16th INTERNATIONAL CONFERENCE ON THE PROPERTIES OF WATER AND STEAM

WATER, STEAM AND AQUEOUS SOLUTIONS: WORKING FOR THE ENVIRONMENT AND INDUSTRY

ICPWS XVI LONDON 2013

EARLY BOOKING DISCOUNTS UNTIL 22/7

1-5 September 2013
University of Greenwich, UK
www.icpws16.org

Organised by

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Institution of MECHANICAL ENGINEERS

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ABB

WHY YOU SHOULD BE THERE

The 16TH International Conference on the Properties of Water and Steam (ICPWS16) is the latest in the sequence of international conferences, which started in 1929.

The conference provides a forum for the presentation of the scientific foundation of the accurate thermophysical properties and water chemistry data. It also covers new areas of pure and applied research related to water and aqueous solutions at extreme conditions, along with sea water and humid gases.

Molecular simulation studies of water and solvated species in high-temperature and sub-cooled water are also covered.

Relevant areas of basic science include:

- spectroscopy
- calorimetry
- potentiometry
- thermo-physical property measurements
- modelling

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 storage of carbon dioxide in aqueous environments

The scientific programme is organised by an International Programme Committee selected by IAPWS, with representatives from a cross-section of member countries, spanning industry, universities and national laboratories.

SUPPORTING ORGANISATION

RSC | Advancing the Chemical Sciences

BIAPWS STUDENT AWARDS

All papers submitted by students will be considered for the **BIAPWS Student Awards**. The winning author will be granted with an honorarium of £500 and certificate and there will be five awards made in total. To qualify for the award the main author and presenter must be a student*. This year the awards are sponsored by RWE npower, a leading integrated UK energy company, in memory of Dr Geoff Bignold who died prematurely after a short illness in 2012.

Geoff was employed originally by the Central Electricity Generating Board (CEGB) as a chemist in its research branch. His employment continued in the CEGB successor company RWE npower, thus the reason for the sponsorship. Geoff served both IAPWS and BIAPWS over many years and was the author of many technical papers, as well as being the main author to the IAPWS Technical Guidance Document on Power Plant Instrumentation.

*Proof of student status will be required.

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PROGRAMME

SUNDAY 1 SEPTEMBER

18:00 – 21:00

CONFERENCE REGISTRATION AND WELCOME DRINKS RECEPTION
Queen Anne Building, University of Greenwich

All ICPWS16 delegates are invited to attend the Welcome Drinks Reception

This is an excellent opportunity to collect your registration documents and meet other conference delegates before the conference gets underway the following day

DAY 1 MONDAY 2 SEPTEMBER

9:00 **OPENING SESSION AND KEYNOTE ADDRESSES**

9:00 **WELCOME ADDRESS FROM THE PRESIDENT OF IAPWS, PROFESSOR TAMARA PETROVA**

IAPWS GIBBS AWARD LECTURE:
UNDERSTANDING THE CORROSION OF METALS IN REALLY HOT WATER
Professor Digby D Macdonald, Dept of Nuclear Engineering and Materials Science, University of California, USA

IAPWS GIBBS AWARD:
The IAPWS Gibbs Award is given at each International Conference on the Properties of Water and Steam (ICPWS) to a distinguished scientist or engineer who has made substantial contributions to the development of knowledge on the properties of water, steam and aqueous solutions at high temperatures and pressures, as well as to other areas of underlying science and technology of interest to IAPWS.

Nominations are made by the IAPWS National Committee or Working Groups. A committee, consisting of representatives from each IAPWS Working Group, chooses the winner from among the nominees at the annual IAPWS meeting in the year prior to the award. The winner receives a medal and complementary attendance to the ICPWS conference, where they will have the opportunity to present a keynote lecture.

This year's Gibbs Award winner is Professor Digby D Macdonald from the University of California, USA

KEYNOTE LECTURE 1
LINKING ESSENTIAL CLIMATE VARIABLES TO SI TRACEABLE MEASUREMENT
Dr Robert Wielgosz, Director of Chemistry, BIPM, Paris, France

10:45 **REFRESHMENT BREAK**

11:15

KEYNOTE LECTURE 2
POST-NUCLEAR ACCIDENT ACTIVITIES AND ENERGY POLICIES IN JAPAN
Dr Shunsuke Uchida, Japan Atomic Energy Agency, Tokai, Ibaraki, Japan

KEYNOTE LECTURE 3
SUPERCRITICAL WATER CONTINUOUS REACTORS FOR INORGANIC NANOMATERIALS SYNTHESIS; DESIGN AND SCALE-UP TO PILOT PLANT
Professor Jarwwad Darr, Dept of Chemistry, University College, London, UK

IAPWS HELMHOLTZ AWARD LECTURE:
WHO'S AFRAID OF THE HYDROPHOBIC EFFECT?
Dr Hank Ashbaugh, Tulane University, New Orleans, USA

IAPWS HELMHOLTZ AWARD:
The IAPWS Helmholtz Award is given yearly to a qualified researcher who, at the time of the nomination, received his or her last earned degree less than 15 years earlier. There is no requirement for the nominee to be associated with IAPWS.

The award recognises talented and developing scientists and engineers who are making significant contributions to, or defining new directions in the areas of research of interest to IAPWS; and to encourage them to become active in IAPWS.

Nominations are made by any individual outside of the IAPWS Award Committee; self-nominations are not allowed. A committee, made up of representatives from five IAPWS member nations, selects the winner from among the nominees. The winner receives a framed certificate and complimentary attendance to the annual IAPWS meeting (in this case it is ICPWS16), where they will have the opportunity to present the Helmholtz Award lecture.

This year's Helmholtz Award winner is Dr Hank Ashbaugh from Tulane University, USA

PROGRAMME (CONTINUED)

MONDAY (CONTINUED)

13:00 LUNCH BREAK

PARALLEL SESSIONS

14:30

SEAWATER pH

WATER, STEAM AND CLIMATE
R Feistel, Leibniz Institute for Baltic Sea Research (IOW) Warnemunde, Germany

STATUS REPORT ON THE EUROPEAN METROLOGY RESEARCH PROJECT ENV05 METROLOGY FOR OCEAN SALINITY AND ACIDITY
P Spitzer, Physikalisch-Technische Bundesanstalt (PTB), Germany

MEASURING pH IN SEAWATER: PREJUDICE, PRACTICE, AND PITFALLS
Professor A Dickson, University of California, USA

pH MEASUREMENTS IN SEAWATER: REDUCING THE LIMITATIONS OF THE EXISTING PRIMARY STANDARD BUFFERS
Dr D Stoica, Laboratoire National de Métrologie et d'Essais, France

THERMO 1

PREDICTION OF GAS HYDRATES IN CCS RELEVANT MIXTURES WITH REFERENCE EQUATIONS OF STATE
A Jäger, Ruhr-Universität Bochum, Germany and Dr V Vinš, Institute of Thermomechanics ASCR, Czech Republic

DEW-POINT MEASUREMENTS FOR WATER IN COMPRESSED CARBON DIOXIDE
Dr A Harvey, National Institute of Standards and Technology, USA

ROLE OF LIQUID WATER PROPERTIES FOR ENHANCEMENT OF HYDROGEN FUEL CELL EFFICIENCY
Professor F Marsik, Institute of Thermomechanics ASCR, Czech Republic

HYDROTHERMAL 1

21ST CENTURY HYDROTHERMAL GEOCHEMISTRY: ATOMISTIC PERSPECTIVES
Dr D Wesolowski, Oak Ridge National Laboratory, USA

NON-COMPLEXING ANIONS FOR PHYSICO-CHEMICAL STUDIES BY RAMAN SPECTROSCOPY UNDER HYDROTHERMAL CONDITIONS
Dr L Applegarth, University of Guelph, Canada

VOLUMETRIC PROPERTIES OF MIXED ELECTROLYTE AQUEOUS SOLUTIONS AT ELEVATED TEMPERATURES AND PRESSURES
Dr D Zezin, Institute of Geochemistry and Petrology, ETH Zurich, Switzerland

BIOMASS RELATED SALT SOLUTIONS AT HYDROTHERMAL CONDITIONS: INVESTIGATIONS WITH ISOCHORIC DIFFERENTIAL SCANNING CALORIMETRY
J Reimer, Paul Scherrer Institute, Switzerland

PCC FLOW ASSISTED CORROSION 1

WORLDWIDE EXPERIENCES WITH FAC IN FOSSIL AND COMBINED CYCLE PLANTS
Dr B Dooley, Structural Integrity, USA

E.ON'S EXPERIENCE WITH FLOW ACCELERATED CORROSION IN HEAT RECOVERY STEAM GENERATORS
P McCann, E.ON New Build & Technology, UK

ANALYSIS OF THE INFLUENCE OF ANIONS AND CO_2 ON AFTER-CATION CONDUCTIVITY OF STEAM SAMPLES DURING HRSG START-UP USING ION CHROMATOGRAPHY
F Spellissy, ESB, Ireland

16:00 REFRESHMENT BREAK

16:30

SEAWATER PH WORKSHOP

THERMO 1

BOND CONTRIBUTION METHOD FOR AQUEOUS ORGANICS IN HIGH-TEMPERATURE SOLUTIONS
Professor J Sedlbauer, Technical University of Liberec, Czech Republic

TEMPERATURE DEPENDENCE OF THE THERMAL CONDUCTIVITY OF LiF, NaF and NaBr AQUEOUS SOLUTIONS
B Grigoriev, Gazprom VNIIGAZ LLC, Russia

LIQUID / LIQUID PHASE TRANSITION IN AQUEOUS SOLUTIONS OF N-HYDROCARBONS AND AMPHIPHILES
Professor Y Mirgorod, Southwest State University, Russia

HYDROTHERMAL 1

ESTIMATION OF THE DIELECTRIC CONSTANT OF WATER AND APPLICATION TO THE SOLUBILITIES OF CARBONATES, QUARTZ AND CORUNDUM TO 50 KB AND 1,000°C
Professor D Sverjensky, Department of Earth & Planetary Sciences, USA

AN APPROACH TO PREDICT THERMODYNAMIC PROPERTIES OF NEUTRAL AQUEOUS NON-VOLATILE SPECIES OVER A WIDE RANGE OF STATE PARAMETERS
Professor N Akinfiev, IGEM RAS, Russia

CALCULATION OF SOLUBILITIES OF METAL OXIDES IN STEAM
A Plyasunov, Institute of Experimental Mineralogy, Russia

PREDICTING CORROSION PRODUCT SOLUBILITY IN SUPERCRITICAL WATER USING REVISITED HKF-MODEL PARAMETERS AND THERMODYNAMIC MODELLING
Dr W Cook, University of New Brunswick, Canada

SOLUBILITY OF CHROMIUM III OXIDE & METAL CHROMITES: DEVELOPMENT OF MULTEQ MODELS
Dr S Dickinson, National Nuclear Laboratory, UK

PCC/CORROSION/WATER TREATMENT 1

ELECTROCHEMICAL CREVICE CORROSION BEHAVIOR OF LP STEAM TURBINE MATERIALS IN THE AVT WATER ADDED CHLORIDE AND SULFATE IONS
Dr L Niu, Shinshu University, Japan

APPLICATION OF ELECTROCHEMICAL NOISE, ACOUSTIC EMISSION AND DCPD FOR DETECTION OF EARLY STAGES OF STRESS CORROSION CRACKING IN STAINLESS STEELS EXPOSED TO HIGH TEMPERATURE WATER
Dr S Nouraei, AMEC

SURFACE CHARACTERISTICS OF MAGNETITE PARTICLES UNDER CONDITIONS OF POWER PLANT WATER CYCLES
Dr S Vidojkovic, Institute of Chemistry, Technology and Metallurgy - University of Belgrade, Serbia

MAGNETIC WATER TREATMENT: BACKGROUND AND CURRENT STATE
Professor V Ochkov, Moscow Power Engineering Institute, Russia

IMPROVING THE EFFICIENCY OF WATER TRANSPORT SYSTEMS
PhD A Ryzhenkov, Moscow Power Engineering Institute (MPEI), Russia

17:30 CLOSE OF DAY ONE

PROGRAMME (CONTINUED)

DAY 2 — **TUESDAY 3 SEPTEMBER**

8:00 REGISTRATION AND REFRESHMENTS

PARALLEL SESSIONS **9:00**

SEAWATER SG

DEVELOPING A HIGH-QUALITY DATA COLLECTION METHOD OF SEAWATER DENSITY
Dr H Uchida, Japan Agency for Marine-Earth Science and Technology, Japan

HIGH-PRECISION MEASUREMENTS OF THE DENSITY-SALINITY RELATION OF STANDARD SEAWATER
Dr H Wolf, Physikalisch-Technische Bundesanstalt, Germany

DENSITY MEASUREMENT BY MEANS OF OSCILLATING U-TUBE TECHNOLOGY
B Laky, Anton Paar GmbH, Germany

REFRACTIVE INDEX MEASUREMENTS OF SEAWATER: CHALLENGES AND OPPORTUNITIES
Dr C Waldmann, University of Brenmen/MARUM, Germany

CALCULATION 1

WHY ARE FAST STEAM PROPERTY CALCULATIONS IMPORTANT FOR THE CALCULATION OF CONCENTRATING SOLAR POWER PLANTS
Dr R Pawellek, STEAG Energy Services, Germany

AN OPTIMIZED FORMULATION FOR P(r,T) AND F(r,T) BASED ON THE JEFFERY-AUSTIN MODEL FOR LIQUID WATER AND STEAM FOR FAST TRANSIENT CFD
Dr F Crouzet, EDF R&D, France

ADVANCED 3D CFD APPLICATIONS USING SPLINE FUNCTIONS FOR THE COMPUTATION OF THERMODYNAMIC PROPERTIES OF REAL FLUIDS
Dr F di Mare, German Aerospace Center (DLR), Germany

FAST CALCULATION OF THERMODYNAMIC PROPERTIES OF WATER AND STEAM USING A SPLINE BASED TABLE LOOK-UP METHOD (STM)
M Kunick, Zittau/Goerlitz University of Applied Sciences, Germany

THE FAST CALCULATION OF STEAM AND WATER PROPERTIES IN CFD USING SPLINE INTERPOLATION
Professor H Kretzschmar, Zittau/Goerlitz UAS, Germany

HYDROTHERMAL 2

THE HYDRATION OF CdCln2-n (0≤n≤4) IN HYDROTHERMAL FLUIDS OF LIQUID-LIKE DENSITY: INSIGHT FROM Ab INITIO COMPUTATIONS AND X-RAY ABSORPTION SPECTROSCOPY
Professor T Seward, Victoria University of Wellington (SGEES), New Zealand

ION PAIR FORMATION CONSTANTS AND TRANSPORT PROPERTIES FOR AQUEOUS STRONTIUM COMPLEXES UP TO 350°C AT 20 MPa BY FLOW AC CONDUCTANCE
Dr H Arcis, Department of Chemistry, University of Guelph, Canada

FT-ICR MASS SPECTROMETRIC AND DENSITY FUNCTIONAL THEORY STUDIES OF POLYNUCLEAR CADMIUM CHLORIDE CLUSTERS IN AQUEOUS FLUIDS
Dr K Lemke, University of Hong Kong, Hong Kong

INVESTIGATIONS ON THE STRUCTURAL ENVIRONMENT OF Zn ADSORBED ON Fe3O4 NANOPARTICLES IN AQUEOUS FLUIDS TO SUPERCRITICAL CONDITIONS
Robert Mayanovic, Missouri State University, USA

PCC FLOW ASSISTED CORRISION 2

MEASURES TAKEN BY ESKOM TO UNDERSTAND AND MITIGATE FLOW ACCELERATED CORROSION IN HEATER SHELLS AND DISTILLATE DRAIN LINES
S Marais, Eskom, South Africa

CONTRIBUTION OF PROBABILISTIC RISK EVALUATION OF FLOW-ACCELERATED CORROSION TO SYSTEM SAFETY ANALYSIS OF AGING NPPS
Dr S Uchida, Institute of Applied Energy, Japan

PIPE WALL THINNING MANAGEMENT IN JAPANESE NUCLEAR POWER PLANT AND DEVELOPMENT OF PREDICTION METHOD
K Yoneda, CRIEPI/EDF R&D, France

HRSG DESIGN CONSIDERATIONS TO ENABLE OPTIMUM CYCLE CHEMISTRY TO BE APPLIED
David Addison, Thermal Chemistry, New Zealand

WATER CHEMISTRY IMPLICATIONS FOR FLOW ACCELERATED CORROSION IN COMBINED CYCLE HEAT RECOVERY STEAM GENERATORS
B Balakrishnan, Parsons Brinckerhoff, UK

10:45 REFRESHMENT BREAK

PARALLEL SESSIONS **11:15**

SEAWATER SG WORKSHOP

CALCULATION 1

ON A MODEL FOR SOLUTION OF SHOCK WAVE PARAMETERS IN WET STEAM
Professor P Safarik, Czech Technical University in Prague, Czech Republic

THE IAPWS INDUSTRIAL FORMULATION FOR THE THERMODYNAMIC PROPERTIES OF SEAWATER
Professor H Kretzschmar, Zittau/Goerlitz University of Applied Sciences, Germany

EXTENDED EQUATION FOR REGION 5 OF THE INDUSTRIAL FORMULATION IAPWS-IF97
Professor W Wagner, Ruhr-University Bochum, Germany

HYDROTHERMAL 2

THERMODYNAMIC CALCULATIONS AND MICROWAVE-HYDROTHERMAL SYNTHESIS OF MnWO4 MULTIFERROIC MATERIALS
Dr A Dias, Federal University of Ouro Preto, Brazil

CHLORARGYRITE (AgCl) SOLUBILITY IN LOW DENSITY HYDROTHERMAL FLUIDS
Dr A Zotov, IGEM RAS, Russia

HIGH PURITY HYDROGEN PRODUCTION FROM FORMIC ACID USING ZINC II CATION AS HOMOGENOUS CATALYST
Dr K Yoshida, University of Tokushima, Japan

MICRO-ALGAE LIQUEFACTION UNDER HYDROTHERMAL CONDITIONS
Dr A Roubaud, French Alternative Energies and Atomic Energy Commission, France

CRITICAL PHENOMENA AND SALT SOLUBILITY IN TERNARY WATER-SALT SYSTEMS WITH LIQUID IMMISCIBILITY AND SUPERCRITICAL FLUIDS
Professor V Valyashko, Kurnakov Institute of General and Inorganic Chemistry, Russia

PCC CORROSION 2

CONTROL OF CORROSION IN AIR-COOLED CONDENSERS
Dr B Dooley, Structural Integrity, USA

SELECTION OF WATER CHEMISTRY FOR FOSSIL PLANTS WITH ALUMINIUM ALLOY HEAT EXCHANGERS
Professor T Petrova, National Research University "MPEI", Russia

CHARACTERISTICS OF OXIDE FILMS FORMED ON THE WELDED SURFACES OF A CARBON STEEL FOR BOILER TUBES IN A SIMULATED ALL VOLATILE WATER
Professor H Takaku, Shinshu University, Japan

SURFACE CHEMISTRY PROPERTIES OF HIGH NITROGEN STAINLESS STEELS IN A POLYMER ELECTROLYTE MEMBRANE FUEL CELL ENVIRONMENT
Dr A Howell, Xcel Energy

PROGRAMME (CONTINUED)

TUESDAY (CONTINUED)

12:45 LUNCH BREAK

PARALLEL SESSIONS

13:40

SEAWATER RELATIVE HUMIDITY

THERMOPHYSICAL PROPERTIES OF WATER FOR ATMOSPHERIC APPLICATIONS
Dr J Kalová, University of South Bohemia, Czech Republic

CALIBRATION OF HYGROMETERS IN NON-AIR GASES AND AT A RANGE OF PRESSURES
Dr S Bell, National Physical Laboratory, UK

CALCULATION 2

CALCULATION OF WATER AND STEAM PROPERTIES USING HETEROGENEOUS CPU/GPU COMPUTING
Dr K Orlov, National Scientific University "MPEI", Russia

WATER AND STEAM PROPERTIES CALCULATIONS LIBRARIES FOR REAL-TIME PROCESS CONTROL IN PLCs (PROGRAMMABLE LOGIC CONTROLLERS)
Dr K Orlov, National Scientific University "MPEI", Russia

DEVELOPMENT OF A MOBILE PHONE APP FOR STEAM THERMOPHYSICAL PROPERTIES
Dr G Bandara, GB Simulation Technology, UK

CLOUD WATER AND STEAM FUNCTIONS FOR INDUSTRIAL APPLICATIONS
Professor V Ochkov, Moscow Power Engineering Institute, Russia

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PCC AMINE

SAMPLING AMINES FROM FLOWING STEAM-WATER MIXTURES
P Srisukvatananan, Chemical Engineering, University of New Brunswick, Canada

DEGRADATION KINETICS OF SIX ALKALISING AMINES
D Moed, Delft University of Technology, Netherlands

TOWARD A RESOLUTION OF THE AMINES VS. HYDROGEN CATION EXCHANGED CONDUCTIVITY QUESTION
Dr J Bellows, Siemens Energy Inc

15:00 REFRESHMENT BREAK

PARALLEL SESSIONS

15:30

SEAWATER RELATIVE HUMIDITY WORKSHOP

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PCC NUCLEAR 1

OPTIMIZED PH STRATEGY COMBINED WITH APPLICATION OF FILM-FORMING AMINE FOR IMPROVED WATER CHEMISTRY TREATMENT IN STEAM-WATER CYCLE OF PWRs
Dr A Drexler, AREVA NP GmbH, Germany

DIMETHYLAMINE AS A REPLACEMENT FOR AMMONIA DOSING IN THE SECONDARY CIRCUIT OF AN ADVANCED GAS-COOLED REACTOR (AGR) POWER STATION
Dr A Bull, EDF Energy

AN INTRODUCTION TO THE WYTHENSHAWE BOILER TEST RIG FACILITY AND ITS APPLICATION TO IMPLEMENT DIMETHYLAMINE AS AN ALTERNATIVE TO AMMONIA FOR ONCE-THROUGH BOILER WATER TREATMENT
Dr C Auener, AMEC Clean Energy

MITIGATING THE RISK OF STRESS CORROSION OF AUSTENITIC STAINLESS STEELS IN ADVANCED GAS COOLED REACTOR BOILERS
Dr J Owen, EDF Energy

17:15 - 18:15 ICPWS GENERAL MEETING

18:15 CLOSE OF DAY TWO

DAY 3 — **WEDNESDAY 4 SEPTEMBER**

8:30 — **REGISTRATION AND REFRESHMENTS**

PARALLEL SESSIONS — **9:00**

NATURAL 1

A GLOBAL ALGORITHM FOR ESTIMATING ABSOLUTE SALINITY IN COASTAL WATERS
Professor R Pawlowicz, Department of Earth and Ocean Sciences, Canada

A NEW THERMOPHYSICAL FLUID LABORATORY FOR GEOTHERMAL APPLICATIONS
Dr H Milsch, GFZ German Research Centre for Geosciences, Germany

THERMOPHYSICAL PROPERTIES OF SYNTHETIC GEOTHERMAL BRINES
U Hoffert, GFZ German Research Centre for Geosciences, Germany

THE ROLE OF THERMOPHYSICAL DATA ON ICES OF ASTROPHYSICAL INTEREST AND WATER IN GENERAL IN AEROSPACE RESEARCH
J Biele, DLR, German Aerospace Centre (DLR), Germany

THERMO 2

TEMPERATURE DEPENDENCE OF ICE VAPOR PRESSURE: COMPARISON OF MEASURED VALUES AND THERMODYNAMIC CORRELATIONS
Dr A Harvey, National Institute of Standards and Technology, USA

PROGRESS IN DETERMINING THE EQUILIBRIUM VAPOUR PRESSURE OF LIQUID WATER AND ICE OVER THE TEMPERATURE RANGE 193 K TO 373 K
Professor V Fernicola, INRIM, Italy

UNCERTAINTY OF THE SATURATION PRESSURE AND ITS DERIVATIVE FOR ORDINARY WATER
Dr J Hrubý, Institute of Thermomechanics ASCR, Czech Republic

MEASUREMENT OF SATURATION VAPOR PRESSURE OF PURE WATER IN THE TEMPERATURE RANGE BETWEN 303,15 AND 193,15K
Dr S Mokdad, Laboratoire Commun de Métrologie LNEINM/CNAM, France

IAPWS-95 FORMULATION FOR TEMPERATURES FROM 253K TO 303K AT PRESSURES UP TO 400 MPA
Professor W Wagner, Ruhr- Universität Bochum, Lehrstuhl für Thermodynamik, Germany

MOLECULAR 1

PREDICTING HYDRATION FREE ENERGIES OF POLYFUNCTIONAL ORGANIC MOLECULES USING MOLECULAR DYNAMICS SIMULATIONS
Dr M Rouha, CxI, TU Liberec, Czech Republic

BULK PROPERTIES OF SWM4-NDP WATER MODEL AT ELEVATED TEMPERATURE AND PRESSURE
Dr W Abdallah, Schlumberger Middle East, UAE

DEVELOPMENT OF A RELIABLE MODEL FOR SIMULATIONS OF AQUEOUS SALT SOLUTIONS IN A WIDE RANGE OF TEMPERATURES, PRESSURES AND SALT CONCENTRATIONS: FORCE FIELD SCREENING OF SW10e WATER BRINES WITH POLARIZABLE CHLORIDE AND SODIUM IONS
Dr W Abdallah, Schlumberger Middle East, UAE

MELTING POINT OF HEXAGONAL ICE FROM THE ISOBARIC-ISOENTHALPIC MOLECULAR DYNAMICS SIMULATION
D Takaiwa, Keio University, Japan

IAPWS CYCLE CHEMISTRY FOR FOSSIL AND COMBINED CYCLE PLANTS

WORLDWIDE PERSPECTIVE ON CYCLE CHEMISTRY IN FOSSIL AND COMBINED CYCLE PLANTS
Dr B Dooley, Structural Integrity, USA

INSTRUMENTATION AND CONTROL
M Rhiza, Siemens, Germany

GUIDANCE FOR FOSSIL AND COMBINED CYCLE PLANTS OPERATING ON AVT OT PT AND CT
Dr B Dooley, Structural Integrity, USA

CARRYOVER FROM DRUM BOILERS
F Gabrielli, Alstom Power, USA

STEAM PURITY
Dr R Svoboda, Svoboda Consulting, Switzerland

MONITORING AND ANALYSING TOTAL IRON AND COPPER IN FOSSIL AND COMBINED CYCLE PLANTS
D Addison, Thermal Chemistry, New Zealand

DISCUSSION ON TGDs AND REQUIREMENTS FOR THE FUTURE

11:00 — **REFRESHMENT BREAK**

PARALLEL SESSIONS — **11:30**

NATURAL 1

AN EXPERIMENTAL APPARATUS FOR MEASURING THE SEAWATER SPEED OF SOUND UP TO 70 MPa
Dr A Albo, Istituto Nazionale di Ricerca Metrologica, Italy

WHICH IS THE POTENTIAL MINIMUM UNCERTAINTY ACHIEVABLE MEASURING THE SOUND SPEED OF STANDARD SEAWATER BY A PULSE-ECHO METHOD UP TO HIGH PRESSURE?
Dr S Lago, Istituto Nazionale di Ricerca Metrologica, Italy

SPEED OF SOUND MEASUREMENTS IN SEAWATER USING THE TIME-OF-FLIGHT METHOD
Dr C von Rohden, Physikalisch-Technische Bundesanstalt, Germany

THERMO 2

REEVALUATION OF THE SECOND VIRIAL COEFFICIENT FOR STEAM WITH A SPECIAL EMPHASIS ON SYSTEMATIC UNCERTAINTIES
Dr M Duska, Institute of Thermomechanics ASCR, Czech Republic

A VIRIAL EQUATION OF STATE OF STEAM IN THE 0°-300°C RANGE
Dr H Paurobally, Université de Provence, France

SUPERCRITICAL WATER: PERCOLATION TRANSITIONS AND A COLLOIDAL MESOPHASE
Professor L Woodcock, University of Manchester, UK

MOLECULAR WORKSHOP

PCC GEOTHERMAL

ELECTROCHEMICAL CORROSION BY REACTION OF HOT SALINE FLUID WITH CASING MATERIAL IN A GEOTHERMAL WELL
Dr S Regenspurg, GFZ German Research Centre for Geosciences, Germany

CONTROL OF SILICA PRECIPITATION KINETICS IN SYNTHETIC GEOTHERMAL BRINES
M Andhika, GFZ Potsdam, Germany

CYCLE CHEMISTRY CHALLENGES WITH ENHANCED GEOTHERMAL SYSTEMS SURFACE POWER PLANTS
D Addison, Thermal Chemistry, New Zealand

SCALING TENDENCY OF GEOTHERMAL WATERS ARMUTLU PENINSULA, NORTHWESTERN TURKEY
C Ertekin, Aegean Regional Directorate of Mineral Research and Exploration of Turkey, Turkey

12:50 — **LUNCH BREAK**

PROGRAMME (CONTINUED)

WEDNESDAY (CONTINUED)

PARALLEL SESSIONS **14:00**

NATURAL 2

EXPERIMENTAL STUDY ON THE CORRELATION BETWEEN ELECTRICAL CONDUCTIVITY, DENSITY AND EQUILIBRIUM RELATIVE HUMIDITY IN A HUMIDIFYING SYSTEM
Dr M Heinonen, Centre for Metrology and Accreditation (MIKES), Finland

DELIQUESCENCE/ EFFLORESCENCE INDUCED HYSTERESIS DURING HYDRATION/DEHYDRATION OF HGYGROSCOPIC PARTICLES
Dr O Hellmuth, TROPOS, Germany

EFFECTS OF GLOBAL WARMING ON SOIL TEMPERATURE
Dr M El Amine Boukli Hacene, Djillali Liabès University, Algeria

PHYSICO-CHEMICAL ANALYSIS OF DRINKING WATER SAMPLES FROM DIFFERENT REGIONS OF NAGPUR & AAVATI IN MAHARASHTRA STATE, INDIA
Dr S Gupta, Brijlal Biyani Science College, India

THERMO 3

INVESTIGATION OF CONDENSATION NUCLEI IN SUPERHEATED STEAM IN STEAM TURBINES
Dr J Hrubý, Institute of Thermomechanics ASCR, Czech Republic

CHARACTERISATION OF CRITICAL CLUSTERS OF SUPERCOOLED WATER
M Fransen, Eindhoven University of Technology, Netherlands

ESTIMATION OF ICE-WATER INTERFACIAL ENERGY BASED ON CLASSICAL NUCLEATION THEORY AND EXPERIMENTAL ICE NUCLEATION RATES
Dr T Nemec, Institute of Thermomechanics ASCR, Czech Republic

FORMULATION OF THERMODYNAMIC PROPERTIES FOR COMPUTATION OF NON-EQUILIBRIUM CONDENSING STEAM FLOWS
Dr J Hrubý, Institute of Thermomechanics ASCR, Czech Republic

MOLECULAR 2

PREFERENTIAL ADSORPTION OF UREA, GUANIDINIUM AND METHANOL FOR HYDROPHILIC AND HYDROPHOBIC SURFACES: A MOLECULAR DYNAMICS SIMULATION STUDY
Professor T Koishi, University of Fukui, Japan

COMPUTING INTRINSIC AQUEOUS SOLUBILITY OF CRYSTALLINE ORGANIC MOLECULES
Dr D Palmer, University of Strathclyde, UK

MOLECULAR MECHANISM OF BENZOIC ACID AND BENZOATE BEHAVIOR AT THE AQUEOUS SOLUTION/ VAPOR INTERFACE: EFFECT OF PH AND IONS
Ms A Romanova, University of Strathclyde, UK

ORIGIN OF ANOMALOUS FEATURE OF WATER MOLECULES ON MEMBRANE SURFACE
E Yamamoto, Keio University, Japan

PCC NUCLEAR 2

NUCLEAR ACCIDENT IN FUKUSHIMA DAIICHI NPP AND ITS INFLUENCE ON NUCLEAR ENERGY IN JAPAN
Dr M Naitoh, Institute of Applied Energy, Japan

CORROSION ISSUES FOR THE MID-AND-LONG TERM SAFETY MANAGEMENT OF FUKUSHIMA DAIICHI NPP
Dr T Tsukada, Japan Atomic Energy Agency, Japan

GENERIC DESIGN ASSESSMENT OF NEW NUCLEAR REACTOR DESIGNS FOR THE UK – THE REACTOR CHEMISTRY ASPECTS
J Glover, Office for Nuclear Regulation, UK

THE EVOLUTIONS IN REACTOR CHEMISTRY & DESIGN FOR THE UK EPR NUCLEAR REACTOR
M Harrington, NNB Generation Company - EDF Energy, UK

CORROSION AS A MAJOR MATERIAL DEGRADATION ISSUE THAT HAS AFFECTED LWR AVAILABILITY AND COULD CHALLENGE NUCLEAR SAFETY
Dr J Hickling, Independent Technical Consultant, UK

15:30 **REFRESHMENT BREAK**

PARALLEL SESSIONS **16:20**

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THERMO 3

BEHAVIOR OF THE EQUATION OF STATE FOR SUPERCOOLED WATER: TOWARDS AN IAPWS FORMULATION
Dr V Holten, University of Maryland, USA

POSSIBLE OBSERVATION OF THE WIDOM LINE IN SUPERCOOLED WATER AT NEGATIVE PRESSURE
Dr G Pallares, Institut Lumière Matière - Université Claude Bernard Lyon, France

THERMAL CONDUCTIVITY OF SUPERCOOLED WATER
J Biddle, University of Maryland, USA

MOLECULAR 2

COMPUTER SIMULATION STUDIES OF HEAT TRANSPORT IN WATER
Dr F Bresme, Imperial College London, UK

ATOM-ATOM BRIDGE FUNCTIONS OF WATER EXTRACTED FROM MOLECULAR SIMULATIONS
Professor G Chuev, Institute of Solution Chemistry of RAS, Russia

POLYAMORPHISM IN LIQUID AND SUPERCRITICAL WATER
Professor M Kiselev, Institute of Solution Chemistry of RAS, Russia

PCC NUCLEAR 3

SAMPLING NUCLEAR REACTOR COOLANT SYSTEMS
Dr D Lister, University of New Brunswick, Canada

WATER CHEMISTRY MEASUREMENTS IN THE HALDEN REACTOR AND ITS EXPERIMENTAL CIRCUITS
P Bennett, Institutt for Energiteknikk, Norway

WATER CHEMISTRY MEASUREMENT IN IN-PILE LOOP EXPERIMENT OF THE JMTR
Dr S Hanawa, Japan Atomic Energy Agency, Japan

DISSOLUTION KINETICS OF SILICON NITRIDE IN HIGH TEMPERATURE ALKALINE SOLUTIONS
Dr L Qiu, Atomic Energy of Canada Limited, Canada

18:00 **CLOSE OF DAY THREE**

18:45 **GROUP PHOTO**
Continuing the ICPWS conference tradition, all conference attendees are invited to take part in the group photo before the conference banquet.

19:00 **ICPWS16 Conference Banquet**
This will take place in the Painted Hall at the University of Greenwich.
Advance booking is required for the Conference Banquet – please see the booking form for prices.

DAY 4 — **THURSDAY 5 SEPTEMBER**

8:30 REGISTRATION AND REFRESHMENTS

PARALLEL SESSIONS 9:00

THERMO 4

MODELING INTERFACIAL AND SURFACE TENSION OF SYSTEMS CONTAINING ELECTROLYTES
Dr A Anderko, OLI Systems Inc

THE EXPERIMENTAL DETERMINATION OF SURFACE TENSION OF SUPERCOOLED WATER
Professor R Mares, University of West Bohemia, Czech Republic

MODIFICATION OF AN EXPERIMENTAL APPARATUS AND NEW MEASUREMENTS OF THE SURFACE TENSION OF SUPERCOOLED WATER
Dr V Vins, Institute of Thermomechanics ASCR, Czech Republic

EFFECT OF THE CRYSTALLOGRAPHIC TEXTURE ON THE ELASTIC PROPERTIES OF ICE AGGREGATED FROM HEXAGONAL CRYSTALS
Professor A Gokhman, South Ukrainian National Pedag. University, Ukraine

EXPERIMENTAL INVESTIGATION OF THE WATER THERMAL HISTORY EFFECT ON BEHAVIOR OF THAT WATER AT SUPERCOOLED METASTABLE STATE
Professor V Buleiko, Gazprom VNIIGAZ – Research Institute of Natural Gases, Russia

MOLECULAR 3

PRESSURE EFFECT ON THE ROTATIONAL CORRELATION TIME OF WATER IN FORMAMIDE- AND N,N-DIMETHYLFORMAMIDE WATER MIXTURES AT 25°C
Professor M Ueno, Doshisha University, Japan

INFRARED SPECTRUM LINE SHAPE FOR SUPERCRITICAL WATER STUDIED BY MOLECULAR DYNAMICS SIMULATION: THE EFFECT OF THE ROTATIONAL COUPLINGS
Dr K Yoshida, University of Tokushima, Japan

PCC DESIGN

AMMONIUM FORM CONDENSATE POLISHING AT LOUGH REE POWER STATION
C Bell, Ovivo UK, UK

SUCCESSFUL EXPERIENCE OF HIGH-AVT OPERATION IN MEXICO TUXPAN POWER STATION
T Ichihara, Power Systems - Mitsubishi Heavy Industries Ltd, Japan

STATUS OF WATER CONDITIONING FOR DRUM BOILER AND HRSG IN JAPANESE FOSSIL AND COMBINED CYCLE POWER PLANTS
H Hirano, Central Research Institute of Electric Power Industry, Japan

COMPLEX APPROACH FOR WORKING OUT CYCLE CHEMISTRY MONITORING AT POWER PLANTS
O Egoshina, Moscow Power Engineering Institute, Russia

MATHEMATICAL MODELS APPLICATION AT THE CYCLE CHEMISTRY MONITORING SYSTEMS
Dr P Gotovtsev, Moscow Power Engineering Institute, Russia

PCC NUCLEAR 4

THE PHYSICAL CHEMISTRY OF CORROSION IN A SUPERCRITICAL WATER-COOLED REACTOR
Dr D Guzonas, Atomic Energy of Canada Limited, Canada

BEHAVIOR OF HYDRATED ELECTRON AT ELEVATED TEMPERATURES UP TO 400°C
Professor Y Katsumura, University of Tokyo, Japan

CORROSION PRODUCT TRANSPORT AND DEPOSITION IN A SUPERCRITICAL WATER-COOLED REACTOR
Dr W Cook, University of New Brunswick, Canada

EVALUATION OF THE EFFECTIVENESS OF HYDROGEN WATER CHEMISTRY IN A SUPERCRITICAL WATER REACTOR
Professor T Yeh, National Tsing Hua University, Taiwan

EXPERIMENTAL WATER CHEMISTRY RESEARCH FOR BOILING, PRESSURIZED AND SUPERCRITICAL WATER COOLED REACTORS
Dr J Kysela, Research Centre Rez Ltd, Czech Republic

10:30 REFRESHMENT BREAK

PARALLEL SESSIONS 11:00

POSTER SESSION

PROPERTY LIBRARIES FOR WATER AND STEAM, AND OTHER WORKING FLUIDS, FOR CALCULATING HEAT CYCLES, TURBINES, HEAT PUMPS, AND REFRIGERATION PROCESSES
Professor H Kretzschmar, Zittau/Goerlitz University of Applied Sciences, Germany

STEAM TABLES AND PROPERTY LIBRARIES SOFTWARE FOR EXCEL, MATLAB, MATHCAD, DYMOLA, SIMULATIONX, LABVIEW, ENGINEERING EQUATION SOLVER, SMART PHONES, TABLETS, POCKET CALCULATORS, AND ONLINE USE
Professor H Kretzschmar, Zittau/Goerlitz University of Applied Sciences, Germany

MEASUREMENT OF WATER VAPOUR ENHANCEMENT FACTOR IN BINARY MIXTURES USING A DUAL-MODE MICROWAVE RESONATOR
Dr S Bell, National Physical Laboratory, UK

SALT EFFECTS ON BIOLOGICAL POLYELECTROLYTES IN WATER
R Orr, University of Strathclyde, UK

MOLECULAR 3

AB INITIO CALCULATIONS OF VIBRATIONAL SPECTRA AND GUEST-HOST INTERACTION IN CLATHRATE HYDRATES
M Hiratsuka, Keio University, Japan

PROPERTIES OF WATER AND AQUEOUS SOLUTIONS - A TIME DOMAIN REFLECTOMETRY SPRECTROSCOPY APPROACH
Dr A C Kumbharkhane, Marathwada University, India

THERMODYNAMIC PROPERTIES OF INTERFACIAL WATER (SOLID-WATER AND WATER-AIR INTERFACES) FROM ITS INFRARED SIGNATURE
I Bergonzi, University of Orleans - Institute of Earth Sciences, USA

PCC WATER TREATMENT 2

ESKOM'S APPROACH TO WATER MANAGEMENT – PHILOSOPHIES, TECHNOLOGIES AND PRACTICES
S Marais, Eskom, South Africa

MATHEMATICAL SIMULATION OF IONIC EQUILIBRIUMS OF WATER COOLANT USING ELECTRICAL CONDUCTIVITY AND pH MEASUREMENTS
Professor B Larin, Ivanovo Stare Power Engineering University (ISPU), Russia

CALCULATION AND VISUAL DISPLAY OF A WATER AND CHEMICAL MODE OF CIRCULATING WATER COOLING SYSTEM ON THERMAL POWER PLANTS
Professor V Ochkov, Moscow Power Engineering Institute, Russia

BIOSORPTION OF CHROMIUM FROM WASTE WATER BY BACILLUS SUBTILIS IN A PACKED BED BIOREACTOR
N Korrapati, National Institute of Technology Warangal, India

PCC NUCLEAR 5

SUPERCRITICAL WATER, HYDROGEN PRODUCTION AND ION ASSOCIATION IN NUCLEAR POWER CYCLES
Professor I Svishchev, Trent University, Canada

WATER RADIOLYSIS CHEMISTRY UNDER BOILING WATER REACTOR CONDITIONS
Dr J Henshaw, National Nuclear Laboratory, UK

VERIFICATION AND VALIDATION EVALUATION PROCEDURE OF CALCULATION CODES FOR DETERMINING CORROSIVE CONDITIONS IN BWR PRIMARY COOLING SYSTEM
Dr Y Wada, Hitachi Research Laboratory, Hitachi LTd

A NUMERICAL SIMULATION MODEL FOR ASSESSING THE EFFECTIVENESS OF HYDROGEN WATER CHEMISTRY IN AN ADVANCED BOILING WATER REACTOR
Dr M Wang, National Tsing Hua University, Taiwan

PROGRAMME (CONTINUED)

THURSDAY (CONTINUED)	**13:10**	**LUNCH BREAK**
	14:00	**EXCURSION:** **AFTERNOON TEA ON THE THAMES** ICPWS16 delegates and partners are invited to join a boat trip along the River Thames, travelling from Greenwich through the Thames Barrier then heading upstream towards the Tower of London. The boat will then sail back to Greenwich whilst you enjoy the sights and relax with some refreshments. There will be an additional cost to guarantee your attendance; please see the booking form for information. Full details will be provided with the joining instructions.
	18:30	**CLOSE OF ICPWS16 CONFERENCE**

- This programme is subject to change.
- In addition to the sessions there will be IAPWS Working Group meetings taking place on Sunday 1st September, Tuesday 3rd September and Friday 6th September 2013 in Greenwich. IAPWS will be in contact with those involved in the meetings to advise of the timings and locations for these.

CONFERENCE ORGANISATION

ICPWS16 is organised on behalf of the International Association for the Properties of Water and Steam (IAPWS) by the British & Irish Association for the Properties of Water and Steam (BIAPWS) and the Institution of Mechanical Engineers.

Local Organising Committee

- Eric Huff, BIAPWS (Chair, UK)
- Peter Calver, IMechE (Siemens Energy, UK)
- Jeff Cooper, BIAPWS (Queen Mary University of London, UK)
- Hugh Lloyd, BIAPWS (Independent Consultant, UK)
- Paul McCann, BIAPWS (E.ON New Build & Technology, UK)

International Programme Committee

- Jeff Cooper (Chair, Queen Mary University of London, UK)
- Barry Dooley (Executive Secretary of IAPWS; Structural Integrity Associates, USA)
- Allan Harvey (Chair of WG TPWS of IAPWS; NIST, USA)
- Masaru Nakahara (Chair of WG PCAS of IAPWS; Kyoto University, Japan)
- Rich Pawlowicz (Chair of SCSW of IAPWS, UBC, Canada)
- Tamara Petrova (President Elect of IAPWS, Moscow Power and Engineering Institute, Russia)
- Michael Rziha (Chair of WG PCC of IAPWS; Siemens Power Generation, Germany)
- Roland Span (Member of WG TPWS of IAPWS; Ruhr-University Bochum, Germany)
- Ingo Weber (Chair of WG IRS of IAPWS; Siemens Power Generation, Germany)

LOCATION

The conference will be held in London at the University of Greenwich, centre of the Maritime Greenwich UNESCO World Heritage Site. Further local information can be found at www.visitgreenwich.org.uk

University of Greenwich
Old Royal Naval College
Park Row
Greenwich
London
SE10 9LS
www.gre.ac.uk/greenwich

The University is easily accessible by public transport and centrally located to reach the numerous points of interest in London that attract many visitors from all over the world. Greenwich is just 20 minutes from Central London in Zone 2 of London's travel network.

RAIL

Southeastern trains provide direct services from London Charing Cross, Cannon Street, Waterloo East and London Bridge to Greenwich Station (Travel Zone 2 or 3) a 10 minute walk away from campus West Gate Entrance. If you are travelling from Kent, alight at Maze Hill Station (Zone 3) which is less than a 10 minute walk from campus – East Gate Entrance. For timetable information and a route map visit www.southeasternrailway.co.uk or contact National Rail Enquiries on 08457 484950.

LONDON UNDERGROUND (TUBE)

London Underground does not directly serve the University of Greenwich campus and transfer to another transport service will be required. The best option is to get off at Canary Wharf (Jubilee Line) and get a DLR Lewisham bound train to Cutty Sark.

DOCKLANDS LIGHT RAILWAY (DLR)

The Docklands Light Railway goes to Greenwich (Cutty Sark for Maritime Greenwich and Greenwich Stations) from Bank and Stratford stations via Canary Wharf which is also on the Jubilee line.

BY AIR

Easy connections are also available from London City Airport.
Alternative airports in London are
Gatwick www.gatwickairport.com
Heathrow www.heathrowairport.com
Stanstead www.standsteadairport.com
and Luton www.london-luton.co.uk

RIVER SERVICES

Thames Clippers provide a regular boat service to Greenwich Pier, right next to the campus, from central London picking up at Blackfriars, London Bridge, City, Canary Wharf.

BY CAR

The Campus is approximately 15 miles from Junction 2 of the M25. Please note there is no visitor or student parking on campus but there is a public car park opposite in Park Row as well as other car parks elsewhere in the town centre. More information on parking can be found at: www.royalgreenwich.gov.uk/Greenwich/Travel/Parking/CarParks

ACCOMMODATION

A limited number of rooms are being held at the University of Greenwich student halls of residence by The Corporate Team. Special rates have also been arranged for conference delegates at recommended hotels in the local area.
Visit **www.corporateteam.com/events/8488PWS** for more details or contact hotels@corporateteam.com

PARTNER PROGRAMME

There is a partner programme available for the ICPWS16 conference – please enquire for more details at **icpws16@imeche.org**

PROMOTIONAL OPPORTUNITIES: EXHIBITION AND SPONSORSHIP

This international conference provides you with an opportunity to highlight your organisation's solutions, products and services. Exhibiting at and/or sponsoring ICPWS16 offers excellent value for promoting your expertise to experts from industry and academic research backgrounds.

On-site, sponsors enjoy networking functions, exhibition and demonstration opportunities. A number of IMechE sponsors also opt for a prime position by selecting one of our premium packages, providing serious players with the opportunity to combine branding and networking in one package.

If you are interested in taking up a space at the ICPWS16 exhibition or would like to discuss other sponsorship opportunities please contact **Aman Duggal** on +44 (0) 20 7973 1309 or email: **sponsorship@imeche.org**

BOOKING FORM

ICPWS16
1-5 SEPTEMBER 2013
C1349

REGISTRATION Please complete in capitals.

Family Name | Title (Mr, Mrs, Miss)
First Name | Job Title
Membership No | Institution
Name of Organisation (for name badge)
Address for correspondence

Town/City
Postcode
Contact Telephone
Email
Do you have any special requirements?

How did you hear about this event? ☐ Direct mail ☐ Website ☐ Colleague ☐ Other

FEES AND CHARGES Please complete the appropriate box.

Registration fees include entry to the sessions, refreshments, and a copy of the event proceedings.

EARLY BOOKING DEADLINE: 22 July 2013

CONFERENCE FEES	Fee	VAT	Total	£
Institution of Mechanical Engineers Member – early booking	£550.00	£110.00	£660.00	_____
Member of supporting Organisation – early booking	£550.00	£110.00	£660.00	_____
Non-Member – early booking	£650.00	£130.00	£780.00	_____
Presenting Author – early booking	£550.00	£110.00	£660.00	_____
Student/Retired Delegate – early booking	£250.00	£50.00	£300.00	_____
Institution of Mechanical Engineers Member	£600.00	£120.00	£720.00	_____
Member of supporting Organisation	£600.00	£120.00	£720.00	_____
Non-Member	£700.00	£140.00	£840.00	_____
Presenting Author	£600.00	£120.00	£720.00	_____
Student/Retired Delegate	£300.00	£60.00	£360.00	_____

EXTRA ITEMS	Fee	VAT	Total	£
Invoice Charging – see below	£10.00	£2.00	£12.00	_____
Power Plant Chemistry One-day Rate 3/9/2013				
One-day attendance - Tuesday only – Member/Student	£150.00	£30.00	£180.00	_____
One-day attendance - Tuesday only – Non-Member	£200.00	£40.00	£240.00	_____
Conference Banquet 4/9/2013				
Full paying Delegates/Presenters	£15.00	£3.00	£18.00	_____
Student/Retired Delegate	£50.00	£10.00	£60.00	_____
Guests – non-conference delegate	£75.00	£15.00	£90.00	_____
Conference Excursion 5/9/2013	£30.00	£6.00	£36.00	_____
			Total	_____

PAYMENT DETAILS

Payment must accompany this registration form. Registration will be confirmed only on receipt of full payment.

Please indicate method of payment: ☐ Cheque ☐ Credit Card ☐ BACS ☐ Invoice (see below)

Cheques should be made payable to IMechE and crossed. Please note international delegates may pay only by credit card, BACS or banker's draft. A copy of the draft must accompany this form. It is the delegate's responsibility to pay any bank charges.

Credit Card: ☐ Visa ☐ MasterCard (please note we cannot accept American Express, Diners Club or Maestro)

Card No | Valid From / | Expiry Date /
Name of Cardholder
Billing Address of Cardholder (if different from above)
Postcode
Amount to be Deducted | Signature

INVOICE DETAILS (UK DELEGATES ONLY)

Delegates wishing to be invoiced must provide an order number. If your company does not use order numbers please include a formal request for invoicing on your company's letterhead. A charge of £10 +VAT will be made to cover additional administration costs. Invoices are payable on receipt and no alterations to these terms will be accepted.

Order No
Contact Name
Name and Address for Invoicing
Postcode
Tel | Fax

BACS bank transfers can be made to: **IMechE Current Account, NatWest Charing Cross Branch**.
Sort code: **60-40-05** Acc No: **00817767**
Swift Code: **NWBKGB2L**
A copy of the draft must accompany this form.
IBAN Code: **GB96NWBK60400500817767**

Institution of Mechanical Engineers
1 Birdcage Walk, London SW1H 9JJ

Fax +44 (0)20 7222 9881

Please read the information listed below as each booking is subject to the Institution's standard terms and conditions.

For registration enquiries call **Tina Churcher** on +44 (0)20 7973 1258 or email **t_churcher@imeche.org**

CONDITIONS OF BOOKING

Completed application forms should be returned to the address above, along with the correct payment. Attendance at the event will be confirmed on receipt of the full balance. All participants are advised to bring a copy of their confirmation with them on the day, to ensure the fastest possible entry.

SPECIAL REQUIREMENTS

Please inform us of any special requirements, ie dietary or access, on the relevant section of this form.

CANCELLATION

For a refund (minus £40 +VAT admin charge), cancellations must be received at least 14 days prior to the event. Replacement delegates are welcome at any time. The Institution reserves the right to cancel any event. In this case, the full fee will be refunded unless a mutually convenient transfer can be arranged. In the event that the Institution postpones an event for any reason and the delegate is unable or unwilling to attend on the rescheduled date, they will receive a full refund of the fee paid.

The Institution is not responsible for any loss or damage as a result of a substitution, alteration or cancellation/postponement of an event. The Institution shall assume no liability whatsoever if this event is cancelled, rescheduled or postponed due to a fortuitous event, Act of God, unforeseen occurrence or any other event that renders performance of this conference impracticable, illegal or impossible. For purposes of this clause, a fortuitous event shall include, but not be limited to: war, fire, labour strike, extreme weather or other emergency.

Please note that while speakers and topics were confirmed at the time of publishing, circumstances beyond the control of the organisers may necessitate substitutions, alterations or cancellations of the speakers and/or topics. As such, the Institution reserves the right to alter or modify the advertised speakers and/or topics if necessary without any liability to you whatsoever. Any substitutions or alterations will be updated on the event's webpage as soon as possible.

SUPPORTING ORGANISATIONS

Members of supporting organisations can register at members' rates: RSC and IAPWS.

VENUE

This event will be held at University of Greenwich, Park Row, Greenwich, London, SE10 9LS, UK

LIABILITY

The organisers do not accept liability for any injuries or losses of any nature incurred by delegates and/or accompanying persons, nor for loss or damage to their luggage and/or personal belongings.

ACCOMMODATION

We have arranged special discounted rates at local hotels via The Corporate Team.
Tel: 0845 604 4060 (UK only)
or +44 (0)20 7592 3050 (international)
Email: **events@corporateteam.com**
Quote ID number 8488PWS
www.corporateteam.com/events/8488PWS

ENQUIRIES

For event enquiries, please contact
Hannah Atkins
on +44 (0)20 7304 973 1260
or email **icpws16@imeche.org**

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