Conference programme

Netherlands conference on Electrochemical Conversion & Materials (ECCM)

Friday 29 June 2018, The Hague – NH Hotel

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TOPSECTOR ENERGIE
Empowering the new economy

Holland High Tech
High-tech Solutions for Global Challenges

Holland Chemistry
Global Challenges, Smart Solutions

Conference programme

Date: Friday 29 June
Venue: NH Hotel The Hague

Time	Activity
9:00	Reception and registration
9:30	Opening conference by **Dr. Bertholt Leeftink** (Director-General Enterprise and Innovation at Ministry of Economic Affairs & Climate Policy) and **Prof. Dr Richard vd Sanden** (chair of the Dutch committee for Electrochemical Conversion & Materials)
9:45	Opening lecture by **Ir. Diederik Samsom** (former politician, advisor in green energy supplies, negotiator for the Dutch Climate and Energy Agreement, Netherlands)
10:15	Keynote: **Dr. Behnam Taebi** (Delft University of Technology)
10:45	Keynote: **Prof. Dr Ib Chorkendorff** (Technical University of Denmark, Denmark)
11:15	Coffee break and change rooms for parallel tracks
11:30	Parallel tracks part 1 (1x 30 min + 3x20 min)

	Room: Rotterdam 1 (2nd floor)	Room: Rotterdam 2 (2nd floor)	Room: Rotterdam 3 (2nd floor)
	Materials & Catalysis	**Innovative electrochemistry**	**System integration, business & governance**
11:30 - 12:00 (30min)	**Keynote: Dipl.-Ing. Thomas Burgler (voestalpine Stahl)**	**Keynote: Prof. Dr. Annick Hubin (Vrije Universiteit Brussel)**	**Keynote: Dr. Pieter Boot (PBL Netherlands Environmental Assessment Agency)**
12:00 - 12:20 (20 min)	Dr Vera Smulders (UT)	Prof. Dr Emiel Hensen (TU/e)	Rob Terwel, MSc (Kalavasta)
12:20- 12:40 (20 min)	Dr Shiju Raveendran (UvA)	Dr Anja Bieberle-Hütter (DIFFER)	Ing. Rob van der Sluis (MTSA)
12:40- 13:00 (20 min)	Dr Ruud Kortlever (TUD)	Dr Thijs de Groot (Akzo)	Guy Verkoeyen, MBA (Hydrogenics)

13:00	Lunch
13:45	Keynote: **Dr. Ajay Mehta** (Shell - Long Range Research and New Energy Technologies, United States)
14:15	Keynote: **Dr. Günter Schmid** (Siemens, Germany)
14:45	Coffee break and change rooms for parallel tracks
15:00	Parallel tracks part 2 (4x 20 min)

	Room: Rotterdam 1 (2nd floor)	Room: Rotterdam 2 (2nd floor)	Room: Rotterdam 3 (2nd floor)
	Materials & Catalysis	**Innovative electrochemistry**	**System integration, business & governance**
15:00 - 15:20 (20 min)	Leon Jacobse, MSc (UL)	Dr Roman Latsuzbaia (TNO)	Dr Andreas ten Cate (ISPT)
15:20 - 15:40 (20 min)	Dr Maarten Biesheuvel (Wetsus)	Dr Waldo Bongers (DIFFER)	Drs. Toon van Harmelen (TNO)
15:40 - 16:00 (20 min)	Prof. Joost Reek (UvA)	Dr Thomas Burdyny (TUD)	Dr Frits van Hout (ASML)
16:00 - 16:20 (20 min)	Dr Frans van Berkel (TNO)	Dr Klaas Jan Schouten (Avantium)	Prof. Gert-Jan Kramer (UU)

16:20	Change room for closing lecture
16:30	Keynote: closing lecture: **Prof. Dr. Robert Schlögl** (Max-Planck-Institut für Chemische Energiekonversion, Germany)
17:15	Drinks
18:00	End of programme

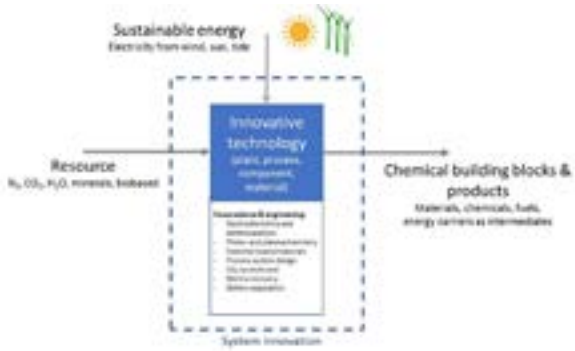
Scope of the conference

It is clear that in our future energy system renewable electricity will play a main role in the transition to a low carbon energy supply. This transition is facilitated by CO_2 targets of national governments and requires extensive electrification. In the future, however, there will still be a need for fuels (for aviation, shipping and heavy road transport) and for chemical products and materials. These activities and associated production processes are now responsible for more than 35% of global CO_2 emissions. There is a big challenge to produce these fuels and chemical products through the use of renewable electricity, at the basis of biomass and/or CO_2.

In addition, solutions are needed for the problem of the imbalance between production and consumption of electricity. These solutions lie in connecting networks and production capacity (interconnection), organizing an optimal balance of supply and demand, and in direct storage of electrical energy. Storage of electricity in batteries or similar systems is an option; electrochemical production of chemicals as an energy carrier is another option. Electrochemical conversion is a promising option for long-term storage as this technology is easy scalable to the amount of energy. During the conference the state-of-the-art in science and technology will be shared by international key notes from academia and industry. Dutch scientist and industry representatives will contribute to an appealing parallel programme related to the theme of the conference.

Setup

- Date: Friday 29 June 2018
- Venue: Netherlands, NH Hotel, The Hague - easy access from Amsterdam Schiphol Airport.
- Participation: free, including lunch: registration on the basis of first come, first serve. Registration will open March 2018 via www.topsectoren.nl and www.CO_2neutraalin2050.nl.
- Setup: one day conference with scientific keynote lectures from academia, industry and NGO's. To the parallel sessions Dutch scientists (group leaders) and representatives from industry from various disciplines related to the central theme of the day will contribute to an appealing scientific programme.
- Language: English



Key note speakers

Prof. Dr. Robert Schlögl, Max-Planck-Institut für Chemische Energiekonversion, Germany

Robert Schlögl studied chemistry and completed his PhD on graphite intercalation compounds at the Ludwig Maximilians University in Munich (1982). After postdoctoral stays at Cambridge and Basle he carried out his habilitation under the supervision of Professor Ertl (Nobel Laureate) at Fritz Haber Institute in Berlin (1989). Later he accepted the call for a Full Professorship of Inorganic Chemistry at Frankfurt University. In 1994 he was appointed his current position as Director at the Fritz Haber Institute of the Max Planck Society in Berlin. In addition, in 2011 he was appointed Founding Director at the new Max Planck Institute for Chemical Energy Conversion in Mülheim a.d. Ruhr. He is an Honorary Professor at Technical University Berlin, Humboldt University Berlin, University Duisburg-Essen and Ruhr University Bochum.

Robert Schlögl's research focuses primarily on the investigation of heterogeneous catalysts, with the aim to combine scientific with technical applicability as well as on the development of nanochemically-optimized materials for energy storage. The application of knowledge-based heterogeneous catalysis for large-scale chemical energy conversion summarizes his current research focus.

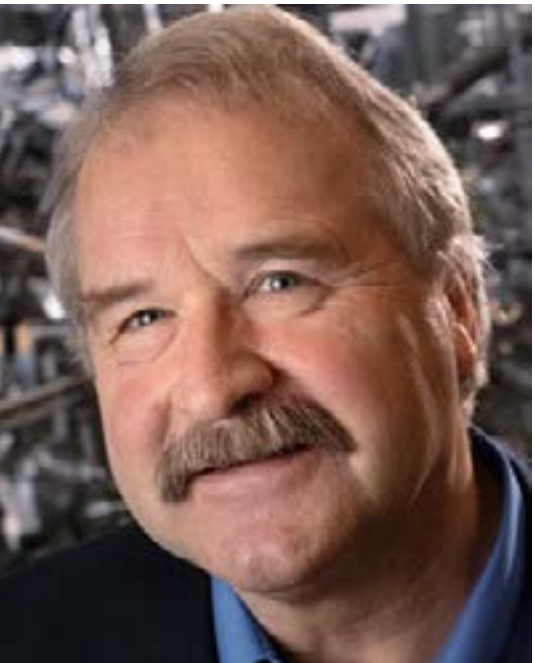
He is author of more than 1,000 publications, gave more than 450 invited talks and lectures and is registered inventor of more than 20 patent families. He is a Fellow of the Royal Society of Chemistry, Tetelman Fellow and member of numerous international organizations. His research activities have been recognized with several national and international awards, here to list the ENI award 2017.

Ir. Diederik Samsom, former politician, advisor in green energy supplies, negotiator for the Dutch Climate and Energy Agreement, Netherlands

Diederik Samsom, a former physics student, is an advocate for renewable energy and he worked on the Dutch Energy Agreement during his political career for the Dutch Labour Party. He previously held positions at among others DNV GL and is currently also a part-time advisor for a company that supplies green energy to various governmental institutes and companies.

Dr. Ajay Mehta, Shell - Long Range Research and New Energy Technologies, United States

Ajay Mehta has worked at Shell for 22 years, mainly in its upstream exploration and production division. He spent his first decade at Shell working on Deepwater projects worldwide, first as a Research Scientist, then as a R&D Team Leader and finally, as a Research Manager. During this time, he served as a subject matter expertise on gas hydrates, and was recognized as a Distinguished Lecturer for the Society of Petroleum Engineers. Ajay subsequently assumed assignments in production operations, project engineering and general management, including postings in Malaysia and New Orleans. Prior to his current role, he was an Engineering Manager in Shell's Deepwater Projects division and his group was accountable for de-risking subsea technologies. In 2016, he returned to R&D to assume the role of General Manager - Long Range Research and New Energy Technologies. In this role, he leads a global team of engineers, scientists and researchers dedicated to developing more and cleaner energy solutions for the future. Ajay holds a BS in Chemical Engineering from the National Institute of Technology, Karnataka, India, a PhD in Chemical Engineering and Petroleum-Refining from the Colorado School of Mines, and an MBA from the Massachusetts Institute of Technology.

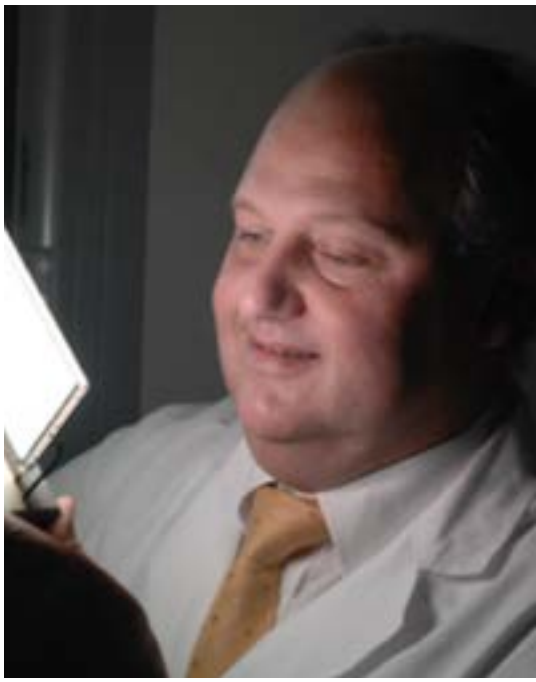


Prof. Dr. Ib Chorkendorff, Technical University of Denmark, Denmark

Professor Ib Chorkendorff is director of the The Villum Center for the science of sustainable fuels and chemicals (V-SUSTAIN). He is furthermore section leader of the section for Surface Physics & Catalysis (SurfCat) at department of Physics DTU.

His research focuses on the fundamental aspects of catalysis in a broad sense relating to Heterogeneous Catalysis in the fields of Thermal Catalysis, Electro-Catalysis and Photo-Electro-Catalysis. Thermal catalysis relates to large scale production like the methanol synthesis process, the steam reforming process and ammonia synthesis, but also processes in relation to energy production are of great interest. In the latter, the research is focused on designing and realizing new electrode material for fuel cell technology and the reverse process, electrolysis, where hydrogen is produced. Also the primary production of energy from sun light in the form of hydrogen is a topic of major interest. All the research activities share a fundamental approach to the processes on the atomic level developing new nanomaterials with special functionality for the specific use. The nanomaterials may be used for solving some of the future's major environmental and energy challenges mankind is facing.

Dr. Günter Schmid, Siemens, Germany



Dr. Günter Schmid is a Principal Key Expert Research Scientist at Siemens AG in the department Corporate Technology - Research for Energy and Electronics – Power-to-X and Storage (CT REE PXS). He earned his PhD degree from the University of Ulm (Germany) in 1993 and joined 1994 the Laboratory for Molecular Structure and Bonding at the Texas A&M University for a postdoctoral position. Since 1996 he is working within the framework of Siemens companies like Siemens AG, Infineon AG and Osram in various positions. His overall focus is the interaction of matter with electrons. From 1996 to 1999 he developed organic dielectrics for the application in silicon based semiconductors. In the years 1999 – 2005 he worked on organic field effect transistors based on vacuum processed organic semiconductors with self assembled monolayers (SAM) as gate dielectrics. Later on these SAMs were used in printed circuit boards to manufacture integrated capacitors. From 2006 – 2014 his interest was on Lewis acid based organometallic dopants for OLED application. Currently, his is working on energy storage topics, mainly the single step electrochemical reduction of CO_2 to high value chemical feedstock or specialties in aqueous media. Focus areas are electro catalysts, gas-diffusion electrodes, industrially applicable electrochemical cell design and the corresponding operation conditions.

Prof. Dr. Annick Hubin, Vrije Universiteit Brussel, Belgium

Annick Hubin is full professor at the Faculty of Engineering of VUB with a chair in Electrochemical Engineering, and is head of the research group SURF 'Electrochemical and Surface Engineering' in the department MACH 'Materials and Chemistry'. She is mainly teaching in Bruface, the Brussels Faculty of Engineering, a joint initiative of Vrije Universiteit Brussel (VUB) and Université Libre de Bruxelles (ULB), offering masters in different engineering disciplines in English. Her research is looking at the applications of electrochemical engineering in fields such as corrosion, electrocatalysis, batteries and fuel cells, sensors, and nano materials. The focus is on the in-situ characterization of the solid-liquid interfacial behavior from the macroscopic to the nanometer scale.

Dr. Pieter Boot, PBL Netherlands Environmental Assessment Agency, Netherlands

Dr. Pieter Boot is Head of the Department of Climate, Air and Energy at the Netherlands Environmental Assessment Agency (PBL). PBL assesses progress made by the Dutch government on e.g. climate, energy, nature and mobility issues and advises on ways forward in policy making. Furthermore, his department works with the European Commission and organizations like UNEP or the IPCC. Before joining PBL he worked at the IEA and different ministries in the Dutch government. He is an economist by profession.

Dipl.-Ing. Thomas Bürgler - voestalpine Stahl, Head of Research and Development Ironmaking, Linz, Austria

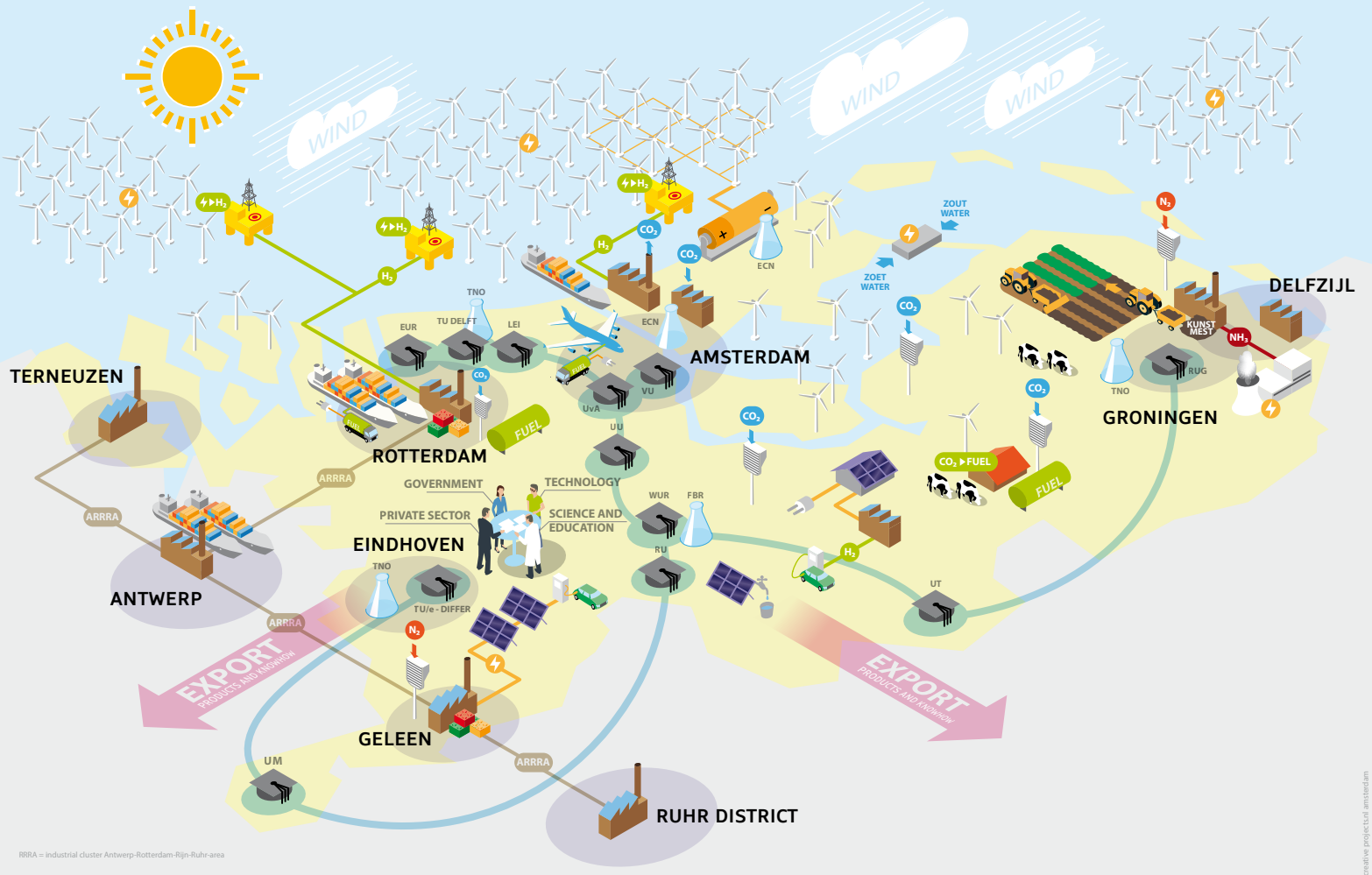
Thomas Buergler is Head of Research and Development Ironmaking of voestalpine, a globally leading technology and capital goods group with a unique combination of material and processing expertise, in Linz (Austria) and CEO of the Competence Center for Metallurgical and Environmental Process Development K1-MET in Linz and Leoben. He graduated in mechanical engineering at the Technical College in Linz and studied metallurgy at the University for Mining, Metallurgy and Materials in Leoben. Since 1992, his applied oriented research work focus on the process development of ironmaking with the classical blast furnace process and alternative process routes via smelting and direct reduction. Beside this main task, he has expertise in the preparation of primary and secondary raw materials for iron and steelmaking, recycling of by-products and treatment of process internal and external wastes. Environmental friendly and sustainable production processes is a key topic for a resource and energy intensive industry like materials production. From 2004 to 2010 he was member of the Technical and Steering Committee of ULCOS, the European cooperative R&D initiative to enable reduction in CO_2 emissions from steel production funded by the 6th Framework and the RFCS (Research Fund Coal Steel) program. From 2011 to 2016 he was involved in a project for a new DR plant in Texas, which is a confirmation, that a transition process from carbon to hydrogen in steelmaking has started. The latest steps in this development process are the engagement of voestalpine and K1-MET in the demonstration project for one of the world largest PEM Module funded by FCH JU and the development of a hydrogen plasma smelting reduction process funded by the Austrian FFG. Imparting of knowledge is an important task. Therefore he is also lector for process technology at the University of Leoben and materials science at the Secondary Technical College in Linz.

Dr. Behnam Taebi, Delft University of Technology, Netherlands

Behnam Taebi is Associate Professor in ethics of technology at Delft University of Technology, and Associate with the Harvard Kennedy School's Belfer Center for Science and International Affairs. His research interests are in energy ethics, nuclear ethics, responsible research and innovation (RRI) and engineering ethics. He studied Material Science and Engineering (2006) and received his Ph.D. in Philosophy of Technology (2010). Taebi is currently working on a project on ethics and governance of multinational nuclear waste repositories (with a personal Veni-grant) and a joint RRI project on understanding controversies in energy technologies (both projects awarded by the Netherlands Organization for Scientific Research). He is the coordinating editor of a volume on The Ethics of Nuclear Energy (Cambridge University Press, 2015) and five special issues on "Socio-Technical Challenges of Nuclear Power Production" (Journal of Risk Research - 2015), "Sustainability and ethics; Reflections on Sustainable Development Goals" (Sustainability – 2018), "Ethics in Modern Universities of Technology" (Science and Engineering Ethics – 2018), "Risk Governance: New Perspectives" (Journal of Risk Research - 2019) and "Multilateral governance of nuclear risks" (Risk, Hazard, Crisis and Public Policy – 2018). Taebi is currently writing a monograph on Ethics and Engineering (under contract with Cambridge University Press). Since 2016, Taebi is a member of the Young Academy (DJA) of the Royal Netherlands Academy of Arts and Sciences (KNAW) and in 2017 he1 joined the board of DJA.

Advisory committee for Electrochemical Conversion & Materials

Prof. dr. Richard van de Sanden (chair, Dutch Institute for Fundamental Energy Research, DIFFER), director DIFFER, Plasma physics & chemistry
Dr. Peter Bouwman (Nedstack fuel cell technology), Chief Technology Officer
Prof. dr. Bernard Dam (Delft University of Technology), Materials for Energy Conversion & Storage
Dr. Earl Goetheer (TNO), Principle scientist Sustainable Process & Energy Systems
Prof. dr. Gert-Jan Gruter (Avantium), Chief Technology Officer
Prof. dr. Petra de Jongh (Utrecht University), Inorganic Chemistry & Catalysis
Prof. dr. Marc Koper (Leiden University), Electrochemistry
Ir. Geert Laagland (Vattenfall), Head of Engineering
Prof. dr. Guido Mul (Twente Universityt), Photocatalytic synthesis
Dr. Alexander van der Made (Shell), Principal Scientist Future Energy Technologies
Dr. John van der Schaaf (TU/e), Chemical reactor engineering
Drs. Marco Waas (AkzoNobel), Director RD&I and Technology Industrial Chemicals
Dr. Hans van der Weijde (Tata Steel), Programmamanager Electrochemistry and CO_2 reduction



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Holland Chemistry

Powered by the Netherlands Ministry of Economic Affairs and Climate Policy

Ministry of Economic Affairs and Climate Policy

Parallel session: Materials & Catalysis

11:30 - 12:00
Keynote: Dipl.-Ing. Thomas Burgler (voestalpine Stahl)

12.00 – 12.20
Vera Smulders, MSc (UT)
The production of chlorate, a key chemical for paper pulp bleaching, is the third-largest of all electrochemical industries in terms of energy expenditure. It currently relies on highly carcinogenic chromium(VI) to achieve sufficient efficiency for economic viability. With the recent inclusion of Cr(VI) in REACH legislation, continued operation of this process in the EU is uncertain. Understanding the workings of Cr(VI) is crucial to pave the way to a non-toxic solution. We use an array of techniques to elucidate key behaviors that make Cr(VI) so suitable, and speculate on solutions to operate the chlorate process safely and efficiently.

12.20 – 12.40
Dr Shiju Raveendran (UvA)
A novel inexpensive catalyst for the efficient conversion of CO2 to CO.
We are working on a novel approach of using a co-ionic conducting Electrochemical Membrane Reactor to convert CO2 to value added chemicals at atmospheric pressure. The reactor consists of a dense co-ionic ceramic membrane and two porous electrodes. In the cathode, CO2 will be converted to CO catalytically. We have invented a new catalyst for this purpose. This bimetallic oxide system, which is inexpensive and easy to prepare, converts CO2 to syngas with unprecedented efficiencies at atmospheric pressure. The catalyst works without deactivation for several hours. In the lecture, I will discuss more about the catalyst and its performance.

12.40 – 13.00
Dr Ruud Kortlever (TUD)
Tuning the selectivity of electrochemical CO2 reduction on copper with organic additives
Increasing CO2 concentrations in the atmosphere are an issue of global concern. In this talk I will discuss the tuning of the selectivity of electrochemical CO2 reduction on polycrystalline copper electrodes with organic N-substituted heterocycles in the electrolyte.

15.00 – 15.20
Leon Jacobse, MSc (UL)
Visualizing Electrochemical Reactivity and Electrode Structure at the Nanoscale
Scanning probe techniques play a crucial role in understanding local electrochemistry. Here, I will discuss the nanoscale visualization of electrochemical reactivity (Scanning Electrochemical Cell Microscopy) and electrode surface structure (Electrochemical Scanning Tunneling Microscopy).

15.20 – 15.40
Dr Maarten van Biesheuvel (Wetsus)
Porous electrodes for energy storage, desalination and CO2 cycling
Electrochemical cells with porous electrodes have a high capacity for the storage of salt ions and their subsequent release in a cyclic process. Such systems can make use of intercalation electrodes or electrical double layer effects and store energy, desalinate water (selectively), and play in role in CO2 capture technologies.

15.40 – 16.00
Prof Joost Reek (UvA)

Supramolecular approaches in electrocatalytic water splitting

Electrocatalytic water splitting is crucial for the transformation of a fossil fuel based society to one that is based on sustainable energy. Both half reactions, water oxidation and proton reductions, are efficiently carried out in Nature by enzymes, for which the active site resides in a well-defined protein cage. Inspired by this, we have explored the effect of catalyst encapsulation in well-defined cages on their electrocatalytic performance, and we demonstrate that also for synthetic systems this can be a versatile strategy to increase their performance in electrocatalysis.

16.00 – 16.20
Dr Frans van Berkel (TNO)

Cost-efficient PEM-based electrolyzers: Shortening the time-to-market

One of the big challenges in the implementation of water electrolysis in the renewable energy system is the high capital cost and uncertainty regarding future cost and performance improvements. The current cost of electrolyzers is partly determined by achieving low performance degradation, requiring relatively expensive components. In order to shorten the time-to-market of more cost-efficient components an accelerated stress test procedure is required. This paper discusses the approach by ECN part of TNO and Hydron Energy towards an Accelerated Stress Test protocol(s) (AST) for complete cells and individual cell components for PEM-based electrolysis.

Parallel session: Innovative electrochemistry

11:30 - 12:00
Keynote: Prof. Dr. Annick Hubin (Vrije Universiteit Brussel)

12.00 – 12.20
Prof. Dr Emiel Hensen (TU/e)
Within the alliance between Eindhoven University of Technology and Utrecht University a new research program is initiated, focused at understanding electrochemical conversion processes at the fundamental level. Combining catalysis, electrochemistry, spectroscopy and reaction engineering, high-PT electrochemistry will be explored for the efficient reduction of CO2 and biogenic resources to chemicals and fuels. The scientific challenges and possible solution will be highlighted as well as the need to connect these lab-scale developments to scale-up efforts in test beds, which would benefit from intensive collaboration between academia, knowledge institutes and industry.

12.20 – 12.40
Dr Anja Bieberle-Hütter (DIFFER)
Electrochemical interfaces are the heart of many energy conversion and storage devices. However, the processes limiting the performance of these are often not well known because they cannot be measured directly. We will present a new approach where we combine experiments with modeling and simulations in order to identify limiting processes at electrochemical interfaces. We will discuss the general approach using the example of photoelectrochemical water splitting. We will compare electrochemical impedance spectra from our experimentally measured hematite photoanodes with those simulated from an electrochemical model using state-space modeling. Surface coverage plots from simulations which cannot straight forwardly be obtained by experiments, will be discussed.

12.40 – 13.00
Dr Thijs de Groot (Akzo)
Improvement potential in alkaline water electrolysis
Alkaline water electrolysis has been operational for over 100 years and is therefore considered to be a mature technology. However, there is still significant room for improvement of alkaline water electrolysis, eg. through increased current density, thinner separators and improved electrode coatings.

15.00 – 15.20
Dr Roman Latsuzbaia (TNO)
Electrosynthesis of lactic acid
Lactic acid is an important feedstock for sustainable production of bio-based polymers, fibers, and solvents. It can be produced from 2-propandiol derived from glycerol, the latter is an abundant and cheap feedstock, as it is a side product of production of biodiesel. 90% of lactic acid is produced through fermentation of carbohydrates, which is associated with issues such as high costs of the culture media, product purification, waste generation. The aim of our work is to develop a cheap electrochemical production method of lactic acid and demonstrate continuous electrochemical production, particularly, achieve high lactic acid conversion and yield at industrially relevant conditions, obtain design parameters for an electrochemical process.

15.20 – 15.40

Dr Waldo Bongers (DIFFER)

"Waldo Bongers, Henny Bouwmeester*, Zandrie Borneman**, Juehan Gao, Floran Peeters, Dirk van den Bekerom, Tom Butterworth, Adelbert Goede, Pieter Willem Groen, Teofil Minea, Qin Ong, Tim Righart, Gerard van Rooij, Michail Tsampas, Tiny Verreycken, Stefan Welzel, Bram Wolf and Richard van de Sanden

Electrically-driven conversion technologies of feedstock CO2, H2O, CH4 and N2 may convert surplus electricity from renewable sources like wind and solar energy into synthetic fuels and products. Plasmolysis and high-temperature electrolysis, using solid oxide cells (SOECs), are considered as most promising. Integration of plasmolysis and electrolysis may enhance both conversion and energy efficiencies. Current CO2 MW plasma reactor designs lead to core temperatures well above 1000 K, making integration of CO2 plasmolysis and electrolysis challenging. New reactor designs are investigated to minimize gas temperatures.

This work is supported by NWO, TTW (Toegepaste en Technische Wetenschappen), project 15325.

15.40 – 16.00

Dr Thomas Burdyny (TUD)

Enhancing electrocatalytic CO2 reduction using a system-integrated approach to catalyst discovery

Industrial-scale electrochemical CO2 conversion will be required to operate at high current densities in order offset capital cost expenditures and minimize the overall conversion footprint. However, as the reaction itself impacts the local reaction environment, the catalytic reaction substantially changes as currents are increased. In this talk we will show that operating at high current densities using a gas-diffusion layer not only improves CO2 reduction performance metrics, but provides further opportunities for catalyst discovery.

16.00 – 16.20

Dr Klaas Jan Schouten (Avantium)

CO2 electrocatalysis as key technology for the production of high value chemicals

Avantium is developing a technology-platform to electrocatalytically convert CO2 by bringing in it's technology and capabilities in catalyst research into the area of electrochemistry. In 2016, Avantium acquired Liquid Light, in which more than $35M was invested to develop a proprietary technology to make major chemicals from CO2. The acquisition combines the capabilities of both Liquid Light and Avantium to develop a leading electrocatalysis platform and brings Avantium in the top of the world's IP position in CO2 related electrolysis. Using this technology platform Avantium is developing an integrated process for the production of high-value C2 chemicals from CO2.

Parallel session: System integration, business & government

11:30 - 12:00
Keynote: Dr. Pieter Boot (PBL Netherlands Environmental Assessment Agency)

12.00 – 12.20
Rob Terwel, MSc (Kalavasta)
Affordable Carbon Neutral Synthetic Kerosene Enabled by Electrochemistry
Renewable synthetic kerosene seems to be the only solution to significantly reduce CO2-emissions in aviation on the medium term. The authors explore how system integration and advances in electrochemistry can enable affordable production of carbon-neutral jet fuel.

12.20 – 12.40
Ing. Rob van der Sluis (MTSA)
System integration of electrolysis
• Introduction MTSA
• Role Hydrogen in decentral electricity production.
• MTSA study - Power2Power System
MTSA has the vision that hydrogen will play a crucial role as energy carrier in the Energy Transition towards Sustainable Energy Sources. Decentral electricity production on semi industrial scale demands for flexible, decentral storage of hydrogen and a fast responding system to balance e-consumption and e-supply and stabilize the (local) grid in a reliable way. MTSA developed a concept P2P system consisting of: electrolyser, small battery, H2 compression, H2 storage, fuel cell and endeavors to reduce the cost price of such system to become economically viable.

12.40 – 13.00
Guy Verkoeyen, MBA (Hydrogenics)
Experiences with power-to-gas technologies in international projects
A view on Power to Gas (Electrolysis) from a market perspective.

15.00 – 15.20
Dr Andreas ten Cate (ISPT)
"The ISPT Cluster on System Integration focuses on the industry role in the future renewable-energy system. In this contribution an overview of the program is presented. Current activities are covering both strategic explorations as well as research that ranges from fundamental to pilot scale activities, addressing the following topics:
• Fundamental research on activation of small molecules (CO2 and N2)
• Strategic explorations on future hydrogen-based renewable energy supply chains, and on scale-up of electrolysis to industry scale capacity
• Program on closing the carbon cycle – re-use of carbon from steel to chemicals"

15.20 – 15.40

Drs. Toon van Harmelen (TNO)

Three electrification scenarios to decarbonise the Dutch production of basic materials and transportation fuels

The aim of the study was to quantitatively assess deep decarbonisation scenarios through electrification of the production of basic materials and transportation fuels in the Netherlands in 2050. This to explore the technical feasibility, required feedstock and energy potentials and pro's and con's of three distinct electrification pathways for the Dutch energy intensive industry, viz. A. All electric, B. Big on hydrogen en C. Competition. Each scenario has its own specific set of technologies and infrastructure. With the results in hand, better decisions can be made regarding Power-2-X development and its impact on business and policy.

15.40 – 16.00

Dr Frits van Hout (ASML)

"Energy conversion and storage are key in the energy transition. They offer ample opportunities for enhancing sustainability of industry, agriculture and transport, three important areas in Brabant. To support and promote breakthrough technologies in energy conversion and storage, cooperation between knowledge institutes, industry and governmental organization is essential. We use a new approach in facilitating cooperation around and impact of energy conversion and storage technologies without subsidizing stranded assets while at the same time offering opportunities for high tech industry."

16.00 – 16.20

Prof. Gert-Jan Kramer (UU)

Electrochemical Conversion, Energy Storage and Future Fuels – assessing the options

In this contribution to the ECCM conference I want to put the prospect that electrochemical conversion offers in the context of the wider challenge of the global energy transition. Electrochemical conversion offers great prospects if and when it can be commercialized and scaled up with unprecedented speed and determination. Is the community up for the challenge? And can the world afford to bet on it?