

# NEWSLETTER № 07

# ACE

## European Association of Chemistry and the Environment

<http://www.research.plymouth.ac.uk/ace/>

March 2006

### 1. EDITORIAL

Dear ACE members,

Two years have passed since the last ACE newsletter was published. In the meantime many changes and developments have occurred with the ACE, including changes in Board membership, the publication of the ACE book (see part 3 of this newsletter), the growth of *Environmental Chemistry Letters* (the official journal of ACE now in its fourth volume). In addition, two very successful and pleasant meetings, the 5<sup>th</sup> and 6<sup>th</sup> *European Meetings of Environmental Chemistry* (EMEC), were respectively organized by Michelle Aresta in 2004 (hosted by the University of Bari, Italy) and Branimir Jovancicevic in 2005 (hosted by the University of Belgrade and the Serbian Chemical Society). A short report on EMEC6 is presented in this newsletter. The next meeting (EMEC7) will take place 2006 in Brno (see the EMEC7 conference website <http://www.fch.vutbr.cz/EMEC7> for further details). This is the second EMEC meeting to take place in the more eastern part of Europe, reflecting the aspiration of the ACE to have a presence throughout the continent.

The ACE website has been redesigned and will be further developed in 2006 to reflect the activities of the ACE. Your comments on the website are very welcome; please send feedback to Mark Fitzsimons ([m.fitzsimons@plymouth.ac.uk](mailto:m.fitzsimons@plymouth.ac.uk)). I would like to thank Anthony Lewis at the University of Plymouth for his role in ACE website development and management.

The newsletter represents an opportunity for ACE members to contribute articles and opinions of interest. The newsletter will be published twice a year and is open for any contribution related to the association and its scientific aims and objectives. Additionally, feedback and suggestions for improving the ACE newsletter are welcome.

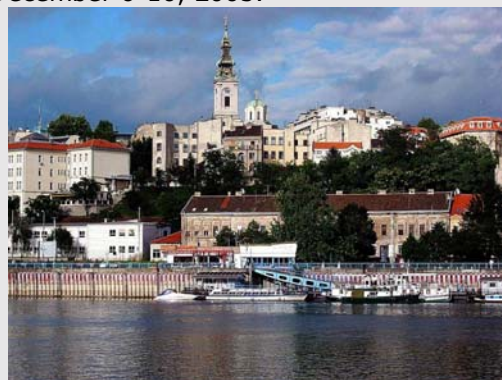
I'm very happy to relaunch the ACE newsletter and look forward to your contributions and remarks.

Jan Schwarzbauer

### 2. MEETINGS

#### 6<sup>th</sup> *European Meeting of Environmental Chemistry*

The Sixth European Meeting on Environmental Chemistry (EMEC6) was held in Belgrade, Serbia and Montenegro, December 6-10, 2005.



The meeting was hosted by *The Serbian Chemical Society* and *The University of Belgrade* on behalf of the ACE, and fostered the development of innovative research themes through a multidisciplinary approach to the chemistry of the environment. General topics included:

- Sustainable development
- Life cycle assessment
- Risk assessment
- Green chemistry
- Soil contamination and decontamination technologies
- Ecotoxicology
- Water treatment and reuse
- Biodegradation of toxic compounds
- Clean technologies
- Atmospheric chemistry, Air pollution, Modelling of pollutant diffusion
- Marine chemistry and Marine pollution
- Environmental analytical methods
- Soil, freshwater and atmospheric systems

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Each session was introduced by given plenary or session lectures. The plenary lectures focussed on two very interesting but quite different topics within the field of environmental chemistry: the development of analytical tools for environmental forensic analysis, and the monitoring and assessment of urban air pollution.

The rich scientific program ran alongside an impressive array of social events, 'crowned' by an official reception hosted by HRH crown prince Alexander.



More detailed information and some nice photos are available online:

<http://www.chem.bg.ac.yu/emec6/>

### 3. MEMBERSHIP 2006

Your ACE membership can now be extended for 2006. Contemporary with the publication of the fourth volume ECL, it is now the right time to renew your membership and continue to receive all issues of the journal. The procedure for membership renewal is very straightforward:

1) Arrange transfer of the membership fee of 50 € to the ACE bank account:

Cheques Postaux  
L-1090 Luxembourg  
Code BIC: CCPLLULL  
IBAN: LU43 1111 0277 0964 0000

2) Add your name and the membership year on the transfer form so that we can update our records. Otherwise we cannot assign the fee received to your personal membership.

Please, don't forget to inform the ACE membership secretary, Mark Fitzsimons, about any changes of your contact data (postal address, e-mail, etc.). Mark can be contacted by e-mail at [m.fitzsimons@plymouth.ac.uk](mailto:m.fitzsimons@plymouth.ac.uk).

### 4. THESIS

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#### Thesis title:

Evaluation of heavy metals and arsenic toxicity by using different biological models.

**Supervisor:** Dr. Isabel Villaescusa.

**Abstract:** Toxicity of some metals and arsenic was investigated using different biological models. Microtox<sup>®</sup> bioassay, which is based on variation in light emission by *Vibrio fischeri* luminescent bacteria, was used to establish dose-response curves for several toxic elements, namely, Zn(II), Pb(II), Cu(II), Hg(II), Ag(I), Co(II), Cd(II), Cr(VI), As(V), and As(III), in aqueous solutions adjusted to different pH values showing that pH has an influence on the measured toxicity. In the case of arsenic, EC50 values were found to decrease, reflecting an increase in toxicity, as pH became basic, whereas in the case of As(III), EC50 values were almost unchanged within a 6.0 – 8.0 pH range and lowered at pH 9.0 only.  $\text{HAsO}_4^{2-}$  and  $\text{H}_2\text{AsO}_3^-$  were found to be the most toxic species. On the other hand, results from two mathematical approaches to predict the toxicity of all the possible binary equitoxic mixtures of Co(II), Cd(II), Cu(II), Zn(II), and Pb(II) showed that additive, synergistic and antagonistic interactions were possible what demonstrates that much attention should be paid when establishing environmental safety regulations. EC20 values, which represent a measurable threshold of toxicity, were also determined for each element individually and were found to rank as  $\text{Pb(II)} < \text{Ag(I)} < \text{Hg(II)} \approx \text{Cu(II)} < \text{Zn(II)} < \text{As(V)} < \text{Cd(II)} \approx \text{Co(II)} < \text{As(III)} < \text{Cr(VI)}$ .

As a complement to the previous results, the long-term effects of Cd(II), Cr(VI), and As(V) were studied on growth rate and viability of the same biological model. Surprisingly, these poisonous chemicals were found not to be very toxic to these bacteria when measuring their effect on viability or growth after long periods of exposure. Several experiments were performed as an attempt to explain the lack of Cr(VI) toxicity shown by *Vibrio fischeri* bacteria. The resistance could be attributed to the capacity of the bacteria to convert Cr(VI) ions into less toxic Cr(III) ions.

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On the other hand, the HT29 human cell line and primary cultures of *Sparus sarba* blood cells were used *in vitro* to detect metal toxicity thresholds by evaluating growth rate or measuring the overexpression of stress proteins. Both biological models were found convenient to detect toxicity produced by metals. In general, evaluation of toxicity based on stress proteins overexpression was found to be more sensitive than evaluation of toxicity performed at the organism level.

Based on the obtained results, it can be concluded that a battery of bioassays is necessary to accurately evaluate toxicity of metals since important variations between different organisms can be found and a lot of environmental factors may influence as well as modify the obtained toxicity.

### Publications :

Delmas, F., Maisonnave, V., Fulladosa, E., Villaescusa, I., Soleilhavoup, J.P. and Murat, J.C (2000). *Ecotoxicol. Environ. Safety* 47, 292-297.

Fulladosa, E., Delmas, F., Li-Jun., Villaescusa, I., Woo, N, Murat, JC (2002). *Ecotoxicol Environ Safety*, 53, 134-140.

Fulladosa, E., Murat, JC., Martínez, M., Villaescusa, I (2004). *Arch Environ Contam Toxicol*, 46 (2):176-182.

Fulladosa, E and Villaescusa, I. (2005). *Arch. Environ Contam. Toxicol* 48, 1-9.

Fulladosa, E and Villaescusa, I. (2005). *Chemosphere* 58, 551-557.

Fulladosa, E., Murat, JC., Villaescusa, I. (2005) *Arch Environ Contam Toxicol*, 60, 43-48.

Fulladosa, E., Delmas, F., Gaubin, Y., Skandrani, D and Murat JC (2005) In: *Environmental Chemistry*. Lichtfouse, Schwarzbauer, Didier (Eds), Springer Verlag, Heidelberg, chapter 67, 735-741.

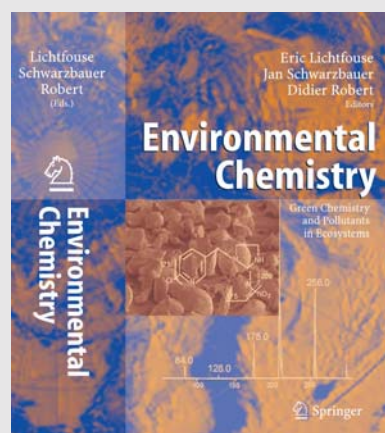
Fulladosa, E., Martinez, M., Murat, JC and Villaescusa, I (2004) In: *Environmental Chemistry*. Lichtfouse, Schwarzbauer, Didier (Eds), Springer Verlag, Heidelberg, chapter 66, 725-734

### 5. THE ACE BOOK IS PUBLISHED

In December 2004 the ACE book '*Environmental Chemistry – Green Chemistry and Pollutants in Ecosystems*' was published by Springer Verlag. The book comprises 780 pages, including 298 figures, made up of selected papers of the 2<sup>nd</sup> European Meeting of Environmental Chemistry (Dijon, 2001), which covered a wide range of science related to environmental chemistry. The main chapters (Analytical Chemistry, Toxic metals, Organic pollutants, Polycyclic Aromatic Compounds, Pesticides, Green Chemistry and Ecotoxicology) reflect this

broad spectrum of research, encapsulating the scientific aims of the ACE. The book describes state-of-the-art advances on our understanding of water soils and air pollution, and contamination of food and organisms by inorganic and organic contaminants. It also presents work on novel bio-assays developed to assess the toxicity of various pollutants, such as dioxins and endocrine disrupters, within complex media. Last but not least, the development and examination of sensitive analytical methods with the capacity to trace the fate of contaminants in complex ecosystems, are considered.

More than 200 authors from Europe, Africa, Asia and the Americas contributed to this unique collection of studies, making it a truly global representation of Environmental Chemistry research.



*Environmental Chemistry – Green Chemistry and Pollutants in Ecosystems*. Lichtfouse, Schwarzbauer, Didier (Eds), Springer Verlag, Heidelberg, 2005.

### 6. NEW INSTRUCTIONS FOR ECL AUTHORS

Please note, that the formal requirements for submitting a manuscript to *Environmental Chemistry Letters* have been modified. The main changes are :

- Using the template-file is not necessary any longer.
- The maximum number of pages is now 10
- Up to 6 graphics and tables are allowed
- Reviews can be submitted for publication

The complete instructions for authors are available on the ECL web page (follow links from <http://www.research.plymouth.ac.uk/ace/>).

### CONTRIBUTORS TO THIS ISSUE

Isabel Villaescusa, Branimir Jovancicevic, Mark Fitzsimons, Jan Schwarzbauer