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*Boosting your Excellence through Knowledge and Training*



MARCH – APRIL 2022



A.N.T. INTERNATIONAL®

*Boosting your Excellence through  
Knowledge and Training*

## Invitation and Seminar Schedule of

Zirconium Alloy Technology (ZIRAT),  
LWR Chemistry and Component Integrity (LCC)

[www.antinternational.com](http://www.antinternational.com)



# Welcome To Our Annual Seminars

We are pleased to announce the arrangements for the ZIRAT26 and LCC17 Seminars that will take place in USA (ZIRAT26) and Spain (ZIRAT26 and LCC17).

*These seminars are open to all current ZIRAT26 and LCC17 members:*

- In USA, the ZIRAT26 Seminar will be hosted by INL, the Idaho National Laboratories in Idaho Falls, USA and will be held at the Energy Innovation Laboratory, 775 MK Simpson Boulevard, Idaho Falls, Idaho 83415 on March 16-17, 2022.
  - In Europe, the LCC17 and ZIRAT26 seminars will be hosted by Iberdrola Generacion Nuclear in Madrid and will be held on the Iberdrola Campus in San Agustin de Guadalix.
- » The LCC17 Seminar will be held on April 26-27, 2022.  
» The ZIRAT26 Seminar will take place on March 16-17, 2022 in USA and April 26-28, 2022 in Spain.



# LCC17 Seminar Presentations

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The following reports will be presented by the authors:

- The condenser: a key player for a good feedwater chemistry by Francois Cattant
- PWR primary side fuel crud, how it forms and its consequences by Jim Henshaw

Presentation without Reports will be prepared within the LCC17 Programme as follows:

Presentations by:

- *Jiaxin Chen*
  - Corrosion kinetics of nickel base alloys »
- *Daniel Parrat*
  - Radiochemistry »
- *Klas Lundgren*
  - Sources of Mo-93 in operational waste from BWR and PWR – Impact of materials selection and water chemistry condition
- *Jim Henshaw*
  - Secondary side CRUD
- *Gary Was*
  - Irradiation Assisted Stress Corrosion Cracking »

*Up to eight (8) persons employed by a LCC17 Member organisation can attend the LCC17 Seminars in Europe.*

## LCC17 Seminar Lecturers



The presentations at the LCC17 Seminar will be given by Dr. Jiaxin Chen, Mr. Francois Cattant, Mr. Klas Lundgren, Prof. Gary Was, Dr. Jim Henshaw and Dr. Daniel Parrat

[Read more about the Network of Experts »](#)

# LCC17 Seminar Lecturers

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**Dr. Jim Henshaw** is a chemist with a PhD in theoretical chemistry, developing methods to solve the time dependent Schrodinger equation. Jim has extensive experience in modelling radiation chemistry phenomena and has worked on topics relating to nuclear plant chemistry and nuclear reactor water/gas chemistry for over 30 years. Initially employed at Harwell Laboratory by the United Kingdom Atomic Energy Authority 1986, he retired from the UK National Nuclear Laboratory in 2020 as its leading reactor chemist. Jim is a recognised world expert in chemistry and in particular radiation chemistry in nuclear reactor systems. Over the years he has also spent much of his time studying material and activity transport issues in a range of different reactor systems and has a good understand of how reactor chemistry impacts material corrosion and fuel behaviour. Working with organisations around the world he has investigated problems in BWRs, PWRs and gas cooled systems and helped optimise plant operations. In fact many of these reactors currently utilise software for optimising their chemistry operations that he helped develop.



**Mr. Klas Lundgren** graduated 1973 in M.S Engineering Physics, Chalmers University of Technology, Gothenburg, Sweden. Joined ASEA-ATOM (later ABB Atom) in 1973. Was one of the founders of ALARA Engineering in 1995, which from 2008 was incorporated in Studsvik Nuclear. Klas holds presently, 2021, a position as Senior Specialist in radiation technology at Studsvik Nuclear.

## **Main areas of interest have been:**

- BWR water chemistry, radiation and materials - sampling and analysis, cleanup systems, condensate, feed and reactor water chemistry, gamma scanning and radiation measurements, Hydrogen Water Chemistry, radiochemistry evaluations, ALARA reviews in European and US BWRs, computer models for activity buildup in BWRs, post-accident analysis, computerized plant chemistry and activity data systems, radioactivity monitoring systems, radwaste and offgas systems. Plant-Life-Extension (PLEX)
- PWR water chemistry and radiation – Radiolysis chemistry, activity build-up, safety analysis and source terms
- Radiation shielding and radiation technology - computer code development, shielding design of BWRs and waste handling facilities, neutron transport calculation for activation and criticality analysis, radiation surveillance at power plants, reactor decommissioning analysis, safety analysis reports. shielding and neutron activation calculations of proton cyclotrons.

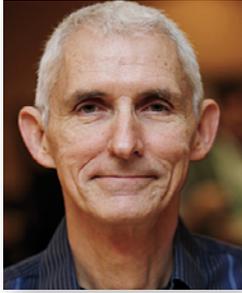


**Dr. Jiaxin Chen** joined Studsvik in 1997 and currently works as Senior Specialist in fuel crud and oxide characterisation in Studsvik Corrosion and Water Chemistry Laboratory. He was adjunct professor at Department of Physics, during 2014-2016, and now at Department of Chemistry and Chemical Engineering (from 2020), Chalmers University of Technology. His recent research interests include quantum chemistry study on coolant zinc interaction with oxides; microstructural characterization of fuel crud and solids in LWR coolant; corrosion kinetics of reactor material surfaces in LWR primary coolant; characterisation of radioactive deposit on LWR piping surfaces; stability of neutron absorber materials in reactor coolant. In the field of PWR fuel crud, he and his colleagues at Studsvik have made some significant experimental findings that are of high value for the industry.



**Professor Gary Was** received his ScD from MIT in 1980, after which he joined the Nuclear Engineering Department at the University of Michigan as an Assistant Professor. He became Full Professor in 1990 and was endowed with the Walter J. Weber, Jr. Professor of Sustainable Energy, Environmental and Earth Systems Engineering chair in 2007. He holds appointments in Nuclear Engineering and Radiological Sciences, and Materials Science and Engineering at the University of Michigan and has served as Director of the Michigan Memorial Phoenix Energy Institute, Associate Dean of the College of Engineering and Chair of the Nuclear Engineering and Radiological Sciences Department twice. Professor Was' research is focused on materials for advanced nuclear energy systems and radiation materials science, including environmental effects on materials, radiation effects, ion beam surface modification of materials and nuclear fuels. Most recently his group has led the development of ion irradiation as a surrogate for neutron irradiation in reactor structural materials, and he has utilised that capability to uncover the mechanism of irradiation assisted stress corrosion cracking of reactor core structural materials.

Professor Was received the Presidential Young Investigator award from NSF in 1985 and in 1994 he received the Excellence in Research Award from the College of Engineering. He was awarded the Champion H. Matthews Award from TMS, the Outstanding Achievement Award and Special Achievement Award by the Materials Science and Technology Division of the American Nuclear Society, the 2008 Henry Marion Howe Medal from ASM, the Lee Hsun Award from the Chinese Academy of Sciences, the Mishima Award from ANS and the Glenn Murphy Award from ASEE. He is a Fellow of The Minerals, Materials and Metals Society (TMS), the Materials Research Society, ASM International, NACE International and the American Nuclear Society. Professor Was has published over 270 technical articles in referred, archival journals, presented over 400 conference papers, and delivered over 200 invited talks and seminars, published a graduate level textbook on Radiation Materials Science in 2007 and a second edition in 2016. He serves as Editor-in-Chief of the Journal of Nuclear Materials.



**Mr. François Cattant** graduated in chemical engineering in 1974 and joined Electricity of France (EDF) in 1975 as chemist engineer at the chemical department of the corporate laboratories (Plants Operation Division). At that time, he was involved in power plants water and steam conditioning. Up to 1995 he worked in the following technical fields as an expert in the following areas:

- Failure root cause analysis of gas-cooled reactors components, including fuel
- Water & steam chemistry, chemical cleaning and NDE for fossil fired stations
- Failure root cause analysis of nuclear power plants irradiated or contaminated parts & components and reactor pressure vessel (RPV) irradiation programs monitoring
- Examination of Dampierre 1 retired steam generator, to the examination of RPV head penetrations, to the study of thermal embrittlement, to the analysis of wear.

Between 1995 and 1998 he was loan-in to the Nuclear Maintenance Application Center at EPRI Charlotte (NC, USA). He was involved in various maintenance guides such as those of pumps or diesel generators. He also acted as EPRI expert for the examination of Ringhals 3 retired steam generator.

In 1998 he moved back to France, at the R&D Materials and Mechanics of Components department where he stayed until his retirement in 2009. He served there as scientific advisor and senior engineer. His area of expertise was again chemistry, corrosion, and metallurgy, with special attention to primary water chemistry, source term reduction, primary water corrosion (Alloys 600/182/82, SSs), PWSCC mitigation and repair, fuel cleaning, innovation strategy. He also served as the EDF representative to the EPRI Materials Reliability program. From 2004 to 2008, he was the President of the "Materials, Non Destructive Testing and Chemistry" section of the "French Nuclear Energy Society". During his career he made many presentations and papers in international conferences and scientific journals.

In 2010, he was sponsored by the MAI to write a "Handbook of Destructive Assays", a 1100 pages' document putting together extended summaries of hundreds of destructive examinations performed on LWRs' NSSSs, in France, US, Japan and Sweden. An updated and extended (2200+ pages) version of this handbook will be released by December 2021.



# ZIRAT26 Seminar Presentations

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At the ZIRAT26 Seminar the following Special Topic Reports will be presented by the authors:

- Corrosion and Hydrogen Pickup Behaviour of Zr Alloys

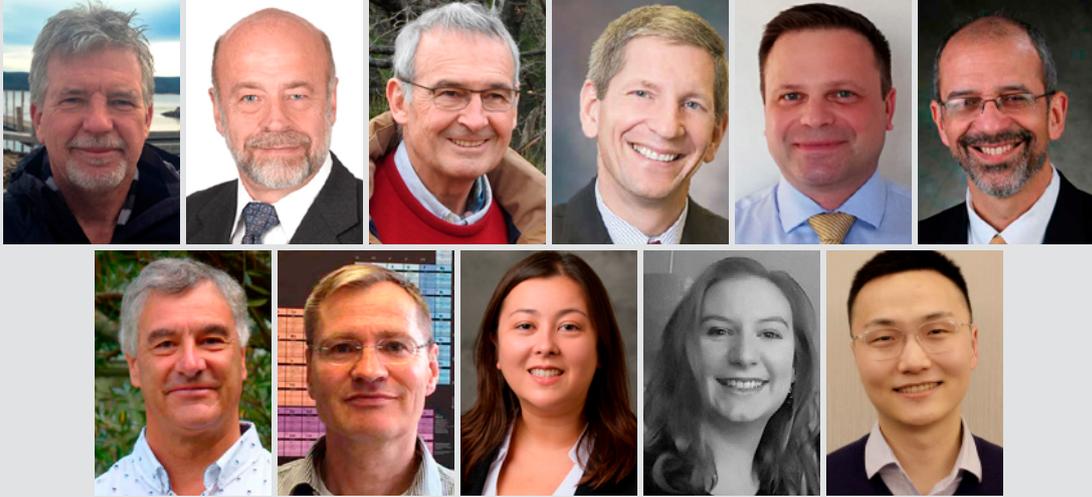
The following presentations will be given at the ZIRAT26 seminar in Idaho Falls, USA March 16-17, 2022 and the ZIRAT26 seminar in Madrid, Spain April 26-28th 2022:

- Dry Storage
  - Albert Machiels, USA and Spain
- Corrosion and Hydrogen Pickup topics by:
  - Arthur Motta, USA »
  - Clément Lemaignan, Spain »
  - Audrius Jasiulevicius, USA
- VVER fuel performance
  - Audrius Jasiulevicius, Spain
- Mechanical Properties of Stainless Steels
  - Malcolm Griffith, USA »
- LiOH effects on Zr alloy corrosion
  - Helen Hulme, USA
- Micro-Mechanical Testing of Irradiated Materials: Opportunities and Limitations »
  - Janelle Wharry, USA
- ATF cladding materials
  - Martin Steinbruck, Spain »
  - Gary Was, USA and Spain
- Fuel Reliability Assessment through Primary Water Radiochemistry Analysis in Operation and Poolside Examinations during Plant Outage »
  - Daniel Parrat, Spain
- NuStar's Exploration and Practice in China's Nuclear Power Industry »
  - Jiadong Bao, Spain



*Up to eight (8) persons employed by a ZIRAT26 Member organisation can attend the ZIRAT26 Seminars in USA and Europe.*

# ZIRAT26 Seminar Lecturers



The presentations of the ZIRAT26 Seminars will be given by:  
Dr. Malcolm Griffiths, Dr. Albert Machiels, Prof. Clément Lemaignan, Prof. Gary Was, Dr. Audrius Jasiulevicius, Prof. Arthur Motta, Dr. Daniel Parrat, Dr. Martin Steinbrück, Dr. Janelle P. Wharry, Ms. Helen Hulme and Mr. Jiadong Bao.

[Read more about the Network of Experts »](#)



# Seminar Invited Speakers

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*Prof. Arthur Motta* is the Chair of the Nuclear Engineering Program and a Professor of Nuclear Engineering and Materials Science and Engineering at Penn State University. He holds a B.Sc. in Mechanical Engineering and an M.Sc. degree in Nuclear Engineering from the Federal University of Rio de Janeiro, Brazil, as well as a Ph.D. in Nuclear Engineering from the University of California, Berkeley. Before joining the Penn State faculty in 1992, he worked as a research associate for the CEA at the Centre for Nuclear Studies in Grenoble, France, for two years and as a post-doctoral fellow for AECL at Chalk River Laboratories in Canada.

Prof. Motta works in the area of radiation damage and environmental degradation of materials, with specific emphasis in Zr alloys. He has current projects in the areas of mechanical testing, corrosion and radiation damage. He has special interests in using advanced characterisation techniques such as x-ray scattering from synchrotron radiation sources, transmission electron microscopy, and in situ irradiation to discern fundamental mechanisms of corrosion and radiation damage.

Prof. Motta is a Fellow of the American Nuclear Society (ANS) and in 2015 he received the Mishima Award from the ANS for outstanding contributions in research and development work on nuclear fuel and materials. In 2016 he was awarded the ASTM William J. Kroll Medal for sustained impactful contributions to zirconium metallurgy including corrosion, hydriding, mechanical properties and irradiation effects.

*Prof. Arthur Motta will attend the ZIRAT26 Seminar in Idaho Falls, USA.*

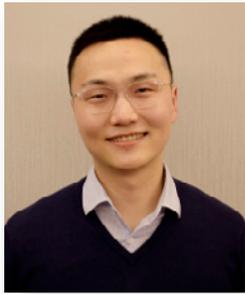


*Dr. Daniel Parrat* is research engineer and was an International Expert at the Nuclear Energy Division of the CEA. He has been working in the field of nuclear fuel behaviour in Light Water Reactors and was responsible of fuel irradiation programs dealing with the release of fission products out of failed rods in normal, incidental and accidental conditions. He developed new methods and techniques for detection and characterisation of failed LWR fuel rods in power plants, for which he won a CEA prize.

He served several times as a lecturer for training sessions or workshops organised by the IAEA or the French INSTN.

He has been involved in the definition of fuel experimental programmes for the future Jules Horowitz material testing reactor (JHR) and in the design of its experimental capacity: irradiation hosting systems, non-destructive examination benches and analysis laboratories in support.

*Dr. Daniel Parrat will attend the ZIRAT26 Seminar in Madrid, Spain*



**Mr. Jiadong Bao** graduated from the Master's program in Nuclear Engineering of École polytechnique fédérale de Lausanne. At 2017, he joined Shanghai NuStar Nuclear Power Technology Co., Ltd., which is currently the only private company in mainland China that is capable of providing vendor-independent commercial reactor core analysis and related services. He is in charge of the product department and is responsible for architect design and development of the company's core product ORIENT, which is a PWR core analysis code system. He also has interests in application of Computational Fluid Dynamics (CFD) for nuclear power research as well as scientific visualization, and is responsible for the company's CFD analysis business.

*Mr. Jiadong Bao will attend the ZIRAT26 Seminar in Madrid, Spain*



**Dr. Martin Steinbrück** graduated in chemistry at the Friedrich Schiller University Jena and received his Doctor of science in 1990. He has been at Karlsruhe Institute of Technology (formerly Forschungszentrum Karlsruhe FZK) since 1991; in that time he worked mainly in the field of Nuclear Safety Research. Dr. Steinbrück is leader of the group High-Temperature Materials Chemistry at the Institute for Applied Materials. He is in charge of the KIT project QUENCH dealing with hydrogen source term and coolability during quenching of an overheated core in the framework of the KIT program on Nuclear Safety. His special interest is the materials behaviour as well as oxidation of and interactions between the various core components at very high temperatures. Dr. Steinbrück is organiser of the annual International QUENCH Workshop (<http://quench.forschung.kit.edu/index.php>).

*Dr. Martin Steinbrück will attend the ZIRAT26 Seminar in Madrid, Spain*





*Mrs. Helen Hulme* graduated from the University of Liverpool in 2011 with a 1st class (honours) MChem and has obtained chartered status with the Royal Society of Chemistry (CChem, CSci). She began her career 10 years ago joining the Core Materials team at what was then Serco, now Jacobs, studying zirconium alloy corrosion behaviour, beginning with test rig operation and undertaking a range of characterisation techniques on corroded test coupons. This developed into a research and consultancy role through which Helen became the technical lead for the Core Materials R&T team within Jacobs. Developing knowledge in this field has now given Helen the opportunity to have involvement in safety case assessments to support safe nuclear operations.

In 2014, Helen undertook a part-time MPhil at the University of Manchester as part of the MUZIC research consortium, which the Core Materials team at Jacobs are still actively involved in. Key areas of expertise at Jacobs include studying the effects of lithium and gamma irradiation on corrosion as well as overseeing long-term corrosion test programmes. In addition, Helen has worked on understanding hydrogen pick-up and trapping mechanisms in zirconium alloy materials.

*Ms Helen Hulme will attend the ZIRAT26 Seminar in Idaho Falls, USA.*



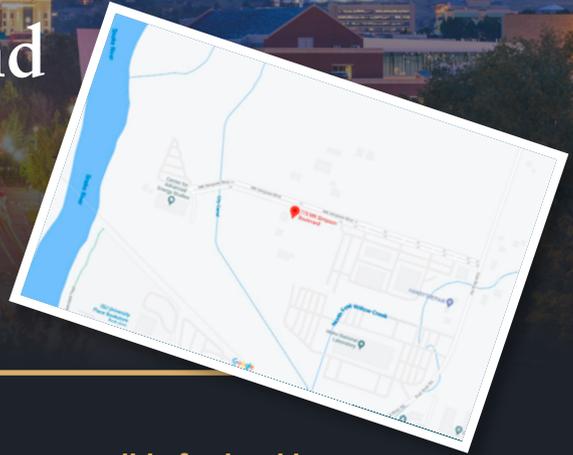
*Dr. Janelle P. Wharry* is an Associate Professor in the School of Materials Engineering at Purdue University and Editor of Materials Today Communications. Dr. Wharry's research aims to understand structure-property-functionality relationships in irradiated materials, with an emphasis on deformation mechanisms and mechanical behavior at the nano/microscale. Her active projects span nuclear structural and cladding alloys, structural materials produced by advanced manufacturing and joining

methods, metal and oxide nuclear fuels, and electroceramic materials. She has published more than 60 peer-reviewed journal articles and conference papers, and has mentored 15 graduate and more than 40 undergraduate researchers. Dr. Wharry's work in nano/micro-mechanical behavior of materials has earned several awards, including the Department of Energy (DOE) Early Career Award, National Science Foundation CAREER Award, and American Nuclear Society (ANS) Landis Young Member Award. She serves as Chair of ASTM International Subcommittee E10.08 on Procedures for Radiation Damage Simulation, was the General Chair of the inaugural Materials in Nuclear Energy Systems (MiNES) Conference, and former Chair of the ANS Materials Science & Technology Division. She received her Ph.D. in Nuclear Engineering & Radiological Sciences from the University of Michigan in 2012. Previously, she was a Nuclear Engineer at Duke Energy, where she worked on core design for the Oconee Nuclear Power Plant.

*Dr. Janelle P. Wharry will attend the ZIRAT26 Seminar in Idaho Falls, USA.*

# Seminar Location and hotels in Idaho Falls

Please click [here](#) to get information on how to get to the conference facility.



*Regarding accommodation, each participant is responsible for booking his/her own room. Here are some recommendations of hotels that are close to the Seminar venue:*

**SpringHill Suites, 665 Riverwalk Drive, Idaho Falls (208) 552-7000 Toll-free 020 795122**



**Fairfield Inn, 1293 West Broadway Idaho Falls**

**(208)552-73782**



Hilton Garden Inn, 700 Lindsay Blvd, Idaho Falls

(208) 522-9500



Le Ritz Hotel, 720 Lindsay Blvd, Idaho Falls

(208) 528-08802



Tru By Hilton, 680 Lindsay Blvd, Idaho Falls

(208) 522-85002



# Seminar Location and hotels in Madrid, Spain

Please click on one of the following links to get information on how to get to the conference facility.

[DOWNLOAD DIRECTIONS TO CAMPUS HERE »](#)

[DOWNLOAD CAMPUS MAP HERE »](#)



*Regarding accommodation, each participant is responsible for booking his/her own room. Here are some recommendations of hotels that are close to the Seminar venue:*

**Hotel Melia Castilla, Calle del Poeta Joan Maragall, 43, 28020 Madrid +34 912 76 47 472**



**Hotel Exe Plaza, Paseo de la Castellana, 191, 28046 Madrid**

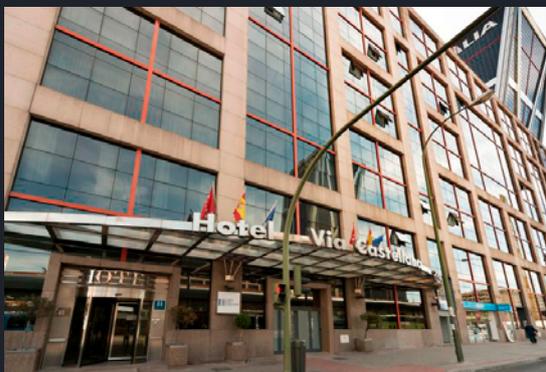
**+34 917 32 70 19**





**Hotel Via Castellana, Paseo de la Castellana, 220, 28046 Madrid**

**+34 915 67 43 00**



**Hotel Barceló Imagine, Calle Agustín de Foxá, 32, 28036 Madrid**

**+34 917 32 70 19**



# Seminar Registration

In addition to hotel/room reservation, you must also register for the ZIRAT26, and/or LCC17.

Please fill out the online registration by clicking here »



*If you need assistance, please contact us via e-mail: [seminar@antinternational.com](mailto:seminar@antinternational.com)*



We cordially invite you to attend our seminars.  
*Mikaela Strand and Peter Rudling*



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