ASSOCIATION OF CHEMISTRY AND THE ENVIRONMENT

Newsletter 2017/1

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Contents of this issue:

1) Jan Schwarzbauer, president of Association: **Association of Chemistry and the Environment (ACE) - its sixteen years**

With the 16th *Meeting on Environmental Chemistry* (EMEC16) also the 15th birthday of the *European Association of Chemistry and the Environment* ACE has been celebrated. This might be a good opportunity to have a look back to the beginnings and the development of ACE. ACE has faced several substantial changes in the organisation, has initiated many actions and is still expanding its activities in the field of environmental science and academic education. Further on, the 15 years of ACE are directly linked to many persons who have supported actively this association e.g. by acting in the board.

First period: the beginnings as French association

In 2000 a *Meeting on Environmental Chemistry* has been organized by Eric Lichtfouse in Nancy. During this meeting a group of European scientists agreed to organise an association for environmental scientists with the goal of facilitating the exchange of scientific knowledge and academic collaboration. It was also decided to continue with meeting organisation and to establish the *Meeting on Environmental Chemistry* as an annual event, a conference series. Founding members and first board members were Eric Lichtfouse (France), acting as president, Josef Caslavsky (Czech Republic), Branimir Jovančićević (Serbia), Jan Schwarzbauer (Germany), Roland Kallenborn (Norway) and Mark Fitzsimons (UK). Beside the organisation of EMEC meetings in Dijon (2001, France), Geneva (2002, Switzerland) and Plymouth (2003, England) a second intiative has been

started. After some very fruitful negotiations with Springer publisher, Eric Lichtfouse, Jan Schwarzbauer and Didier Robert established *Environmental Chemistry Letters* ECL in 2003 as the official journal of the association. Till today this quarterly journal has had a very fruitful development resulting in an impact factor of 2.57 in 2014. As further editorial actions a newsletter has been implemented and a book covering the results of the first EMEC (*Environmental Chemistry*) was published in 2001.

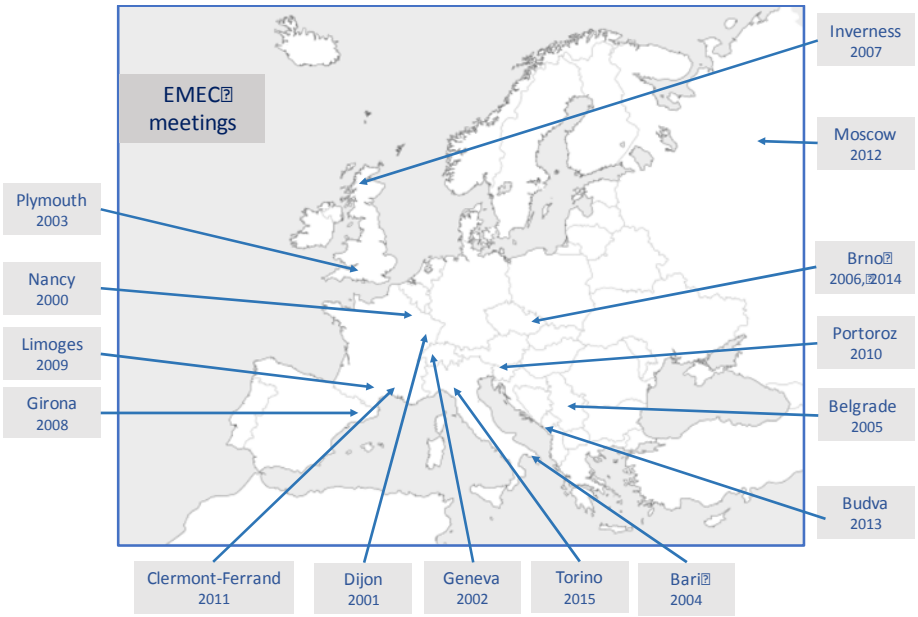
In this period the Board expanded and colleagues from Italy (Michelle Aresta), Switzerland (Montserrat Filella) and UK (Stepahnie Dudd) joined us.

Second period: the transition and expansion to Eastern Europe

With the 5th EMEC held in Bari (Italy) in 2004 the board changed partly and the presidentship has been transfered to Jan Schwarzbauer. The association continued successfully with their established activities, but introduced also some new actions, such as launching a Young Researcher Award as well as a poster prize for EMEC participants. As a remarkable development, the conferences and, therefore, also the association's sphere has been expanded to Eastern Europe with conferences in Belgrade (2005, Serbia) and Brno (2006, Czech Republic).

Third period: Refoundation in Luxembourg and establishment as European association

In 2007 the movement of the association from France to Luxembourg has been finalized. EMEC conferences were now organized fully Europe-wide with Inverness (2007, Scotland), Girona (2008, Spain), Limoges (2009, France), Portoroz (2010, Slovenia), Clermont-Ferrand (2011, France), Moscow (2012, Russia), Budva (2013, Montenegro), Brno (2014, Czech Republic) and finally Torino (2015, Italy). As an outlook, we will meet again in December 2016 in Inverness, Scotland.



In all time periods some members resigned from their board activities but always new members entered (e.g. Ann-Marie Delort, Stuart Gibb, Isabel Villaescusa, Polonca Trebse, Albert Lebedev, or Davide Vione) and supported strongly as treasurer, secretary or in other positions the board's work. Certainly also the presidentship changed over the last 15 years and, as you can see from the list below, the rotation of the presidentship became more flexible in the last years:

ACE presidents:
2000 – 2003 Eric Lichtfouse
2004 – 2008 Jan Schwarzbauer
2009 – 2011 Montserrat Fillela
2012 – 2013 Anne-Marie Delort
2014 Albert Lebedev
2015 Josef Caslavsky
2016 Jan Schwarzbauer

Also in the last couple of years further actions have started, such as the launch of a meeting scholarship for young scientists or the organisation of workshops as satelite events around EMEC meetings. Collaboration between ACE members resulted in joint projects and conferences as well as publishing activities.

Looking back, in the last 15 years ACE has faced an intense and expansive development from the beginnings to a well established and fruitful working scientific association. This is mainly the result of the individual and long lasting commitment of several European colleagues supporting ACE's work with time, efforts and many good ideas now and in former times.

2) Maria Concetta Bruzzoniti, Davide Vione: **Torino, 2015 – EMEC16 which is behind us**

The EMEC16 meeting took place in Torino (Italy) in the Environment Park Conference Center. It was organized by the Department of Chemistry of the University of Torino under the auspices of the European Association of Chemistry and the Environment. It hosted more than 160 scientists from 25 countries (Italy, France, Algeria, Serbia, Czech Republic, Spain, Switzerland, Russian Federation, Turkey, United Kingdom, Portugal, Romania, Slovenia, Tunisia, Greece, Germany, Morocco, Austria, Canada, Public Republic of China, Georgia, Hungary, Norway, Poland, USA).

The conference program has been very rich and it was divided into thematic sessions covering the following topics: 1) methods for environmental analysis, 2) atmospheric sciences, 3) characterization of natural and affected environments, 4) water treatment and its implications, 5) green chemistry and suitable use of resources, 6) food and agriculture, 7) photochemistry and photocatalysis and 8) soil, sediments and remediation.

Three plenary speakers have been invited to deliver lectures of general interest: Prof. Boguslaw Buszewski (University of Torun, Poland), Prof. Marcello Brigante (Université Blaise Pascal de Clermont-Ferrand, France) and Prof. Chiara Cordero (University of Torino), all being esteemed

specialists in the topics covered by EMEC16. The above sessions hosted 76 oral communications and 69 posters. Posters were displayed for the whole duration of the congress and had two dedicated sessions. The contributions presented at EMEC16 will be collected in a special issue of the *International Journal of Environmental Analytical Chemistry*.

A total of 10 scholarships were given to young scientists to support their participation to EMEC16. The awardees were Enrico Chiavazza, Lorenzo Ciofi, Andrea Speltini and Marta Stucchi (Italy), Jana Oborna and Maria Chropenova (Czech Republic), Mirjana Cujic, Natasa Djokivic and Maja Milanovic (Serbia), and Dmitry Mazur (Russia). Frank Leresche (Switzerland) received the award for the best poster presented by a young scientist.

The social program included a visit to Torino's Egyptian Museum and the social dinner and concert at the scenic location of Pavone Castle.

EMEC16 has received the patronage of the Municipality of Torino, Universities of Torino and Piemonte Orientale, Professional order of Chemists, Italian Society of Agricultural Chemistry, and Italian Chemical Society (Environmental & Cultural Heritage Division, Analytical Chemistry, Separation Science Group, Food Chemistry Group, Green Chemistry Group).

A special thank goes to the EMEC16 Sponsors (Sciex, Sigma-Aldrich, Agilent Technologies, Leco, Shimadzu, LabService Analytica, Horiba, Mat4treat, CEM, Carlo Erba) for the joint financial support and to Waters Corporation for logistic support.

3) Stuart Gibb:
Inverness, 2016 - EMEC17 which is behind us

University of the Highlands and Islands
Oilthigh na Gàidhealtachd agus nan Eilean

eri environmental research institute

The 17thEuropean Meeting on Environmental Chemistry was held in Inverness, Scotland between the 30th of November and 2nd of December, 2016. Hosted by the Environmental Research Institute of the University of the Highlands and Islands, the event marked the return of EMEC to Scotland and to Inverness.

EMEC meetings are delivered on behalf of the Association of Chemistry of the Environment (ACE) and are held in a different European city each year: EMEC17 in Inverness follows successful events held in 2014 in Brno (Czech Republic) and 2015 in Torino (Italy).

EMEC17 was based at Eden Court Theatre on the banks of the River Ness in the city centre. The meeting commenced in Highland style with a blast on the bagpipes and then welcomes from Prof Stuart Gibb (Chairman, EMEC17 Scientific & Organising Committees), Prof Jan Schwarzbauer (retiring President, ACE) and Prof Crichton Lang (Deputy Principal, University of the Highlands and Islands). A musical welcome was provided by students from UHI's traditional music course, followed by a lively demonstration of traditional highland dance by the girls of Fraser School of Dancing.

With the welcome ceremony complete, the scientific programme got underway with podium and poster presentations providing delegates new insights into some contemporary issues and challenges in environmental chemistry. In addition, the scientific programme featured three keynote lectures from internationally renowned scientists:

- Professor Phillip Whitfield, University of the Highlands and Islands: "*A Matter of Fat: The Development and Application of Lipidomic Workflows*" in which he examined the potential of lipodomics to provide new insights in environmental chemistry.
- Professor Mike Billett, University of Stirling: "*Advances in Environmental Chemistry - Opening the Black Box of Peatland Carbon Cycling*", in which he explored how significant advances in recent years (especially in radiocarbon dating of different carbon species) has led to a major change in our understanding of how carbon is stored, processed and released from organic-rich soils.
- Professor Jörg Feldmann, University of Aberdeen: "*Should We Bother About Elemental Speciation in Environmental Studies?*". The lecture introduced the concept and significance of elemental speciation and explained the different approaches used to determine the molecular structure of metals and metalloids in different environments.

Almost 40 podium presentations were delivered at EMEC17. An array of high-quality posters were also on display throughout the conferenceandwere highlighted during the conference reception sponsored by Highland Council and attended by the Provost of Inverness - Councillor Helen Carmichael. The Provostwelcomed '*so many expert minds that work on world-wide environmental issues to the Highlands of Scotland where we greatly prize our very special and unique environments*'

with the traditional Gaelic greeting "*CeudMìleFàilte - A Hundred Thousand Welcomes to all the delegates.*"

EMEC17 also featured a special session on the 29th of December organised with partners from the EU's ERDF Interreg VB Northern Periphery and Arctic (NPA) programme'*Circular Ocean*' project. The #ChemHack Challenge Hack sought to address some of the issues surrounding the use anti-foulantson fishing nets and ropes. The 'Circular Ocean' project was recently awarded the EU's 2016 RegioStars'Public Choice' Award for project originality and innovation.

Following completion of thescientific programme on the second day of EMEC17, delegates were joined by special guests'Dosan the 28th' and 'Dosan the 30th' from Leys Castle Estate for a group photograph before heading out on conference tours.

Delegates were able to choose from a trip to the ancient ruins of Urquhart Castle perched above the mysterious Loch Ness where the famous monster "Nessie" is said to reside, or, to visit Glen Ord whisky distilleryfor a tour and to and sample their malt whiskiesproduced exclusively for markets in Asia.

Throughout, the conference provided a forum for the exchange of ideas on recent advances in research and development in environmental chemistry and technology, for people from academia, research, and industry. The event provided a forum for lively discussion and networking with colleagues from across Europe and beyond.

The scientific component of the conference drew to a close with a preview of the 18th European Meeting on Environmental Chemistry to be held in Porto (Portugal) and presentationsto ACE Scholarship recipients and 'Early Career' researcher awards. However, for those delegates attending the conference dinner and Cèilidhat the Victorian Pavillion at Strathpeffer,there was a full evening of food, drink, music and dance ahead!

We sincerely hope that EMEC17 in Inverness instigated new collaborations as well as providing the opportunity to renew contacts with old friends from the EMEC community. We also hope that the full social programme allowed delegates to experience and enjoy some of the culture, food and drink of the Highlands and Islands of Scotland– certainly, the feedback received since the event has been incredibly positive!

We look forward to seeing you all again in Porto for EMEC18.

4) Nuno Ratola - **Porto, 2017 - EMEC18 is in front of us**

The European Meeting on Environmental Chemistry (EMEC) is organised annually on behalf of the Association of Chemistry and the Environment (ACE). It traditionally comprises a broad range of topics within the field of environmental chemistry, and interdisciplinary presentations are welcome. The EMEC meeting always attracts high quality science presentations from internationally renowned researchers working in environmental chemistry and related fields.

Under the motto "Chemistry for an Infinite Environment", the 18th edition (EMEC18) will continue the tradition of previous meetings, hoping to contribute for a lasting sustainability of our planet's environment. It will provide a wide forum for the exchange of ideas on recent advances in research and development in environmental chemistry and technology, for people from academia, research and industry. The Department of Chemical Engineering from the Faculty of Engineering of the University of Porto (FEUP) is proud to organize EMEC 18 in Porto (Portugal), from 26 to 29 November 2017, inviting contributions in the following main topics:

- Environmental monitoring
  - Analytical methods for environmental science
  - Water, air, soil and biota
- Environmental technologies
  - Conventional and advanced treatment processes
  - Waste management and recycling
- Environmental modelling
- Sustainable development
  - Exposure and risk assessment
  - Life-cycle analysis
  - Circular economy
- Environmental safety
  - Ecotoxicology and biomarkers
- Agro-environmental friendly processes and food chemistry

We are also glad to announce the presence of three distinguished scientists in the environmental field presenting Plenary Lectures:

- **Prof. Damià Barceló**, Full Research Professor at the Institute of Environmental Assessment and Water Studies IDAEA-CSIC (Barcelona, Spain) and Director of the Catalan Institute of Water Research (ICRA) (Girona, Spain)

- **Prof. DespoFatta-Kassinos**, Professor of the Department of Civil and Environmental Engineering and Director of NIREAS - International Water Research Center at the University of Cyprus (Nicosia, Cyprus)

- **Prof. Kevin Jones**, Distinguished Professor at Lancaster Environment Centre – Lancaster University (Lancaster, UK) and Senior Visiting International Professor with the Chinese Academy of Sciences

In addition to the main conference, delegates will have the opportunity to enjoy the highlights of Porto, a city that was declared a UNESCO World Heritage Site in 1996, as well as European Culture Capital in 2001 and Lonely Planet's Best Travel Destination in Europe in 2013. Its iron bridges, narrow roads, picturesque buildings, delicious food, warm-welcoming locals… and Port Wine cellars will be the perfect complement to a high quality scientific event. All the information related to the event is available on EMEC 18 webpage (http://emec18.eventos.chemistry.pt/).

5) Environmental Chemistry is really very interesting:

Anne-Marie Delort with Amato O., Vinatier V., Canet I., Traïkia M., Jousse C., Lagree M., Deguillaume L. and Sancelme M.:

Understanding cloud microorganism's activity to better evaluate the effect of clouds on climate change

By reflecting solar radiation back to space and by trapping infrared radiation emitted by the surface and the lower troposphere, clouds exert two competing effects on the Earth's radiative budget. The balance between these two components depends on many factors, including macro- and micro-physical parameters. The effect of clouds on climate is still subject to debate with uncertainties related to cloud formation and their microphysical and chemical properties, which are highly variable in time and space (last IPCC's report). One of the factors contributing to these uncertainties is due to the lack of knowledge of the multiphase chemistry (gas/aqueous phase and aerosol particles) taking place in clouds. Studying chemistry in cloud is therefore crucial for scientists to evaluate the effect of clouds on climate change.

Up to recently, only abiotic processes involving radical chemistry (mainly photochemistry) were considered in atmospheric numerical models representing the cloud system. This radical reactivity leads to the oxidation of the organic matter present in clouds resulting in the formation of short chain compounds such as C1-C4 carboxylic acids, formaldehyde, and CO_2 that are found at high concentration in cloud water but also in the formation of Large Molecular Compounds (LMC) such as oligomers (1). However, metabolically active microorganisms have been discovered in cloud waters (2) and can thus act as biocatalysts and transform organic matter. Our group in Clermont-Ferrand (France) has been a pioneer in studying cloud microorganism's activity and its contribution to cloud chemistry as an alternative route to photochemistry (3-6). Cloud water samples are collected at the puy de Dôme station (1465 m, France) thanks to cloud impactors, under sterile conditions (Figure 1). Our team has isolated more than 1000 microbial strains including bacteria and yeasts (7).

Our strategy is to work on microcosms containing model microbial strains in an artificial cloud water solution, or to study directly real cloud samples containing the whole biodiversity and a complex chemical mixture. In both cases, biodegradation rates are measured and compared to abiotic rates of

degradation, particularly due to the reactivity of HO° (mainly during the day) and NO_3° (mainly during the night). We have specifically designed photo-bioreactors for these experiments.

Among others, the biotransformation of C1 compounds (methanol, formaldehyde, formic acid and CO_2) have been studied in details, these compounds represent a valuable carbon source for some microorganisms (methylotrophic metabolism). Unlike radical chemistry, microorganisms can oxidize formaldehyde to CO_2 and/or reduce it to methanol or incorporate it into central metabolism (Figure 2). We have shown that a large number of microorganisms isolated from clouds are able to bio-transform these C1 compounds (3), biodegradation and photodegradation rates are in the same range (5). In addition, a detailed study carried out on a *Bacillus* strain has shown that this bacterium could not only produce methanol, formic acid and CO_2, but also synthesise higher molecular compounds including glycerol, 1,2-propanediol and 1,3-propanediol (4). When real cloud water samples were used, it was shown that formic acid is degraded more efficiently by biotic than by abiotic processes. The case of formaldehyde is more complex: it is photoproduced by light while it is also degraded by microorganisms (6).

In conclusion these microorganism-driven reactions were shown under laboratory conditions to be competitive with radical chemistry and could thus impact on cloud chemistry. Now, this biological contribution needs to be implemented in detailed cloud chemistry models that simulate explicitly the chemistry of the multiphase cloud system (8). This will be the first step to improve global models that predict climate change.

*(1) Herrmann et al., Chem. Rev.**2015**,115 (10), 4259–4334.*
*(2) Delort et al.,Atmos.Res.**2010**, 98 (2-4), 249–260.*
*(3) Amato et al.,Atmos. Chem. Phys. **2007**, 7, 4159–69.*
*(4) Husarova et al., Atmos. Environ.**2011,**45 (33), 6093–6102.*
*(5) Vaïtilingom et al.,Atmos. Chem. Phys. **2011,** 11, 8721–33.*
*(6) Vaïtilingom et al., Proc. Natl. Acad. Sci.**2013**, 110 ,559–564.*
*(7) Vaïtilingom et al. Atmos. Environ.**2012**, 45, 6093-6102.*
*(8) Mouchel-vallon et al., GMDD, **2016,**submitted.*

Figure 1. Cloud sampling at the puy de Dôme station (1465 m, France) (A) using a cloud impactor (B).

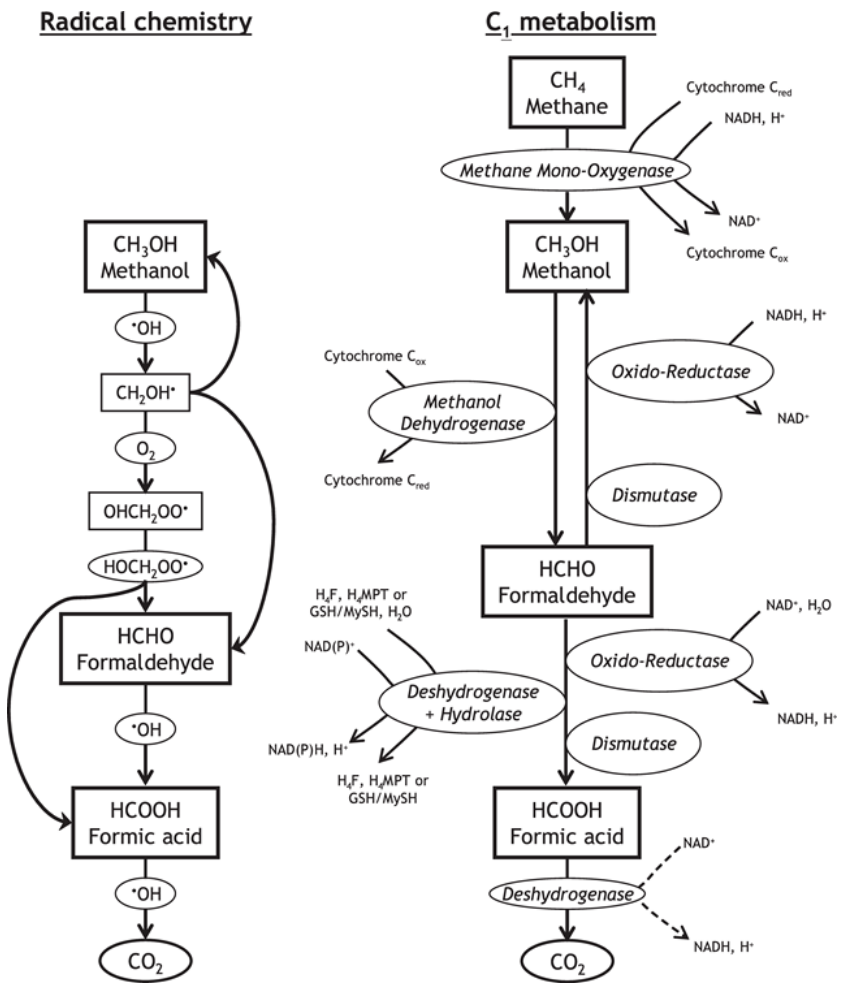


Figure 2. Non-exhaustive schemes presenting the pathways of C1 compounds degradation by radical chemistry and by metabolism (adapted from 4). NAD-Nicotinamide adenine dinucleotide; H_4F-Tetrahydrofolate, H_4MPT-Dephospho-tetrahydromethanopterin; GSH -Glutathione,MySH-Mycothiol.

6) Josef Caslavsky:
ACE and young researchers - scholars at EMEC16 in Torino and EMEC17 in Inverness

EMEC16

In order to support the participation of MSc and PhD students at EMEC16 meeting the ACE board decided for the first time to offer the scholarship to five successful candidates. The scholarship valued at € 500 was intended to cover the conference fee and travel and accommodation costs. Candidates were asked to send their CV together with description of their scientific results, letter of recommendation of their supervisor and certificates of current enrolment and examination results to prof. Caslavsky, who was the chairman of the evaluation committee consisting of all members of the

ACE Board. Each member of the committee then proposed his/her order of candidates. These partial results were then summarized by the chairman of the evaluation committee and the final table was then discussed in details and finally confirmed by all committee members.

In total seven applications were submitted before deadline, which was September 1, 2015 (another two, which were sent after the deadline, were rejected without evaluation). During the evaluation process the committee highly appreciated the scientific level of the submitted contributions. Due to this fact it was a bit difficult to set up the final order. Finally, the following five students were awarded: Maja Milanović (Faculty of Medicine, University of Novi Sad, Serbia); Dmitri Mazur (Chemistry Department, Moscow State University, Russia); Mária Chropeňová (RECETOX, Masaryk University, Brno, Czech Republic); Mirjana Ćujić (Faculty of Physical Chemistry, University of Belgrade, Serbia); and Nataša Djoković (Faculty of Chemistry, University of Belgrade, Serbia).
EMEC17 ACE Scholarships

EMEC17

For EMEC17 candidates were also asked to send their CV together with description of their scientific results, letter of recommendation of their supervisor and certificates of current enrolment and examination results to prof. Caslavsky, who was the manager of the evaluation process. Evaluation committee consisted of those members of the ACE Board who were not interested about the result (i.e. they weren't supervisors of any of applying Ph.D. students).

In summary, 13 applications had been submitted before the deadline. After check of completeness all information has been forwarded to the members of the evaluation committee. Each of them than proposed his/her order of candidates and these partial results were then summarized by manager and final ranking had been approved by all committee members.

The evaluation committeedecided to award following three students: Daniela Sofia Borges Capela, (Chemical Engineering Department, University of Porto, Portugal); MarijaNujić (Faculty of

Food Technology, University of Josip JurajStrossmayerin Osijek, Croatia) and GordanaGajica (Faculty of Chemistry, University of Belgrade, Serbia).

Given that the ACE scholarship has fulfilled its purpose, this year it will be proclaimed again.