

BIAPWS ANNUAL REPORT 2013

1 INTRODUCTION

The British and Irish Association for the Properties of Water and Steam (BIAPWS) is the UK and Ireland national committee of the International Association for the Properties of Water and Steam (IAPWS) and the representative body for Power Plant Chemistry in the UK and Ireland. BIAPWS is a not for profit organisation. This is the annual report of the activities of BIAPWS for the year to August 2013.

2012/13 has been another successful year for BIAPWS. Membership has continued to grow and BIAPWS meetings have been well supported, with finances remaining in good and stable condition. In particular, we look forward to co-hosting with the Institution of Mechanical Engineers (IMechE) the 16th International Conference on the Properties of Water and Steam (ICPWS) at the University of Greenwich, 1-5 September 2013.

With their annual report, IAPWS requests that National Committees provide a listing of relevant technical publications that have originated from the respective nation/s during the year. The purpose of this request is to allow National Committees to share such lists to disseminate the international body of work being done on topics of interest to IAPWS and to IAPWS members. The list of publications for the UK and Ireland for the 2012/13 period is provided in the Appendix to this report.

If you would like to know more about BIAPWS, please feel free to contact one of the BIAPWS Officers listed above, visit our web site www.biapws.org or e-mail contact.us@biapws.co.uk.

2 BIAPWS MEMBERSHIP

BIAPWS membership continues to remain strong, with BIAPWS currently supported by twenty-two industrial sponsors, six honorary members, two ordinary members and fourteen corresponding members.

In 2012/13, BIAPWS was pleased to welcome Air Liquide, GE Power and Water and Doosan Power Systems as new industrial sponsors.

BIAPWS committee meetings are held three times a year and attendance at these continues to be good, with typically around twenty people present. BIAPWS committee meetings are preceded by a technical session with presentations on areas of interest to BIAPWS members, which always generate a high level of interest. Industrial member's representatives are able to bring a colleague to the meetings to benefit from and contribute to the discussions.

In May 2012, the BIAPWS committee meeting was held at Scottish Power's Longannet Power Station in Fife. The meeting was extended to include a one day technical seminar on topics of relevance to power plant chemistry and water treatment, including experience with the sea water washing flue gas desulphurisation (FGD) process, water treatment for organics removal and boiler water carryover issues. A tour was also arranged of Longannet's seawater FGD plant. The event was well attended with some excellent presentations that prompted much interest and discussion. BIAPWS would like to thank Scottish Power for hosting a very successful meeting.

Whilst BIAPWS retains a strong membership representation in the area of power plant chemistry, other areas that are of relevance to IAPWS are less well represented and BIAPWS remains keen to expand its individual membership in these areas. Therefore, in 2012-13, BIAPWS was very pleased to welcome Dr Stephanie Bell from the National Physical Laboratory and Prof. Maxim Fedorov from the University of Strathclyde as corresponding members. Both Stephanie and Maxim are already well involved with IAPWS activities. Stephanie's prior involvement has been through the international metrology committee that she chairs (CIPM CCT WG6), which includes responsibilities for the international harmonisation of humidity terms and definitions and the expression of humidity units within the SI. In 2012, Maxim was the recipient of the IAPWS Helmholtz Award for his work on molecular integral equation theory.

As was reported last year, it was with great sadness that BIAPWS was informed of the sudden death, after a short illness, of Dr Geoff Bignold in August 2012. In recognition of his contribution to power plant chemistry internationally, a tribute to Geoff was published in the *PowerPlant Chemistry* journal in October 2012 (*PowerPlant Chemistry*, 2012, 14(9), 544-547).

3 IAPWS ACTIVITIES

BIAPWS has continued to support IAPWS through its formal membership and participation in IAPWS activities. A number of BIAPWS committee members are represented on IAPWS working groups, in particular Power Cycle Chemistry (PCC).

IAPWS holds annual meetings and BIAPWS members support these events by participating in the relevant IAPWS working groups, including attendance at the 2012 IAPWS annual meeting proceedings in Boulder, Colorado (Paul McCann and Jeff Cooper). In addition, BIAPWS is represented on the executive committee of IAPWS.

Every four or five years, IAPWS holds the International Conference on the Properties of Water and Steam (ICPWS) in place of the annual meeting. The next such conference will be the 16th and this will be hosted by BIAPWS and held at the University of Greenwich, 1-5 September 2013. It has been over fifty years since this conference has been held in the UK and BIAPWS is looking forward to a welcome return to London, where the very first such conference was held in 1929.

A BIAPWS sub-group is leading the work on ICPWS 16 in coordination with the Institution of Mechanical Engineers (IMechE), which is co-hosting the event with BIAPWS and has taken on the role of Conference Organiser. We are very grateful to the ICPWS sub-group, comprising Eric Huff, Jeff Cooper, Hugh Lloyd and Peter Calver, and to the IMechE, Stephanie Love, Hannah Atkins and Aman Duggal, for their considerable work, time and effort to make this important event a success. More information on the conference can be found at www.icpws16.org/. Current expectations are for around 200 delegates to be attending and we look forward to another successful conference.

For further information on the activities of IAPWS, visit the IAPWS web site, www.iapws.org.

4 BIAPWS AWARD

The BIAPWS Award is given annually by BIAPWS to qualifying students as a means of promoting awareness of the topics of interest to BIAPWS and their industrial application.

In 2012, the BIAPWS award was co-sponsored by AMEC Nuclear UK Ltd. and the award recipient was Harry Greenwood, a 3rd year MChem student at the University of Liverpool. The Award is given in the form of contributory funding by BIAPWS for a work experience placement for the student. Harry spent a twelve week summer placement with AMEC investigating the effect of temperature on ion exchange resins used in the secondary circuit condensate polishing plants of certain nuclear and conventional power plants. This involved the investigation of the thermal stability and effect of temperature on the mass transfer coefficients of selected commercially available ion exchange resins.

Many past BIAPWS Award winners have since gone on to full time employment in power generation, demonstrating significant success for the Award in attracting high calibre individuals to the industry.

BIAPWS has also continued to sponsor and judge prizes for energy related projects at a schools science fair in Hinckley, Leicestershire. We welcome new opportunities to support ventures of this nature.

5 BIAPWS SYMPOSIUM

BIAPWS has organized a series of annual symposia on topics relevant to power plant chemistry and water treatment. The 14th BIAPWS Symposium, 'Progress in Environmental and Cycle Chemistry', took place at the Village Hotel, Nottingham, on 28-29 March 2012, as reported last year, for which a summary report of the event was published in the Power Plant Chemistry journal (PowerPlant Chemistry, 2012, 14(5), 298-305). This year, the annual symposium has effectively been replaced by the hosting of the 16th International Conference on the Properties of Water and Steam, throughout which there is a technical programme on Power Cycle Chemistry. For the return of the annual BIAPWS symposium next year, provision dates of 2-3 April 2014 have been announced.

6 BSI REPRESENTATION

BIAPWS is currently represented on three British Standards and Euro Norm Committees of relevance to power plant chemistry and water treatment:

- PVE/2: Water Tube and Shell Boilers. The UK standards committee has responsibility for BS EN 12952-12:2003: "Water-tube Boilers and Auxiliary Installations - Requirements for Boiler Feedwater and Boiler Water Quality" and BS EN 12953-10:2003: "Shell Boilers - Requirements for Feedwater and Boiler Water Quality". BIAPWS has led on behalf of other European power plant chemistry specialists to lobby for these Euro standards to be revised and improved. Whilst the European body responsible for these standards has agreed to their revision, there have not been any significant developments.
- CII/62: Treatment of water for boilers. The UK standards committee also has responsibility for BS 2486:1997: "Recommendations for Treatment of Water for Steam Boilers and Water Heaters". Currently, this committee is not active.

- EH/3/6: Water quality - sampling. The UK standards committee is responsible for BS 6068-6.7:1994 (ISO 5667-7:1993): "Guidance on Sampling of Water and Steam in Boiler Plants". The standard is due for revision, but even in its current state, it remains a technically sound and useful document. BIAPWS has joined E/H/3 to act as co-coordinator for the revision. Tony Lister from Lowe Engineering, who manufacture steam and water sampling equipment for the power industry, is representing BIAPWS on the BSI committee that is responsible for leading the revision.

7 INTERACTION WITH PROFESSIONAL ORGANISATIONS

Because of the diverse nature of the interests of IAPWS, BIAPWS has continued correspondence with a number of professional bodies with the aim of sharing information and closer working.

- BIAPWS is represented on the Energy Sector Interest Group of the Royal Society of Chemistry by John Greene;
- BIAPWS is also represented on the Water Science Forum of the Royal Society of Chemistry by Eric Huff;
- Richard Hill, who is a committee member of the Institution of Chemical Engineers (IChemE) Water Subject Group, is also a Corresponding Member of BIAPWS.

BIAPWS is also organising the 16th International Conference on the Properties of Water and Steam with the Power Industries Division of the IMechE on behalf of IAPWS.

Paul McCann
Chair, British & Irish Association for the Properties of Water and Steam
August 2013

APPENDIX: List of UK and Ireland Originated Reference Papers in areas of interest to IAPWS, published between April 2012 and August 2013

Windsor, B. and Hayhurst, D., "A Practical Guide to Investigating Operating Problems on In-Situ Regenerated Polishing Mixed Beds", *PowerPlant Chemistry*, 2012, 14(5), 282-287

McCann, P. and Robson, M., "Proceedings of the BIAPWS 2012 Symposium on Power Plant Chemistry", *PowerPlant Chemistry*, 2012, 14(5), 298-305

Armstrong, C., Bull, A.E.A., Mitchell, M.S., Quirk, G.P., Rudge, A. and Woolsey, I.S., "Dimethylamine as a Replacement for Ammonia Dosing in the Secondary Circuit of an Advanced Gas-Cooled Reactor (AGR) Power Station", *PowerPlant Chemistry*, 2012, 14(6), 372-379

Garbett, K., Woolsey, I.S., Ball, M., Fyfield, R. and Dooley, R.B., "Tribute to Dr. Geoff Bignold", *PowerPlant Chemistry*, 2012, 14(9), 544-547

Palmer, D., McDonagh, J. L., Mitchell, J. B. O., van Mourik, T. & Fedorov, M. V., "First Principles Calculation of the Intrinsic Aqueous Solubility of Crystalline Druglike Molecules", *Journal of Chemical Theory and Computation*, September 2012, 8, 9, p. 3322–3337

N. Ottosson, A.O. Romanova, J. Söderström, O. Björneholm, G. Öhrwall and M.V. Fedorov, "Molecular Sinkers: X-Ray Photoemission and Atomistic Simulations of Benzoic Acid and Benzoate at the Aqueous Solution/Vapor Interface", *Journal of Physical Chemistry B*, August 2012, 116(43), 13017-13023

V.P. Sergiievskiy and M. V. Fedorov, "3DRISM Multi-Grid Algorithm for Fast Solvation Free Energy Calculations", *Journal of Chemical Theory and Computation*, June 2012, 8 (6), p. 2062-2070.

A. Romanova, E. Chibunova, R. Kumeev, M. Fedorov, M. I. Terekhova, "α-Cyclodextrin/Aminobenzoic Acid Binding in Salt Solutions at Different pH: Dependence on Guest Structure", *International Journal of Biological Macromolecules*, June 2013, 57, 255-258.