Highlights

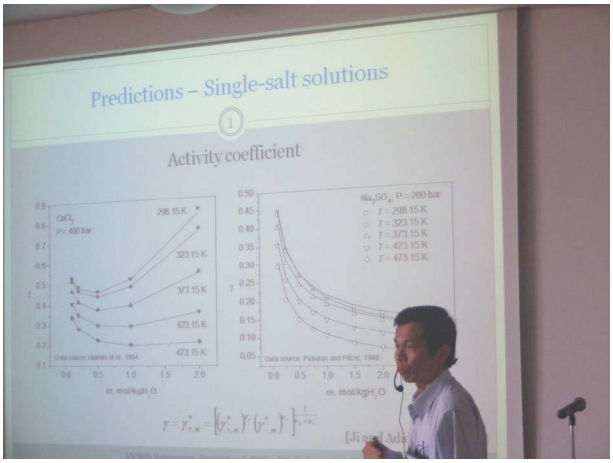
International Association for the Properties of Water and Steam

2011 Meeting

Continuing a series of conferences started in 1929, 89 scientists and engineers from 16 countries attended the annual meetings of the International Association for the Properties of Water and Steam (IAPWS), September 4-9 in Plzen, Czech Republic. The meeting was hosted by the Czech National Committee of IAPWS and the University of West Bohemia in Plzen. The meeting connects academic researchers with engineers who use their information. It provides the researcher with guidance on useful problems and provides the engineers with the latest research. IAPWS has traditionally concentrated on the science underlying the thermodynamics and chemistry in steam power plants, but is broadening into other aspects of power generation and high temperature aqueous systems as well as seawater and ice. Discussions range from puzzling power plant chemistry results to reports on solutions to such problems to practical implications of fundamental theory and molecular modeling of thermodynamic and transport properties.

This year IAPWS welcomed an Australian national committee and a New Zealand national committee as new associate members.

The IAPWS delegates were joined by 22 additional people from the Czech Republic for a symposium on **Water and Aqueous Mixtures: Research for Future Energy Technologies**. The symposium opened with the IAPWS Helmholtz award lecture "Towards a Complete Thermodynamic Description of Geologic and Industrial Aqueous Electrolyte Systems: A Statistical Associating Fluid Theory Approach", given by Hertanto Adidharma of the University of Wyoming. The Helmholtz Award is given annually to a young scientist for work of interest to IAPWS. The symposium continued with presentations on molecular modeling of aqueous systems, new steam turbines for ultrasupercritical plants, supercritical water reactors, and an authoritative review of the events at Fukushima, Japan.



Hertanto Adidharma presents the IAPWS Helmholtz Award Lecture, introducing many in the audience to Statistical Associating Fluid Theory.

IAPWS produces releases, guidelines, technical guidance documents, and certified research needs (ICRN's). Information may be found at the IAPWS website: www.iapws.org.

A major accomplishment was the Release on the Thermal Conductivity, the first complete update in over 30 years. The release was an international effort jointly with the International Association for Transport Properties. This release completes the complete revision of the state-of-the-art formulations for the properties of water and steam that started with the release on the thermodynamic properties in 1995.

The ICRN is guidance for funding agencies and an aid to people doing research in defining important research. ICRN's expressing the need for improved thermodynamic properties of CO2-rich systems for carbon capture and sequestration and for improved understanding of homogeneous nucleation and properties of metastable steam were approved this year.

The new seawater standard TEOS-10 that is based on the IAPWS formulations for fluid water, ice, seawater and humid air, has recently also been adopted by the International Union of Geodesy and Geophysics (IUGG). To improve the metrological basis of TEOS-10, IAPWS is in contact with the BIPM in Paris and is intensifying cooperation with several European metrological institutes in the framework of the new EURAMET project "ENV05 – Ocean". Reports were presented on newly developed commercial instruments to enable regular, SI-traceable seawater density measurements with repeatability better than 1 ppm even under harsh conditions at sea. New extended measurements of seawater properties at high temperatures and pressures, as urgently needed by the industry, were reported.

The working group on Physical Chemistry of aqueous solutions is increasingly focusing its activities on the physico-chemical aspects of the development of green technologies. This includes hydrogen chemistry, modeling of processes related to CO2 capture and interactions between CO2 and minerals in geologic environments.

IAPWS will be sending a questionnaire to industrial organizations eliciting needs for steam properties and new priorities. People interested in receiving the questionnaire are encouraged to contact the Executive Secretary of IAPWS.

The Power Cycle Chemistry Working Group completed a new technical guidance document, "Phosphate and NaOH treatments for the steam-water circuits of drum boilers of fossil and combined cycle/HRSG power plants". The working group keeps a priority list for research related to power plant chemistry. It is currently headed by the behavior of aluminum in the steam / water cycle, the metal-water/steam interface in advanced ultra supercritical plants, and the accuracy of water and steam sampling in power plants. This working group includes in its scope the concentrated solutions found in the cooling water that goes through power plant condensers, makeup water and waste streams.

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 is planned for Boulder, Colorado, USA, late summer or early fall, 2012. Further information on meetings can be found at the IAPWS website, www.iapws.org, as it becomes available. IAPWS documents may also be found on the website.

People interested in IAPWS documents and activities should contact the chairman of their IAPWS National Committee (see website) or the IAPWS Executive Secretary, Dr. Barry Dooley, Structural Integrity Associates, Inc., 2616 Chelsea Drive, Charlotte, North Carolina 28209, USA, e-mail: bdooley@structint.com. People do not need to be citizens or residents of member countries to participate.