IAPWS Highlights 2024

18TH INTERNATIONAL CONFERENCE ON THE PROPERTIES OF WATER AND STEAM (ICPWS) & ANNUAL EXECUTIVE COMMITTEE AND WORKING GROUP MEETINGS

Continuing a series of conferences started in 1929, the 18th International Conference on the Properties of Water and Steam (ICPWS) was held in Boulder, Colorado, on June 23–28, 2024. The Conference is organized by the International Association for the Properties of Water and Steam (IAPWS) and for the first time was combined with another conference: the 22nd Symposium on Thermophysical Properties (STP). The STP is held in the U.S. every three years and brings together experts in the theory, modeling, and measurement of thermophysical properties of fluids and solids. The joint meeting allowed a wider community of researchers to be exposed to the work of IAPWS and gave people from IAPWS the opportunity to learn about leading-edge research and applications in fields outside water and steam. The combined conference attracted 440+ attendees from 29 countries.

IAPWS produces releases and guidelines on the recommended scientific formulations for physical and chemical properties of water in its various forms as well as technical guidance documents (TGDs) that are the concerted opinion of IAPWS members on the best operating practices for power plant chemistry. IAPWS also documents certified research needs that represent the opinion of experts in their respective fields that a research topic is greatly needed to fill a current gap in knowledge. All this information is freely available and can be found on the IAPWS website at www.iapws.org.

A primary highlight of the ICPWS is the awarding of the IAPWS Gibbs Award for outstanding technical achievements in an area of interest to IAPWS. The Gibbs Award is only given every four to five years in conjunction with the ICPWS and this year was awarded to Dr. Rainer Feistel (Germany) for exceptional IAPWS contributions to the creation of the international seawater standard, TEOS-10; establishment and leadership of the IAPWS Subcommittee on Seawater, SCSW; and leadership in building a broad international consensus on standards for seawater thermodynamics. Dr. Feistel accepted his award and provided the keynote lecture entitled "Thermodynamics of Water in the "Steam Engine" Climate" to kick-off the joint conference. Also, during the IAPWS General Assembly, Dr. Sebastian Herrmann (Germany) presented the Helmholtz lecture "From Accurate Viscosity Measurements to Wide-Ranging Viscosity Formulations Including the Near-Critical Region Applying a Structural-Optimization Method" and received the Helmholtz Award. This is given annually to an early-career researcher and this year was given for high precision measurements of the viscosity of gases and successful application of the structural-optimization method on the correlation of viscosity formulations including the critical enhancement with outstanding accuracy which is accepted worldwide.

The IAPWS banquet was held in the historic Chautauqua Dining Hall. The Boulder Chautauqua, in a beautiful location against the foothills of the Rocky Mountains, is one of the best-preserved examples of the Chautauqua movement for culture and education that swept the United States around the year 1900. During the banquet, Nobuo Okita (Japan) was given the IAPWS Honorary Fellow Award for advancing the use of IAPWS formulations in the power industry, and for leadership of the IAPWS Working Group on Industrial Requirements and Solutions.

Given the busy schedule of the combined conferences, the annual meetings of the IAPWS Executive Committee and Working Groups began on Sunday June 23rd and continued sporadically throughout the week with the following highlights from each group's activities.

The Thermophysical Properties of Water and Steam (TPWS) working group will examine the

feasibility of a new industrial formulation in form of the SBTL method (biquadratic spline polynomials). Computations with the method are up to 270 times faster than the IF-97 backward equations. It is intended to publish the tables of coefficients and interpolation algorithms based upon the IAPWS-97 formulation, which is preferred by some industrial users. A task group will approach the industry to explain the drawbacks and benefits. Another task group is defining the path for eventual replacement of the standard reference equation of state for water and steam known as IAPWS-95.

The Industrial Requirements and Solutions Working Group (IRS) prepared a white paper on accurate estimation of low sulfur dew point in gas turbine combined-cycle plants for efficient operation to avoid acid corrosion. Furthermore, it was proposed that the SBTL method for fast calculation of the properties of water and steam to become a standard and a task group has been established for its review. Other task groups have been established to define verification standards for the "Translation of IF97 Fortran routines into other programming languages" and examining the requirements for industrial calculations and data. Finally, IRS offers the warmest congratulations to Nobuo Okita for his IAPWS Honorary Fellow award.

The Physical Chemistry of Aqueous Systems (PCAS) working group prepared two proposals for IAPWS International Collaboration projects, one concerning the effect of radiation on iodine chemistry under low dose rate conditions and the other regarding the effect of film-forming amines on flow-accelerated corrosion. In collaboration with the TPWS working group, PCAS contributed to a Revised Release on the Ionization Constant of H_2O, based on a re-evaluation of the data including new near-critical and supercritical conductivity data. PCAS had 17 presentations from 6 countries during the ICPWS and at a joint meeting with Power Cycle Chemistry (PCC) working group, there was an exchange of information on available literature and research needs related to film forming substances and electrode boilers.

The Power Cycle Chemistry (PCC) working group has revised the Instrumentation TGD that is now ready for approval and has completed a new white paper on corrosion product transport in cycling plants. The white paper introduces a new IAPWS corrosion product decay map to assist the practical interpretation of plant chemistry performance, especially during shutdown and start-up operation. A key new area is the water/steam/corrosion issues in electrode boilers and investigating the water chemistry requirements for hydrogen generation plants. Other areas of active work include boiler corrosion thresholds, geothermal steam purity and dew point of low sulfur exhaust gas. An ongoing strategy is in place to increase the outreach and profile of PCC internationally with PCC webinars to commence soon.

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 held in Helsinki, Finland, from June 22 to 27, 2025. 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 chairman of their IAPWS National Committee (see website) or the IAPWS Executive Secretary, Dr. R. Barry Dooley, bdooley@iapws.org. People do not need to be citizens or residents of member countries to participate.