

ASSOCIATION OF CHEMISTRY AND THE ENVIRONMENT

Newsletter 2022

edited by Branimir Jovančičević

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1) Alebert Lebedev, ACE president:
Global ecochemical world problems and the role of science in their solving

Dear friends and colleagues!

Despite the terrible humanitarian, political, and economical situation in the Eastern Europe environmental issues should not be forgotten at least by the scientists working in that field. Contamination of the Planet will be notably increased directly due to the war in Ukraine and indirectly by possible softening of environmental requirements in Russia as a

consequence of the military activity and economic sanctions. The latter may make returning to the older and dirtier technologies in the majority of the economy and production sectors.

Direct influence of the war on the environment involves destruction of fuel reservoirs, storages of chemicals including those for pesticides and toxic reagents (e.g. chlorine, ammonia, etc.). As a result all these xenobiotics appear in the soil, water and atmosphere and contaminate not only the neighbor territory, but will spread all over the world due to the global long-distance transfer. One should take into account certain possibility of nuclear accidents as the fighting takes place around nuclear power stations. It is also worth mentioning that the current situation is still worsening as the conflict is far away from its finish.

All these issues seem not so important when every day the world gets information about thousands dead people. However, as soon as the peaceful negotiations bring positive results the environmental damage should be carefully estimated and protective measures to limit the hazard should be applied.

Fortunately, international scientific community continues education and research activity as well as discussions on the environmental safety. ACE entered 2022 rather actively organizing the first Chem2Chem Conference of the young scientists, which was definitely very successful. Later this year we are going to organize Petromass 2022 in Crete (16-23 October) and EMEC in Ljubljana (5-8 December). I believe, these events despite political and economical difficulties as well as the changes in the dates and places should be well attended and successful as usual.

2) Branimir Jovančičević:
Novi Sad, 2021 – EMEC21 that lies behind us

The Serbian Chemical Society and Matica Srpska, on behalf of the Association of Chemistry and the Environment (ACE), organized the 21st European Meeting on Environmental Chemistry (EMEC21). The meeting took place in Novi Sad (Serbia) in November 30 - December 3, 2021.

This, already traditional, international meeting of researchers from all over the world was held at the Matica Srpska, one of the most important academic institutions in Serbia. The President of the Scientific Committee of the Conference was Jan Schwarzbauer (Germany), the President of the Organizing Committee, Branimir Jovančičević (Serbia), the President of the Executive Committee, Vladimir Beškoski (Serbia) and the Conference Secretaries were Nevena Antić, Aleksandra Šajnović and Aleksandra Tubić (Serbia). The technical organization of the conference was led by Mrs Olivera Blagojević-Popović (Congrexpo), and the computer technology was led by Mr. Miodrag Javorina.



The building of the Matica Srpska in Novi Sad.



Matica Srpska has a large number of paintings by the most famous Serbian painters.

Four plenary lectures were held at the conference. The working part of the conference with the plenary lecture "The cloud of microbiota - Microorganisms-H₂O₂ interactions" was opened by Professor Anne-Marie Delort (Institut de Chimie de Clermont-Ferrand, Université Clermont Auvergne, Aubierre, France). On the second day, first Professor Tatjana Ćirković-Veličković (University of Belgrade, Faculty of Chemistry, Belgrade, Serbia) gave a lecture entitled: "Emerging food contaminants". On the same afternoon, a lecture entitled "Mechanisms of the formation of disinfection by-products in water treatment" was given by Professor Albert Lebedev (Department of Organic Chemistry, Moscow State University, Moscow, Russia). Finally, on the last day, a lecture entitled "A closer look at the elemental composition of macrofungi, with a focus on arsenic" was given by Professor Walter Gössler (Institut für Chemie Universität Graz, Austria).



More than two thirds of the participants contributed to the event with their presence in Matica Srpska.



A number of researchers participated on an online basis - Professor Stuart Gibb.

During the three-day gathering, eight section lectures were held. The lecturers were Jasmina Nikodinović-Runić (Serbia), Vesna Antić (Serbia), Pierro Bellanova (Germany), Lydia Niemi (Great Britain), Sonja Kaišarević (Serbia), Hideyuki Inui (Japan), Tatjana Andjelković (Serbia) and Djurdja Kerkez (Serbia).

Under epidemic circumstances, the conference had a hybrid character. About 150 researchers participated. More than two thirds of the participants contributed to the event with their presence in Matica Srpska. Participants from Austria, Bosnia and Herzegovina, Croatia, the Czech Republic, France, South Korea, Germany, Greece, Ireland, Italy, Japan, Montenegro, Poland, Portugal, Russia, Serbia, Slovenia, Spain and the United Kingdom presented their scientific results through 46 oral presentations and 91 poster presentations.



The program of the conference, all abstracts of presented lectures, oral and poster presentations, as well as the list of participants, were printed in the Book of Abstracts (edited by I. Ivančev-Tumbas *et al.*).

The conference began with a gathering of participants on Tuesday, November 30, at the "Veliki" restaurant. At the end of the first working day of the conference, a tour of the city of Novi Sad was organized. The host city is located in the northern part of Serbia and is the capital of the province of Vojvodina. It is officially the European Capital of Culture 2022. Lunches were organized in the restaurant "Staro zdanje". The very rich social program at the conference was enriched with a gala dinner at the end of the second working day of the restaurant "Vine House Kovačević", which is located near Novi Sad.



The gala dinner was really beautiful.

During the conference, the ACE Association held its regular annual Assembly. In addition, the Board of the Association held its meeting. Professor Albert Lebedev (Russia) was elected the new president, and Professor Nuno Ratola (Portugal) was elected vice president.

The conference ended in the late afternoon on Friday, December 3. On that occasion, awards were given for the best poster announcements (6 in total), and for the two best oral presentations.

The awards for the best oral presentations went to Luisa Bellanova (RWTH Aachen University, Germany) and Konstantin B. Ilijević (Faculty of Chemistry, Belgrade University, Serbia). Awards for the best posters were given to: Elena A. Detenchuk (Department of Chemistry, Moscow State University, Russia), Tatjana Mijošek (Ruđer Bošković Institute, Zagreb, Croatia), Urszula Ryszko (Łukasiewicz Research Network-New Chemical Syntheses Institute, Lublin, Poland), Francisco Sánchez Soberón (PhD Researcher in Environmental Chemistry, Faculty of Engineering, University of Porto, Portugal), George Taxeidis (School of Chemical Engineering, National Technical University of Athens, NTUA, Greece) and Nikola Zdolšek ("Vinča" Institute of Nuclear Sciences, University of Belgrade, Serbia). The prize money for the best oral presentation was 500 euros, and for the best poster presentation 200 euros. The awards were provided by the "Prince Sultan Bin Abdulaziz International Prize for Water" foundation.

During the closing ceremony, Matica Srpska, founded in 1826, and the Serbian Chemical Society, founded in 1897, signed a protocol on mutual cooperation. On behalf of Matica Srpska, the protocol was signed by its president, professor Dragan Stanić, and on behalf of the Serbian Chemical Society, its president, professor Dušan Sladić.



Professor Dragan Stanić, the president of Matica Srpska and professor Dušan Sladić, the president of Serbian Chemical Society signed a protocol on mutual cooperation.

At the end of the ceremony, the current president of ACE, Professor Start Gibb (Great Britain), addressed the gathering with selected words. The conference was closed by Professor Emeritus Mirjana Vojinović-Miloradov (Serbia).

The EMEC21 conference was organized and held under very complex epidemiological conditions. All epidemiological measures were respected during the conference. The organizers of the gathering, as well as the participants, are satisfied with the way EMEC21 was organized, especially due to the fact that no one fell ill with covid at the conference itself.



EMEC21 organizers.

3) Polonca Trebše:
Ljubljana 2022 – EMEC22 is in front of us

The 22nd European Meeting on Environmental Chemistry (EMEC 22) will be held from the 5th to the 8th of December 2022 in Ljubljana, Slovenia.

Ljubljana (pop. 293,822) is one of the smallest European capitals. It's never crowded – but also never boring. 50,000 university students give it its youthful appeal, and as an economic and cultural hub of Slovenia, it has a lot to offer to the locals and visitors alike. In 2016, Ljubljana was the European Green Capital and is a candidate for the European Capital of Culture 2025. It is located at the intersection of major European transportation routes,

halfway between Vienna and Venice. It is easily accessible by train, highway, and by air, with Ljubljana Jože Pučnik international airport being only a short drive away.



Photo by Aleš Kravos, source: Facebook - Aleš Kravos Photo Journey (<https://www.facebook.com/aleskravos.photojourney/>), shared under CC-BY-SA-4.0 license.

The conference will be organised by the University of Ljubljana (UL), Faculty of Health Sciences, on behalf of The Association of Chemistry and the Environment – ACE. UL is the oldest and largest higher education and scientific research institution in Slovenia. University with its rich tradition was founded in 1919. It has approximately 40,000 undergraduate and postgraduate students and employs approximately 6,000 higher education teachers, researchers, assistants, and administrative staff in 23 faculties and three arts academies. UL has been ranked among the top 600 universities by the prestigious Academic Ranking of World Universities (ARWU) and is placed 374th in The Centre for World University Rankings (CWUR). UL is the central and largest educational and research institution in Slovenia with 30% of all registered researchers.

The organisation of EMEC22 will be led by members of the Health Protection Mechanisms Programme Group, pillars Environment and Chemistry, all part of the Research Institute at the UL Faculty of Health Sciences. The group conducts interdisciplinary research on emerging environmental pollutants (pesticides, UV filters, microplastics, bisphenols, etc.) in various environmental matrices (wastewater, soil, swimming pool water, etc.) and their remediation with nature-based solutions and advanced oxidation processes.

The EMEC meetings cover a broad range of topics within the field of environmental chemistry, and interdisciplinary presentations are very welcome. They always attract high-quality science presentations and invited talks from internationally renowned researchers working in environmental chemistry and related fields. Every year the EMEC conferences are organised all over Europe, gathering between 150 and 200 participants from Europe and other countries. The main objectives of these meetings are to bring together scientists working in the field of environmental chemistry in a scientific and social setting, to report the most advanced research progresses in this field and to pave the way for future research and challenges.

EMEC22 will cover the following topics: environmental compartments, including (1) Atmosphere, (2) Soil and other solid matrices, (3) Water, including drinking water, wastewater, marine and surface waters). These topics can cover the development of analytical methods for environmental monitoring, reports on monitoring in these compartments, and remediation processes (biological, chemical, physical). Additionally, topics will include (4) Sustainable development (exposure and risk assessment, life-cycle analysis, resource reuse, circular economy), and (5) One global health (ecotoxicology and biomarkers, ‘farm-to-fork’ approaches, environmental health, pollution and disease prevention, and food chemistry).

The conference will be organised around five sessions that will be introduced in three plenary talks and five keynote lectures. Poster sessions and social events (welcome reception, city tour, gala dinner) will also contribute to the scientific and friendly exchanges. Additionally, the early-career researcher (ECR) network within ACE that was established at the Chem2Change online conference in March 2022 will organise side events, such as the first general meeting of the ACE ECR (setting up ECR roles, discussing future events, memberships) and an ECR social to finally meet each other in person. EMEC22 will encourage the participation of young scientists, thanks to ACE scholarships for registration fees and travel/ accommodation, and prizes for the best oral and poster presentations, kindly provided by The Prince Sultan Bin Abdulaziz International Prize for Water – PSIPW.

The website of EMEC22 and all the details (venue, important dates) will be announced shortly. We will inform you when the website launches and are looking forward to welcoming you to our charming capital – Ljubljana!

EMEC22 Organising Committee

Mojca Bavcon Kralj, Polonca Trebše, Franja Prosenc, Urška Šunta, Lara Čižmek

4) Gordana Gajica:
**ACE Seminar »Chem2Change – Environmental Chemistry towards
Global Change«**

The 2nd Online ACE Seminar "Chem2Change - Environmental Chemistry for Global Change" was held on March 15 and 16, 2022, via the Zoom platform. The conference is intended for early-career researchers (master's and doctoral students, postdoctoral researchers) The main objectives of the seminar were to bring together early career researchers working in the field environmental science and current global challenges, in order to exchanged knowledge, to maps' participant research interests, to form ACE early-career researchers network for potential future collaborations.

The website of the Seminar: <https://www.eventcreate.com/e/chem2change>

1. The Organizers

The Seminar was led by Early-Career Scientists from Scotland, Slovenia, Czech Republic and Serbia with support of ACE board members and sponsors.

Organizing committee:

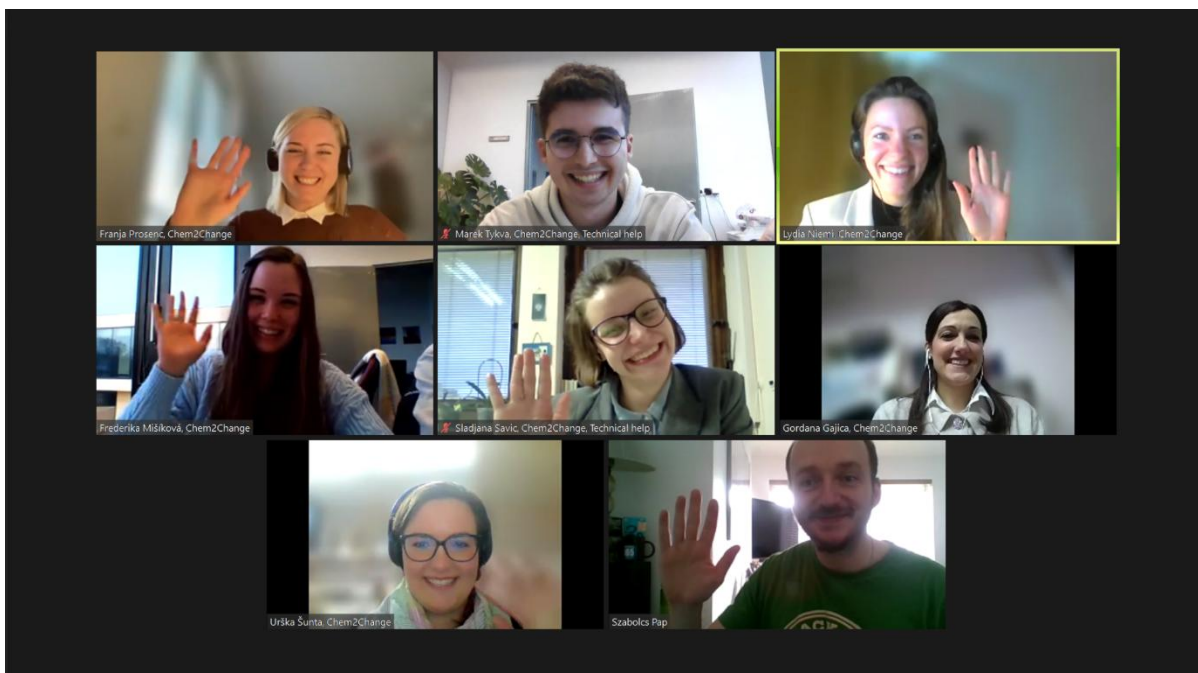
- Lydia Niemi, University of the Highlands and Islands, United Kingdom
- Szabolcs Pap, University of the Highlands and Islands, United Kingdom
- Franja Prosenc, University of Ljubljana, Slovenia
- Urška Šunta, University of Ljubljana, Slovenia
- Frederika Mišíková, University of Pardubice, Czech Republic
- Anna Krejčová, University of Pardubice, Czech Republic
- Marek Tykva, University of Pardubice, Czech Republic
- Gordana Gajica, University of Belgrade, Serbia
- Slađana Savić, University of Belgrade, Serbia.

Scientific Committee:

- Gilles Mailhot, University of Clermont Auvergne, France
- Iwona Malgorzata Szykowska-Jozwik, Lodz University of Technology, Poland
- Juan Facetti, National University of Asuncion, Paraguay
- Polonca Trebše, University of Ljubljana, Slovenia
- Nuno Ratola, University of Porto, Portugal
- Nuria Fiol, University of Girona, Spain
- Marian Olazabal, University of the Basque Country, Spain.

Sponsors:

- University of Pardubice, Faculty of Chemical Technology, Czech Republic
- BASF, Serbia



The Organizing committee.

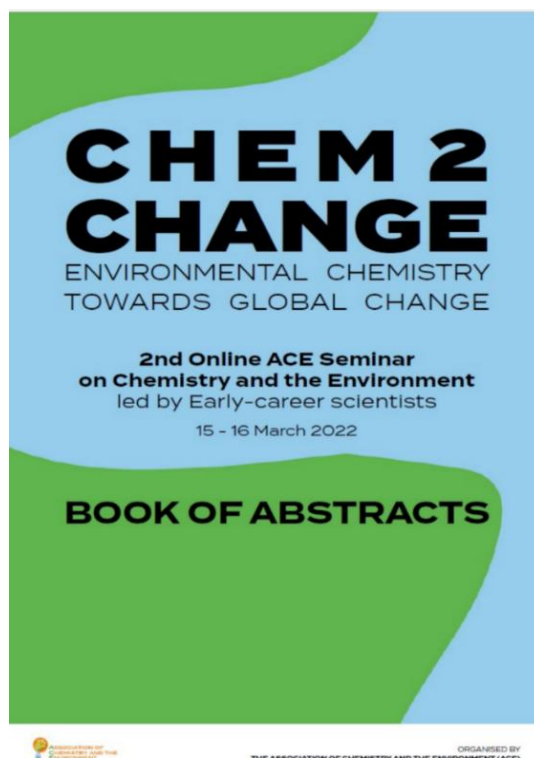
2. The Scientific Program

The Chem2Change covered a broad range of topics within the three sessions:

- Global Challenges: Corona Virus, Climate & Nature Restoration,
- Instrumental Analysis and Method Development in Environmental Chemistry,
- Sustainability & The Environment: Circular Economy, Treatment Technologies, Agriculture & Industry.

The Seminar was attended by 72 participants from 13 different countries (United Kingdom, Slovenia, Czech Republic, Serbia, Switzerland, Croatia, Poland, Italy, Germany, Russia, Turkey, Portugal, Bosnia and Herzegovina). The seminar was opened by Prof. Dr. Albert Lebedev, the president of the Association of Chemistry and Environment. In total 45 participants presented their research in 3 sessions, which were organized in 6 parallel sessions due to the large number of presenters. The first day was started by a keynote lecture by Dr. Nuno Ratola (Universidade do Porto, Portugal) with the topic "Current Challenges of Waste Valorization", while the second day was opened by a keynote speaker Prof Matthias Rillig (Freie Universität Berlin, Germany) with the topic "Resilient labs, and how you can make your lab a better place".

The link of the Book of Abstracts: <https://eshop.upce.cz/epub/9007340/>



ACE Seminar Book of Abstracts.

3. The Social Program

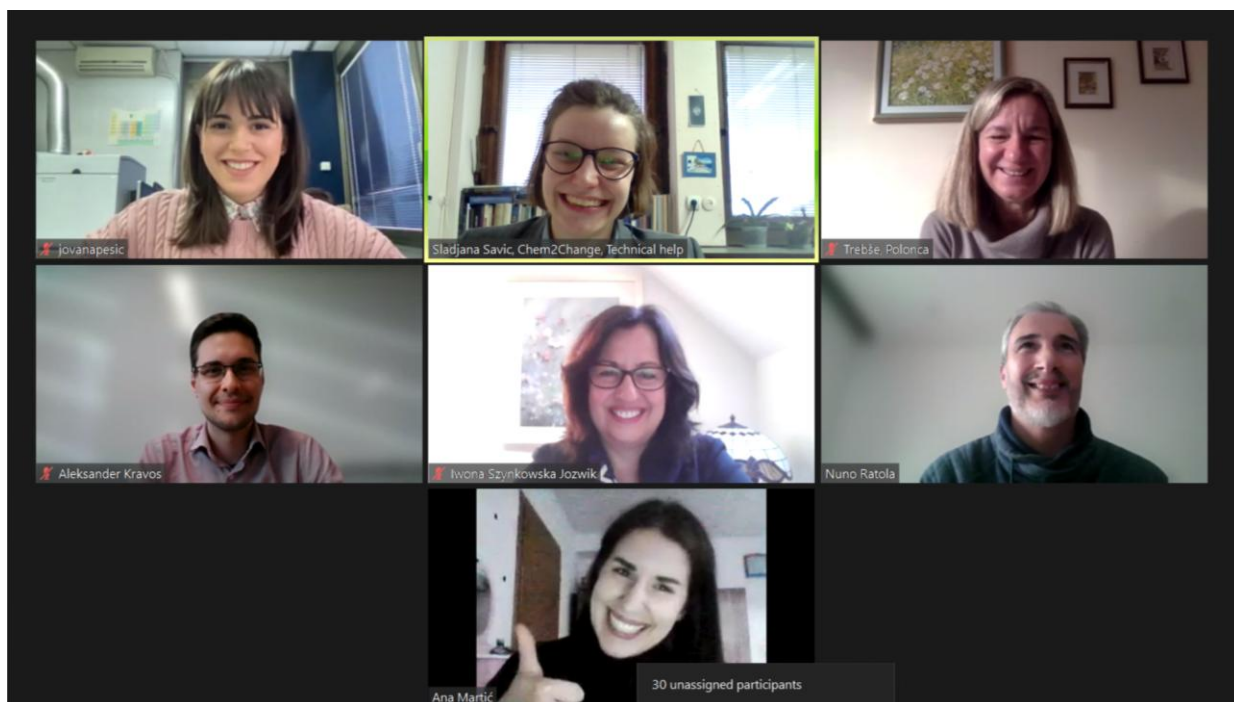
In addition to the scientific program, the seminar had a rich online social program. At the end of the first day, there was a presentation on “How to live greener every day”, and an interactive quiz. At the end of the second day, participants virtually connected using the Padlet platform in order to map and connect their research interests, and to discuss establishing an ACE early-career network. Participants ended the Seminar with a glass of drinks and a discussion on what makes their selected drinks environmentally conscious. The criteria were water consumption, energy consumption, transport, distance and packaging used.

4. The Awards

The Seminar granted three awards (one in each session) for the best presentation thanks to sponsorships from BASF, Serbia and the University of Pardubice, Czech Republic. The awards were selected by scientific committees and lead chairs of the sessions, and amounted to 100€ each.

The winners of the best presentation awards were:

- Jovana Pešić (University of Novi Sad, Serbia),
- Aleksander Kravos (University of Ljubljana, Slovenia),
- Ana Martić (Ruđer Bošković Institute, Croatia).



Winners and members of the Scientific Committee.

5) Polonca Trebše: **Retirement of Prof. Anne Marie Delort, ACE board member**

This year's EMEC 20 conference was sadly the last one that dr. Anne-Marie Delort attended because of her retirement.

Anne-Marie is a member of Association of Chemistry and the Environment already from its beginning back in 2001. In fact, she missed only three meetings, the first one in Nancy (France) in December 2000, when the association has been founded, then meeting in Geneva, Switzerland (2002) and in Brno, Czech republic (2006). She was one of a few who had joined it and continued with active role within association since then. She organized EMEC conference in Clermont-Ferrand twice, in year 2011 and 2018 as well as an interdisciplinary scientific meeting Interactions between phisico-chemical and microbiological processes in the envrionemnt in 2008. In the year 2012-2013 she served as a president of the Association. Additionally, she actively participated as evaluator of applications for ACE scholarship.

Anne-Marie's studied chemistry and molecular biology, her expertise covers microbiology and NMR spectroscopy, and more recently Metabolomics, (NMR and MS). She has been a pioneer in studying the microbial population in clouds. In her research she focused on the role of microorganisms in atmospheric chemistry and physics, including the transformation of organic matter, interaction with oxidants, formation of Ice Nuclei and Cloud Condensation Nuclei.

She was head of the Institute of Chemistry of Clermont-Ferrand back in the day. She was in charge of representing the CNRS at ALLENVI (Alliance Nationale de Recherche en Environnement) that gathers all the French institutions of research working in the environmental field. She published 150 papers in international journals and 18 book chapters and was an invited speaker at 75 national and international conferences.



We will remember her as one of the most valuable members of Association, a Board member and as the most active participant at every EMEC conference.

I, personally, will remember her as a person who actively attended conferences and always asked questions, made comments and encouraged discussion. we have met for the first time at EMEC 6 in Belgrade, Serbia. Since then we have met regularly not only at conferences, but also at research exchanges in France in Nova Gorica, as well as privately in Slovenia during her holidays in Soča valley. When I look back, I will remember the great time that we had together, which was full of joy, laughter, discussion, tolerance, and understanding.

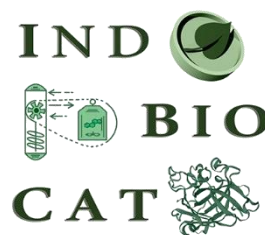
Dear Anne-Marie,

we all wish you a joyful retirement, filled with family and friendly life!

Polonca Trebše, on behalf of the Board of ACE

6) George Taxeidis – PhD student, awarded poster presentation at EMEC 21:
Enzymatic degradation of plastics: Making Impossible a Reality

IndBioCat, Industrial Biotechnology & Biocatalysis Group, Biotechnology Laboratory,
 School of Chemical Engineering, National Technical University of Athens, Athens, Greece
gtaxidis@chemeng.ntua.gr



Every day we see people using surgical masks, drinking coffee in a single use cup, wearing their favorite T-shirt or even smoking a cigarette. All these actions may seem usual, although include plastic materials, whose presence many of us ignore. Plastic films, containers, or fibers are almost ubiquitous, making our life better, easier and safer. However, the uncontrollable disposal of plastic waste has raised scientist's concern, who now understand and estimate the consequences of plastics accumulation. Plastic pollution is not a present-day problem, but it started with industrial production of plastic decades ago. Nowadays, however, there are several ways of handling plastic waste, such as recycling and incineration, but unfortunately landfilling is still the most popular "solution" followed by many countries. Concerning incineration, it generates toxic gas emissions that carry heavy metals, dioxins, and other volatile organic compounds (Yang et al., 2012), whereas recycling design is not fully utilized, due to complications with the accumulation and sorting of plastic waste. Moreover, its effectiveness is profoundly depended on public awareness, economic viability, and the implementation of public infrastructures.

At this point, it should be mentioned that apart from traditional recycling, scientists have recently discovered another way to recycle plastic waste, which mimics nature's mechanism of assimilating the "plastic problem". These techniques are based on the discovery and identification of novel microorganisms, from different environments, which are able to utilize and assimilate carbon from plastic waste, in order to survive. This primary observation stimulated scientific interest, with researchers trying to isolate and identify the enzymes responsible for plastic depolymerization. The last few years a number of

microorganisms and their secreted enzymes with high depolymerization potential have been discovered (Nikolaivits et al., 2021), making real an otherwise unlikely scenario.

Meanwhile, biodegradable polymers were proposed as a green alternative, but are coming at a higher production and an overall cost. Apart from their production cost, biodegradable polymers proved to not be an entirely sustainable solution, as their natural degradation can take many decades, depending on the environmental conditions such as temperature, humidity, exposure to UV rays etc. (Kijchavengkul & Auras, 2008).

Concerning my PhD research, it is a part of BioICEP project, in the context of which a European-Chinese collaboration formed, in order to reduce the burden of plastic waste in the environment.

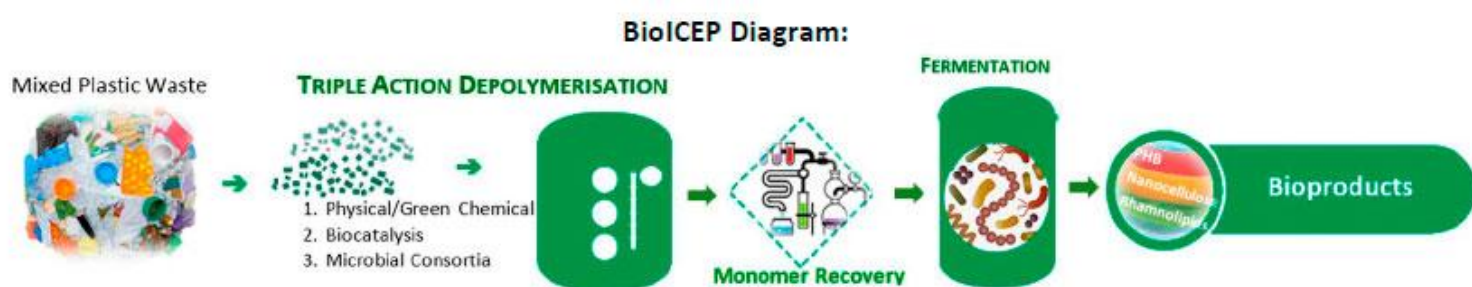


Figure 1. BioICEP goals. Source: BioICEP internet site (<https://www.bioicep.eu/project.php>).

BioICEP overall objective is to demonstrate sustainable route to a circular economy for plastics by developing an advanced energy, carbon, and cost-efficient waste plastic biotransformation into high market demand bioproducts and bioplastics.

More specifically, my project is based on the discovery of novel fungal strains, which possess the necessary arsenal of enzymes to degrade synthetic polymers. To begin with, several isolated fungi are screened for their ability to secrete depolymerizing enzymes. Screening takes place using carbon sources, which are either polymer intermediates or mimic polymer structure. The positive fungal strains are subsequently grown on liquid cultures with the aforementioned carbon sources, and the supernatant is used as biocatalyst for polymer degradation. The polymer degradation yield is determined by analytical techniques such as HPLC, FT-IR and GPC. The proteomic analysis of the culture supernatants helps us to identify the enzymes, which take part in polymer degradation. Afterwards, the genes coding the depolymerization enzymes are heterologously expressed in protein expression hosts such as *Pichia pastoris* and *Escherichia coli* and the degradation yield is re-evaluated incubating pure enzymes with different polymers.

Protein engineering, recombinant DNA technology and biochemical engineering and biocatalysis is only some of the scientific fields that our group has expertise in. Industrial Biotechnology and Biocatalysis group, headed by Dr. Evangelos Topakas, is a part of the

Biotechnology Laboratory of the School of Chemical Engineering and is located in the campus of National Technical University of Athens. Biotechnology Laboratory has a renowned world reputation in the area of biomass bioconversion and biochemistry of plant cell wall degrading enzymes and has at its disposal a big variety of biomass degrading enzymes. This fact is beneficial for our laboratory, as biomass degrading enzymes are also active on synthetic polymers, as natural and synthetic polymers have many structural and physicochemical similarities.

Enzymatic degradation of plastics is definitely a very promising alternative, but it would be great if we could develop a plan to exploit our waste in a more profitable way. It may seem impossible to convert a plastic bottle into nanocellulose or bio-pigments, but this idea is only a few steps away!



Figure 2. InduBioCat logo. Visit our website <https://www.chemeng.ntua.gr/indubiocat>.

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7) Nuno Ratola:
ACE and young researchers - scholars at EMEC21 in Novi Sad



The CoViD-19 pandemic changed everyone's life and plans and prevented us from having EMEC21 in 2020 as scheduled. And it was with great effort and dedication from the Organizers in Novi Sad that despite all the uncertainties it was possible to put together a hybrid event in December 2021 that could accommodate everyone that wished to attend, regardless of their personal restrictions. So, the Association of Chemistry and the Environment was quite happy to be able to open again the call for scholarships for the participation of M.Sc. and Ph.D. students and early career researchers at the EMEC21 meeting in Novi Sad (Serbia). As usual, this award covered the conference fee and travel and accommodation expenses up to €500. Naturally, only in-person participants were eligible. And maybe due to the absence of travel and face-to-face networking for so long, the turnout was exceptional, with a total of 13 applications from all over Europe. As a result, it was exceptionally decided to support the participation of 5 young scientists instead of the normal 3, respecting the financial status of the Association. The dissemination of the call was similar to previous years: potential applicants were informed about the possibility of scholarship on the EMEC21 and ACE web pages and also by e-mail from the EMEC21 Organization.

To apply, the candidates sent their CV together with a description of their scientific results, a letter of recommendation from their supervisor and certificates of current enrolment and examination results to Dr. Nuno Ratola, the ACE Scholarship Officer. After the administrative check, he confirmed the eligibility of all the candidates and all applications were evaluated by a committee formed by the ACE Board members who had no conflict of interests (i.e., supervisors or co-workers). The evaluations were sent to Dr. Nuno Ratola, who summarized and ranked all proposals. Finally, after the pertinent approval by the evaluation committee members, the final ranking of the candidates was conveyed.

The following candidates (in alphabetical order) were awarded this year: Ioanna Pantelaki (Aristotle University of Thessaloniki, Greece), Mark Popov (Northern (Arctic) Federal University, Russia), Urška Šunta (University of Ljubljana, Slovenia), Patricia Tarín (Instituto de Salud Global, Spain) and Taja Verovšek (Jožef Stefan Institute, Slovenia). Congratulations to all!