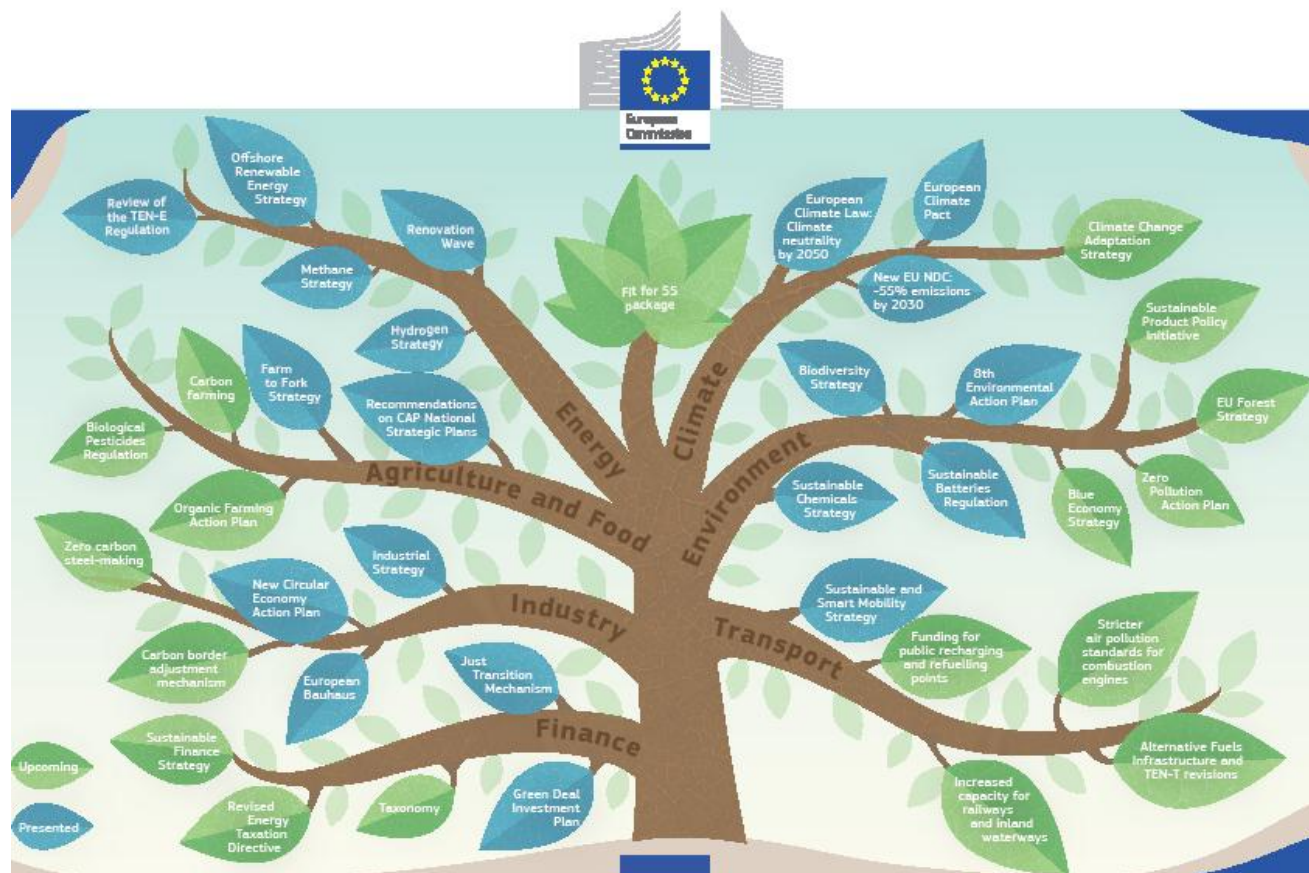


EU climate action and the European Green Deal

(<https://ec.europa.eu/clima/policies/eu-climate-action>)



The actions for fighting climate changes addresses to the following key area:

- Energy
- Environment
- Mobility and transport
- Regional policy and the low-carbon economy
- Sustainable finance
- Industrial policy
- Trade and sustainable development
- International cooperation and development
- Research and innovation on climate change
- Sustainable development goals

Chemistry has to play an important role in finding solutions for many of these areas.

For details see:

https://ec.europa.eu/clima/sites/default/files/eu-climate-ction/docs/green_deal_birthday_tree_en.pdf

News from the DCE

Quo Vadis Life Science International Scientific Conference Opole, June 23-27,



2021

And yet it worked!!! Despite of all pandemic restrictions, a group of determined researchers associated with the Committee of Analytical Chemistry of the Polish Academy of Sciences, decided to organize in June 23-27, 2021 at the *Collegium Maius* of the University of Opole, the *12th Polish Chromatography Conference* in conjunction with the *13th International Ion Chromatography and Related Techniques Conference*, as well as the *2nd International Conference on Ion Analysis (ICIA)*. The conference hosted also the participation of the Division of Chemistry and the Environment (DCE) of EuChemS. The patronage for this scientific event was provided by: the Rectors of the Universities of Opole and *Adam Mickiewicz* of Poznań, the Marshal of the Opole Voivodeship, the Mayor of Opole city, the President of the Polish Chemical Society, the Chair of DEI and the President of the Committee of Analytical Chemistry of the Polish Academy of Sciences (KChA PAN).



Over 150 registered participants from 16 countries of Europe, America, and Africa attended this important event. The conference took place in hybrid system, with about 60 people attending *in person*, and the rest, about 90 people, *via internet*. Over 50 participants registered from abroad, from which over 40 participated actively.

The program of the conference included a large variety of interdisciplinary subjects. It concerned analytical chemistry and environmental chemistry, with subjects in the field of

separation, flow and electro-migration, spectroscopic and electrochemical techniques, including methods for sample preparation, validation and chemometrics. New approach to the transformation at the molecular level (omics) of a full range of chemical and biological species, i.e. nanocomposites, biologically active substances or xenobiotics, in matrices such as: air, water, sewage, soil, tissue, food, etc. were discussed. In line with the *motto*, during the sessions, the changes taking place in the ecosystem, both alive and lifeless (life sciences) were also considered. The organizers managed to combine the topics in a very balanced way, paying particular attention to the relationship between theory and practice. In 9 sessions, 25 plenary lectures, 43 section lectures and 60 electronic posters (e-poster + 5 min. presentation) were offered.

In the opening ceremony representatives of authorities, as well as of the Polish Chem. Soc., EuChemS and the Committee of Analytical Chemistry of the Polish Academy of Sciences were present. A number of Committee's awards for scientific achievements were delivered, such as: for the best habilitation to Dr. hab. Marcin Poręba, Technical University of Wrocław, and for the best PhD thesis, to Dr. Martyna Pajewska-Szmyt, UMK Toruń, and Dr. Tomasz Majchrzak from Technical University of Gdańsk. The Committee also awarded medals "*For Merits to the Committee*" to prof. dr. hab. Renata Gadzała-Kopciuch (*Nicolaus Copernicus* University of Toruń) and prof. dr. hab. Rajmund Michalski (*Institute of Environmental Engineering* Polish Academy of Sci. Zabrze). Moreover, prof. dr. hab. eng. Joanna Kałużna-Czaplińska (Technical University of Łódź) and Dr. Vaclav Kašička (Institute of Chemistry of the Czech Academy of Science) were awarded with the *Prof. A. Waksmundzki* medal. The whole event was concluded with the performance of a student string quartet introducing the participants into the dynamic atmosphere of the conference.

The scientific session was opened by a lecture presented by Dr. Silvia Lacorte (IDAEA-CSIC, Barcelona), with an up-to-date hot subject: nano- and micro-plastics in the aquatic environment, their analysis and their impact on the ecosystem and human health. The following presentations were related to: nano-materials and nano-composites and their impact on the environment and ecosystem presented by prof. Antonio Marcomini (University of Venice); determination of fragrances using coupled and combined chromatographic (GC) and spectral

(MS) techniques, including new solutions in the preparation of samples, presented by prof. Henryk Jeleń (University of Life Sciences of Poznań). The role of chromatography, especially ion chromatography, in the determination of atmospheric pollutants was the subject of prof. Wolfgang Frenzel's lecture (Technical University of Berlin). Prof. Bogusław Buszewski's lecture (*Nicolaus Copernicus University of Toruń*) entitled "*The influence of chemical structure and biological activity of analytes on chromatographic retention, selectivity and specificity*" ended the first day of the conference. The progress that was achieved in the description of the separation mechanism in ion chromatography with different ways of detection was the subject of a series of lectures presented by prof. R. Dyczyński (IChTiJ from Warsaw), Dr. Rosa M. Alonso (University of Basque of Bilbao) and Dr. Joachim Weiss (Thermo Fisher Sci. GmbH, Dreieich). Interesting considerations on the analysis of cytokines and their medical-therapeutic determination were presented by Prof. Karel Doležel (University of Olomouc). The second day morning session ended with a lecture by prof. Agata Kot-Wasik (Technical University of Gdańsk) on the issues related to the comparison of various methods of sample preparation in lipid compounds analysis.

The next session presented a series of reports on: new methodological solutions (including ionization methods) by coupled separation (LC-MS, GC-MS) and multidimensional techniques (GCxGC-MS, LCxLC-MS/MS) for the determination of biologically active substances. It started with prof. Olivier J. Schmitz (University of Duisburg-Essen) followed by dr. hab. A. Stachniuk, dr. hab. E. Fornal (Medical University of Lublin), dr. hab. M. Matczuk (Warsaw University of Technology) and dr. hab. J. Piechocka (University of Lodz). Issues related to pharmaceutical residues in the aquatic environment, their transformations and methods of determination were the topic of the lectures presented by Dr. M. Caban (University of Gdańsk) and Dr. Diana Lopez (ENFOCHEM, Barcelona). Later on dr. T. Hernandez Sotomayor from Mexico discussed the impact of aluminum toxicity on plant cells and the analysis of this element. Dr. hab. Paweł Pomastowski (*Nicolaus Copernicus University of Toruń*) presented the application of the MALDI technique in the determination of microorganisms.

Tracking the changes taking place within the metabolic pathways and biogenic changes in living organisms was the subject of a series of

papers presented by prof. Uwe Karst (University of Munster), prof. Michał Markuszewski (Gdańsk Medical University), dr. Paweł Dzygiel (Hoffmann-LaRoche, Basel) and dr. hab. M. Szultka-Młyńska (*Nicolaus Copernicus University, Toruń*). Theoretical considerations related to the description of the retention mechanism in chromatography were discussed by prof. Pavel Nesterenko (Lomonosov University of Moscow) and Dr. A. Subert (Philips University of Marburg). Prof. Michaela Dina Stanescu (University of Arad) discussed aspects related to "*Various solutions to textile dye water pollution*" emphasizing the importance of the prevention of pollution. The issues related to the application of new molecular imprint sorbents were the subject of lectures by Dr. Antonio Martin-Esteban (National Institute of Research and Technology in Agricultural and Food Science, Madrid). Dr. Mariusz Marćn (Gdańsk University of Technology) and prof. Luke Chimuka (WITS University, Johannesburg) discussed the issues of extraction and chemometric approach in obtaining biologically active substances from plants. Analysis of the oils obtained from plant material was also presented by Dr. Natalia Hudz (Lviv National Medical University). The entire conference program was centered on analytical issues, including the calibration and validation of systems, modeling and statistical analysis, based on chemometrics. Examples were the excellent lectures presented by prof. Michał Daszkowski (University of Silesia from Katowice), prof. Rafał Głowackiego (University of Łódź), Dr. Neuredine Djebli (Abdelhamid Ibn-Badis University, Mostaganem), and prof. Ivana Ivancev-Tumbas (Novi Sad University). The conference ended with two plenary lectures. "*Correlation of histochemical express method with instrumental technique of analysis in phytochemistry*" presented by prof. Uliany Karpiuk (Bogomoltes National Medical University of Kiev) and the very illustrative title "*Green ion chromatography?*" of prof. Rajmund Michalski (Institute of Environmental Engineering PAsci. from Zabrze).

A detailed program and the electronic book of abstracts can be found at the online address: <http://opoleconference2021.wch.uni.opole.pl>

Short oral presentations and posters presented by young researchers were connected to the conference topics. The jury assessed the scientific novelty, the form and method of presentation distinguishing 3 winners. The laureates of the competition were:

- Dominika Kołodziej, Nicolaus Copernicus University of Toruń; "3D printed polyamide and carbon fiber blends as an alternative support for thin film microextraction (TFME) devices or an alternative stationary phase for extraction of small molecules" - oral presentation,
- Katarzyna Kurpet, University of Łódź; "Optimization of sample preparation for determination of biothiols by ion-pair chromatography after derivatization with 2-chloro-1-methylpyridinium iodide" - e-poster presentation,
- Klaudia Kokoszka, Silesian University of Technology; "Analysis of pharmaceutical residues and their transformation products in groundwater and municipal sewage samples" - e-poster presentation.



During the **Quo Vadis Life Science** conference, beside the modern and full scientific program, the organizers provided also an interesting and attractive cultural program. The performance of the already mentioned string quartet, a *Gala dinner* or trips around the charming town of Opole, the capital of Polish song, are just some of the attractions during this difficult period.

A meeting of the Chromatographic Analysis and Related Techniques Commission was also held in a hybrid form. The current situation in Polish science was discussed, underlining the role and the importance of the Polish Academy of Sciences. The tasks of the Committees and Commission for the development of science were emphasized. The activity of the Commission and plans for the future were also discussed, paying attention to the initiatives and publishing activity of the members of the Commission. The organizer and the venue for the next Conference were chosen (Prof. R. Michalski - Zabrze'2023). The participants of the meeting thanked the organizers of the *Opole'2021 meeting* (prof. Piotr Wieczorek and prof. Anna Poliwoda and their team, prof. Rajmund Michalski from the Institute of Environmental Engineering PAsci. of Zabrze, and prof. Marcin Frankowski from Adam Mickiewicz University of Poznań) with gratitude for their efforts and courage in making difficult decisions, especially during the pandemic time.

All this would not have been possible without the financial support of governmental and non-governmental institutions (Polish Academy of Sciences, the Marshal of the Opole Voivodeship, the Mayor of Opole city, companies: Anchem, Phenomenex, Metrohn-Polska, Perlan Technologies, Polygen, Shim-Pol, Spectrometry, Merck, ABL&E-Jasco, Polska Sp. Zoo, Głubczyce Brewery, Hard Beans and many others). The organizers and participants expressed their thanks for these entities support.



Prof. dr. hab. Bogusław Buszewski
The chairman of the Committee of Analytical Chemistry of the Polish Academy of Sciences
Toruń / Opole, July 21, 2021

Conferences:

- [2nd Carbon Dioxide Conversion Catalysis Conference - CDCC-2](#); 08-09.11.2021- online
- [5th EuChemS Conference on Green and Sustainable Chemistry – EUGSC-5](#); 26-29.09. 2021- online
- [21st European Meeting on Environmental Chemistry](#) 30.11-3.12.2021, Novi Sad, Serbia <https://emec21.rs/>

Environmental education in Europe

Higher Education with focus on Chemistry and the Environment in Spain

Almost one decade ago, the DCE established a task force in Education that elaborated an extensive study about Higher Education on Environmental Chemistry in Europe (*Environ. Sci. Pollut. Res.* **2014**, *21*, 7211–7218). The work by the DCE delegates G. Lammel, E. Jover and I. Ivancev-Tumbas established then, the fact that Spain Universities had developed 26 BSc and 22 MSc programs in Environmental Sciences with some emphasis on Chemistry. A few years later the scenario has significantly changed with 46 BSc and more than 40 MSc degrees identified.



A very homogeneous distribution can be observed now, with 16 out of the 17 Regions of Spain offering at least one degree and 9 of them offering both BSc and MSc degrees. A remarkable situation can be found in Andalusia and Valencia where all provinces (eight and three respectively) have at least one BSc or MSc program offered.

Regarding BSc studies, only three of the initial degrees have disappeared, while the rest continue active or suffered minor changes. For the new degrees, most correspond to Environmental Sciences or Environmental Engineering (16), with the rest involving Marine or Forestry / Agricultural Sciences.

Given the nature of those undergraduate studies, the focus on Chemistry has not significantly changed and Chemistry continues to be a relatively minor area of study. The credits given for chemistry represent, in most cases, appreciably less than 20% of the total.

The situation for postgraduate studies is more complex. The above-mentioned study had identified 22 MSc programs in Spain in 2012. This number has essentially doubled currently. Besides, many changes and transformations of the former programs can be observed, often associated to the multiple legal changes in postgraduate education in Spain.



The heterogeneity of the identified MSc programs does not facilitate a simple classification or the identification of the exact role of chemistry in those studies. The main category involves those focusing on Environmental or Ecosystems Management. If added to the MSc programs relating Agriculture and Food technologies to Sustainability, both categories account for around 30% of the postgraduate programs identified. The role of

Chemistry in those programs is very variable and represents a minor contribution in most cases. The same applies for a series of MSc programs in the field of Energy (Renewable Energies, Energetic Efficiency, Energy and Sustainability) that although requiring a strong component of Chemistry - in particular Materials Chemistry – do not present, in general, a significant contribution of Chemistry subjects. Multidisciplinary approaches can be found in different MSc degrees in Sustainable Development/Circular Economy and in Environmental Sciences. While Chemistry is essentially absent in the first case, it can represent a significant contribution to those degrees involving topics like Environmental Pollution, waste, toxicology, etc.

Finally, there are two categories where Chemistry and Chemical Engineering play a key role. The first group includes the MSc degrees in Environmental Engineering that are mainly associated to Departments of Chemical Engineering. The second one corresponds to the MSc studies in Sustainable Chemistry. The pioneer initiatives in this area were carried out by the Spanish Network in Green Chemistry, with the contribution of educators and researchers from more than a dozen universities and research centres. This led, at the beginning of the XXI century, to the development of an Interuniversity PhD Program in Sustainable Chemistry that was later transformed into a postgraduate program encompassing MSc [University Master's Degree in Sustainable Chemistry - 2020 program of study (uji.es)] and PhD [Doctoral Program in Sustainable Chemistry (uji.es)] studies and being offered jointly by four different institutions in the present academic course. Since the beginning, this initiative has been coordinated by our group at the University Jaume I of Castellón and currently involves topics from different areas of Chemistry and Chemical Engineering as well as from Physics (mainly regarding renewable energies and materials). After this initiative, three additional MSc programs in Sustainable Chemistry have been offered by different universities. In all instances, the main contribution to those MSc corresponds to the fields of Chemistry and Chemical Engineering. Overall, Higher Education with focus on Chemistry and the Environment has been consolidated in Spain in the last decade. The contribution of Chemistry has slightly increased in those years, but mainly because of the increase in Environmental Engineering and

Sustainable Chemistry studies. Increasing the involvement of chemical topics in those degrees with a higher level of interdisciplinarity still remains an open challenge.



Santiago V. Luis Spanish Royal Society of Chemistry delegate at the DCE, University Jaume I Spain
Belén Altava
Coordination of Spanish Interuniversity PhD and MSc studies in Sustainable Chemistry. University Jaume I, Spain

Environmental studies in Germany Universities of Baden-Württemberg

Overall, the number of degree programs offered in Germany has increased since the implementation of the Bologna Reform. In winter semester 2020/2021 a total of 18745 Bachelor's and Master's degree programs were offered by a total of 422 higher education institutions in Germany with 108 universities, 210 universities of applied sciences and 104 colleges (www.destatis.de).



In Baden-Württemberg, 9 state universities and 23 universities of applied sciences are among those offering bachelor's and master's degree programs (<https://www.studieren-in-bw.de>). The universities are characterized by a theory- and research-oriented focus and the general right to award doctorates. In addition to specialist knowledge and knowledge of methods, interdisciplinary qualifications are also taught. The universities in Baden-Württemberg offer a wide range of subjects: *Engineering Sciences*;

Mathematics, Computer science and Natural sciences; Agricultural and forestry sciences; Medicine and health care; Law and economics; Social sciences; Cultural and linguistic sciences; Arts and design.

However, the individual universities have an independent profile and form different focal points. A very broad spectrum of subjects is offered at the three oldest universities, namely Heidelberg (founded in 1386), Freiburg (founded in 1457) and Tübingen (founded in 1477). The universities of Stuttgart (founded in 1829) and Karlsruhe (founded in 1825) teach mainly engineering and natural sciences. Newer and smaller universities specialize in particular fields: Economics and Social Sciences at the University of Mannheim (founded in 1946), and Economics and Agricultural Sciences at the University of Hohenheim (founded in 1818). The youngest universities in the state offer a wide range of natural sciences, humanities and social sciences at Konstanz (founded in 1966), while Ulm (founded in 1967) focuses on natural sciences, engineering and medicine.

The universities of applied sciences (FH) are distinguished by their practice-oriented education, which prepares students more strongly for later professional activities that require the independent application of scientific knowledge and methods. Application-oriented scientific education is offered at the universities of applied sciences for similar subjects.

Beginning with the 1980s, an increasing number of interdisciplinary courses with a focus on "environment" in the broader sense are now offered at German universities. This also takes into account the fact that the current problems associated with the preservation of our earth as an intact habitat (water, soil and air) and with the sustainable management of natural resources are generally interdisciplinary in character. Only through a sound understanding of environmental systems and their complex interaction with anthropogenic processes can these goals be achieved in the long term. This requires in higher education, in addition to the basic science knowledge, the ability to integrate and synthesize different technical, natural and social science aspects in the development of solutions, as well as in communication at different levels.

Typical examples of degree programs with a focus on the environment at universities (Uni) and universities of applied sciences (FH) are:

at the Bachelor level

- *Environmental and Energy Process Engineering (FH Offenburg)*

- *Environmental and Geoinformation Management (FH Karlsruhe)*
- *Environmental and Process Engineering (FH Heilbronn)*
- *Environmental Engineering (FH ;Karlsruhe)*
- *Environmental Engineering and Resource Management (FH Konstanz)*
- *Environmental Hydrology (Uni Freiburg)*
- *Environmental Protection (FH Stuttgart, Nürtingen-Geislingen, Esslingen)*
- *Environmental Protection Engineering (Uni Stuttgart, FH Ulm)*
- *Environmental Sciences (Uni Tübingen, Freiburg)*
- *Forest Sciences (Uni Freiburg)*
- *Geoecology (Uni Tübingen and Karlsruhe)*
- *Nature Conservation and Landscape Management (FH Rottenburg)*
- *Renewable Resources and Bioenergy (Uni Hohenheim)*
- *Resource Management Water (FH Rottenburg)*
- *Sustainability and Change (Uni Hohenheim)*
- *Sustainable Management (FH Nürtingen-Geislingen)*
- *Sustainable Regional Management (FH Rottenburg)*

at the Master level

- *Applied and Environmental Geoscience (Uni Tübingen)*
- *Environmental Protection (FH Stuttgart, Nürtingen-Geislingen, Esslingen)*
- *Environmental Protection Engineering (Uni Stuttgart)*
- *Environmental Sciences (Uni Freiburg)*
- *Geoecology (Uni Tübingen and Karlsruhe)*
- *Renewable Resources and Bioenergy (Uni Hohenheim)*
- *Water Resources Engineering and Management (Uni Stuttgart)*
- *Water Science and Engineering (Uni Karlsruhe)*

Depending on the focus of the universities and the orientation of the study programs, the basic education concerns natural sciences, engineering or social sciences and law. This also includes subjects such as environmental chemistry, environmental physics, biology, environmental informatics, environmental management, communication, environmental law or administrative law. At universities, the program is designed to last 6 to 8 semesters for the bachelor's degree and 2 to 4 semesters for the master's degree; at universities of applied sciences, the program is designed to last 7 semesters (BSc) and 3 semesters (MSc).

As an example, the BSc program in Environmental Sciences at the University of Tübingen will be examined in more detail (<https://uni-tuebingen.de/>). The focus is on scientific methods and their application to

understand and describe biogeochemical and physical processes in the water cycle, soil and atmosphere. The aim of the course is to provide a sound theoretical and methodological basis for dealing with environmental science problems and issues in the Earth system (keywords: climate change, geo-resources, environmental systems management). In addition to basic training in mathematics, chemistry and physics, environmental processes are described with mathematical models and environmental systems are examined in detail on the basis of material cycles (e.g. for carbon and nitrogen). Special emphasis is placed on environmental physics (atmospheric processes), environmental chemistry (dispersion processes) and ecotoxicology (pollutants and their hazard potential). The knowledge is deepened in the study units of environmental system modeling, environmental analytics and in a field course in which chemical-analytical and physical measurement methods as well as model simulations are applied. For further qualification on the Master level, the international MSc program Applied and Environmental Geoscience (AEG) of the University of Tübingen is suitable. This program focuses on environmental problems in the subsurface such as: the contamination of drinking water resources, the non-sustainable use of natural resources, the impact of waste disposal, the climate or land use, the change on soil and the water quality. Further qualification in a PhD program is offered by all universities on an individual basis or in structured PhD programs (international Graduate Schools of the Excellence Initiative, Research Training Groups of the German Research Foundation, international Max Planck Research Schools). The topics of the Research Training Groups are typically highly specialized. Accordingly, only a few of the currently 39 Research Training Groups in Baden-Württemberg are in the field of environmental sciences (e.g. Conservation of Forest Biodiversity, Uni Freiburg; Resilience and Reversibility of Lake Ecosystems, Uni Konstanz; Integrated Hydrosystem Modelling, UniTübingen).

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Environmental research in different European Institutions

Project Acronym and Title:

N9ve-REE: N9ve –Rare Earth Elements

Rare earth elements (REE) are considered the seed of technology because of their vast set of applications in different areas and sectors (*i.e.* electrical and electronic, medicine, optics, metallurgy, ceramics, catalysts, polishing, among others), being crucial for the development of emerging technologies, such as those associated with green energies.

Due to its economic and strategic importance, high demand, and supply limitations, as are mainly controlled by a small number of producers (China remains as the main world producer and exporter of REE, with an 80% market share in 2015). A list of mineral raw materials identified by the European Commission as “Critical” was created setting the rare earth elements at its top, acknowledging them as those that have the highest risk of disruption in the supply chain.

The recycling of electronic components and electrical materials for the recovery of rare earth elements aims to avoid the monopoly of this market and to provide the industry with raw material obtained through low-cost biotechnology and with reduced environmental impacts. The vision of the N9ve-REE project is, therefore, a paradigm shift in the use of rare earth elements by the numerous high-tech industries.

The N9ve-REE project has three main objectives:

1. Investigate and develop technologies and processes necessary for the removal, concentration and recovery of rare earth elements from contaminated water and aqueous solutions, such as: industrial effluents and/or solutions from the chemical attack on solid waste, using living macroalgae, in order to define technological solutions that can be applied to industrial processes;
2. Allow the recovery of rare earth elements in an efficient, simple, economic and with less environmental impact compared to the currently used methods as hydrometallurgical and pyrometallurgical ones. It is intended to achieve an average recovery efficiency rate above 70%, from aqueous solution;
3. Disseminate, through various means, an optimized and scientifically validated

methodology, making it available to the scientific community and the business world.

List of co-promoters:

N9ve - Nature, Ocean and Value, Lda;
University of Aveiro/Eduarda Pereira Lda.



University of Aveiro, Portugal

Start date:	01/06/2020
Date of conclusion:	31/03/2023
Duration (months):	34

The technology will be based on the use of living marine macro-algae, which represent a widely available resource, and on the exploration and optimization of their capability to remove and concentrate elements from aqueous solutions. The solution is intended to be easily scalable, to allow the creation of an alternative source of REE and contribute to the reduction of severe environmental impacts associated with the extraction and separation of these elements.

Total Investment:	1.125.096,07 €
Eligible Investment:	1.120.165,44 €

*Project N°46998_N9ve-REE, co-funded by Portugal 2020 program (PT2020), PO Centro and European Regional Development Fund.
Dr. Maria Eduarda Pereira
University of Aveiro, Portugal*

Environmental Science and Pollution Research

4.223 (2020)

Impact factor

4.306 (2020)

Five year impact factor



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