alves, Maria Inês Dias, Lillian Barros, Ricardo C. Calhelha, Osvaldo Resende, Ana Carolina Ribeiro Aguiar, Isabel C.F.R. Ferreira</i> | |
| PC67 | | |
| | Volatile profile of different monovarietal olive oils by HS-SPME-GC/MS | 134 |
| | <i>Nuno Martins, Raquel Garcia, Marco Gomes da Silva, Maria João Cabrita</i> | |
| PC68 | | |
| | Assessment of volatile composition in amphora wines by HS-SPME-GC/MS | 135 |
| | <i>Raquel Garcia, Nuno Martins, Marco Gomes da Silva, Maria João Cabrita</i> | |
| PC69 | | |
| | Optimization of the extraction of phenolic compounds from walnut leaves using DES | 136 |
| | <i>Vanessa Vieira, Miguel A. Prieto, Lillian Barros, João A.P. Coutinho, Olga Ferreira, Isabel C.F.R. Ferreira</i> | |
| PC70 | | |
| | Óleo essencial de <i>Chenopodium ambrosioides</i> : perfil químico em CG/EM e influência na resposta imune em ratos infectados com <i>Trypanosoma cruzi</i> | 137 |
| | <i>Marley Garcia Silva, Cássia Mariana Bronzon da Costa, Fabrícia Helena Santelo, Míriam Paula Alonso Toldo, José Clóvis do Prado Júnior</i> | |
| PC71 | | |
| | Influence of storage conditions on polyphenolic, terpenoids and sensory profile from <i>Cymbopogon citratus</i> infusions | 138 |
| | <i>Marta Coelho, Célia Rocha, M.J. Pereira, Luís M. Cunha, L. Cardoso, L. Alves, R.C. Lima, Francisco M. Campos, Manuela Pintado</i> | |
| PC72 | | |
| | Preparation, purification and chromatographic fractionation of hydrophobins from biomass of fungus <i>Aspergillus niger</i> | 139 |
| | <i>Nikita A. Khrapatov, Ekaterina V. Kochurova, Boris A. Kolesnikov, Mark M. Shamtsyan</i> | |
| PC73 | | |
| | Análise cromatográfica de iogurte funcionalizado com extrato etanólico de <i>Agaricus bisporus</i> | 140 |
| | <i>Cristhian R.L. Francisco, Isabel P.M. Fernandes, João C.M. Barreira, Lillian Barros, Odinei Hess Gonçalves, Maria Filomena Barreiro, Isabel C.F.R. Ferreira</i> | |
| PC74 | | |
| | Cromatografia em Camada Fina e Cromatografia em Coluna utilizadas na síntese química de derivados do ergosterol | 141 |
| | <i>Cristhian R.L. Francisco, Sandrina A. Heleno, Ricardo C. Calhelha, Odinei Hess Gonçalves, Maria Filomena Barreiro, Pablo García, Isabel C.F.R. Ferreira</i> | |
| PC75 | | |
| | Cosmeceutical properties of phenolic acids and use of microencapsulation to ensure controlled release | 142 |
| | <i>Oludemi Taofiq, Sandrina A. Heleno, Ricardo C. Calhelha, Isabel P. Fernandes, Maria José Alves, Ana M. González-Paramás, Lillian Barros, M. Filomena Barreiro, Isabel C.F.R. Ferreira</i> | |

| | | |
|---|-----|--|
| PC76 | | |
| A QuEChERS method followed by liquid chromatography for the quantification of three organic contaminants in soil samples | 143 | |
| <i>Paula Guedes, Vanda Lopes, Nazaré Couto, Eduardo P. Mateus, Alexandra B. Ribeiro</i> | | |
| PC77 | | |
| Estudo e identificação de compostos bioativos na casca de pinheiro (<i>Pinus pinaster</i> Aiton subsp. <i>Atlantica</i>) | 144 | |
| <i>Preciosa Pires, Catarina Vieito, Élia Fernandes, Begoña Besada, Manuela Vaz Velho</i> | | |
| PC78 | | |
| Optimization of key parameters influencing the chromatographic analysis of phenolic compounds in beverages after isolation by u-SPEed | 145 | |
| <i>Priscilla Porto-Figueira, José A. Figueira, Jorge Pereira, José S. Câmara</i> | | |
| PC79 | | |
| Fingerprint of phenolic compounds in <i>Osyris quadripartite</i> Salzm. ex Decne. from Algeria | 146 | |
| <i>Wahiba Rached, Ricardo C. Calhelha, Ângela Fernandes, Ana Maria Carvalho, Malika Bennaceur, Abderrazak Marouf, Lillian Barros, Celestino Santos-Buelga, Isabel C.F.R. Ferreira</i> | | |
| PC80 | | |
| Determination of residual amounts of acetamiprid in crops by high-performance liquid chromatography | 147 | |
| <i>Roman A. Illarionov, Elisey Yu. Alekseev, Alyona I. Peskova, Maria O. Petrova</i> | | |
| PC81 | | |
| Miniaturized Techniques for the determination of Antidepressants in plasma | 148 | |
| <i>Rosa A. Lorenzo, Ana M. Ares, María Regenjo, Purificación Fernández, Antonia M. Carro</i> | | |
| PC82 | | |
| An Improvement of Lab Efficiency in Liquid Chromatography | 149 | |
| <i>Rúben Chaves, Andreia Costa, Sofia Silva, Joana Durão</i> | | |
| PC83 | | |
| Aplicação da metodologia SALLE para a determinação de amins biogénicas em produtos alimentares de origem animal | 150 | |
| <i>Karen C. Almeida, Pedro F. Brandão, Rui M. Ramos, Arnaldo A. Cardoso, José A. Rodrigues</i> | | |
| PC84 | | |
| High-performance liquid chromatography in routine environmental analysis: in-house validation of analytical methods | 151 | |
| <i>Rui S. Ribeiro, Adrián M.T. Silva, Joaquim L. Faria, Helder T. Gomes</i> | | |
| PC85 | | |
| Identification and quantification of phenolic compounds present in three different cultivars from <i>Sambucus nigra</i> L. | 152 | |
| <i>Sandrine S. Ferreira, Pedro Silva, Amélia M. Silva, Fernando M. Nunes</i> | | |
| PC86 | | |
| Anthocyanins profile of <i>Sambucus nigra</i> L. harvested in three different years | 153 | |
| <i>Sandrine S. Ferreira, Pedro Silva, Amélia M. Silva, Fernando M. Nunes</i> | | |
| PC87 | | |
| Asthma urinary metabotyping: strategies for data normalization | 154 | |
| <i>Jéssica E.P. Marques, Ana Morête, Sónia A.O. Santos, Armando Silvestre, Sílvia M. Rocha</i> | | |
| PC88 | | |
| Combined application of two-dimensional gas chromatography and headspace solid phase microextraction unravels changes in the volatiles of <i>Rhizobium</i> exposed to cadmium | 155 | |
| <i>Paulo Cardoso, Magda Santos, Rosa Freitas, Etelvina Figueira, Sílvia M. Rocha</i> | | |
| PC89 | | |
| Fatty acids as potential chemical marker to discriminate robusta coffee silverskin from different geographical origins | 156 | |
| <i>Sílvia Bessada, Rita C. Alves, M. Antónia Nunes, M. Beatriz P.P. Oliveira</i> | | |
| PC90 | | |
| Vitamin E profile of melon seed oils | 157 | |
| <i>Adrián Rabadán, Manuel Álvarez-Ortí, Sílvia Bessada, Rita C. Alves, José E. Pardo, M. Beatriz P.P. Oliveira</i> | | |

| | | |
|-------|---|-----|
| PC91 | | |
| | Comparison of <i>Ulva rigida</i> fatty acid profile in summer and winter seasons | 158 |
| | <i>Andreia Silva, Ana Sofia Queiroz, Helena Abreu, Artur M.S. Silva, Susana M. Cardoso</i> | |
| PC92 | | |
| | Lipophilic profile of four European macroalgae species | 159 |
| | <i>Andreia F.R.Silva, Rodrigo T. Neto, Ana Sofia Queirós, Artur M.S. Silva, Susana M. Cardoso</i> | |
| PC93 | | |
| | Caracterização de compostos antociânicos em flores comestíveis | 160 |
| | <i>Tânia C.S.P. Pires, Maria Inês Dias, Lillian Barros, Celestino Santos-Buelga, Isabel C.F.R. Ferreira</i> | |
| PC94 | | |
| | Gas chromatography: a useful tool for bakery products differentiation | 161 |
| | <i>Tânia Gonçalves Albuquerque, Joana Santos, Mafalda Alexandra Silva, M. Beatriz P.P. Oliveira, Helena S. Costa</i> | |
| PC95 | | |
| | Profile of Bound Phenolic Compounds from Olive Pomace | 162 |
| | <i>Tânia I.B. Ribeiro, Ana L. Oliveira, João Nunes, António A. Vicente, Manuela Pintado</i> | |
| PC96 | | |
| | Application of GC-MS to characterize the volatile composition of fruit distillates made with honey | 164 |
| | <i>Teresa Delgado, Ilda Caldeira, Ofélia Anjos</i> | |
| PC97 | | |
| | HPLC/DAD fingerprint of standardized extracts from <i>Ligustrum lucidum</i> Aiton berries, for bioactive activity screening | 165 |
| | <i>Teresa Delgado, Vanessa B. Paula, Maria Graça Campos, Nelson Farinha, André Caeiro, Leticia M. Estevinho, Ofélia Anjos</i> | |
| PC98 | | |
| | Similarity analysis between four Portuguese propolis samples using UHPLC-DAD-ESI-MSn chromatographic profiles of phenolic compounds | 166 |
| | <i>Vanessa B. Paula, Susana M. Cardoso, Luís G. Dias, Leticia M. Estevinho</i> | |
| PC99 | | |
| | Determination of organophosphorus pesticides in strawberries using modified QuEChERS method with magnetic nanoparticles and GC-FPD | 167 |
| | <i>Virgínia Cruz Fernandes, José Maria Oliveira, João Grosso Pacheco, Maria Freitas, Valentina F. Domingues, Cristina Delerue-Matos</i> | |
| PC100 | | |
| | Occurrence of Organophosphorus pesticide in sediments from Portuguese rivers | 168 |
| | <i>Carolina Rodrigues, Virgínia Cruz Fernandes, Cristina Delerue-Matos, Natividade Vieira</i> | |
| PC101 | | |
| | Total fat content and fatty acid profile of pseudocereals | 169 |
| | <i>Roberts R. Slaukstins, Santa Jakobsone, Vitor M. R. Martins, Clementina M.M. Santos</i> | |
| PC102 | | |
| | Enantiomeric separation and chiral recognition mechanisms of different macrocyclic glycopeptide-based chiral stationary phases | 170 |
| | <i>Ye Zaw Phyo, Andreia Palmeira, Sara Cravo, Maria Elizabeth Tiritan, Anake Kijjoo, Madalena M.M. Pinto, Carla Fernandes</i> | |
| PC103 | | |
| | Pyrolytic appraisal of the effect of agricultural practices on soil organic matter quality | 171 |
| | <i>Zulimar Hernández, Gonzalo Almendros, Tomas de Figueiredo</i> | |
| PC104 | | |
| | Gas chromatographic signature of soil lipids associated to land-use changes | 172 |
| | <i>Zulimar Hernández, Gonzalo Almendros, Jesús Sanz, Tomás de Figueiredo</i> | |
| PC105 | | |
| | Influência do método de secagem no perfil fenólico e propriedades bioativas de <i>Galium aparine</i> L. | 173 |
| | <i>Sylwia Senio, Carla Pereira, Lillian Barros e Isabel C.F.R. Ferreira</i> | |
| PC106 | | |
| | A novel natural colouring strategy for ice cream: effects on the profiles of individual sugars | 174 |
| | <i>Custódio Lobo Roriz, João C.M. Barreira, Patricia Morales, Lillian Barros, Isabel C.F.R. Ferreira</i> | |

| | | |
|-------|--|-----|
| PC107 | Development of a MHS-SPME-GC/MS method for analysis of volatile composition of Tawny Port wine | 175 |
| | <i>Juliana Milheiro, João Siopa, Sandrine S. Ferreira, Alice Vilela, Irene Fraga, António Inês, Carlos Matos, João Coutinho, Fernanda Cosme, Fernando M. Nunes</i> | |
| PC108 | Translocation study of pesticides applied by endotherapy in coconut palm (<i>Cocos nucifera</i> Linn.) and determination of residues by UHPLC-MS/MS | 176 |
| | <i>Jordana A. Ferreira, Joana M.S. Ferreira, Viviane Talamini, Paulo M.P. Lins, Carla B.G. Bottoli</i> | |
| PC109 | The impact of extrusion on the organics acids composition of gluten-free snacks based on rice, bean and carob flour blends. | 177 |
| | <i>C. Arribas, E. Pereira, L. Barros, E. Guillamón, I.C.F.R. Ferreira, M.M. Pedrosa</i> | |
| PC110 | Tocopherols content in gluten-free extruded composite flours of rice and different legumes | 178 |
| | <i>C. Arribas, E. Pereira, L. Barros, E. Guillamón, I.C.F.R. Ferreira, M.M. Pedrosa</i> | |
| PC111 | Phytochemical characterization of <i>Opuntia macrorhiza</i> (Engelm.) and <i>Opuntia microdasys</i> (Lehm.) cladodes | 179 |
| | <i>Hassiba Chahdoura, João C.M. Barreira, Lillian Barros, Celestino Santos-Buelga, Isabel C.F.R. Ferreira, Lotfi Achour</i> | |
| PC112 | Chemical characterization of <i>Opuntia</i> sp. by-products | 180 |
| | <i>Hassiba Chahdoura, João C.M. Barreira, Lillian Barros, Celestino Santos-Buelga, Isabel C.F.R. Ferreira, Lotfi Achour</i> | |
| PC113 | Extractability of rosmarinic acid by using three different aqueous based extraction procedures | 181 |
| | <i>Márcio Caroch, Lillian Barros, Isabel C.F.R. Ferreira</i> | |
| PC114 | Rosmarinic acid contents in putative natural food preservatives | 182 |
| | <i>Márcio Caroch, Lillian Barros, Isabel C.F.R. Ferreira</i> | |
| PC115 | Medicinal properties of biologically active substances derived from basidiomycetes | 183 |
| | <i>Sergei Sorokin, Ekaterina Antontceva, Alexander Ponyaev, Mark Shamtshyan</i> | |
| PC116 | Holistic strategy using HPLC-QqQ-MS and GC-qMS towards the screening of bioactive compounds from <i>Salicornia ramosissima</i> | 184 |
| | <i>Carla Martins, Ângelo C. Salvador, Cátia Martins, Sónia A.O. Santos, Carla Vilela, Neda Mimica-Dukic, Armando J.D. Silvestre, Sílvia M. Rocha</i> | |
| PC117 | Análise cromatográfica de compostos hidrofílicos em acessos de tomate (<i>Solanum lycopersicum</i> L.) conservados ex-situ | 185 |
| | <i>Valter Martins, José Pinela, Lillian Barros, Ana Maria Carvalho, Filomena Rocha, Ana Maria Barata, Isabel C.F.R. Ferreira</i> | |
| PC118 | Caracterização do perfil em tocoferóis e ácidos gordos de uma coleção de germoplasma de tomate (<i>Solanum lycopersicum</i> L.) | 186 |
| | <i>Valter Martins, José Pinela, Lillian Barros, Ana Maria Carvalho, Filomena Rocha, Ana Maria Barata, Isabel C.F.R. Ferreira</i> | |
| PC119 | Epicarpo de <i>Diospyros kaki</i> L. como uma fonte de vitaminas: análise cromatográfica de ácido ascórbico e de tocoferóis | 187 |
| | <i>Nilton P. de Souza, Ângela Fernandes, Natália Conceição, Lillian Barros, Isabel C.F.R. Ferreira</i> | |
| PC120 | Propriedades nutricionais de croissants aditivados com sumo de sabugueiro | 188 |
| | <i>Ricardo F.R. da Silva, João C.M. Barreira, Lillian Barros, Sandrina A. Heleno, Isabel C.F.R. Ferreira</i> | |
| PC121 | Utilização de subprodutos de bagas de sabugueiro como fonte de corantes naturais | 189 |
| | <i>Andreia C.R. Sousa, Sandrina A. Heleno, Lillian Barros, João C.M. Barreira, Isabel C.F.R. Ferreira</i> | |

| | | |
|-------|---|-----|
| PC122 | Perfil cromatográfico de ácidos orgânicos e tocoferóis de <i>Umbilicus rupestris</i> (Salisb.) e <i>Raphanus raphanistrum</i> L. | 190 |
| | <i>Júlia Harumi Iyda, Ângela Fernandes, Samara Cristina da Silva, Flávio Dias Ferreira, Lillian Barros, Joana S. Amaral, Isabel C.F.R. Ferreira</i> | |
| PC123 | Perfil cromatográfico em tocoferóis e ácidos orgânicos da microalga <i>Spirulina platensis</i> | 191 |
| | <i>Samara Cristina da Silva, Ângela Fernandes, Júlia Harumi Iyda, Lillian Barros, Eliane Colla, Maria Filomena Barreiro, Isabel C.F.R. Ferreira</i> | |
| PC124 | Lipophilic and phenolic compounds from <i>Eucalyptus grandis</i> wood cultivated in Portugal, Brazil and South Africa | 192 |
| | <i>Sônia A.O. Santos, Carla Vilela, Rui M.A. Domingues, Catia S.D. Oliveira, Juan J. Villaverde, Carmen S.R. Freire, Carlos P. Neto, Armando J.D. Silvestre</i> | |
| PC125 | Detailed composition and biological properties of lipophilic fraction of <i>Bifurcaria bifurcata</i> macroalga | 193 |
| | <i>Sônia A.O. Santos, Stephanie S. Trindade, Catia S.D. Oliveira, Paula Parreira, Daniela Rosa, Maria F. Duarte, Isabel Ferreira, Maria T. Cruz, Andreia M. Rego, Maria H. Abreu, Silvia M. Rocha, Armando J.D. Silvestre</i> | |
| PC126 | Tocopherols content of different wheat varieties: differences between refined and whole-wheat flour | 194 |
| | <i>Maria Ciudad-Mulero, Ângela Fernandes, Lillian Barros, Isabel C.F.R. Ferreira, M. Cruz Matallana, Patricia Morales, Virginia Fernández-Ruiz, José M. Carrillo</i> | |
| PC127 | Analysis of tocopherols and phenolic compounds in extruded lentil flour formulations for development of snack-type functional foods | 195 |
| | <i>Maria Ciudad-Mulero, Ângela Fernandes, Lillian Barros, Isabel C.F.R. Ferreira, José De J. Berrios, Montaña Cámara, Patricia Morales, Virginia Fernández-Ruiz</i> | |
| PC128 | Design of an one-step platform purification of STEAP1 using octyl-sepharose | 196 |
| | <i>Diogo P. Monteiro, Diana R. Duarte, Fátima M. Santos, Cláudio J. Maia, Luís A. Passarinha</i> | |
| PC129 | Valorising leaves of <i>Garcinia brasiliensis</i> Mart as sources of bioactive compounds | 197 |
| | <i>Stephanie Jedoz, Ângela Fernandes, Renato André Zan, Ricardo C. Calhelha, Roberto Carlos Campos Martins, Lillian Barros, Isabel C.F.R. Ferreira</i> | |
| PC130 | Evaluation of fatty acids of salmon from different origins: comparison of extraction and derivatization methodologies | 198 |
| | <i>Liliana Grazina, Maria A. Nunes, Isabel Mafra, M. Beatriz P.P. Oliveira, Joana S. Amaral</i> | |
| PC131 | A new multiple reaction monitoring method for the assessment of catechol-O-methyltransferase Val/Met108 | 199 |
| | <i>Ana M.G. Gonçalves, Fátima Santos, Joana Diogo, Eugénia Gallardo, Cláudio J. Maia, Luís A. Passarinha</i> | |

PC-75

Cosmeceutical properties of phenolic acids and use of microencapsulation to ensure controlled release

Oludemi Taofiq^{a,b,c}, Sandrina A. Heleno^{a,b}, Ricardo C. Calhella^a, Isabel P. Fernandes^b, Maria José Alves^a, Ana M. González-Paramás^c, Lillian Barros^a, M. Filomena Barreiro^{b,*}, Isabel C.F.R. Ferreira^a

^a*Centro de Investigação de Montanha (CIMO), Instituto Politécnico de Bragança, Campus de Santa Apolónia, 5300-253 Bragança, Portugal*

^b*Laboratory of Separation and Reaction Engineering - Laboratory of Catalysis and Materials (LSRE-LCM), Bragança Polytechnic Institute, 5301-857 Bragança, Portugal;*

^c*GIP- USAL, Unidad de Nutrición y Bromatología, Faculty of Pharmacy, University of Salamanca, Campus Miguel de Unamuno, 37007 Salamanca, Spain*

*barreiro@ipb.pt

Skin care formulations are designed to exert multifunctional benefits to the skin, promoting the interest on natural bioactive compounds as cosmeceutical ingredients. However, the utilization of such natural ingredients can present constraints related to their stability (e.g. against pH and temperature) being microencapsulation useful to overlap some of these limitations [1].

The present work describes the anti-inflammatory, anti-tyrosinase and antimicrobial activities of *p*-hydroxybenzoic, *p*-coumaric, protocatechuic and cinnamic acids. These compounds were microencapsulated using the atomization/coagulation method with sodium alginate coagulated with calcium chloride. The obtained microspheres were characterized in terms of morphology, particle size distribution, FTIR and encapsulation efficiency. Free and microencapsulated individual compounds were then incorporated into a semi-solid cosmetic base formulation. HPLC-DAD was used to check the presence of the compounds in the formulations.

Considering anti-inflammatory activity, *p*-Coumaric acid presented the lowest EC₅₀ value (152 ± 6 µg/mL) (NO production inhibition), followed by cinnamic acid (180 ± 14 µg/mL), which was also the most active in the anti-tyrosinase assay (EC₅₀ = 310 ± 50 µg/mL). All tested compounds displayed antimicrobial activity against Gram positive and Gram negative bacteria. The microparticles showed spherical morphology, various sizes (20-260 µm) with little agglomeration and a unimodal and bimodal particle size distribution (number and volume, respectively). The encapsulation efficiency was above 50 % in all cases. After incorporation, free compounds still maintained some of its bioactive properties, while the encapsulated forms preserved the bioactivity showing a slow release profile of the compounds. Concluding, this encapsulation procedure provides a suitable alternative to prolong retention of bioactive compounds for subsequent release (sustained release).

Acknowledgements:

FCT and FEDER under Program PT2020 (POCI-COMPETE2020) (CIMO (UID/AGR/00690/2013) and LA LSRE-LCM (POCI-01-0145-FEDER-006984)). Interreg España-Portugal (project 0377_Iberphenol_6_E) and European Structural and Investment Funds (FEI) through NORTE 2020 (Project Mobilizador ValorNatural®). Project NORTE-01-0145-FEDER-000006, funded by NORTE 2020 under the PT2020, through FEDER.

References:

[1] O.Taofiq, A.M. González-paramás, M.F. Barreiro, I.C.F.R. Ferreira. *Molecules* 2017, 22, 1–24.