# EMEC 18

CHEMISTRY TOWARDS AN INFINITE ENVIRONMENT

## 18th European Meeting on Environmental Chemistry

Porto 26-29th November 2017

# BOOK OF ABSTRACTS

Lepabe
Laboratory for Process Engineering, Environment, Biotechnology and Energy

U.PORTO
FEUP FACULDADE DE ENGENHARIA UNIVERSIDADE DO PORTO

SRE CM
LABORATORY OF SEPARATION AND REACTION ENGINEERING
LABORATORY OF CATALYSIS AND MATERIALS

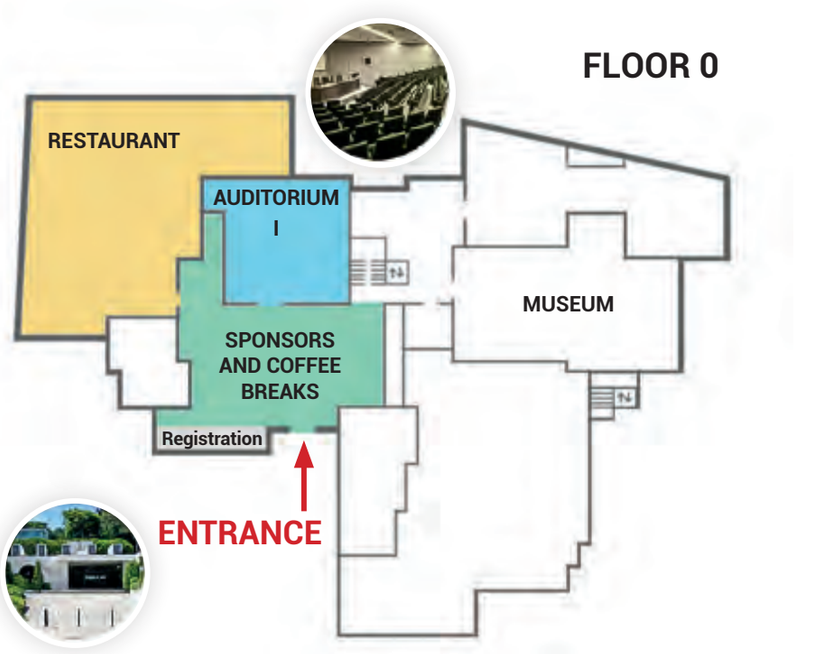
ASSOCIATION OF CHEMISTRY AND THE ENVIRONMENT

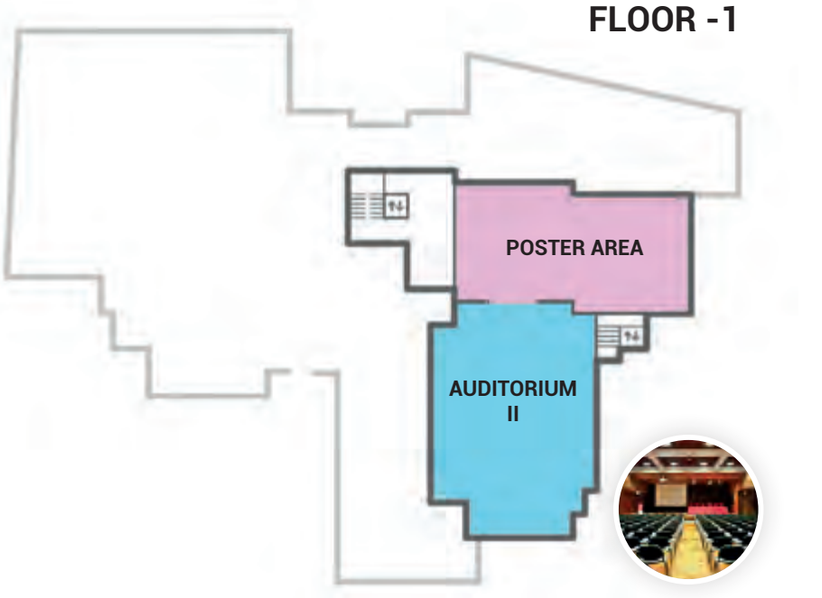
CEFT

SOCIEDADE PORTUGUESA DE QUÍMICA

## Venue – Fundação Dr. António Cupertino de Miranda

Avenida da Boavista, 4245, 4150 – 639 Porto; GPS: N 41°9'54'' | W 8° 40' 19''



## November 26th

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**Participants Registration**

## November 27th

**Participants Registration**

Opening ceremony — ***Aud. II***

***Diamond Sponsor*** – Prince Sultan Bin Abdulaziz International Prize for Water *(PSIPW)*

PL #1 **Damià Barceló**
Climate Changes, Water Scarcity, Emergent Contaminants and Other Stressors

KN #1 **Elia Psillakis**
Microextraction: An Ideal Platform to Analyse and Simulate the Environment

**Coffee-Break & Exhibition**

***Platinum Sponsor*** — ***Aud. II***
**Euan Ross** *(Waters Corporation)* – The Analysis of Natural and Synthetic Estrogens at Low ppq Levels in Surface Water and Final Effluent Water by LC-ESI-MS/MS

OP Env Monit #1 **Juan Francisco Facetti** — ***Aud. II***
Preliminary Characterization of MTBE in the Aquifer Patiño, Metropolitan Region of Asuncion, Paraguay

OP Env Tech #1 **Amina Khaled** — ***Aud. I***
Photodegradation of Brominated Flame Retardants in Textiles from End of Life Vehicles (ELVs): Kinetic and Photoproducts Characterization

OP Env Monit #2 **Eleonora *Conca***
Characterization and Temporal Evolution of the Inorganic Component of PM10 Collected at Ny-Ålesund (Arctica)

OP Env Tech #2 **Rajae Chahboune**
Photochemical Processes for the Elimination of Nitrosomorpholine During Water treatment: Kinetic and Analytical studies

OP Env Monit #3 **Francisco Cereceda-Balic**
Vehicle Emissions Impact on Snow Albedo Reduction in Los Andes Mountains. Study Case: Portillo, Chile

OP Env Tech #3 **João Gomes**
Operating Conditions Optimization for Photocatalytic Ozonation of Parabens Using Ag-$TiO_2$

OP Env Monit #4 **Miguel Velázquez Gómez**
Organic Contaminants in Indoor Dust: An Approach Through a GC-MS/MS method

OP Env Tech #4 **Eneliis Kattel**
Degradation of Ceftriaxone in Aqueous Solution by Heterogeneous Photo-Activated Persulfate System

OP Env Monit #5 **Eran Tas**
Ozone Deposition Over Vegetation in the Easterm Mediterranean

OP Env Tech #5 **Maria Conceição Amado**
Photocatalytic Reactor for Pharmaceutical Drugs and Pesticides Removal From Water, Using Thin Film CVD-Technology

**Lunch**

KN #2 **Pedro Jiménez-Guerrero** — ***Aud. I***
Using Chemistry Transport Models to Evaluate the Fate of Atmospheric Pollutants

OP Env Monit #6 **Olga V. Polyakova** — ***Aud. II***
Novel Methods for Comprehensive Analysis of Environmental Samples: GCxGC-HR-TOFMS

OP Env Model #1 **Gerhard Lammel** — ***Aud. I***
Monsoon Air Triggers Re-volatilization of Persistent Pollutants Stored in Soils in India

OP Env Monit #7 **Regina Duarte**
A Primer on – Omics Strategy for Untargeted Profiling of Organic Aerosols: Lessons Learned and Future Challenges

OP Env Model #2 **Noelia Domínguez-Morueco**
Combining Monitoring and Modelling Approaches for BaP Characterization Over a Petrochemical Area

OP Env Monit #8 **Isabel Brás**
Validation of ICP-MS Methodology for Quantification of 22 Elements in Wastewaters

OP Env Model #3 **Luís Silva**
DFT Calculations on Climate Forcing and on Sustainable $CO_2$ Conversion

OP Env Monit #9 **Priscilla Rocío-Bautista**
Metal-Organic Frameworks: A New Generation of Sorbents for Solid-Phase Extraction

OP Env Model #4 **Lotfi Belkhiri**
The DFT Modeling As A Partner Of Reprocessing Nuclear Waste. Rich Interplay Between Theory And Experience

OP Env Monit #10 **Claudia Fontàs**
Can Polymer Inclusion Membranes be Used as an Integral Tool to Facilitate Environmental Monitoring? The Case of Hg

OP Env Model #5 **Davide Vione**
Photodegradation of Sulfadiazine Under Conditions Significant for Surface Waters, and Inhibition by Organic Compounds

OP Env Monit #11 **Sónia Lopes**
Evaluation Of The Effect Of Organic Matter On The Dissolution Of Cu From CuO And $Cu(OH)_2$ Nanomaterials In Agricultural Soils

OP Env Model #6 **Luca Carena**
Photoinduced Reactions in Sunlit Paddy-Field Water

**Coffee-Break & Exhibition**

OP Env Monit #12 **Javier Castro-Jiménez**
Atmospheric Particle-Bound Organophosphate Esters (OPEs) in a North African Mediterranean Coastal Environment (Bizerte, Tunisia)

OP Env Tech #6 **Yael Mishael**
Efficient Removal of Pharmaceuticlas from Treated Wastwater by Tailored Polycation-Clay Sorbents

OP Env Monit #13 **Sofia Augusto**
Source Apportionment of PAHs in a Petrochemical and Chemical Industrial Area Using Lichens as Biomonitors

OP Env Tech #7 **Yuan Li**
Removal of the Pharmaceuticals Diclofenac and Trimethoprim from Aqueous Media Using Low-Cost Biosorbents

OP Env Monit #14 **Karen Yáñez**
Concentration Ratios for Polycyclic Aromatic Hydrocarbons from Wood Combustion: Comparison of Laboratory Results and Sampling in Temuco City (Chile)

OP Env Tech #8 **Elaine Fabre**
Agricultural Wastes for Mercury (II) Removal in Wastewater Treatment

OP Env Monit #15 **Albert Lebedev**
Organic Pollutants in Moscow Rain

OP Env Tech #9 **Ariana Pintor**
Arsenate and Arsenite Adsorption onto Iron-Coated Cork Granulates

OP Env Monit #16 **Mária Mörtl**
Determination of Surfactants Used in Agrochemicals

OP Env Tech #10 **Anna Bogush**
Potential Utilisation of Air Pollution Control Residue from Municipal Solid Waste Incineration Facility in the Cement Industry

OP Env Monit #17 **Dmitry Mazur**
Organic Pollutants in the Snow of Russian Arctic Islands

OP Env Tech #11 **Nuno Cruz**
Waste Management From Pulp and Paper Industry: Recycling to Soil as a Viable Management Option

**Poster Session & Porto D'Honra**

## November 28th

**Participants Registration**

PL #2 **Despo Fatta-Kassinos** — ***Aud. II***
Considerations Related to Contaminants of Emerging Concern and Wastewater Reuse

KN #3 **Maria Llompart**
Recycled Tire Rubber in Playgrounds for Children and Football Fields: Health and Environmental Concern

OP Env Tech #12 **Jianan Li** — ***Aud. II***
The Use of *Spirodela Polyrhiza* in Batch Scale Constructed Wetlands to Remove PPCPs from Synthetic Wastewater

OP Env Monit #18 **Silvia Lacorte** — ***Aud. I***
Pharmaceuticals Released from Health Care Facilities: New Control Procedures

OP Env Tech #13 **Maria Celeiro**
Assessment of Different Photodegradation Strategies To Remove Multiclass UV Filters From The Aquatic Environment

OP Env Monit #19 **Triantafyllos Albanis**
Determination of Pharmaceuticals in Hospital and Municipal Wastewaters by Using LC-LTQ Orbitrap Mass Spectrometry

OP Env Tech #14 **Carmen Mazón**
Effect of Sunlight and UV-C Disinfection Dose Irradiation on the Degradation of Organophosphorous Pesticide Dichlorvos

OP Env Monit #20 **Mónica Santos**
Development of an Analytical Methodology for the Analysis of Priority Cytostatics in Water

**Coffee-Break & Exhibition**

**Platinum Sponsor** — ***Aud. II***
**Peter Abrahamsson** *(Agilent Technologies)* – Using a Novel Accurate Mass MS/MS Library for the Qualitative Analysis of Environmental Samples

OP Env Tech #15 **Joana Vilas Boas** — ***Aud. II***
Single Chamber Microbial Fuel Cell (SCMFC) using *Lactobacillus pentosus* biofilms

OP Env Monit #21 **Patrícia Peixoto** — ***Aud. I***
Fast Methods for Screening Fluoroquinolones in Environmental Water

OP Env Tech #16 **Paula Figueira**
Nutshells as Very Low Cost Sorbents for Contaminated Waters Treatment

OP Env Monit #22 **Manuela Correia**
Assessment of 83 Pharmaceuticals in Wastewater Samples by UHPLC-MS/MS

OP Env Tech #17 **Benigno Nóvoa**
Kinetics, Transformation and Toxicity of 1,3-di-o-tolylguanidine and 1,3-diphenylguanidine During Disinfection with Chlorine

OP Env Monit #23 **Belen González-Gaya**
Optimizing a Clean Method for Environmental Samples: Antibiotics and Matrix Interferences in Marine Sediments, Water and Biota

OP Env Tech #18 **Elisabete Geraldes**
Eco-Friendly Non-Biocide-Release Coatings for Biofouling Prevention on Submerged Surfaces

OP Env Monit #24 **Liliana Silva**
SSRIs Antidepressants in Marine Mussels from Atlantic Coastal Areas and Human Risk Assessment

OP Env Tech #19 **Djilali Tassalit**
Photocatalysis And Adsorption Synergy For Simultaneous Removal Of Phenol And Acétamiprid Pollutants In Water

OP Env Monit #25 **Tamara Gorena**
Evaluation of the Environmental Impact of High Pollution Load from an Industrial Complex using *Cupressus macrocarpa* biomonitoring

**Lunch**

KN #4 **Cristina Branquinho** — ***Aud. II***
Evaluating the Role of Urban Green Spaces in Improving Urban Sustainability: The case of Air Purification and of Climate Regulation

OP Sust Devel #1 **André Pereira** — ***Aud. II***
Human Pharmaceuticals in Portuguese Rivers: the Impact of Water Scarcity in the Environmental Risk

OP Env Monit #26 **João Sousa** — ***Aud. I***
Spatiotemporal Monitoring Campaign of the Watch List Compounds in Ave and Sousa Rivers

OP Sust Devel #2 **Klara Slezakova**
Ultrafine Particles in Ambient Air of Metropolitan Area of Porto: Levels and Risk Assessment

OP Env Monit #27 **Gabriela Varela**
Determination of Cardiac Drugs in Sludge by Ultra Performance Liquid Chromatography Followed by Tandem Mass Spectrometry

OP Sust Devel #3 **Mirco Volanti**
LCA Methodology: A Case Study Of The Industrial Production Of Terephthalic Acid From Renewable Sources

OP Env Monit #28 **Polonca Trebse**
Identification of disinfection by-products formed within aquatic bromination of avobenzone

OP Sust Devel #4 **José Virgílio Prata**
How an Environmental Issue Could Turn Into Useful High-valued Products: The Olive Mill Wastewater Case

OP Env Monit #29 **Jan Schwarzbauer**
Molecular Indicators for Dockyard Works in Coastal Sediments of a Large Industrialized Port Area in Hainan Island, China

OP Env Safe #1 **Anabela Francisco**
The Predicted Concentrations of Antibiotics in STPs in Portugal – A tool for the Microbial Community Resistance Research

OP Env Monit #30 **Filipe Rocha**
Seaweed Analysis for the Determination of Volatile Methylsiloxanes in Coastal Areas in North of Portugal

OP Env Safe #2 **Elena Bessonova**
LC/MS Determination of Anti-TB Drugs and Their Metabolites in Human Plasma for Optimization Therapeutic Treatment of Tuberculosis

OP Env Monit #31 **Irene Aparicio**
Occurrence of Parabens and Bisphenol A in Sludge Stabilization Treatments: Anaerobic Digestion and Composting

**Coffee-Break & Poster Session**

**Departure for Porto Wine Cellars and Conference Dinner**

## November 29th

**Participants Registration**

PL #3 **Kevin Jones** — ***Aud. II***
Passive Sampling the Environment: Why, How and a Vision of the Future

KN #5 **Kurunthachalam Kannan**
Biomonitoring of Human Exposure to Environmental Chemicals

OP Env Safe #3 **Marta Silva** — ***Aud. II***
Synthesis and Environmental Fate Evaluation of New Nature-Inspired Antifouling Compounds

OP Env Tech #20 **Susana Ortega** — ***Aud. I***
Ammonium Removal as Struvite from Biologically Treated Human Urine

OP Env Safe #4 **Inês Bezerra**
Effects of Emerging Contaminants Detected in Drinking Water on Bacteria Tolerance to Antimicrobials

OP Env Tech #21 **Paula Guedes**
Removal of PPCPs from Effluent Based on Electrochemical Process – Possibility of Further Use in Agriculture

OP Env Safe #5 **Anne-Marie Delort**
$H_2O_2$ Modulates the Energetic Metabolism of the Cloud Microbiome

OP Env Tech #22 **Paulo Augusto**
Exploring Magnetism as a Way to Decontaminate Wastewater and Leachates

**Coffee-Break & Exhibition**

**Platinum Sponsor** — ***Aud. II***
**Juergen Wendt** (LECO) – The Usage of Time-of-Flight Mass Spectrometry for Environmental Analysis

OP Env Safe #6 **Rui Santos** — ***Aud. II***
PLASMAQUANT® MS a new potential tool for Iron Isotope Ratios determination in Biological Samples

OP Env Tech #23 **Abuzar Kabir** — ***Aud. I***
Encapsulation of High Surface Area Carbonaceous Particles into Sol-gel Matrix and Their Use in Environmental Pollution Mitigation

OP Env Safe #7 **Paulo Reis**
RIBE Assessed At An Inter-organismic Level In *Daphnia magna* Exposed To Low Doses Of Uranium Mine Effluent And Waterborne Uranium

OP Env Tech #24 **Luísa Maia**
Formate Dehydrogenase-catalysed Carbon Dioxide Reduction: Aiming to Develop a Catalyst for Carbon Dioxide Utilisation

OP Env Safe #8 **Patrícia Palma**
Ecotoxicological Tools Used in the Assessment of the Ecological Status of Freshwater Systems: a Case-study of the Temporary River Brejo do Cagarrão (South of Portugal)

OP Env Tech #25 **Maria Laura Tummino**
Green Waste Derived Substances Immobilized on SBA Silica: Adsorbing and Photosensitizing Properties Towards Metals and Organics

OP Env Safe #9 **Joana Lourenço**
Uranium Mining Legacy Sites: Genetic Effects of Metals and Low-Dose Radiation in Farm Animals Exposed to Contaminated Water and Foodstuffs

OP Env Tech #26 **Cláudia Neves**
Immobilized Porphyrins as Photocatalysts for the Degradation of Metoprolol

OP Env Safe #10 **Pavel Fojt**
Ecotoxicity Assessment of Cadmium Using Different Life Stages of the Terrestrial Gastropod *Helix aspersa aspersa*

OP Env Tech #27 **Alaâeddine Elhalile**
Synthesis, Characterization and Photocatalytic Performance of Mg-ZnO-$Al_2O_3$ Nanocomposite for Degradation of Pharmaceutical Pollutants

**Lunch**

**ACE General Assembly (*Aud. II*)**

OP Env Safe #11 **Helena Soares** — ***Aud. II***
Additive Inhibitory Free Metal Ion Concentration Index: a New Method for Assessing Multi-Metal Contamination Risk on Freshwaters

OP AgroFood #1 **Ana Martínez Piernas** — ***Aud. I***
Suspect-screening Strategy Applied To The Identification Of Transformation Products Of Carbamazepine In Lettuce And Soil Commodities

OP Env Safe #12 **Marilyne Pflieger**
Ecotoxicity of Biomass Burning Pollutants and Their Nitro Derivatives

OP AgroFood #2 **Anabela Cachada**
Chemical and Biological Methods for the Evaluation of Cu Availability in Soils of the Douro Region

OP Env Safe #13 **Ruth Pereira**
Ecosystem Services Provided by Soils Under Different Land Uses: Implications to Water Quality

OP AgroFood #3 **Carlos Ferreira**
Soil interactions of azotochelin and DPH and determination of iron induced chlorosis mending potential in soybean (glycine max)

OP Env Safe #14 **Verónica Nogueira**
The Impact On Soil Biota of Leather From The Footwear Industry Treated With ZnO Nanomaterial: A Microcosm Study

OP AgroFood #4 **Filipa Paulo**
How and Why Incorporation of Microencapsulated Bioactive Ingredients in Foods?

**Scholarship Ceremony & EMEC19 Presentation & Closing Ceremony (*Aud. II*)**

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Titulo

Book of Abstracts of the18th European Meeting on Environmental Chemistry - EMEC18: Chemistry Towards an Infinite Environment

Editor(es)

M.S.F. Santos, A.M.T. Silva, L. Santos, N. Ratola, A.M.F.R. Pinto, M.F.R. Pereira, V. Homem, N.F. Azevedo, A. Alves

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# Assessing the Potential of Six Common Brazilian Crops for Gold Phytoextraction from Mine Tailings

PP Env Tech #19

*L.A.B. Novo[1, 2*], E.F. Silva[1], C.F. Mahler[3], C.R.G. Tavares[4], D.V. Peréz[5]. (1) University of Aveiro, Aveiro, Portugal, (2) Catholic University of Portugal, Porto, Portugal, (3) Federal University of Rio de Janeiro, Rio de Janeiro, Brazil, (4) State University of Maringá, Maringá, Brazil, (5) EMBRAPA Soils, Rio de Janeiro, Brazil; *novo@ua.pt*


In recent years, the ever-growing price of rare and valuable elements, the inability of conventional mining to extract the totality of metals from mineral ores, and the build-up of billions of tons of mine waste worldwide [1], have emphasized the importance of alternative solutions like phytotechnologies. These inexpensive and environment-friendly plant-based techniques have demonstrated their competence to not only mitigate pollution (phytoremediation), but also to recover critical metals (phytomining/agromining) and generate carbon-neutral energy from harvested biomass [2–4]. In this study, six naturalized crops that can be extensively found in Brazil, were assessed for their capacity to uptake Au from the tailings of a gold mine.

Seeds of *Pennisetum glaucum* (pearl millet), *Sorghum bicolor* (sorghum), *Sinapsis arvensis* (wild mustard), *Medicago sativa* (alfalfa), *Cajanus cajan* (pigeon pea), and *Leucaena leucocephala* (white leadtree), were sown on a 2:1 perlite:sand mixture (2:1 v/v), and allowed to germinate and grow till two fully expanded leaves. Seedlings were then transferred to pots at the rate of 1 per pot, following uniform criteria. The pots were filled with equal volume of mine tailings (Mina do Morro, Campo Largo, PR-Brazil), presenting 2.15 mg of Au $kg^{-1}$. One week before harvesting, the pots were treated with a solution of ammonium thiocyanate ($NH_4SCN$), at a rate of 1 g $kg^{-1}$. Plants, 3 replicates per species, were harvested 60 days after sowing. Plants were divided into root and shoot, and their dry weights were measured. Metal contents in plant tissue and tailings (pseudo-total and bioavailable fractions) were assessed by inductively coupled plasma mass spectrometry (ICP-MS). One-way analysis of variance (ANOVA) was carried out to determine significant differences ($p<0.05$) between plant species.

The biomass yield and metal levels of the shoots are critical for phytomining because they control the quantity of metal to be harvested from each plant (henceforth referred to as harvestable amount). Thus, although the dry weight of the aboveground parts was significantly lower in alfalfa than in the other species, it presented the highest Au levels (24.08 mg $kg^{-1}$), followed by wild mustard (7.82 mg $kg^{-1}$), and white leadtree (1.91 mg $kg^{-1}$). The remaining crops exhibited shoot Au concentrations below 1 mg $kg^{-1}$. These results translate into maximum harvestable amounts of $27.32^a$, $15.17^b$, $2.59^c$, $2.34^c$, $1.28^c$, and $0.34^c$ µg of Au $plant^{-1}$ in alfalfa, wild mustard, white leadtree, sorghum, pigeon pea, and pearl millet, respectively (different letters indicate significant differences between crops).

Further analysis to the results obtained in this study include an economic assessment to determine the process profitability.

## Acknowledgements

The authors gratefully acknowledge financial support from the Portuguese Foundation for Science and Technology (FCT) under grant no. SFRH/BPD/103476/2014.

## References

**[1]** R.L. Hooke, J.F. Martín-Duque, *GSA Today*, 12 (2012) 4.

**[2]** L.A.B. Novo et al., *Phytoremediation*, 5 (2017) 469.

**[3]** N. Witters et al., *Biomass and Bioenergy*, 39 (2012) 454.

[4] R.L. Chaney, I.A. Baklanov, *Advances in Botanical Research*, 83 (2017) 189.