



Dear Reader

This is the 49th Edition of the Newsletter of the Division of Nuclear and Radiochemistry (DNRC) which appears in a new outfit that closely resembles that of the EuCheMS Newsletter.

Moreover, we also changed the editing responsibility. For all previous editions, our distinguished colleague Tony Ware was in charge of this task. After many years of engagement he asked to resign from this duty. We therefore decided to pass the editing task to the actual chairman of the division.

Even though we very well understand the desire of Tony to step down from his manifold duties within DNRC we very much miss his persistent and deep engagement in boosting our discipline to become a division of EuCheMS and to initiate the Newsletter as a highly valuable forum for mutual information. We wish him all the best for his future.

Fifty years of Radiochemistry in Finland

Laboratory of Radiochemistry, University of Helsinki, in Finland celebrated its 50th anniversary in August 2012. The laboratory was established in 1962 when Jorma K. Miettinen, now one of the twelve Finnish science academicians, was appointed to the radiochemistry professorship.

The most important research field of the laboratory in the 1960's and the 1970's was environmental and food chain studies of radionuclides from nuclear weapons test fallout. Already in the early 1960's a highly radiocesium-enriching food chain was observed in the Finnish Lapland where radiocesium accumulated into reindeer herding Sami people via lichen and reindeer meat. The whole-body counting of Sami people started in 1961 and they have been continued for fifty years.

In the 1970's the focus was moved to transuranium elements Pu and Am from the global fallout. The knowledge and skills then created were of high importance when the Chernobyl accident in 1986 brought to Finland new environmental radioactivity. After that the Laboratory of Radiochemistry has determined the spatial distribution of Pu, Am and Np over whole Finland and studied their behavior in aquatic environment. Later, from 1990's on environmental studies have more and more focused on natural radionuclides, U, Th, Ra, Po and radiolead, especially in drinking water, in the forest environment and in mining mill tailings.

A new challenge for Finnish radiochemistry was raised by the turn of 1970's and 1980's when four nuclear power reactors were constructed in Finland. Ever since studies on nuclear waste has been the largest research field of the laboratory. Most studies in this field have focused on the behavior, migration and retention, in the geosphere of long-lived radionuclides from spent nuclear fuel. In addition, a wide range of inorganic ion exchangers have been developed for the selective removal of

Successful participation of DNRC at 4ECC in Prague

The 4th ECC congress in Prague from 26-31 Aug. 2012 was attended by 1800 participants from 57 countries. Our DNRC division contributed to the program in form of a joint symposium with the division of Chemistry and the Environment entitled: ENVIRONMENT AND GREEN CHEMISTRY.

This symposium was structured in three parts: Environmental Radiochemistry, Mining and the Environment, and Green Chemistry.

Our symposium Environmental Radiochemistry included three sessions on i) Fukushima and Chernobyl, ii) Environmental studies using radionuclides, and iii) Speciation of actinides in the environment, followed, iv) by a poster session.

The sessions were very well attended by up to 170 persons.

It can therefore be concluded that the strategy to organize at ECC congresses joint symposia with other divisions or working parties was very encouraging.

Our division decided to plan another joint symposium at 5ECC in Istanbul (2014) together with the division of chemistry in life science. From our side we plan to organize again three sessions devoted to i) imaging with PET and SPECT, ii) radiopharmacy, and iii) nuclear reactions for production of radionuclides for life science application.

***NRC8 in Como, Italy, with special emphasis on life sciences***

From 16-21 Sept. 2012 NRC8 was held in the lovely Grand Hotel di Como in Italy. As chairman acted Prof. Mauro Luigi Bonardi from the LASA institute in Milano. Thanks to his effort as well as the help of his wife, Prof. Flavia Groppi, the conference developed to a very successful and stimulating scientific event that was well attended by about 180 participants. NRC8 was for the first time organized in Italy. Previous conferences in this series that started in 1984 were organized by colleagues in Germany (twice), Great Britain, France, Austria, Switzerland, and Hungaria.

The conference started with a Sunday evening lecture entitled Chemistry in Italy during the late 18th and 19th century, presented by Prof. em. Ignazio Renato Bellobono.

The spectrum of topics covered at NRC8 was traditionally very broad. It included sessions devoted to a) radiopharmacy, b) chemistry of radioelements and superheavy elements, c) reaction mechanisms and nuclear recoils, nuclear based spectroscopy, radiation geochronology, isotope effects, d) nuclear fuel cycle, research reactors and present nuclear power plants, e) nuclear chemistry, radionuclide production, high-power targets, f) application of radiotracers and nanoparticles, g) radioanalytical chemistry and nuclear analytical techniques, h) education and training in radiochemistry and dissemination of culture in nuclear and radiochemistry, and i) radioactive elements in the environment, radiation archeometry and health physics.

A special session celebrated the 50th birthday of Radiochimica Acta.

radionuclides from nuclear waste effluents during the last thirty years. Three of these ion exchangers are being manufactured by the Finnish company Fortum and they have been utilized in several nuclear facilities world-wide during the last twenty years.

Newest research field of the laboratory is radiopharmaceutical chemistry. In 1998 a cyclotron was purchased to the laboratory and with the cyclotron the short-lived positron emitters ¹⁸F and ¹¹C have been produced for labeling of radiopharmaceuticals. The main focus today of the radiopharmaceutical chemistry research is preclinical study for drug development.

Laboratory of Radiochemistry is the only general radiochemistry unit within Finnish universities. It offers an internationally unique, comprehensive master's program in radiochemistry. During the last fifty years 180 master's degrees have been granted. Doctoral education has increased greatly during the last fifteen years and altogether 36 radiochemistry doctors have been educated. At the moment the laboratory has thirteen doctoral students.

In the beginning, in 1962, the Laboratory of Radiochemistry consisted of eight people. Today there are more than thirty people, including doctoral students, which make the laboratory one of the largest radiochemistry unit in world's universities.

Jukka Lehto

Professor

Head of the Laboratory of Radiochemistry

A warm welcome to two new elements of the periodic table

Based on a scientific evaluation by a joint IUPAC/IUPAP commission of recent discovery claims for elements with atomic numbers between 113 and 118, the IUPAC decided on 31 March 2012 to approve discovery of the two elements flerovium (Fl, Z=114) and livermorium (Lv, Z=116) based on convincing experimental evidence from a Russian (Flerov Laboratory for Nuclear Reactions, Dubna) - American (Lawrence Livermore National Laboratory, Livermore) team (see Pure and Applied Chemistry, Vol. 84, No. 7, 2012). These two new elements were synthesized at the 4m cyclotron of FLNR in Dubna using the heavy ion reactions between ⁴⁸Ca projectiles and ^{242,244}Pu (for Fl) and ^{245,248}Cm (for Lv) targets. Produced atoms were isolated using a gas-filled magnetic separator and then implanted into a position sensitive detector which is able to assay single atoms via registering their decay properties.



Obituary Prof. Attila Vertes

Attila Vertes, a renowned radiochemist of the Hungarian Academy of Sciences passed away on 31 December 2011. He is author of over 500 scientific papers, as well as editor of numerous scientific monographs. His highly valuable textbook on Nuclear and Radiochemistry (Elsevier, 1987) and the Handbook of Nuclear Chemistry (Springer, 2008 and 2011) are extensively used in University courses.

He received his Ph.D. at Lomonosov University (Moscow) in 1965. The doctoral degree (being equivalent to the habilitation thesis in Western Universities) he obtained in 1973 for his studies on *Mössbauer studies of the chemical structures of solution*. In 1998 he became an ordinary member of the Hungarian Academy of Sciences.

Between 1974 and his retirement in 2004 he acted as professor at Eötvös Lorand University in Budapest. But also as Emeritus he actively continued his teaching and research activities at the same University.

He has been a visiting scientist at University Newcastle (UK), a Humboldt Fellow at Technical University Munich (Germany) as well as a guest professor at Lehigh University, Bethlehem (USA), Tokyo University (Japan) and Johannes Gutenberg University, Mainz (Germany).

His scientific interest was mainly devoted to the interaction of radiation with matter. In particular, he devoted his studies to Mössbauer spectroscopy and positron annihilation spectroscopy.

Thanks to his excellent skills as an organizer he initiated a large number of scientific collaborations.

He received several honors, such as e.g. a honorary doctoral degree by Glasgow Caledonian University (UK) in 1996, the Szechemy Prize in 2001 and the George Hevesy Medal Award in 2004.

Attila Vertes had an open and charming personality – free from formalities. He was an exceptionally warm and unpretentious person with a good sense of humor. This may probably be expressed best by the attitude that all his colleagues around the world addressed him with Attila, his first name.

(Excerpt from an obituary printed by Magyar Tudományos Akademy)

Our division is seeking a new chairman

By end of 2013 the actual chairman finishes his second three year term. He expressed the sincere wish to step down from his duties - in line with the EuCheMS rules to serve no longer than two terms in a position such as a chairmanship of a division or a working party.

At the annual meeting of DNRC during NRC8 in Como the division took notice of this decision and started the process of seeking a new chairperson from 2014 onwards. Candidates are highly encouraged to express their interest in this position until one month ahead of the next annual meeting of DNRC during the MIGRATION 2013 conference from 8 – 13 Sept. 2013 in Brighton, England. Candidates should, however, also verify whether their National Chemical Society is in support of a candidature. Applications should be send to our secretary:

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Forthcoming Conferences and Workshop

14th International Conference on the Chemistry and Migration Behaviour of Actinides and Fission Products in the Geosphere, MIGRATION 2013, 8-13 Sept.2013, Brighton, UK

www.lboro.ac.uk/departments/cm/MigrationConference2013/MigrationIndex.html

5th Asia-Pacific Symposium on Radiochemistry '13, ABSORC13, Kanazawa, Japan

www.radiochem.org/apsorc13/

47th General Assembly of IUPAC, 9-15 Aug. 2013, Istanbul, Turkey

www.iupac2013.org

2nd World Congress on Ga-68 (Generators and Novel Radiopharmaceuticals), Molecular Imaging (PET/CT), Targeted Radionuclide Therapy, and Dosimetry, 28 Feb. – 2 March 2013, Chandigarh, India.

www.2ndworldcongress-ga-68.de

20th International Symposium on Radiopharmaceutical Sciences, Jeju, South Korea, 12 – 17 May 2013.

www.isrs2013.org

2013 Gordon Research Conference on Nuclear Chemistry, 8-14 June 2013, New London, NH, USA

www.grc.org/programs.aspx?year=2013&program=nuchem

8th Workshop on the Chemistry of Heaviest Elements, 19 – 21 Sept. 2013, Takayama, Japan

<http://asrc.jaea.go.jp/soshiki/gr/schaedel-gr/CHES/index.html>

Fifth Symposium on Nuclear Analytical Chemistry (NAC-V), 20 – 24 January 2014, Bhabha Atomic Research Centre, Mumbai, India.

www.barc.gov.in

8th International Conference on Isotopes and Expo, 24-28 Aug. 2014, Chicago, Illinois, USA

www.8ici.ans.org

5th EuCheMS Chemistry Congress, 31 Aug. – 4 Sept. 2014, Istanbul, Turkey

www.euchems2014.org



Some recent textbooks/handbooks in Nuclear chemistry/Radiochemistry

Handbook of Nuclear Chemistry, Vol. 1, 2nd Edition (Vertes, A., Nagy, S., Klenscar, Z., Lovas, R.G., Rösch, F., Eds.) Springer, ISBN 978-1-4419-0719-6 (2011).

Chemistry and Analysis of Radionuclides, by Jukka Lehto, Xiaolin Hou, Wiley-VCH, ISBN: 978-3-527-32658-7 (2010).

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