

**10th Nordic Conference
on
Plasma Spectrochemistry**

**June 12 - 15, 2022
Loen, Norway**



Programme and Abstracts



2 Welcome Letter

Dear colleagues,

On behalf of the Analytical Section of the Norwegian Chemical Society and the Organising Committee it is an honour and pleasure to welcome you to Loen and the 2022 Nordic Conference on Plasma Spectrochemistry. This conference provides both an international and regional forum by which researchers and users can share their knowledge and exchange ideas.

The plenary programme has been planned with a view of furnishing a comprehensive overview of the latest developments in this scientific field. Since some of the world's leading authorities will be present, the conference will hopefully be a stimulating forum for communication across borders and between scientific disciplines.

In contrast to other plasma spectrochemistry meetings, short tutorial courses will be offered to all participants during the three and a half day meeting which may be attractive to participants who can learn about or to be updated on plasma spectrochemistry and applications. This concept is meant to stimulate especially Nordic users of plasma-based techniques to learn more about theoretical and practical issues as well as to obtain specialists recommendations for method improvements.

We know that the natural beauty of the area will captivate you, but we also hope that the conference excursions, social events, and outdoor farewell dinner may complement the scientific endeavours. We promise you an exciting and memorable conference and stay in Loen!

On behalf of the Organising Committee

Yngvar Thomassen
Chairman

3 Organising and Scientific Committee

Yngvar Thomassen (Chairman), National Institute of Occupational Health, Oslo and
Norwegian University of Life Sciences, Ås
Elin Gjengedal, Norwegian University of Life Sciences, Ås
Balazs Berlinger, University of Veterinary Medicine, Budapest, Hungary
Ivar Martinsen, GE Healthcare, Oslo
Arne Åsheim, (Exhibition coordinator), 3A pro analysi, Porsgrunn
Oddvar Røyseth, (Treasurer) , Røyseth AS, Oslo
Jens Sloth, Technical University of Denmark, National Food Institute, Denmark
Ari Väisänen, University of Jyväskylä, Finland

4 General Information

Conference Desk

The conference desk is situated in the conference foyer of Hotel Alexandra. It will operate as follows:

Saturday	June 11	15:00 - 18:00
Sunday	June 12	07:30 - 08:15
Monday	June 13	07:30 - 08:00
Tuesday	June 14	07:30 - 08:00
Wednesday	June 15	08:30 - 09:00

Participants are requested to register as soon as possible upon arrival to the conference venue, Hotel Alexandra, Loen.

Conference Venue

All oral and poster sessions will be held in the various auditoriums of Hotel Alexandra.

Tel: +47 57 87 50 00 Fax: +47 57 87 50 51 Email: alex@alexandra.no
Homepage: www.alexandra.no

Meals

Participants staying at Hotel Alexandra are served breakfast, lunch and dinner (all included in their accommodation package).

5 Social Programme

Saturday, June 11, 17:00 - 19:00 Informal get-together in the Hotel Alexandra Bath & Spa

All delegates and accompanying persons are invited to enjoy the heated outdoor swimming pool and refreshments. *This event is kindly sponsored by PerkinElmer.*

Sunday, June 12, 14:15: Half-day excursion to Geiranger

This tour encompasses a mountain plateau above the tree and snow lines, the summit of Dalsnibba (1746 m), and a sail of 25 km along the spectacular Geirangerfjord.

Price per person: NOK 750 (not included in the registration fee).

Sunday, June 12, 14:15: Guided walk to Bødal Glacier

On the Bødal Glacier in Loen Valley you can enjoy a genuine walking experience in beautiful West Norwegian surroundings. The whole trip, rated a moderately difficult hike, takes from five to six hours.

The Bødal Valley, with the Bødalseter summer pasture farms and the Bødal Glacier, is one of the gems of the Jostedalbreen National Park. Take a rucksack, clothes, food and drink for a half day walk. Good strong mountain boots will be an advantage.

Free of charge.

Sunday, June 12, 14:15: Mountain hiking for fit spectroscopists: The Skåla Challenge

Those who want to challenge the Norwegian mountains after lunch may climb to the Klaumann Tower at Skåla Mountain. This is the hardest uphill walk in entire Norway, approx. 1800 m straight up. Presently there may still be much snow above 1000 meters. Hikers are advised to bring appropriate footwear and clothing for this walk. Free of charge, but we promise; you will sweat!

Sunday, June 12, 14:15: Loen Skylift

Loen Skylift is a spectacular attraction and adventure arena in the inner part of the Nordfjord. A cable car will lift you from the fjord to 1011 m above sea level. Here you can enjoy the views of the fjord landscape – from the restaurant table, or while exploring in the mountains. NOK 555 (not included in the registration fee)

Monday, June 13, 21:30: Bring your own wine to the poster viewing and wine tasting

The cork fee charged by the hotel to allow you to bring your own wine is kindly sponsored by *Agilent Technologies and Matriks AS*

Tuesday, June 14, 16:30: Excursion to the Briksdal Glacier with a conference outdoor dinner

You are invited to visit the heart of Norway - an **Unforgettable** trip to the Briksdal Glacier. Participants can enjoy a walk to view the enormous cascade of ice where you will be able to test the best aquavite in the world; *Gilde Aqua Ultra Plus*, or the local *Loen Apple Juice* sponsored by *HolgerHartmann/Milestone*.

Afterwards there will be the famous outdoor barbeque at "Kleivane" (weather permitting - otherwise the grill party will be held at Briksdalen Inn).

The well-known Norwegian gourmet chef Frode Aga will once again be in charge of the kitchen to ensure your best outdoor food experience.

This event is kindly sponsored by Shimadzu, NU and HolgerHartmann/Milestone.

6 Scientific Programme

Oral presentations

Invited plenary lectures and submitted oral contributions will be 25 and 15 minutes in length, respectively (including discussion).

Video projectors will be provided in all lecture rooms.

Posters

The posters should be mounted in the early morning on Sunday June 12, in the poster area located next to the lecture room. Materials for poster mounting are available either from the conference desk or in the poster mounting area.

Language

The working language of the conference is english.

7 Liability

The Organising Committee declines any responsibility whatsoever for injuries or damages to persons or their property during the conference.

8 Sponsors and exhibitors

The conference is sponsored by





The exhibition of scientific instrumentation, literature and consumables is located next to the auditorium at the first floor.

The following companies have registered for display and demonstration:

Holger Hartmann AS/ Milestone
Houm AS
LAB Norway AS
Matriks AS/Agilent Technologies
Nu Instruments
Perkin Elmer
Shimadzu Europa GmbH
Thermo Fisher Scientific

9 Correspondence after the conference

Yngvar Thomassen
National Institute of Occupational Health
P.O. Box 8149 DEP, N-0033 Oslo, Norway
Tel: +47 23 10 53 20 +47 99 51 05 21
E-mail: Yngvar.Thomassen@stami.no

10 Schedule of events**Saturday, June 11, 2022**15:00 - 18:00 **Registration**17:00 - 19:00 **Informal get-together in the Hotel Alexandra Bath & Spa**
This event is kindly sponsored by PerkinElmerFrom 19:00 **Dinner****Sunday, June 12, 2022**07:30 - 08:15 **Registration**08:00 - 08:15 **Welcome and opening remarks**08:15- 13:00 **Plenary session I: Progress in plasma spectrochemistry**
Poster viewing and exhibition13:00 **Lunch**14:15 **Excursion to Geiranger, The Skåla Challenge, Loen Skylift and guided walk to Bødal Glacier**From 19:00 **Dinner****Monday, June 13, 2022**08:00 – 12:55 **Plenary session II: Bio-imaging and speciation**
Poster viewing and exhibition13:00 - 14:15 **Lunch**14:15 – 15:45 **Plenary session III: Applications of plasma spectrochemistry**
Poster viewing and exhibition15:45-16:00 **Coffee break, exhibition and poster viewing****Short course session I**16:00 - 17:45 **Short course** **Short course** **Short course** **Short course** **Short course**
 A1 **A2** **A3** **A4** **A5**

Short course session II

18:00 -19:45 **Short course B1** **Short course B2** **Short course B3** **Short course B4** **Short course B4**

From 19:00 **Dinner**

21:30 **Poster viewing and discussions with wine tasting
(Bring your own wine)**
This event is sponsored by Matriks AS and Agilent Technologies

Tuesday, June 14, 2022

08:00 - 08:15 **The Nordic Plasma Torch Award**

08:15 – 10:20 **Plenary Session IV: Single particle and single cell analysis by plasma spectrochemistry
Poster viewing and exhibition**

10:35-13:30 **Plenary Session V: New analytical capabilities**

13:35 - 14:30 **Lunch**

Short course session III

14:30 - 16:15 **Short course C1** **Short course C2** **Short course C3** **Short course C4** **Shor course C5**

16:30 **Excursion to Briksdal Glacier and conference outdoor dinner**

Wednesday, June 15, 2022

08:15 – 09:45 **Plenary Session VI: Applications of plasma spectrochemistry**

Short course session IV

09:45 - 11:30 **Short course D1** **Short course D2**

11:30 – 11:45 **Closing remarks and farewell**

12:00 **Lunch**

1 Daily Programme**Sunday, June 12, 2022****Time Abstr.**

08:00-
08:15 **Welcome/Opening remarks**
Yngvar Thomassen, Conference chairman

Session I: Progress in plasma spectrochemistry

Chairman:

08:15 O-1 **Distinguished Speaker Lecture: And Now What?**
08:50 Gary M. Hieftje
Indiana University, USA

08:50- O-2 **New possibilities in single cell analysis via ICP-TOF-MS – Zooming into the**
09:15 **region where materials meet environment**
Björn Meermann
Federal Institute for Materials Research and Testing (BAM) – Berlin, Germany

09:15- O-3 **Unique uses of plasmas: From molecular analysis to chemical synthesis**
09:40 Jacob T. Shelley
Rensselaer Polytechnic Institute, Troy, USA

09:40- O-4 **High-precision MC-ICP-MS isotopic analysis of essential mineral elements as a**
10:05 **tool in biomedical research**
Frank Vanhaecke, Yulia Anoshkina, Marta Costas-Rodriguez, Rosa Grigoryan,
Agustina A.M.B. Hastuti, Kasper Hobin and Lana Van Heghe
Atomic & Mass Spectrometry – A&MS research unit, Department of Chemistry,
Ghent University, Belgium

10:05- **Coffee, exhibition and poster viewing**
10:20

Session I continues: Progress in plasma spectrochemistry

Chairman:

10:20- O-5 **Laser Ablation Research & Development: 60 Years Strong**
11:45 Richard E. Russo
Applied Spectra, Inc., West Sacramento, CA, USA
Lawrence Berkeley National Laboratory, Berkeley, CA, USA

10:45- O-6 **Improving the solution cathode glow discharge atomic emission spectrometry**
11:10 **source through discharge-liquid interaction studies and novel instrumental**
approaches
Jaime Orejas¹, Nicholas V. Hazel², Yinchexi Zhang¹, Cristian Soto Gancedo¹, Jorge
Pisonero¹, Steven J. Ray² and Nerea Bordel¹
¹Grupo de Espectroscopia, Láseres y Plasmas, Universidad de Oviedo, Mieres,
Spain
²Department of Chemistry, University at Buffalo, Buffalo NY, USA

11:10- O-7 **Intracellular element and nanoparticle analysis by nanoscale secondary ion mass**
11:35 **spectrometry**
Dirk Schaumlöffel and Maria Angels Subirana
CNRS/Université de Pau et des Pays de l'Adour, Pau, France

- 11:35-12:00 O-8 **The LS-APGD microplasma: A versatile ionization source for elemental, isotopic and molecular species determinations**
R. Kenneth Marcus,
Department of Chemistry, Clemson University, Clemson, USA
- 12:00-12:15 O-9 **Thin-layer chromatography surfaces for enhanced plasma-based ambient desorption/ionization mass spectrometry**
Maximilian Heide, Cristian C. Escobar-Carranza, Manuel Heinelt, Désirée A.-M. Schütz and Carsten Engelhard
University of Siegen, Department of Chemistry and Biology, Germany
- 12:15-12:30 O-10 **Glow discharge-mass spectrometry in the field of lithium batteries-Overcoming challenges in method development**
Malina Helling¹, Maximilian Mense¹, Simon Wiemers-Meyer¹, Martin Winter^{1,2}, Sascha Nowak¹
¹ University of Münster, MEET Battery Research Center, Münster, Germany
² Helmholtz-Institute Münster, IEK 12, Forschungszentrum Jülich GmbH, Münster, Germany
- 12:30-12:45 O-11 **Isobaric dilution analysis as a tool for the internal quantification of ⁹⁹Tc in aqueous samples**
M. Horstmann^a, C. Derrick Quarles Jr.^b, S. Happel^c, A. Faust^d, U. Karst^a
^a University of Münster, Institute of Inorganic and Analytical Chemistry, Münster, Germany, ^bElemental Scientific, Inc., 7277 World Communications Dr., Omaha, NE, USA
^c Triskem International, Rue Maryse Bastié, Campus de Ker Lann, Bruz, France, ^d European Institute for Molecular Imaging, Münster, Germany
- 12:45-13:00 O-12 **High precision in-situ Rb-Sr dating using the Thermo Scientific Neoma MS/MS MC-ICP-MS**
G. Craig¹, S. Dalby¹, C. Bouman¹, J. Roberts¹, N. S. Lloyd¹ and J. Schwieters¹
¹Thermo Fisher Scientific, Bremen, Germany
- Lunch**
- 14:15- **Excursion to Geiranger, the Skåla challenge, guided walk to Bødal Glacier And Loen Skylift**
- From 19:00 **Dinner**

Monday, June 13, 2022**Session II: Bio-imaging and speciation**

Chairman:

- | Time | Abstr. | |
|-------------|---------------|--|
| 08:00-08:25 | O-13 | High-resolution and high-speed imaging by LA-ICP-TOF-MS
<u>Sarah Theiner</u> ^a , Andreas Schweikert ^{a,b} , Oana Voloaca ^c , M. Clench ^c , L. Cole ^c , S. Haywood-Small ^c , Bernhard K. Keppler ^b , Gunda Koellensperger ^a
^a Institute of Analytical Chemistry, Faculty of Chemistry, University of Vienna, Austria, ^b Institute of Inorganic Chemistry, Faculty of Chemistry, University of Vienna, Austria, ^c Biomolecular Sciences Research Centre, Sheffield Hallam University, Sheffield, U.K |

- 08:25-08:50 O-14 **Quantitative bioimaging by LA-ICP-MS as a tool to study genetic disorders of the iron and metabolism**
Michael Sperling, Jennifer-Christin Müller and Uwe Karst
University of Münster, Institute of Inorganic and Analytical Chemistry, Germany
- 08:50-09:15 O-15 **ICP-MS as a workhorse to study how nanoparticles can be tailored to efficiently deliver nutrients to agricultural plants**
Søren Husted
University of Copenhagen, Department of Plant and Environmental Sciences, Frederiksberg C, Denmark
- 09:15-09:30 O-16 **Bioimaging of Zn and Cd in leaves of hyperaccumulator *Arabidopsis halleri* using laser ablation-inductively coupled plasma-mass spectrometry with referencing strategies**
Maximilian von Bremen-Kühne¹, Hassan Ahmadi², Michael Sperling^{1,3}, Ute Krämer² and Uwe Karst¹
¹Institute of Inorganic and Analytical Chemistry, University of Münster,
²Molecular Genetics and Physiology of Plants, Ruhr University Bochum,
³European Virtual Institute for Speciation Analysis (EVISA), Münster, Germany
- 09:30-09:45 O-17 **Elemental bioimaging for the simultaneous quantification of cisplatin and a gadolinium-based contrast agent in liver tissue**
Katharina Kronenberg¹, Julia Werner², Peter Bohrer², Fabian Lohöfer², Rickmer Braren², Philipp Paprottka², Uwe Karst¹
¹University of Münster, Institute of Inorganic and Analytical Chemistry,
²Technical University of Munich, Department of Diagnostic and Interventional Radiology, Faculty of Medicine, Germany
- 09:45-10:05 **Coffee break, exhibition and poster viewing**
- Session II continues: Bio-imaging and speciation**
Chairman:
- 10:05-10:30 O-18 **Fluorine speciation using ICP-MS: Is that necessary and useful?**
Jörg Feldmann^{1,2}, Viktoria Mueller^{1,3}, Amnah Al Zbedy², Tengetile Nxumalo²
¹TESLA-Analytical Chemistry, University of Graz, Austria
²TESLA-Department of Chemistry, University of Aberdeen, Scotland
³James Hutton Institute, Craigiebuckler, Aberdeen, Scotland
- 10:30-10:55 O-19 **Potential toxic elements and arsenic species in new aquafeed ingredients - are there concerns in terms of feed and food safety?**
Veronika Sele^a, Jojo Tibon^{a,b}, Anne-Katrine Lundebye^a, Tore Strohmeier^a, Marta Silva^a, Robin Ørskov^a & Jens J. Sloth^{a,b}
^a Institute of Marine Research, Bergen, Norway
^b National Food Institute, Technical University of Denmark, KGS Lyngby, Denmark
- 10:55-11:10 O-20 **Speciation analysis of arsenic in seafood and seaweed at the U.S. Food and Drug Administration**
Mesay Mulugeta Wolle, Sean D. Conklin and Todor Todorov
Center for Food Safety and Applied Nutrition, U.S. Food and Drug Administration, College Park, MD, USA

- 11:10-11:25 O-21 **Arsenic speciation in mesopelagic biomass – An insight into arsenic behavior during aquafeed processing**
Jojo Tibon^{1,2}, Heidi Amlund², Ana I. Gomez-Delgado¹, Marc H. G. Berntssen¹, Marta S. Silva¹, Martin Wiech¹, Jens J. Sloth^{1,2}, and Veronika Sele¹
¹Institute of Marine Research, Bergen, Norway
²National Food Institute, Technical University of Denmark, KGS Lyngby, Denmark
- 11:25-11:40 O-22 **Fast and automated total arsenic and arsenic speciation by inductively coupled plasma mass spectrometry**
C Derrick Quarles Jr.¹, Patrick Sullivan¹, Nick Bohlim¹, Nathan Saetveit¹, Michael Szoltysik²
¹Elemental Scientific, Inc., Omaha, NE, USA
²Elemental Scientific Sweden, Lidköping, Sweden
- 11:40-11:55 O-23 **Occupational exposure to organotin substances: Speciation of organotin compounds in workplace air samples via HPLC-ICP-MS**
T. Schwank^{1*}, C. Claesgens¹, K. Pitzke¹, D. Breuer¹
¹Institute for Occupational Safety and Health of the German Social Accident Insurances – IFA, Sankt Augustin, Germany
- 11:55-12:10 O-24 **Identification and quantification of metal complexes by isotope dilution HPLC - ICP MS / ESI MS**
Katarzyna Kińska, Luluil Maknun, Katarzyna Bierla, Ryszard Lobinski. Joanna Szpunar
Institute of Analytical and Physical Chemistry for the Environment and Materials Pau, France
- 12:10-12:25 O-25 **Utilization of ICP-MS technique for investigation of bovine lactoferrin interactions with metals and characterization of respective metal-rich protein complexes**
Oleksandra Pryshchepa^{1,2}, Katarzyna Rafińska^{1,2}, Adrian Gołębiowski^{1,2}, Agnieszka Rogowska^{1,2}, Philippe Schmidt-Koplin^{3,4}, Bernhard Michalke⁴, Bogusław Buszewski^{1,2}, Paweł Pomastowski¹.
¹Centre for Modern Interdisciplinary Technologies Nicolaus Copernicus University in Torun, Poland
²Department of Environmental Chemistry and Bioanalytics, Faculty of Chemistry, Nicolaus Copernicus University in Torun, Poland
³Comprehensive Foodomics Platform, Chair of Analytical Food Chemistry, TUM School of Life Sciences, Technical University of Munich, Freising, Germany
⁴Helmholtz Zentrum Muenchen, Analytical BioGeoChemistry, Neuherberg, Germany
- 12:25-12:40 O-26 **Challenges of ultra-trace speciation analysis of chromium in foodstuffs by species-specific isotope dilution and HPLC-ICP-MS**
Petru Jitaru^{1*}, Marina Saraiva^{1,2}, Thierry Guerin³ and Jens Sloth²
¹French Agency for Food, Environmental and Occupational Health & Safety (ANSES), Laboratory for food safety, Maisons-Alfort, France,²National Food Institute, Technical University of Denmark, Kemitorvet, KGS Lyngby, Denmark,³French Agency for Food, Environmental and Occupational Health & Safety (ANSES), Directorate of Strategy and Programs, Maisons-Alfort, France
- 12:40-12:55 O-27 **Rapid speciation analysis of anthropogenic gadolinium in surface and drinking water**
Marcel Macke,¹ Mathis Athmer,¹ C. Derrick Quarles Jr.,² Michael Sperling¹ and Uwe Karst¹
¹University of Münster, Institute of Inorganic and Analytical Chemistry, Germany
²Elemental Scientific Inc., 7277 World Communications Dr., Omaha, NE, USA

13:00-
14:15**Lunch****Session III: Applications of plasma spectrochemistry**

Chairman:

Time **Abstr.**14:15-
14:30O-28 **A metrological journey into the high accuracy determination of total arsenic in biological materials by ICP-MS**John Entwisle, Christian Ward-Deitrich, Sarah Hill and Heidi Goenaga-Infante
LGC Ltd., Leatherhead, UK14:30-
14:45O-29 **Using ICP-TOFMS to significantly reduce measurement uncertainty for Pd, Pt and Rh in autocatalysts**Stanislav Strekopytov, John Entwisle, Christian Ward-Deitrich, Sarah Hill and Heidi Goenaga-Infante
LGC National Measurement Laboratory, Teddington, Middlesex, UK14:45-
15:00O-30 **Evaluating multi-energy calibration as a potential tool for regulatory analysis of nutrient elements in food ICP-OES**Jake A. Carter, Patrick J. Gray, and Todor I. Todorov
Center for Food Safety and Applied Nutrition, United States Food and Drug Administration, College Park, MD, 20740, USA15:00-
15:15O-31 **Rapid and accurate determination of uranium and neodymium concentrations in environmental and urine samples using standards addition HPIC-SF-ICP-MS**Nancy N. Wanna, Andrew Dobney, Mirela Vasile, Karen Van Hoecke and Ingrid Geuens
Belgian Nuclear Research Centre SCK CEN, Mol, Belgium15:15-
15:30O-32 **Development of a microsystem dedicated to the selective capture of uranyl-target proteins**Marta Garcia-Cortes¹, Monica Araya-Farias^{2,3}, Thuy Tran⁴, Claude Vidaud⁵, François Becher⁶, Carole Bresson¹¹Université Paris-Saclay, CEA, Service d'Etudes Analytiques et de Réactivité des Surfaces, Gif-sur-Yvette, France²Institut Curie, Université PSL, Paris, France³Institut Pierre-Gilles de Gennes pour la Microfluidique (IPGG), Paris, France⁴Université Paris-Saclay, CNRS, Institut Galien Paris Saclay, Châtenay-Malabry, France.⁵CEA, BIAM, Institut de Biosciences et Biotechnologies d'Aix-Marseille, CEA-Marcoule, Bagnols Sur Cèze, France⁶Université Paris-Saclay, CEA, Service de Pharmacologie et Immunoanalyse (SPI), Gif-sur-Yvette, France15:30-
15:45O-33 **Reflections on the first decade of triple Quadrupole ICP-MS: Addressing challenging applications using ICP-MS/MS**Uwe Noetzel¹, Glenn Woods², and Ed McCurdy²¹Agilent Technologies Germany; ²Agilent Technologies LDA (UK) Ltd15:45-
16:00**Coffee break, exhibition and poster viewing**

Short Course Session I

16:00- 17:45	A1-A5	A1 Ilia Roduskhin Sources of contamination and remedial strategies A5 Carsten Engelhard Nanomaterials characterization by ICP-MS in single particle mode and related techniques	A2 Rick Russo Eliminate sample digestion	A3 Jörg Feldmann Arsenic speciation, how to it for rice and seafood: routine and affordable options	A4 Kenneth Marcus Use of the orbitrap as an analyzer for isotope ratio mass spectrometry
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Short Course Session 2

17:55- 19:40	B1-B5	B1 Jacob Shelley Unique uses of plasmas: From molecular analysis to chemical synthesis B5 Björn Meermann and Marcus von der Au From ICP-Quads to ToF & single particles to cells – Theory, applications, future possibilities	B2 Gary Hieftje Glow discharge: The most versatile source	B3 Sasha Novak Surface analysis of Li ion batteries- Challenges and opportunities	B4 Michael Sperling LA-ICP-MS as a tool for bioimaging
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From
19:00

Dinner

21:00

Poster viewing and discussions with wine tasting and exhibition. (Bring your own wine)

This event is sponsored by Matriks AS and Agilent Technologies

Tuesday, June 14, 2022**Time Abstr.**

08:00-
08:15 **The Nordic Plasma Torch Award**
Organising Committee

Session IV: Single particle and single cell analysis by plasma spectrochemistry

Chairman:

- 08:15- 0-34 **Detection of nanoparticles and microplastics in environmental samples with atomic and molecular mass spectrometry**
08:40
Carsten Engelhard, Darya Mozhayeva, Annika Schardt, Cristian C. Escobar-Carranza, Maximilian Heide, Manuel Heinelt, Johannes Schmitt, Ingo Strenge
University of Siegen, Department of Chemistry and Biology, Siegen, Germany
- 08:40- 0-35 **Influence of sample handling on the quality of single cell ICP-MS data**
08:55
Alexander Köhrer¹, Matthias Elinkmann¹, C. Derrick Quarles jr.², Uwe Karst¹
¹University of Münster, Institute of Inorganic and Analytical Chemistry, Germany
²Elemental Scientific, Inc., Omaha, NE, USA
- 08:55- 0-36 **Endogenous metal analysis in labelled single cells using time of flight ICP-MS for the elucidation of a cells metalome on a per cell level**
09:10
Lukas Schlatt
Nu Instruments, Unit 74 Clywedog Road South, Wrexham Industrial Estate, Wrexham LL13 9XS, United Kingdom
- 09:10- 0-37 **Automated single cell ICP-MS for the quantification of trace metals in beer samples**
09:25
Matthias Elinkmann¹, Patrick Sullivan², Tyler Herek², C. Derrick Quarles Jr.², Uwe Karst¹
¹Institute of Inorganic and Analytical Chemistry, University of Münster, Germany
²Elemental Scientific, Inc., Omaha, NE, USA
- 09:25- 0-38 **MDG-ICP-MS - A versatile tool for quantification in the field of single particle ICP-MS using isotopic dilution**
09:40
M. von der Au, S. Faßbender, M. Chronakis and B. Meermann
Federal Institute for Materials Research and Testing (BAM), Berlin, Germany
- 09:40- 0-39 **LA-ICP-MS and proteins: Utilization on nanoparticle-based biorecognition elements**
09:55
Tomáš Vaculovič¹, Markéta Vejvodová¹, Kristýna Zemánková^{2,3}, Kristýna Pavelicová^{2,3}, Marcela Vlčnovská^{2,3}, Vratislav Horák⁴, Viktor Kanický¹, Vojtěch Adam^{2,3}, Markéta Vaculovičová^{2,3}
¹ Masaryk University, Brno, ² Mendel University in Brno,
³ Central European Institute of Technology, Brno University of Technology, Brno,
⁴ Laboratory of Applied Proteome Analyses, Institute of Animal Physiology and Genetics of the Czech Academy of Sciences, Libečov, Czech Republic

- 09:55- O-40 **Single particle ICP-OES analysis of battery materials determining particle**
10:10 **inactivation and its consequences for the battery**
Till-Niklas Kröger^a, Patrick Harte^a, Marc Vahnstiege^a, Thomas Beuse^a, Mathis Jan Wölke^a, Sven Klein^a, Markus Börner^a, Martin Wintera,^b Sascha Nowak^a and Simon Wiemers-Meyer^a
^a University of Münster, MEET Battery Research Center, Münster,
^b Helmholtz-Institute Münster, Münster, Germany
- 10:10- O-41 **Capabilities of fast single particle ICP-MS with nanosecond time resolution as a**
10:25 **new tool for nanomaterial analysis**
Annika Schardt, Johannes Schmitt, and Carsten Engelhard
University of Siegen, Department of Chemistry and Biology, Siegen, Germany
- 10:25- O-42 **Distribution of inorganic nanoparticles in a Norwegian fjord**
10:40 Are S. Bruvold^{1,2}, André Marcel Bienfait², Torunn Kringlen Ervik³, Katrin Loeschner⁴, Stig Valdersnes^{1,2}
¹University of Bergen, Department of Chemistry, Bergen,
²Institute of Marine Research, Bergen, Norway
³Norwegian Institute of Occupational Health, Oslo, Norway
⁴National Food Institute, Technical University of Denmark, KGS Lyngby, Denmark

Session V: New analytical capabilities of plasma spectrochemistry

Chairman:

- 10:40- O-43 **Multi-isotope approach within environmental forensics**
11:05 Ilia Rodushkin^{a,b}, Emma Engström^{a,b}, Cora Paulukat^b and Simon Pontér^a
^a Division of Geosciences, Luleå University of Technology, Luleå, Sweden
^b ALS Laboratory Group, ALS Scandinavia AB, Luleå, Sweden
- 11:05- O-44 **Traditional use of LA-ICP-MS in geology and new approaches combining laser**
11:30 **ablation, ICP-MS, ICP-OES, SEM and EMPA**
Tonny Bernt Thomsen
Geological Survey of Denmark and Greenland, Denmark
- 11:30- O-45 **Analysis of permanent gases and light hydrocarbons evolving during operation of**
11:55 **lithium ion batteries with a barrier discharge ionization detector**
Marco Leißing¹, Martin Winter^{1,2}, Simon-Wiemers-Meyer¹ and Sascha Nowak¹,
^a MEET Battery Research Center, Münster, Germany
^b Helmholtz-Institute Münster, Forschungszentrum Jülich GmbH, Germany
- 11:55- O-46 **ICP-MS/MS analysis of technologically critical elements in printed circuitboard**
12:20 **waste**
Timo Sara-Aho
Finnish Environment Institute (SYKE), Helsinki, Finland
- 12:20- O-47 **Materials mapping, what laser induced breakdown spectroscopy can afford in**
12:35 **order to help us?**
C.-P. Lienemann¹, L. Jolivet¹, V. Motto-Ros², L. Sorbier¹
¹ IFP Energies Nouvelles, Rond-point de l'échangeur de Solaize, Solaize, France
² Institut Lumière Matière, UMR5306 Université Lyon, Villeurbanne, France
- 12:35- O-48 **Evaluation methods for LIBS data in industrial on-line applications**
12:50 Arne Bengtson, Jonas Petersson, Melina Gilbert-Gatty, Krister Ekström, Louise Hagesjö
Swerim AB, Kista, Sweden

- 12:50- O-49 **LA-ICP-MS imaging method: Can make a geologist happy?**
13:05 Markéta Holá¹, Martin Kubeš², Jan Dobeš¹, Vojtěch Wertich², Jaromír Leichmann², Viktor Kanický¹
¹Department of Chemistry, Faculty of Science, Masaryk University, Brno
²Department of Geological Sciences, Faculty of Science, Masaryk University, Brno, Czech Republic
- 13:05- O-50 **Application of analytical techniques for the characterization of battery materials**
13:20 Mikael Axelsson,
Thermo Fisher Scientific, Stockholm, Sweden
- 13:20- O-51 **Do we still have to worry about interferences in ICP-MS?**
13:35 Ewa Pruszkowski, Chady Stephan and Liyan Xing
PerkinElmer Inc., Shelton, CT, USA
- 13:35- **Lunch**
14:30

Short Course Session III

- | | | | |
|----------------|--|---|--|
| 14:30- C1 – C5 | C1
Jaime Orejas | C2
Dirk Schaumlöffel | C3
Frank Vanhaecke |
| 16:15 | Liquid-Electrode Discharges | SIMS and related techniques for elemental and isotopic imaging at nanometer scale | An introduction to isotopic analysis using single- and multi-collector ICP-MS |
| | C4
Sarah Theiner | C5
Stefano Paggio | |
| | Calibration strategies for quantitative bioimaging by LA-ICP-MS | Choosing the right sample preparation technique for your elemental analysis: what are the key factors? | |
| 16:30 | Excursion to Briksdalen Glacier and conference outdoor dinner | | |

Wednesday, June 15, 2022

Time Abstr.

Session VI: Application of plasma spectrochemistry

- 08:30 O-52 **Seaweed for food and feed applications – need for elemental analysis**
08:45 Jens J. Sloth, David J. Jensen, Katarina Kreissig, Cecilie W. Nielsen, Susan L. Holdt
National Food Institute, Technical University of Denmark, KGS Lyngby, Denmark
- 08:45- O-53 **ICP-MS determination of metals in sodium hypochlorite solutions used for**
09:00 **disinfection of drinking waters**
André Miranda; João Miguel Paiva; Rui Neves Carneiro
Empresa Portuguesa das Águas Livres, S.A., Lisbon, Portugal
- 09:00- O-54 **Utilization of 3D printed metal scavengers for precious metal recovery and for**
09:15 **pre-concentration and speciation of mercury**
Ari Väisänen, Suvi Kulomäki and Siiri Perämäki
Department of Chemistry, University of Jyväskylä, Finland
- 09:15- O-55 **Technology-critical elements (TCE) in soils in areas around waste electrical and**
09:30 **electronic equipment (WEEE) recycling plant**
Magdalena Jabłońska-Czapla^{1*}, Katarzyna Grygoyć¹, Marzena Rachwał^{1,3}, Agnieszka
Fornalczyk², Joanna Willner²
¹ Institute of Environmental Engineering of the Polish Academy of Sciences, Zabrze,
Poland
² Faculty of Materials Engineering and Metallurgy, Silesian University of Technology,
Katowice, Poland
³ Institute of Safety Engineering, Warsaw, Poland
- 09:15- O-56 **Determination of cadmium and other elemental contaminant in cocoa/chocolate**
09:30 **products and their packaging by ICP-MS**
Lucas Givelet, Heidi Amlund, Yuka Omura Lund, Katrin Löschner, and Jens J. Sloth
Research group for analytical food chemistry, National Food Institute, Technical
University of Denmark, Lyngby, Denmark
- 09:30 **Coffee break, exhibition and poster viewing**
09:45

Short Course Session IV

- | | D1 | D2 |
|------------------------|--|--|
| 09:45- D1- D2
11:30 | Gary Hieftje | Karl Andreas Jensen |
| | Make your own
lecture counts! | Practical approaches to
use reaction gases in ICP-
MS triple quadrupole |

11:30- **Closing remarks and farewell**
11:45

12:00- **Lunch**

11.6 Poster Presentations**Sunday, June 12 - Wednesday, June 15, 2022****Abstr.**

- P-1 CADMIUM LEVELS IN WHELKS FROM DANISH WATERS – INFLUENCE OF SIZE, SAMPLING LOCATION AND SEASON**
Florian Brulfert¹, Heidi Amlund¹, Johan W. Nielsen², Bent Wismann³ and Jens J. Sloth¹
¹ *Research group for Analytical Food Chemistry, National Food Institute, Technical University of Denmark, Lyngby, Denmark*
² *Department of Biology, Marine Biological Section, University of Copenhagen, Copenhagen, Denmark*
³ *Aquamind, Hellerup, Denmark*
- P-2 ICP-OES ANALYSES IN SOLVENT EXTRACTION OF GOLD FROM PRINTED CIRCUIT BOARDS**
Krista Oikarinen, Ari Väisänen
Dept. of Chemistry, University of Jyväskylä, Finland
- P-3 FAST, HIGH-RESOLUTION FULL ELEMENTAL LASER ABLATION IMAGING USING TIME-OF-FLIGHT ICP-MS FOR ENDOGENOUS METAL ANALYSIS AND LABEL IDENTIFICATION IN BIOLOGICAL SAMPLES**
Lukas Schlatt
Nu Instruments, Wrexham, United Kingdom
- P-4 THE USE OF TIME OF FLIGHT ICP-MS AND VERY FAST WASHOUT LASER ABLATION SYSTEMS TO ACCURATELY IMAGE MAJOR AND MINOR ISOTOPES AS WELL AS ELEMENTAL RATIOS IN GEOLOGICAL SAMPLES**
Lukas Schlatt
Nu Instruments, Wrexham, United Kingdom
- P-5 ACCURATE IDENTIFICATION, EXAMINATION AND DIFFERENTIATION OF MULTIELEMENT NANOPARTICLES USING TIME OF FLIGHT ICP-MS AND SUB-MILISECOND SPECTRAL ACQUISITION TIMES**
Lukas Schlatt
Nu Instruments, Wrexham, United Kingdom
- P-6 TOTALQUANT TECHNIQUE – MORE THAN SEMI-QUANTITATIVE ANALYSIS**
Ewa Pruszkowski, Chady Stephan and Liyan Xing
PerkinElmer Inc., Shelton, USA
- P-7 ANALYSIS OF TOXIC AND NUTRITIONAL ELEMENTS IN BABY FOODS BY ICP-MS**
Liyan Xing, Ewa Pruszkowski, Chady Stephan
PerkinElmer Inc., Woodbridge, ON, Canada
- P-8 QUANTITATIVE DETERMINATION OF LITHIUM PLATING ON GRAPHITE ANODE SURFACES UTILIZING GC-BID**
Tobias Brake^a, Martin Winter^{a,b}, Sascha Nowak^a and Simon Wiemers-Meyer^a
^a *University of Münster, MEET Battery Research Center, Münster, Germany*
^b *Helmholtz-Institute Münster, IEK-12, FZ Jülich, Münster, Germany*

Poster Presentations Cont.**Abstr.**

- P-9 ASSESSING LITHIUM MIGRATION IN LITHIUM ION BATTERIES AT DIFFERENT STATES OF CHARGE BY COMBINING ISOTOPE DILUTION ANALYSIS WITH PLASMA-BASED TECHNIQUES**
Stephen Lars Dorn¹, Marcel Diehl¹, Martin Winter^{1,2}, Simon Wiemers-Meyer¹, Sascha Nowak¹
¹ University of Münster, MEET Battery Research Center, Münster, Germany,
² Helmholtz-Institute Münster, IEK 12, Forschungszentrum Jülich GmbH, Münster, Germany
- P-10 INVESTIGATION OF THE C-RATE DEPENDENT GASSING DURING FORMATION OF LITHIUM-ION BATTERIES UTILIZING GAS CHROMATOGRAPHY - BARRIER DISCHARGE IONIZATION DETECTOR**
Marco Leißing¹, Fabian Horsthemke¹, Simon Wiemers-Meyer¹, Martin Winter^{1,2}, Philip Niehoff¹ and Sascha Nowak¹
¹ University of Münster, MEET Battery Research Center, Münster, Germany
² Helmholtz Institute Münster, IEK-12 of Forschungszentrum Jülich, Münster, Germany
- P-11 THE INFLUENCE OF ADDITIVES ON PRIMARY SEI-DEVELOPMENT ON LITHIUM METAL – AN ACCUMULATION STUDY**
Bastian von Holtum^a, Martin Winter^{a,b}, Sascha Nowak^a and Simon Wiemers-Meyer^a
^a MEET Battery Research Center, Münster, Germany
^b Helmholtz-Institute Münster, IEK-12, Forschungszentrum Jülich GmbH, Münster, Germany
- P-12 SPATIALLY RESOLVED POST-MORTEM ANALYSIS OF LITHIUM DISTRIBUTION AND TRANSITION METAL DEPOSITIONS ON CYCLED ELECTRODES VIA LASER ABLATION-ICP-OES / -MS METHODS**
Constantin Lürenbaum¹, Patrick Harte¹, Martin Winter^{1,2}, Simon Wiemers-Meyer¹ and Sascha Nowak¹
¹ University of Münster, MEET Battery Research Center, Münster, Germany
² Helmholtz-Institute Münster (HI MS), IEK-12, Forschungszentrum Jülich GmbH, Münster,
- P-13 ANALYSIS OF HETEROGENEOUS WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT SAMPLES BY ICP-OES**
Jutta Koskinen and Ari Väisänen
Department of Chemistry, University of Jyväskylä, Finland
- P-14 "ICP-MS IN A BOX"**
Torill Kalfoss¹, Bente Sæten¹, Ørjan Espeseth² and Thor Lichtenthaler²,
² Bayer AS, Oslo, Norway
¹ Matriks AS, Oslo, Norway
- P-15 ANALYTICAL PLASMA CHEMISTRY IN A MINI-PILOT SCALE HYDROMETALLURGICAL LABORATORY**
Antti Tiihonen and Ari Väisänen,
Department of Chemistry, University of Jyväskylä, Finland
- P-16 OPTIMIZATION OF ANALYTICAL METHOD FOR SELENIUM SPECIATION IN FISH FEED AND FEED INGREDIENTS USING A CHEMOMETRIC APPROACH**
Kjersti E. Vaksdal^{1,2}, Marta S. Silva¹, Svein A. Mjøs², Snorri Gunnarsson¹, Marita Eide Kristoffersen¹ and Veronika Sele¹
¹ Institute of Marine Research (IMR), Bergen.
² Department of Chemistry, University of Bergen, Norway.

Poster Presentations Cont.**Abstr.**

- P-17 INVESTIGATION ON THE BIOACCUMULATION AND TRANSLOCATION OF RARE EARTH ELEMENTS IN THE SOIL-RICE SYSTEM**
Andrea Mara¹, Mario Deroma², Iliaria Langasco¹, Maria Itria Pilo¹, Antonino Spanu², Nadia Spano¹ and Gavino Sanna¹
¹ *Department of Chemistry and Pharmacy, University of Sassari, Italy.*
² *Department of Agricultural Sciences, University of Sassari, Italy.*
- P-18 NANOGRAM LEVEL ANALYSIS OF MERCURY IN HUMIC-RICH NATURAL WATERS BY ICP-MS**
Suvi Kulomäki, Elmeri Lahtinen, Siiri Perämäki, Ari Väisänen
Department of Chemistry, University of Jyväskylä, Finland
- P-19 DETERMINATION OF XANTHATES IN AQUEOUS SOLUTIONS BY HPLC-ICP-MS/MS**
Ronja Suvela, Matti Niemelä, Paavo Perämäki
Research Unit of Sustainable Chemistry, University of Oulu, Finland
- P-20 METHOD DEVELOPMENT AND OPTIMISATION FOR THE ELEMENTAL ANALYSIS OF ACETIC ACID LEACHATES OF NEODYMIUM MAGNETS**
Joni Niskanen, Virva Kinnunen, Siiri Perämäki
Department of Chemistry, University of Jyväskylä, Finland
- P-21 ALUMINIUM MEASUREMENTS BY ICP-MS: INFLUENCE OF MICROWAVE DIGESTION PARAMETERS ON THE RECOVERY**
Lucas Givelet, Heidi Amlund, Yuka Omura Lund, Florian Brulfert and Jens J. Sloth
Research group for analytical food chemistry, National Food Institute, Technical University of Denmark, Lyngby
- P-22 CLASSIFICATION OF FERMENTED BEAN PASTE PRODUCTS USING PLASMA-BASED ELEMENTAL ANALYSIS TECHNIQUES**
Sang-Ho Nam and Yonghoon Lee
Department of Chemistry, Mokpo National University, Muan-gun, Jeonnam,, Republic of Korea.
- P-23 TWO-STEP PARTIAL LEAST SQUARES-DISCRIMINANT ANALYSIS TO OVERCOME THE LIMIT OF GLOBAL MODELING APPROACH: APPLICATION TO CLASSIFICATION OF EDIBLE SALT PRODUCTS USING LASER-INDUCED BREAKDOWN SPECTROSCOPY**
Yonghoon Lee and Sang-Ho Nam
Department of Chemistry, Mokpo National University, Muan-gun, Jeonnam Republic of Korea
- P-24 A NOVEL ICP-MS METHOD FOR SENSITIVE, ACCURATE AND HIGH-THROUGHPUT ANALYSIS OF BABY FOOD**
Mikael Axelsson, Marshall Allin, Sukanya Sengupta, Daniel Kutscher
Thermo Fisher Scientific, Stockholm, Sweden
- P-25 SENSITIVE DETERMINATION OF IMPURITIES IN LITHIUM BATTERIES USING THE THERMO SCIENTIFIC ICAP PRO XP ICP-OES**
Mikael Axelsson and Simon Nelms,
Thermo Fisher Scientific, Stockholm, Sweden

Poster Presentations Cont.**Abstr.**

- P-26 DEVELOPMENT OF GERMANIUM SPECIATION STUDY USING IC-ICP-MS TECHNIQUE IN SOIL SAMPLES**
Magdalena Jabłońska-Czapla, Katarzyna Grygoyć
Institute of Environmental Engineering of the Polish Academy of Sciences, Zabrze, Poland
- P-27 IMPROVED ENVIRONMENTAL IMPACT ASSESSMENT OF HIGH SALINITY PRODUCED WATER**
Neri Bonciani, Matteo Ottaviani, Karen Louise Feilberg
Technical University of Denmark, Danish Offshore Technology Centre, Lyngby, Denmark.
- P-28 DIGESTATE FROM ANAEROBIC DIGESTION AND POWER PLANT FLY ASH AS A CIRCULAR ECONOMY FERTILIZER: EVALUATION OF HEAVY METAL CONCENTRATIONS**
Sylva Larsson, Virva Kinnunen, Siiri Perämäki
Department of Chemistry, University of Jyväskylä, Finland
- P-29 COMPARISON OF DIFFERENT PLASMA VIEWS FOR THE ANALYSIS OF COMPLEX SAMPLES**
Petar Ivanov¹, Olaf Schulz¹
¹*Spectro Analytical Instruments GmbH, Kleve, Germany*
- P-30 FEED-TO-FISH TRANSFER OF ARSENIC AND ARSENIC SPECIES IN ATLANTIC SALMON FED ON DIETS CONTAINING NORWEGIAN FARMED BLUE MUSSEL AND KELP**
Marta S Silva^a, Jojo Tibon^{a,b}, Sahar Sartipiyarahmadi^{a,c}, Sofie C. Remø^a, Veronika Sele^a, Liv Søfteland^a, Harald Sveier^d, Martin Wiech^a, Antony J. Prabhu Philip^a, Marc Berntssen^a
^a*Institute of Marine Research, Bergen, Norway*, ^b*National Food Institute, Technical University of Denmark, Lyngby, Denmark*, ^c*Department of Biological Sciences, University of Bergen, Norway*
^d*Lerøy Seafood Group ASA, Bergen, Norway*
- P-31 STUDYING THE MECHANISM OF SILVER IONS BINDING TO CASEIN**
Tetiana Dyrda-Terniuk^{1,2}, Adrian Gołębiowski^{1,2}, Oleksandra Pryshchepa^{1,2}, Katarzyna Rafińska^{1,2}, Magdalena Buszewska-Forajta³, Paweł Pomastowski², Bogusław Buszewski^{1,2}
¹*Department of Environmental Chemistry and Bioanalytics, Faculty of Chemistry, Nicolaus Copernicus University in Torun*
²*Interdisciplinary Centre of Modern Technologies, Nicolaus Copernicus University in Torun*,
³*Institute of Veterinary Medicine, Nicolaus Copernicus University in Torun, Torun, Poland*
- P-32 SPECIATION OF ELEVEN ORGANOTIN COMPOUNDS VIA HPLC-ICP-MS USING THE COMPLEXING AGENT α -TROPOLONE**
C. Claesgens^{1*}, T. Schwank¹, K. Pitzke¹, D. Breuer¹
¹*Institute for Occupational Safety and Health of the German Social Accident Insurances – IFA, Sankt Augustin, Germany*
- P-33 ANALYSIS OF ARSENIC AT ULTRA TRACE LEVEL IN HYDROCHLORIC ACID USING INNOVATIVE ICP-MS TECHNOLOGIES**
Alexandre Labet¹, Nadège Tudela¹, Peio Riss²
¹*CEA, DES, IRESNE, DEC, Cadarache F-13108 Saint-Paul-Lez-Durance, France*
²*Analytik Jena France, L'Orme des Merisiers, 91190 Saint-Aubin, France*

Poster Presentations Cont.

Abstr.

P-34 A METHOD TO DETERMINE NUTRIENT AND OTHER ELEMENTS IN FOODS USING CLOSED VESSEL MICROWAVE ASSISTED DIGESTION AND INDUCTIVELY COUPLED PLASMA OPTICAL EMISSION SPECTROMETRY: SINGLE LAB VALIDATION

Jake A. Carter, Patrick J. Gray, and Todor I. Todorov
Center for Food Safety and Applied Nutrition, United States Food and Drug Administration, College Park, MD, 20740, USA

P-35 INVESTIGATION OF GRAPHITE-BASED ANODES FOR LIB USING GD-OES – IMPACT OF PLASMA PARAMETERS AND ELECTRODE PROPERTIES

Frauke Langer^{1,2}, Anggraini Utami^{1,3}, Jochen Kirres¹, Elisabeth Krämer¹, Julien Bachmann²
¹*Mercedes-Benz Group AG, Stuttgart, Germany*
²*Friedrich-Alexander-Universität Erlangen-Nürnberg, Lehrstuhl Chemistry of Thin Film Materials, IZNF, Erlangen, Germany*
³*Hochschule Darmstadt, Darmstadt, Germany*