

Monday, 11th March 2024

08:00 – 09:00 Registration

09:00 – 09:30 **Welcome Statement:** Prof. Dr. Anke Weidenkaff, Fraunhofer IWKS, Conference Chair
Moderation: Dr. Gert Homm, Fraunhofer IWKS

09:30 – 10:00 **Keynote:** Dr. Stephan Andreas Schunk, hte GmbH & BASF SE
Where do we stand in the Digital Transformation R&D Related to Materials Sciences?

10:00 – 10:10 Q&A

10:10 – 10:25 *Coffee break*

10:25 – 12:45 **Session 1 - Green Materials Synthesis, Sustainable Materials Development and Circular Economy**
Symposium Organizer, Session Chair: PD Dr. Emanuel Ionescu

10:25 Prof. Dr. Sanjay Mathur, University of Cologne (IS)
Challenges of Greener Processing of Energy Harvesting Materials

10:50 Prof. Dr. Silvia Gross, University of Padova (IS)
Enabling circular economy: the overlooked role of inorganic materials chemistry

11:15 Prof. Dr. Christoph Helbig, Universität Bayreuth (IS)
Materials for future – resilient, recycled, carbon neutral

11:40 – 11:55 *Coffee break*

11:55 Dr. Philipp Walter, Heraeus Precious Metals GmbH & Co.KG (IS)
Overview on Circularity for PEM Technologies – The Past, the Now and the Future

12:20 Dr. Steffi Weyand, Fraunhofer IWKS (IS)
Advancing prospective life cycle assessment to support the development of innovative and more circular materials

12:45 PD Dr. Emanuel Ionescu (CS)
Structural and Functional Ceramic Nanocomposites for Applications in Harsh Environmental Conditions

13:00 – 13:45 *Lunch*

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CS = Contributed Speaker

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13:45 – 16:25 **Session 2 - Materials for Sustainable Cooling Applications**

Symposium Organizers: Dr. Wenjie Xie, Jürgen Gassmann, Fraunhofer IWKS

Session Chair: Prof. Dr. Oliver Gutfleisch, TU Darmstadt

13:45 Dr. Franziska Scheibel, TU Darmstadt (IS)
Magneto- and Multicaloric Materials from Basic Mechanism to Application

14:10 Falk Münch, MAGNOTHERM Solutions GmbH (IS)
Cooling with magnets – Bringing the cooling industry to the 21st century

14:35 Dr. Pingjun Ying, Leibniz Institute for Solid State and Materials Research (IS)
A robust thermoelectric module based MgAgSb/Mg₃(Sb,Bi)₂ with a conversion efficiency of 8.5% and a maximum cooling of 72 K

15:00 Prof. Dr. Armin Feldhoff, Leibniz University Hannover (IS)
Thermoelectric cooling - The prospects of calcium cobaltate as p-type component in an efficient entropy pump

15:25 – 15:45 *Coffee break*

15:45 Dr. Andrey Kovalevsky, University of Aveiro (IS)
Thermoelectrics for Sustainable Future: The Case of Strontium Titanate

16:10 Chi-Chia Lin, Fraunhofer IWKS (CS)
Enhancing magnetic properties and rare earth element utilization efficiency of Ce-containing Nd-Fe-B magnets by the 2-powder method

17:00 **Postersession and Networking Dinner**

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Postersessions

No.	Titel	Author
P01	The Application of Dimerization/Cleavage of Anthracenes to Dismantling Adhesion	Yoko Matsuzawa
P02	Solid solution strengthening in single phase Mo alloys	Georg Winkens
P03	Preparation of ceramic coatings based on ultrahigh-temperature ceramic nanocomposites from precursors	Samuel Aeneas Kredel
P04	MatCom-ComMat P.7: High-temperature Stability in Harsh Environments	Lukas Korell
P05	Facile synthesis of sulfurized MoO ₃ nanostructures from industrial waste powder for energy storage application	Federico Ursino
P06		
P07	Development of ductile and oxidation resistant Cr-Mo-Si solid solution alloys	Gabriely Falcão
P08	Mechanochemical synthesis and characterization of compositionally complex transitional metal oxides	Dharma Teja Teppala
P09	Single source precursor synthesis of ceramic composites for UHTC application	Minoo Borojjerdi
P10	Influence of interfaces on the plastic deformation of Mo-Si-Ti alloys	Sri Rathinamani Ramdoss
P11	Microstructure and hot corrosion behavior of Cr-Mo-Si alloys	Katharina Beck
P12		
P13	DigInform – a Digital Information Management System towards a Circular Economy in the Chemical Industry	Romy Auerbach
P14	The instabilities of thermoelectric high ZT SnSe compounds	Moritz Thiem
P15	Applying entropy engineering strategy in TiS ₂ -based thermoelectric materials	Jinxue Ding
P16	Sustainable Management of Nd-Fe-B Magnet Waste Streams: Enhancing Supply Security and Circular Economy in High-Tech Applications through Effective Functional Recycling	Md Mahmudul Hasan
P17	Pursuing Sustainable Thermoelectrics	Wenjie Xie
P18	Alternative manufacturing of ZrNiSn half-Heusler thermoelectric	Vidushi Galwadu Arachchige



Tuesday, 12th March 2024

08:30 – 11:35 **Session 3 - Green Materials for Green Hydrogen**
Session Chair, Symposium Organizer: Dr. Till Frömling, Fraunhofer IWKS
Symposium Organizers: Andreas Brumby, Materials Valley e. V.
Dr. Marc Widenmeyer, TU Darmstadt

08:30 Prof. Dr. Ulrike Kramm, TU Darmstadt (IS)
How rethinking the chemistry of iron can contribute to a more sustainable future

08:55 Dr. Steffen Hasenzahl, Evonik Operations GmbH Creavis (IS)
Successful development and scale-up of materials as pre-condition for a climate-neutral hydrogen economy

09:20 Dr. Thomas Fischer, University of Cologne (IS)
On the Way to Sustainable Hydrogen: Visions and Limitations of Photoelectrochemical Water Splitting Technologies

09:45 Andreas Brumby, Materials Valley e. V. (IS)
Critical Raw Materials for the Hydrogen Economy

10:10 – 10:25 *Coffee break*

10:25 Prof. Dr. Ümit Demirci, European Institute for Membranes & University Montpellier (IS)
BN(C)H materials for hydrogen storage and production

10:50 Nikita Gugin, Bundesanstalt für Materialforschung und -prüfung (BAM) (CS)
Large-Scale Green Synthesis of a Model BSA@ZIF-8 Biocomposite via Reactive Extrusion

11:05 Dr. Andreas Hertwig, Bundesanstalt für Materialforschung und -prüfung (BAM) (CS)
New analytic ways to characterise mesoporous thin layers used in electrocatalytic water splitting

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11:35 – 12:05 **Keynote:** Prof. Dr. Bilge Yildiz, Massachusetts Institute of Technology, USA
Controlling Metal Nanoparticle Exsolution on Oxides By External Drivers – Defects, Elastic Strain and Ion Irradiation

12:05 – 12:15 Q&A

12:15 – 13:15 *Lunch*

13:15 – 16:45 **Session 4 - Green Batteries**
Symposium Organizer, Session Chair: Dr. Benjamin Balke-Grünewald, Fraunhofer IWKS

13:15 Dr. Guinevere Giffin, Fraunhofer ISC (IS)
Sustainable production & recycling of green batteries

13:45 Prof. Dr. Emma Kendrick, University of Birmingham (IS)
Designing sustainability into new battery chemistries

14:10 Dr. Magdalena Graczyk-Zajac, EnBW (IS)
Towards sustainable, grid connected stationary storage system: ResHy project

14:35 – 14:50 *Coffee break*

14:50 Prof. Dr. Monika Wilamowska-Zawlocka, Gdansk Polytechnic University (IS)
Challenges of direct recycling of used lithium-ion batteries

15:15 Dr. Songhak Yoon, Fraunhofer IWKS (IS)
How to revitalize the spent lithium-ion batteries

15:40 **Postersession and Networking**

18:00 **Conference Dinner and Poster awards**

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No.	Titel	Author
P19	Spin-controlled electron transfer in topological chiral semimetals for high-performance oxygen catalysis	Xia Wang
P20	Low-cost synthesis of nanostructured catalysts for Oxygen Evolution Reaction and Hydrogen Evolution Reaction from Molybdenum industrial waste powder	Federico Ursino
P21	Recycling of valuable cathode materials from spent Li-ion batteries based on deep eutectic solvent leaching with oxalate chemistry	Jueun Jang
P22	Towards Carbon Free Fluoride Ion Batteries	Tommi Aalto
P23	Microwave-assisted Regeneration of Li-ion Battery Cathode Active Material by Deep Eutectic Solvents	Hyunjung Lim
P24		
P25	Recycling of solid-state batteries	Kerstin Wissel
P26	Feasibility study and life cycle assessment of boron-assisted direct cathode recycling of LiCoO ₂ for Li-ion batteries	Dennis Michael Jöckel
P27	The Effects of Boron on Li-ion Batteries Recycling Processes	Samuel Meles Neguse
P28	Recycling of Hydrogen Tolerant Oxygen Transport Membranes with Integrated Life Cycle Assessment for Plasma-assisted CO ₂ -Conversion	Aasir Rashid
P29	A novel plasma-assisted hollow fiber membrane concept for efficiently separating oxygen from CO in a CO ₂ plasma	Guoxing Chen
P30		
P31	Upcycling of waste polyolefins via heterogeneous transfer dehydrogenation and olefin metathesis	Tim de la Croix
P32	Material development for a sustainable circular economy: A life cycle assessment of the synthesis methods of activators for the pyrolysis-catalysis of plastic waste in Germany	Ann-Katrin Emmerich
P33	Plasma Pyrolysis for Sustainable Plastic Waste Upcycling	Xaio Yu
P34	K3I Cycling: An AI-based approach towards circular economy of plastic packaging	David Fahz

Wednesday, 13th March 2024

- 09:30 – 10:00 **Keynote:** Prof. Dr. Claudia Felser, Max Planck Institute for Chemical Physics of Solids
Topology for energy efficient spintronics and energy conversion
- 10:00 – 10:10 Q&A
- 10:10 – 10:20 *Coffee Break*
- 10:20 – 12:25 **Session 5 - Plasma-assisted CO₂ (&H₂) Utilization**
Symposium Organizer: Dr. Marc Widenmeyer, TU Darmstadt
Session Chairs: Dr. Marc Widenmeyer, Dr. Andreas Schulz, University of Stuttgart
- 10:20 Prof. Dr. Xin Tu, University of Liverpool (IS)
Plasma catalysis: A promising solution for decentralized production of fuels and chemicals
- 10:45 Dr. Andreas Schulz, University of Stuttgart (IS)
Activation of low-energy molecules using the example of CO₂ in microwave air plasmas
- 11:10 Dr. Amandine Guissart, Muegge GmbH (IS)
Microwave Plasma Sources for Sustainable Applications
- 11:35 Dr. Marc Widenmeyer, TU Darmstadt (IS)
Merging Materials Performance and Sustainability: Ceramic Oxygen Transport Membrane Materials as an Exemplar
- 12:00 Dr. Thomas Schiestel, Fraunhofer IGB (IS)
MIEC hollow fiber membranes for the separation of oxygen from a CO₂ plasma
- 12:25 – 13:15 *Lunch*

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13:15 – 16:10 Session 6 - Chemical Recycling of Plastics

Symposium Organizers: Dr. Gert Homm, Fraunhofer IWKS
Dr. Marc Widenmeyer, TU Darmstadt
Session Chair: Prof. Dr. Xin Tu, University of Liverpool

13:15 Dr. Yeshui Zhang, University of Aberdeen
Advanced Metrology for Studying Catalyst Degradation & Li-ion Battery Drying
Process (IS)

13:45 Dr. Holger Helten, University Würzburg
Furan-based optoelectronic materials from renewable resources – a successful
example where sustainability and performance go hand in hand (IS)

14:05 Prof. Dr. Martin Gräbner, TU Bergakademie
Overview on thermo-chemical Conversion Processes for Chemical Recycling (IS)

14:30 Prof. Dr. René Wilhelm, TU Clausthal (IS)
Chemical Recycling of Carbon Fiber Composites

14:55 – 15:15 Coffee break

15:15 Prof. Dr. Bert Weckhuysen, Utrecht University (IS)
Challenges, Opportunities and Some Mechanistic Understanding in the Chemical
Recycling of Plastic Waste

15:40 Tomislav Stolnar, Bundesanstalt für Materialforschung und -prüfung (BAM) (CS)
Upcycling waste PET bottles to porous UiO-66 by mechanochemistry

15:55 Xaio Yu, Fraunhofer IWKS (CS)
Chemical recycling of medical plastic waste over perovskite-type catalysts for
hydrogen production

16:10 Closing remarks

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