PRESS RELEASE

INTERNATIONAL ASSOCIATION FOR THE PROPERTIES OF WATER AND STEAM

2014 ANNUAL MEETING, MOSCOW, RUSSIA

Continuing a series of conferences that started in 1929 in London, over 60 scientists and engineers from 12 different countries attended the annual meeting of the International Association for the Properties of Water and Steam (IAPWS) which was held on 22 - 27 June 2014 in Moscow, Russia. The meeting was hosted by the Russian National Committee of IAPWS at the Moscow Power Engineering Institute (MPEI). The highlights of the IAPWS working group sessions and other proceedings are summarized in this release.

The main purpose of the IAPWS meetings is to connect researchers with the engineers who use their information, providing the researchers with guidance on useful problems and the engineers with the latest research results. Areas of application include power cycle chemistry, high temperature aqueous technologies applicable to steam cycles and fuel cells, the use of high temperature water and supercritical steam in chemical and metallurgical processes, supercritical synthesis of new materials and destruction of toxic wastes, hydrothermal geochemistry, hydrometallurgy, oceanography, power cycles with carbon dioxide capture and the storage of carbon dioxide in aqueous environments.

IAPWS also produces guidelines and technical guidance documents, notably on power plant chemistry and also documents certified research needs that represent the considered opinion of experts in the field that research on a particular subject is needed. This information can be found on the IAPWS website at **www.iapws.org**.

The working group on Thermophysical Properties of Water and Steam (TPWS) continues to pursue a better knowledge of properties for scientific and industrial application. TPWS has made significant progress toward several new formulations that are expected to be finalized in the next year or two. These include an equation of state for the thermodynamic properties of heavy water to replace the existing standard that is now over 30 years old, work using new scientific insights to accurately describe the properties of supercooled liquid water and, additionally, an improved representation of the surface tension of water that takes advantage of new low temperature measurements performed in the Czech Republic. The latter two items will be especially important for atmospheric science, which is becoming an important constituency for IAPWS work.

The Industrial Requirements and Solutions (IRS) working group focused on the preparation of an IAPWS Guideline dealing with functions for the properties of water and steam applying spline interpolation methods. These functions will have a

substantially higher calculation speed and will be very beneficial for applications that require significant computing time, such as Computational Fluid Dynamics and extensive power cycle heat balance simulations.

The Sub-Committee on Seawater (SCSW) evaluated progress in the recently initiated collaboration between IAPWS and the International Bureau of Weights and Measures (BIPM) to develop standards relevant to environmental science and industry (http://www.teos-10.org/JCS.htm). The aim of current SCSW activities is to promote SI (international system of units) traceable definitions for ocean salinity and acidity (pH value) as well as for relative humidity (RH) in the atmosphere based on the Thermodynamic Equation of Seawater 2010 (TEOS-10). Based on the roadmaps that were developed with BIPM representatives during the 2013 IAPWS meeting in London and on the outcomes of several subsequent meetings held between BIPM and IAPWS in April and May 2014, the SCSW has continued to support work being undertaken by the BIPM Consultative Committee for Thermometry Working Group 'Relative Humidity' on the TEOS-10 compatible calculation of fugacity and relative fugacity of water vapour in humid air. The salinity and pH issues deserve further discussion between the SCSW and the BIPM Consultative Committee for Amount of Substances – Metrology in Chemistry (CCQM). A common IAPWS/BIPM position paper on salinity, pH and Relative Humidity definition is in preparation. The SCSW committee has also revised an IAPWS Certified Research Need on the thermophysical properties of seawater with the aim of promoting more research on extreme seawater conditions in hydrothermal vents in the deep ocean and on requirements for desalination and power plant cooling water systems.

In the proceedings of the Power Cycle Chemistry (PCC) working group, the need for improved industry guidance on chemical sampling and monitoring in cycling power plants was identified. This will be addressed by amendments to the existing suite of IAPWS Technical Guidance Documents (TGDs) on power plant chemistry. The Working Group also intends to develop TGDs on Heat Recovery Steam Generator boiler tube sampling for internal oxide condition assessment and on maintaining the integrity and reliability of boiler demineralized water treatment plant in response to industry recognized needs. A Task Group on Geothermal Power Plant Chemistry has also been established with the aim of promoting work towards improving the fundamental knowledge of potential causes of scaling and corrosion in these types of power plants.

In collaboration with the Power Cycle Chemistry working group, the Physical Chemistry of Aqueous Solutions (PCAS) working group has formed a task group to review and recommend standardized formulations of the liquid/vapor distribution and of acid/base dissociation constants of amines and their acid decomposition products, also in response to current gaps in industry knowledge. Interested parties are invited to participate by contacting the chair at james.bellows@siemens.com. PCAS is also continuing work on a Guideline on the Thermal Conductivity of Seawater.

IAPWS also produces IAPWS Certified Research Needs (ICRNs) as guidance for funding agencies and as an aid to people doing research in defining important research. To date, these have covered a variety of areas related to the properties of

water and steam, seawater and the chemistry of power plants. A list of currently active ICRNs and closing statements on the progress made for those that have expired can be found on the IAPWS website.

During the meeting, a symposium was held on**,** "Water and Steam: Industrial and Scientific Application". This included presentations on the the proprties of amporhous ice and formation of gas hydrates, the thermal conductivity of supercooled water and the properties of gas hydrates in systems based on water and carbon dioxide. The symposium included the IAPWS Helmholtz Award lecture "Self-Diffusion in Supercritical Water: NMR and MD studies on Dynamics of Hydrogen Bonds", given by Dr. Ken Yoshida of the University of Tokushima, Japan. The IAPWS Helmholtz award is given annually to a developing or early career scientist or engineer who is working in a field of interest to IAPWS. It includes an opportunity to attend the IAPWS meeting to present the Helmholtz Award lecture.

The IAPWS Honorary Fellow award is conferred in recognition of many years of contribution to the Association. At the 2014 meeting, the recipient of the IAPWS Honorary Fellow award was Professor Tamara Petrova from the Moscow Power Engineering Institute in recognition of her outstanding contribution to the development of the understanding of power plant chemistry.

IAPWS welcomes scientists and engineers with interest in the thermophysical properties of water, steam, and aqueous systems and in the application of such information to industrial uses. The next IAPWS meeting will be in Stockholm, Sweden on 28 June - 3 July 2015. Further information on meetings can be found at the IAPWS website (www.iapws.org) as it becomes available.

People interested in IAPWS documents and activities should contact the chairs of their IAPWS National Committee (see the IAPWS website for contact details) or contact the IAPWS Executive Secretary, Dr. R. Barry Dooley, bdooley@structint.com. People do not need to be citizens or residents of member countries to participate in IAPWS activities.

Participants of the IAPWS 2014 annual meeting, which was held at the Moscow Power Engineering Institute, Russia.

Dr. Ken Yoshida from the University of Tokushima, Japan, presents the IAPWS Helmholtz Award lecture.

Professor Tamara Petrova from the Moscow Power Engineering Institute was the recipient of the 2014 IAPWS Honorary Fellow Award.