

Centre of Excellence in Environmental Analysis and Monitoring at the Chemical Faculty of the Gdańsk University of Technology

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Rapid development, observed in almost every field of human activity, contributes to the degradation of environment and creates ecological hazards of global scale. Modern societies release into the environment – either during production, storage, transportation, usage or ultimate disposal – much waste, including chemical products. These materials participate in natural cycles and reactions and frequently interfere with or disturb natural systems. One may ask, what role does analytical chemistry play in this context. Analytical chemistry or, in more modern and broader approach, environmental analytics, including monitoring, focuses on determination of all possible pollutants not only in such environment components as air, waters or soils, but also in vegetation, animal and human materials (tissues or whole organisms). Monitoring is dedicated to identification, localization and assessment of ecological risks, principally using automated and autonomous instruments or their modules. Taking into account such definition, analytical chemistry plays significant role in nowadays world and occupies a special place among all the sciences in the field of environmental protection. In almost every case, analytical chemistry provides rapid and robust systems and analytical tools for the characterization of pollutants and assessment of related eco-toxicological risks.

Within the European Framework Programme 5, at the end of its functioning, the European Commission announced a call for proposals, known as “centres of excellence”, to facilitate systematic diffusion of scientific concepts and ideas between the European Research Area and the Newly Associated States through organization of trainings, courses

and workshops, as well as promoting international exchange of scientists. Such a centre was established on 1 January, 2003 at the Department of Analytical Chemistry, Chemical Faculty, Gdańsk University of Technology.

Project entitled: Centre of Excellence in Environmental Analysis and Monitoring (CEEAM) was submitted to the European Commission as a response for the call QoL/Growth/EESD-20001-INTEGR, published by the European Commission in September 2001. On 27 March 2002, project co-ordinator received evaluation outline from the European referees. CEEAM project obtained high notes and soon afterwards, “godfathers” of the centre, prof. dr hab. inż. Jacek Namieśnik and dr hab. inż. Wojciech Chrzanowski were invited to carry on the negotiations, which were completed successfully in September 2002. The project was accepted on 16 December 2002 and the Centre of Excellence in Environmental Analysis and Monitoring became effective on 1 January 2003. Activity of the centre is based on the equipment and human resources of the Department of Analytical Chemistry.

Thematic focus and planned growth of the centre complies with traditional fields of interests in the department. The Department of Analytical Chemistry is devoted to both basic and applied research in a broad range of topics with a focus on micro- and macro-environmental aspects of chemistry. Current research interest may be described as follows:

- development of new analytical methods and procedures for trace analysis, in particular, for environmental analysis and monitoring,
- measurements of chemical pollutants in different environmental components,
- designing, construction and testing new modules and complete automated analytical instruments,

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- including elements of biomonitoring into current research programme of the centre.

Besides its scientific focus, CEEAM also promotes and carries out educational activities. The centre systematically organizes trainings, courses, and seminars for all interested institutions: educational (at all levels), industrial, and governmental (including local government).

Our initiatives are ambitious and challenging for all members of the centre. The prize we are fighting for, is establishing a leading scientific unit in Central and Eastern Europe in the field of environmental analytics and monitoring, especially devoted to water pollution and air-to-water/water-to-air transfer of pollutants. CEEAM is principally dedicated to proper procedures of collection of environmental samples (passive dosimeters and other cheap methods), their pretreatment, storage and preparation (analytes preconcentration, isolation, etc.) for analyses by such techniques as: GC, HPLC (both coupled with MS), and ECZ.

The activities of the CEEAM are organized in 7 work packages (WP). The principle work package (WP1) is devoted to definition and identification of new horizons and challenges in the field of environmental analysis and monitoring. WP1 consists of 2 workshops. WP2 is organization of the international Ph.D. studies programme. The special feature of these studies is inviting leading specialists from the European Union for four cycles of 15 hrs lectures per academic year. WP3 is a summer school which is planned for year 2005. 30 participants of the school will be divided between the European Research Area, Eastern Europe and Poland to facilitate mutual exchange of ideas and getting acquaintance. WP4 is the post-doc fellows exchange programme. WP5 is devoted to increased networking of the CEEAM with leading scientific institutions in Europe, by study visits. WP6 is promotion and dissemination of the CEEAM activities and WP7 is the co-ordination work package.

Attempting to fill such a demanding programme with real activity, the management of CEEAM have initiated intensive actions since the very beginning of its existence. Inaugural meeting of CEEAM's International Scientific Advisory Board (ISAB) took place in February 2003. Table 1 presents names of ISAB members.

During this gathering, Mr. Bernard James Denore (Spain), Project Technical Assistant, delegated by XII Directorate of the European Commission, was also present. His objective was to make first reconnaissance in the centre of excellence. ISAB meeting agenda included presentation of the university, faculty, activities of the Department of Analytical Chemistry and visits in Deans office and in analytical laboratories. Debates were accompanied by numerous, stormy discussions on the subject of the mission and objectives of the unit.

Immediately after the first ISAB meeting, the management started preparations to successive work. We have opened International Ph. D. Studies in field of environmental analytics and monitoring, announced recruitment to "post-docs" exchange programme, and first study visit

Table 1. Members of the International Scientific Advisory Board of CEEAM.

Members of ISAB	Affiliation
Prof. Dr. Dr. h.c. Wittko Francke	Institute for Organic Chemistry, University of Hamburg (Germany)
Prof. Dr. Hartmut Frank	Environmental Chemistry and Ecotoxicology, University of Bayreuth (Germany)
Prof. Dr. Øystein Hov	Norwegian Institute for Air Research, NILU, Kjeller (Norway)
Prof. Dr. rer. nat. Dr. h.c. Antonius Kettrup	Institute for Ecological Chemistry, GSF, Neuherberg (Germany)
Prof. Dr. Ryszard Łobiński	Laboratory of Analytical Chemistry, Bio-Inorganic and Environment, CNRS, Pau (France)
Prof. Dr. Johan Roeraade	Department of Analytical Chemistry, Royal Institute of Technology, KTH, Stockholm (Sweden)
Dr. Richard Murray-Smith	AstraZeneca, Global SHE Operations, Brixham Environmental Laboratory (United Kingdom)

took place. Since March till June we welcomed in our centre Prof. Dr. Magnus Vircavs (University of Latvia, Latvia), Prof. Dr. Hartmut Frank (Environmental Chemistry and Ecotoxicology, University of Bayreuth, Germany), Prof. Dr. Birgit Wierczinski (Interfaculty Reactor Institute, Delft University of Technology, the Netherlands), Prof. Dr. Tadeusz Górecki (University of Waterloo, Canada), and Prof. Dr. rer. nat. Dr. h.c. Antonius Kettrup (Institute for Ecological Chemistry, GSF, Neuherberg, Germany), who either delivered cycles of lectures for the Ph. D. students or shared their experience with us.

Besides these major events, the management did not spare neither time nor efforts in carrying out routine tasks, i.e., promotion and dissemination of CEEAM activities on pages of such journals as, *Analytika* [1], *Orbital*, *Pomorski Przegląd Gospodarczy* [2] or *Pismo PG* [3] (a GUT monthly) and *Biuletyn* (Bulletin of the Dean of the Chemical Faculty, GUT), establishing international cooperation, submitting consecutive proposal in the frames of the Framework Programme 6 which, meanwhile, replaced its predecessor, FP5. First success has already been achieved, as we have become a participant of the European Lifestyles and Marine Ecosystems project (ELME), coordinated by Prof. Dr. Laurence Mee from the University of Plymouth (United Kingdom).

We would like to encourage all parties interested in cooperation with the centre or willing to participate in future CEEAM activities to visit our homepage <http://www.pg.gda.pl/chem/CEEAM>.

Table 2. Lecturers at the workshop: "New Horizons and Challenges in Environmental Analysis and Monitoring".

Lecturer	Affiliation	Title of the lecture
Prof. Damià Barcelo	Department of Environmental Chemistry, IIQAB-CSIC, Barcelona, Spain	LC-MS and LC-MS-MS of selected emerging pollutants (steroid sex hormones, drugs and surfactants) in the aquatic environment
Prof. Peter Bode	Interfaculty Reactor Institute, Delft University of Technology, Delft, the Netherlands	Nuclear Analytical Techniques for Environmental Research, Quality Assurance and Quality Control in Research Development
Prof. Jan Åke Jönsson	Department of Analytical Chemistry, Lund University, Lund, Sweden	Membrane techniques for analysis, sampling and speciation in environmental measurements
Prof. Karsten Levsen	Fraunhofer Institute of Technology and Aerosol Research, Hanover, Germany	Structure elucidation of unknown pollutants in environmental samples by coupling of HPLC to NMR and MS
Prof. Albrecht Paschke	Centre for Environmental Research, University of Leipzig, Leipzig, Germany	Novel passive samplers for monitoring organic pollutants in surface and ground water based on membrane-enclosed silicone material
Prof. Joanna Szpunar	Laboratory of Analytical Chemistry, Bio-Inorganic and Environment, CNRS, Pau, France	Hyphenated Techniques in Environmental Speciation Analysis
Prof. Zbigniew Brzózka	Department of Analytical Chemistry, Warsaw University of Technology	Miniaturized chemical sensors in monitoring of water
Prof. Henryk Matusiewicz	Department of Analytical Chemistry, Poznań University of Technology	Wet digestion methods Chemical vapor generation with slurry sampling: A review of atomic absorption applications
Prof. Jacek Nawrocki	Department of Water Treatment Technology, Adam Mickiewicz University	Analysis of water disinfection by-products Metal Oxides as HPLC Stationary Phases
Prof. Paweł Kościelniak	Department of Analytical Chemistry, Jagiellonian University	Calibration methods – nomenclature and classification Integrated calibration method – a new approach to routine analysis
Prof. Ewa Bulska	Faculty of Chemistry, University of Warsaw	On the importance of metrology in chemistry

First major event in the Centre took place in mid-August 2003. CEEAM organised international workshop entitled: "New Horizons and Challenges in Environmental Analysis and Monitoring". We invited leading experts in the field of environmental analytics and monitoring. Table 2 includes names of the workshop lecturers.

Participants (51 persons) had been chosen from the representatives of young generation of analytical chemists from Poland and Eastern Europe. Two-week workshop included plenary lectures, seminars and brainstorm session in groups and a study visit to the Department of Environmental Chemistry and Ecoanalytics at the Nicolaus Copernicus University and the Department of Analytical Chemistry at the Warsaw University of Technology. At this occasion, not only trends in environmental analytics and monitoring were discussed, but also some problems of nomenclature (still not firmly established in the field). The basis for discussion was the book published by the center under the same title as the workshop (English version, Polish will be published

later this year) in both paper and CD-ROM form. New working relations and acquaintanceships have also been established (see Figure 1).



Fig. 1. Participants and some of the lecturers of the workshop: "New Horizons and Challenges in Environmental Analysis and Monitoring".

At present, centre does not slow down its activities. We are preparing to the second ISAB meeting (14-15 November, 2003), participation in the Poznań International Ecological Fair POLEKO 2003 and organization of the second workshop entitled "Modern measuring techniques in environmental analytics". This event will be rather a course, including practical exercises in the recently developed methods. We plan to invite 3 ERA experts, who will preside over the sessions, consultations, and case studies. The experiments will be carried out using CEEAM's equipment (already in possession of the Department of Analytical Chemistry, GUT), including at least 2 home made devices.

At this stage, after 9 months of CEEAM's existence, one may ask if we succeeded in fulfilling our tasks, sat-

isfying both its founders and ourselves – are we already a leading centre in the field of environmental analytics and monitoring. Complete assessment of CEEAM activities and achievements may be possible after full three years of project duration, moreover, most of the work packages will have indirect long term – lasting beyond the three years period – impact for the Department of Analytical Chemistry.

References

1. *Analityka*, **2**, pp. 41-44, **2003**.
2. *Pomorski Przegląd Gospodarczy*, **3-4**, pp. 21-22, **2002**.
3. *Pismo PG*, **6**, pp. 13-14, **2003**.