

Plenary lectures

Christof Gaiser

Physikalisch-Technische Bundesanstalt, Institut Berlin, Germany

“New SI” - Temperature and the Boltzmann constant



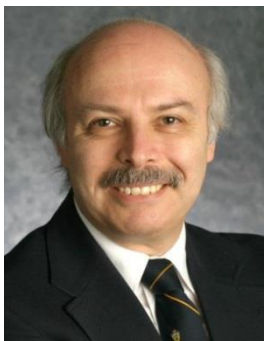
Christof Gaiser received his diploma degree in physics at the “Humboldt-Universität zu Berlin” in the field of optical and electrical properties of semiconductors in 2003. Since 2004 he is with the Physikalisch-Technische Bundesanstalt (PTB) in Berlin and received his doctor degree in 2008 in physics in the field of thermophysical properties of helium at low temperatures and gas thermometry. Since 2007 he has been leading the project dedicated to the determination of the Boltzmann constant as basis for redefining the base unit kelvin. The so called dielectric-constant gas

thermometry was used for this determination. This method combines different disciplines in physics ranging from properties of solids to gas properties and from pressure measurement to measurement of electrical units. All of these properties have to be measured together on the metrological top level, which made this work a challenge. The successful end of the project allows now for a new definition of the kelvin in 2018. The fields of his future work are thermophysical properties of gases and noise thermometry for the realization of the new kelvin.

Andreas Mandelis

Center for Advanced Diffusion-Wave and Photoacoustic Technologies (CADIPT),
Department of Mechanical and Industrial Engineering, University of Toronto, Toronto
Canada

*Photothermal Coherence Tomography: Principles and Applications of a New
Thermophysics-Based Three-Dimensional Imaging Methodology*



Andreas Mandelis is a Full Professor of Mechanical and Industrial Engineering; Electrical and Computer Engineering; and the Institute of Biomaterials and Biomedical Engineering, University of Toronto. He is the Canada Research Chair in Diffusion-Wave and Photoacoustic Sciences and Technologies and Director of the Center for Advanced Diffusion-Wave Technologies (CADIPT) at the University of Toronto. He received his BS degree (Magna cum Laude) in physics from Yale University, and MA, MSE, and Ph.D. degrees from the Applied Physics and Materials Laboratory, Princeton University. He is the author and co-author of more than 380 scientific papers in refereed journals and 190 scientific and technical proceedings papers. He is Editor-in-Chief of the Springer International Journal of Thermophysics, an Associate Editor of the AIP Journals Review of Scientific Instruments, Journal of Applied Physics, Topical Editor of the OSA Journal Optics Letters, and he is on the editorial board of the SPIE Journal of Biomedical Optics. He is Consulting

Editor of the AIP flagship magazine *Physics Today*. He has several inventions, 38 patents and patents pending in the areas of photothermal tomographic imaging, signal processing and measurement, hydrogen sensors, dental laser diagnostics (biothermophotonics), semiconductor laser infrared photothermal radiometry, laser photo-carrier radiometry and laser biophotoacoustic tissue imaging. He holds the Canada Research Chair (Tier 1) in Diffusion-Wave and Photoacoustic Sciences and Technologies at the University of Toronto. He is also a National 1000-Talents Professor at the University of Electronic Science and Technology of China in Chengdu.

Professor Mandelis has received numerous national and international prizes and awards including the APS Keithley Award in Instrumentation Science, the Discovery Award in Science and Engineering (the Ontario Premier's Innovation Award), the ASME 2009 Yeram Touloukian Award (and Medal) in Thermophysics, the Senior Prize of the International Photoacoustic and Photothermal Association, the Canadian Association of Physicists (CAP) Medal for Outstanding Achievement in Industrial and Applied Physics and the CAP-INO Medal for Outstanding Achievement in Applied Photonics. In 2014 he was elected Killam laureate, recipient of the Killam Prize in Engineering, Canada's highest academic prize awarded annually by the Governor General of Canada.

Wolfgang Schützenhöfer

Department testing laboratories, BÖHLER Edelstahl GmbH & Co KG, Kapfenberg, Austria

Numerical Simulation as an Optimization Tool at a Special Steel Producer (Böhler Edelstahl)

Wolfgang Schuetzenhoefer is manager of ISO 17025 accredited laboratories at Böhler Edelstahl GmbH & Co KG in Kapfenberg, Austria. He received his master degree in metallurgy from University of Leoben, his Ph.D. degree from steel metallurgy from University of Leoben. He is the author and co-author of approx. 90 scientific papers in refereed journals and scientific and technical proceedings papers. He is a free peer reviewer for Metallurgical and Materials Transactions B and invited peer reviewer for International Journal of Thermophysics. Formerly he was University Assistant at the Chair of Ferrous Metallurgy at the University of Leoben. At Böhler Edelstahl he started with numerical simulation of different production processes such as heat treatment, remelting technologies and casting processes. He has been innovation manager for more than 4 years. Additionally he is lecturer at the University for Applied Sciences Upper Austria for "Heat Treatment Simulation" and ISO 17025-Auditor for metal testing for the Austrian Federal Ministry of Science, Research and Economy.



Dr. Schuetzenhoefer has received the international awards for the best paper at the "International Conference on Liquid Metals Processing and Casting" and the "Hans Malzacher Prize" for outstanding activities in the metallurgy of ASMET (Austrian Society for Metallurgy and Materials).

Invited talks

Boris Wilthan

Thermodynamics Research Center, Material Measurement Laboratory, Protiro @ National Institute of Standards and Technology, Boulder, CO, USA

A free online NIST/TRC Resource for Thermophysical Property Data of Metals and Alloys



Boris Wilthan is a Physicist working at the Thermodynamic Research Center (TRC) at the National Institute of Standards and Technology (NIST) in Boulder, USA. He received his MS and Ph.D. in experimental physics from Graz University of Technology (TUG) in 2005.

After working on the characterization of thermophysical properties of metals in the liquid state with a μs -pulse heating technique and Differential Scanning Calorimetry, he focused on infrared radiometric characterization of sources and materials, in particular reflectance and emittance, during his time as a Postdoc at

the Optical Technology Division at NIST Gaithersburg, USA.

A researcher excellence grant from EURAMET funded his work "Improvement and validation of techniques and methods for accurate measurements of specific heat capacities up to 2600 K." at TUG and PTB in Braunschweig, Germany. In a staff position at PTB Berlin, he also worked on the determination of definitive thermodynamic temperatures for the melting points of high temperature fixpoints from carbon eutectics by radiometric methods for the next international temperature scale.

Since 2014 he is with TRC at NIST Boulder and is dedicated to his work to create improved, dynamically evaluated resources for thermophysical property data of metals and alloys. His work includes the design, implementation and enhancement of data capture procedures, abstraction and assessment of published properties data in this field, assessments of data quality, and predictive technologies derived primarily from original sources published in scientific literature.

He is author or co-author of more than 40 scientific peer reviewed papers and in 2011, Dr. Wilthan has received the Charles Lucks Award for significant contributions to the field of thermophysics by a young researcher from the International Thermal Conductivity Conference.

Douglas M. Matson

Mechanical Engineering Department, Tufts University, Medford MA, USA

In-Situ Property Measurement for Selection and Control of convection in EML Space Experiments



Douglas Matson is an Associate Professor and the Program Director of the Mechanical Engineering Department at Tufts University and an Adjunct Associate Professor of the Tisch College of Citizenship and Public Service. He received his BS degrees in Chemical Engineering from Cornell University and Mechanical Engineering from California State University - Sacramento, his MS in Materials Science from UC-Davis, and his Ph.D. degree in Materials Engineering from MIT. He is a registered Professional Engineer in Chemical Engineering in California. He is the editor of a book on rapid solidification and is author or co-author of more than 35 scientific papers in refereed journals and 50 scientific and technical proceedings papers. He has co-organized 13 symposiums relating to space physical science, thermophysical property measurement and solidification phenomena. Professor Matson was an Erskine Fellow at the University of Canterbury, Christchurch NZ and visiting scientist at both the NASA Marshall Space Flight Center in Huntsville AL USA and the German Space Agency (DLR) in Köln Germany. He has numerous reduced-gravity space science opportunities including parabolic aircraft missions on the KC-135 vomit comet in Johnson Space Center in Houston Texas and the Novespace A300 Zero-G in Bordeaux-Mérignac France, drop tube experiments at Vanderbilt and at NASA, the TEXUS-49 DLR sounding rocket experiment from ESRANGE Space Center outside Kiruna Sweden, and three space experiments as TEMPUS lead scientist on the NASA shuttle Columbia. He has two ongoing space collaborations on the ISS; a thermophysical property measurement program using the JAXA Electrostatic Levitator ELF and the ESA electromagnetic levitator MSL-EML collaboration for which he serves as Speaker of the International Working Group and NASA Facility Scientist.

Hiroyuki Shibata

IMRAM, Tohoku University, Sendai, Japan

Thermal diffusivity measurement for metallic and oxide glasses using a laser flash method



Hiroyuki Shibata is a Full Professor of the Institute of Multidisciplinary Research for Advanced Materials, Tohoku University. He received his BS degree in material science and engineering from Tohoku University, and Master and Dr.Eng. degrees from Tohoku University. He is the author and co-author of more than 120 scientific papers in refereed journals. He is an Associate Editor of High temperature materials and processes and he is on the editorial board of ISIJ International, the iron and steel institute of Japan.

Professor Shibata has received several national and international prizes and awards including the best paper prizes in the iron and steel institute of Japan and John-Chipman Award (Iron and Steel Society in U.S.A).

Michal Fulem

Department of Physical Chemistry, University of Chemistry and Technology, Prague, Czech Republic

Thermodynamic properties and phase behavior of molecular crystals – theory and experiment hand in hand



Michal Fulem is an Associated Professor at the Department of Physical Chemistry at the Faculty of Chemical Engineering at the University of Chemistry and Technology, Prague (UCT Prague). He received his MS degree in Analytical and Physical Chemistry in 2000 and Ph.D. degree in Physical Chemistry in 2004 from UCT Prague. He then went on to do postdoctoral studies at the University of Porto, Portugal (with prof. M.J.S. Monte and prof. L.M.N.B.F. Santos, 2005-2006) and the University of Alberta, Canada (with prof. John M. Shaw, 2006-2008) and for short-term stays at NIST, USA as a guest researcher (with Dr. Robert F. Berg, 2010-2012). He is the author and co-author of more than 60 scientific papers in refereed journals. His research interests focus mainly on the study of phase behavior and thermophysical properties of organic and organometallic compounds by both experimental and theoretical methods (using electronic structure and statistical thermodynamics calculations), development of experimental set-ups and methodologies, and chemical thermodynamics. Michal Fulem has received several national and international awards among which the IACT Doctorate Award for excellence in thermodynamics (2006) and the Award of Ministry of Education, Youth and Physical Education of the Czech Republic (2004) can be mentioned.

Manuel J Monte

Department of Chemistry and Biochemistry, Faculty of Science, University of Porto, Porto, Portugal

Estimation of phase transition properties of halogenated benzenes



Manuel J. S. Monte is Associate Professor of Department of Chemistry and Biochemistry of the Faculty of Science of University of Porto (FCUP). He was member of the first General Board of the University (2009-2013), Head of the Department of Chemistry (2006-2007) member of the Scientific Board of FCUP since 2006, and he is Vice-Chairman of the Representatives Council of this Faculty. He received his PhD degree (*Magna cum Lauda*) in Chemistry (Physical-Chemistry) in 1990 from University of Porto under the supervision of Prof. Ribeiro da Silva. Part of his PhD work was done in the Thermodynamic Group of the University of Utrecht under the supervision of Prof. C. G. de Kruif and colleagues.

He was the godfather of the Honoris Causa Doctorate of Professor Carl Djerassi by the University of Porto (2011) and has translated into Portuguese two science-in-fiction books from this author, edited by the University of Porto (Oxygen and Phallacy). He has authored a book chapter (NATO ASI Series, 1999) and has co-authored nearly 100 scientific articles published in peer reviewed journals. He was co-Editor of a special issue of Journal of Chemical Thermodynamics (2014) and he is member of the Editorial Advisory Board of this Journal.

Mark B. Shiflett

Chemical and Petroleum Engineering Center for Environmentally Beneficial Catalysis, Life Sciences Research Laboratory, University of Kansas, Lawrence KA, USA

Ionic Liquids – Phase Behavior to Applications



Mark B. Shiflett is a Distinguished Foundation Professor in the School of Engineering at the University of Kansas. Professor Shiflett has a joint appointment in the Department of Chemical and Petroleum Engineering and the Center for Environmentally Beneficial Catalysis. Professor Shiflett recently joined the University of Kansas as the final Foundation Professor in August 2016. Professor Shiflett received his Ph.D. and M.S. degrees in chemical engineering from the University of Delaware in 2001 and 1998. He received his B.S. degree (Magna cum laude) in chemical engineering from N.C. State University in 1989. Dr. Shiflett recently retired from the DuPont Company after 28 years of service. He was a Technical Fellow in the Central Research and Development organization which is located at the Experimental Station in Wilmington, Delaware. Professor Shiflett was also an adjunct professor at the University of Delaware in the Department of Chemical and Biomolecular Engineering. Professor Shiflett is an inventor on 40 U.S. patents and has published over 70 articles on his research at DuPont. He was awarded the DuPont Bolton Carothers award in 2005, the ACS Hero of Chemistry award in 2006 and the University of Delaware presidential citation in 2007 for his development of hydrofluorocarbon refrigerant mixtures to replace chlorofluorocarbons which were linked to the depletion of the Earth's ozone layer. Three of these refrigerant mixtures were commercialized by the DuPont Company and have generated over \$1 Billion in revenue for the company. Professor Shiflett was elected in 2014 to be a Fellow in the American Institute of Chemical Engineers and in 2016 to be a Division Fellow in the American Chemical Society for his significant professional accomplishments and contributions to the chemical engineering profession. Professor Shiflett received the American Institute of Chemical Engineers Institute award for Industrial Research in 2016 for the development of non-ozone-depleting refrigerants which have led to the healing of the Earth's ozone layer, new applications using ionic liquids, an environmentally friendly TiO₂ process and mentoring and educating chemical engineers. Professor Shiflett is a licensed professional engineer and his research at KU focuses on environmentally friendly, energy efficient processes and products for the chemical industry.

