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## **RADIOCHEMISTRY IN EUROPE**

**THE NEWSLETTER of the**

**DIVISION of NUCLEAR and RADIOCHEMISTRY**

**Issue 48– November 2011**

### **EDITORIAL COMMENT**

Welcome to the forty-eighth newsletter for Radiochemists in Europe. The WebPages of the Division can now be found at [www.euchems.eu/divisions/nuclear-and-radiochemistry.html](http://www.euchems.eu/divisions/nuclear-and-radiochemistry.html) from the home page the “Future Events”, updated when fresh information is received, and archived newsletters are readily available. Useful Links have also been established, including the Homepage of the Radiochemistry Group of RSC. If any other group would like their website to be linked, please send me the details.

The aims and objectives of the division have not changed and are given below.

As a Division of EuCheMS it has been our intention to participate in their Congresses whenever possible.

At the forthcoming **4<sup>th</sup> Congress of EuCheMS from 26 to 30 August 2012 in Prague** (see [www.euchems-prague2012.cz](http://www.euchems-prague2012.cz)) our division (DNRC) will share a symposium on Environment and Green Chemistry, organized jointly with the division on Chemistry and the Environment (Chair: Prof. Walter Giger, EAWAG, Switzerland). At this symposium one day will be devoted to Environmental Radiochemistry.

Our Chairman, Dr Heinz Gaeggeler is very happy that four distinguished speakers have already accepted to contribute to a hopefully stimulating program at the forefront of actual Radiochemistry research. These presentations will be given by:

Ammann Markus, Paul Scherrer Institute, Switzerland, *Tracing chemical reactions on aerosol particles and ice*

Denecke Melissa, Karlsruhe Institute of Technology, Germany, *From micro- to nano-XAS for actinide and lanthanide speciation*

Reich Tobias, University of Mainz, Germany, *Application of XAFS spectroscopy for the speciation of Np and Pu in natural clay*

Ikäheimonen Tarja, STUK - Radiation and Nuclear Safety Authority, Helsinki, Finland, *Environmental effect of the Fukushima accident compared to the Chernobyl accident*

At this Environmental Radiochemistry Day there is still space for seven 15 min oral contributions as well as for poster presentations in the late afternoon.

With this call I strongly encourage colleagues of our division to submit contributions for oral or poster presentations to this symposium to me – as the convener – no later than end of 2011 ([heinz.gaeggeler@psi.ch](mailto:heinz.gaeggeler@psi.ch)). Submission should include name, affiliation, title and a short abstract.

Evaluation of submissions and final decision will be pursued by the organizers of 4ECC.

Hoping for an active participation from our members, with my best regards *Heinz Gaeggeler* Chairman of DNRC

This is your newsletter for radiochemists in Europe. Articles, reports on meetings, laboratory profiles, courses, positions vacant, redundant equipment and any other item you feel may be of interest to other radiochemists are still urgently required. Also the early announcement of dates for meetings and conferences is important to avoid the possibility of organising two at the same time on similar topics within Europe. See the 10year Planning Calendar on the website. Details of any courses would also be of interest to extend the existing database.

Providing that information is available it is intended to compile this newsletter 4 times per year in March, June, September, and December/January. Please send information in good time for inclusion that is by the end of the month prior to publication. **Editor: Dr. Tony Ware (e-mail:tonyware@compuserve.com)**

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#### □ DIVISION of NUCLEAR and RADIOCHEMISTRY.

##### **Mission and Objectives**

The Division of Nuclear and Radiochemistry is a network of societies and their scientists working in nuclear and radiochemistry throughout Europe and aims to have close links to related institutions all over the world. A broad communicative basis is achieved by cooperation with relevant supranational bodies such as IUPAC and IAEA as well as with journals and newsletters. It endeavours to establish and maintain the highest quality standards in science and research. NRC accepts a role to harmonise education and training in all aspects of nuclear and radiochemistry and to offer a means of communication and collaboration between scientists working in the fields.

Objectives of the NRC are:

- To contribute to the advancement of nuclear and radiochemistry in Europe;
- To identify important areas in science, technology and other human activities relevant to nuclear and radiochemistry, and to stimulate actions in such fields;
- To address aspects of importance in or to nuclear and radiochemistry which need regulation, harmonisation, standardisation or codification, and to make recommendations as appropriate;
- To encourage cooperation between analytical chemists whether working in academia, industry or governance, in particular within the countries of the member societies of EuCheMS
- To foster close contacts and cooperation of NRC with the European Commission and other relevant institutions;
- To safeguard the interests of the nuclear and radiochemistry community, especially concerning recognition and legitimisation in matters of regulation and legislation as well as decision making in economic and in social areas;
- To assist and strengthen quality in teaching and training of nuclear and radiochemistry in education and in daily practice;
- To support the transfer and exchange of knowledge, equipment and personnel in the areas of NRC expertise both within Europe and in non-European countries;
- To hold a European Conference at least every other year;
- To assume a general promotion and coordination function for other conferences and courses in Europe related to NRC activities;
- To disseminate information to the wider scientific community and general public about nuclear and radiochemistry and its achievements.

**If your country does not have a nominee to the Division, please press your Chemical Society to nominate a candidate.**

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□ EUROPEAN ASSOCIATION for CHEMICAL and MOLECULAR SCIENCES  
DIVISION of NUCLEAR and RADIOCHEMISTRY

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□ LABORATORY/BUSINESS PROFILES

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□ CONFERENCE AND WORKSHOP REPORTS

**Innovative Positron Emitters**

Last year a workshop entitled "Innovative Positron Emitters" was organised in Nantes, France. A few selected papers from there have now been published in a special issue of *Radiochimica Acta* (vol.99, 607--678, 2011).

The "Preface" written by the host physicians and a review article by Dr Syed Qaim are given below. The review article is an abridged but updated version of the lecture given by Dr Qaim when presented with his Becquerel Medal by the Radiochemistry Group of The Royal Society of Chemistry in November 2008.

The other articles in the special issue are more of chemical and technological nature but of interest to radiochemists.  
Syed M. Qaim, Co-ordinating Editor, RCA

**Preface to Special *Radiochimica Acta* (Vol 99)**

The introduction of 2-[<sup>18</sup>F]Fluoro-2-deoxy-D-glucose (FDG) and PET imaging in routine use at the end of the 1990s was a real breakthrough in the field of nuclear medicine. It opened the way to innovative functional imaging, complementary to morphological conventional imaging such as ultrasonography, CT and MRI. For more than a decade, FDG has been the unique PET radiopharmaceutical available in oncology. FDG brings useful information in many clinical indications for tumor staging, tumor aggressiveness assessment and monitoring of response to treatment. This is why PET/CT with FDG is now considered as the reference standard for imaging in oncology. However, despite its noteworthy advantages, FDG has some practical limitations and does not bring information on important tumor functions such as apoptosis, hypoxia, angiogenesis *etc.* Other <sup>18</sup>F-labeled tracers have been tested in clinical applications where FDG is not optimal. For instance, to discuss oncology only, fluoro-ethyl-tyrosine and fluoro-dopamine show better sensitivity than FDG in brain tumors. Fluoro-choline may be used in prostate cancer, where FDG lacks sensitivity. Fluoro-estradiol may image ER+ brain tumors. F-MISO is proposed for hypoxia imaging, but with rather poor contrast ratios. PET imaging with <sup>18</sup>F-fluoride is presented as an alternative to classical bone scintigraphy with <sup>99m</sup>Tc-labeled radiopharmaceuticals. Thus there is a need for alternative radiopharmaceuticals with different carriers and different positron-emitting radionuclides, since the short half-life of <sup>18</sup>F results in a rather expensive supply chain and may be too short for some applications. Tens, if not hundreds, of carrier molecules labeled with a limited number of original positron-emitting radionuclides have been evaluated in preclinical studies. In this context, a "Workshop on Innovative Positron Emitting Radionuclides (WIPR)" was organized in Nantes, France, in July 2010, during which more advanced preclinical and clinical studies were presented with a view to help selecting radionuclides more likely to be approved on a short- to medium-term time scale.

### Summary from Dr Syed Qaim's paper.

In molecular imaging, the importance of novel longer lived positron emitters, also termed as non-standard or innovative PET radionuclides, has been constantly increasing, especially because they allow studies on slow metabolic processes and in some cases furnish the possibility of quantification of radiation dose in internal radiotherapy. Considerable efforts have been invested worldwide and about 25 positron emitters have been developed. Those efforts relate to interdisciplinary

studies dealing with basic nuclear data, high current charged particle irradiation, efficient radiochemical separation and quality control of the desired radionuclide, and recovery of the enriched target material for reuse. In this review all those aspects are briefly discussed, with particular reference to three radionuclides, namely  $^{64}\text{Cu}$ ,  $^{124}\text{I}$  and  $^{86}\text{Y}$ , which are presently in great demand. For each radionuclide several nuclear routes were investigated but the  $(p, n)$  reaction on an enriched target isotope was found to be the best for use at a small-sized cyclotron. Some other positron emitting radionuclides, such as  $^{55}\text{Co}$ ,  $^{76}\text{Br}$ ,  $^{89}\text{Zr}$ ,  $^{82}\text{mRb}$ ,  $^{94}\text{mTc}$ ,  $^{120}\text{I}$ , etc., were also produced *via* the low-energy  $(p, n)$ ,  $(p, \alpha)$  or  $(d, n)$  reaction. On the other hand, the production of radionuclides  $^{52}\text{Fe}$ ,  $^{73}\text{Se}$ ,  $^{83}\text{Sr}$ , etc. using intermediate energy  $(p, xn)$  or  $(d, xn)$  reactions needs special consideration, the nuclear data and chemical processing methods being of key importance. In a few special cases, a high intensity  $^3\text{He}$ - or  $\alpha$ -particle beam could be an added advantage. The production of some potentially interesting positron emitters *via* generator systems, for example  $^{44}\text{Ti}/^{44}\text{Sc}$ ,  $^{72}\text{Se}/^{72}\text{As}$  and  $^{140}\text{Nd}/^{140}\text{Pr}$  is considered. The significance of new generation high power accelerators is briefly discussed

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### □ CONFERENCE AND WORKSHOP DETAILS

#### Ninth International Conference on Methods and Applications of Radioanalytical Chemistry

The **FINAL** call for papers for the (MARC IX) conference to be held March 25-30, 2012 in Kona, HI is **December 1, 2011**. Please visit our website for more information at: <http://altmine.mie.uc.edu/nuclear/marc/index.shtml>

The site has been mirrored (in case of any server disruption) to: <http://www.marconference.org/temp/>

The website contains the current information for registrants and authors and will continue to be the best source of information for the conference. If you have any questions or comments, please don't hesitate to contact Steve LaMont ([lamont@lanl.gov](mailto:lamont@lanl.gov)) or Sam Glover ([sam.glover@uc.edu](mailto:sam.glover@uc.edu)). Please forward the information to colleagues who may have changed e-mail addresses and who previously participated or you feel would be interested in the conference.

Please note that **Pre-Registration ends February 19, 2012**. Furthermore, **hotel reservations** must be made **prior to March 4, 2012** to be considered in the MARC room block. The venue for MARC IX will be the same as it was for MARC VIII, the Kona Sheraton. This facility was remodeled only a few years ago and has excellent conference facilities. Complete information and the reservation link are available at the conference website. I would further like to request your assistance in making the MARC conference a success. The conference costs are strongly linked to the number of rooms that are booked by our attendees. Furthermore, the MARC conference room block decreases as we get closer to the conference date. We are requesting all attendees to please consider early registration (**prior to January 15, 2012**) at the conference hotel. This will greatly help us with conference planning.

Your early submission of abstracts will certainly make the planning easier and will be greatly appreciated (and thank you to those who already have been submitted)! Also, please note that there is an abstract submission form on the website that you must use. This form will permit the abstract to be automatically put into the database. The excel form is the same type as used for MARC VIII. The sessions accepted to date will be included on a dropdown list in the abstract entry form. However, as in the past, additional sessions will be developed as themes of papers come in. If you do not see a specific session for your paper then please choose general call for papers. Please send all abstract entry forms to [sam.glover@uc.edu](mailto:sam.glover@uc.edu). If you have any questions concerning the submission of abstracts please don't hesitate to contact me. Some important dates to consider for authors:

Abstracts due: **December 1, 2011**

Notification to authors: December 15, 2011

Preliminary program: January 15, 2012

Draft Papers Due: **At conference**

**Conference Dates: March 25-30, 2012**

Please note that an important change from previous MARC conferences is that **professional workshops** will be held in the early afternoon on **Sunday, March 25** followed by the official start of the conference with the Hevesy Award Medal presentation on Sunday evening. Additional details have been added to the website on all these topics.

#### **NPC 2012 - Nuclear Power Plant Chemistry Conference Paris 24-28 Sept 2012 - CALL FOR PAPERS**

I am pleased to announce that the Call for Papers for the Chemistry in Nuclear Power Systems Conference in Paris, 24-28 September 2012 (NPC 2012), has now been opened. The deadline for submission is 1 December 2011. All the relevant information can be found at: <https://www.sfen.fr/NPC-2012>

Dr. Andy Rudge

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## NEWS FROM THE INTERNET

### NEW UK Legislation

New legislation on radioactive substances regulation came into effect on 1 October.

Through substantial amendments to the Environmental Permitting Regulations 2010 in England and Wales, and the Radioactive Substances Act 1993 in Scotland and NI, we have introduced a more proportionate and risk based clearance and exemption regime. For the first time in many years we now have comprehensive guidance available.

The Society for Radiological Protection (SRP) is running a series of workshops around the UK to assist users with implementation of the new regime. Information on the new Regulations and Guidance are on our website: [http://www.decc.gov.uk/en/content/cms/meeting\\_energy/nuclear/radioactivity/decc/legislation/epr2010/epr2010.aspx](http://www.decc.gov.uk/en/content/cms/meeting_energy/nuclear/radioactivity/decc/legislation/epr2010/epr2010.aspx)

Dr Steven Chandler has also written an article to be published in the SRP journal, marking the 50<sup>th</sup> anniversary of radioactive substances regulation in the UK, which summarises developments in policy and legislation over the period and looks ahead to the future. <http://stacks.iop.org/0952-4746/31/309>

Steve Chandler

### International Year of Chemistry 2011

The journal Radiochimica Acta is celebrating the International Year of Chemistry 2011. It has brought out a special issue entitled: "**Heavy Elements**".

Our colleague, Prof. J. V. Kratz, did the editing and put together very interesting articles in the July/August issue of the journal.

I have pleasure in informing you that, as a very special case, the Oldenbourg Wissenschaftsverlag, the Publisher of the journal, has decided to give free access to this issue to all interested persons. The link is given below:

<http://www.olderbourg-link.com/toc/ract/99/7-8>.

The issue is very interdisciplinary and should be of interest to other chemists and physicists as well.

The Publisher and I would be very much interested to hear some response from the readers. So if you receive some comments, please do inform me in due course of time.

Syed M. Qaim, Co-ordinating Editor, RCA

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## JOB OPPORTUNITIES

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## AND FINALLY

Please send information for inclusion in future issues to your Division Member or myself Dr Tony Ware, e-mail: [tony.ware@tiscali.co.uk](mailto:tony.ware@tiscali.co.uk)

**IMPORTANT PLEASE** send your e-mail address to Jan John so that he can inform you when websites have been updated and any other news of immediate interest.

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