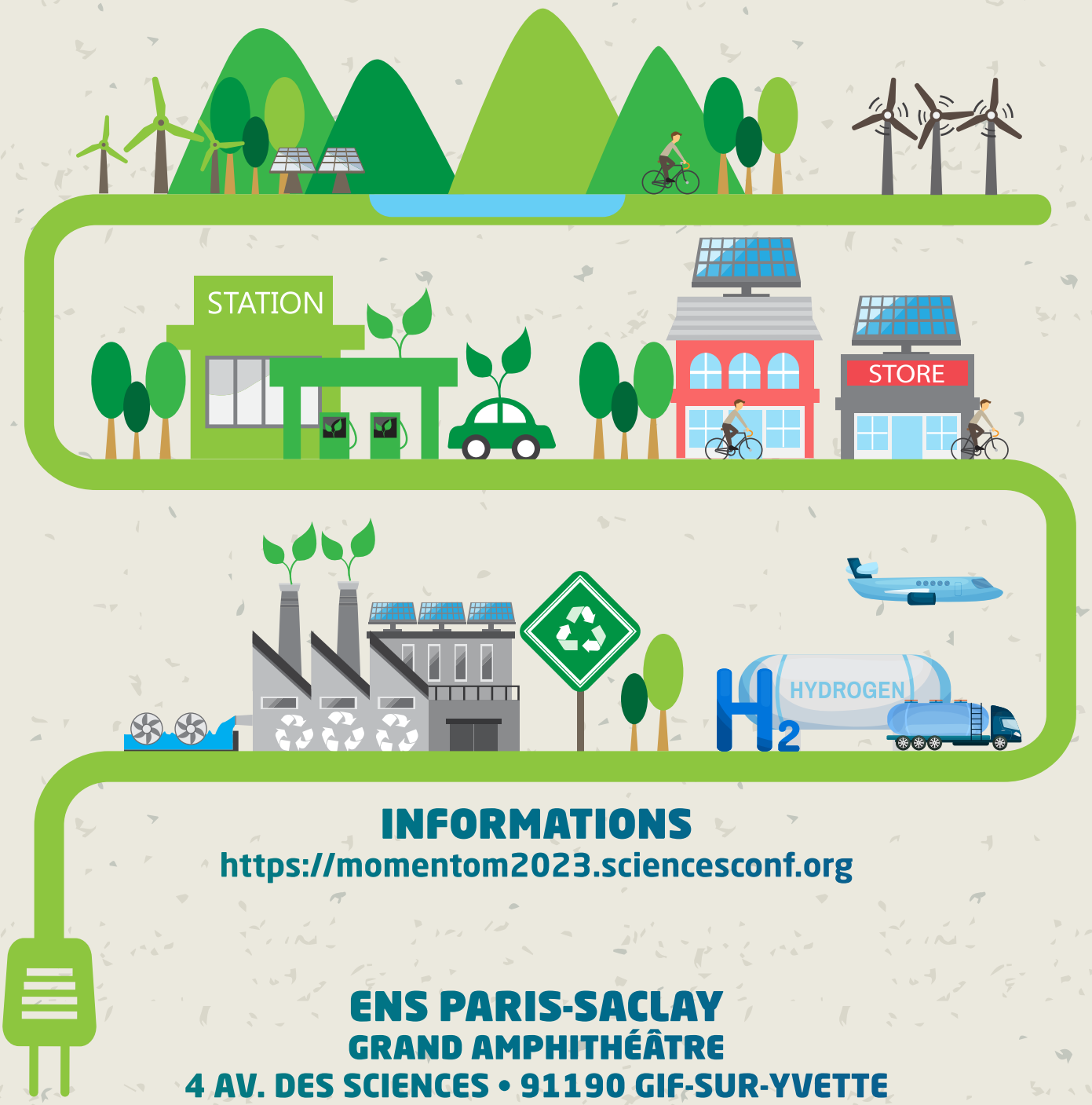
8-10 MARCH 2023

3rd MOMENTOM INTERNATIONAL CONGRESS

ENERGY AT THE CROSSROADS:

Accelerating innovation in the age of disruption



INFORMATIONS

https://momentom2023.sciencesconf.org

ENS PARIS-SACLAY

GRAND AMPHITHÉÂTRE

4 AV. DES SCIENCES • 91190 GIF-SUR-YVETTE

université PARIS-SACLAY | INSTITUT DE L'ÉNERGIE SOUTENABLE | université PARIS-SACLAY | école normale supérieure paris-saclay | cea | cnrs | Maison des Sciences de l'Homme PARIS-SACLAY | ENSTA IP PARIS

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Patrick Schembri,
UVSQ, Université Paris-Saclay

Virginie Tallio,
Université Paris-Saclay, IES

FOREWORD

Dear attendees,

On behalf of the Organization committee of the 3rd MOMENTOM International Congress: Energy at the crossroads, we are glad to welcome you on the campus of the University Paris-Saclay. This congress has been organized on the initiative of the Institute for Sustainable Energy of the University Paris-Saclay. The Institute for Sustainable Energy (IES) is an interdisciplinary program of the University of Paris-Saclay. It brings together research teams from more than 41 laboratories representing about 450 researchers and lecturers.

The aim of this Congress is to share knowledge and the most recent scientific advances, from fundamental to applied research, towards the energy transition. In addition, Human and Social Sciences, in relationship with the society apprehension in our changing world, will be one of the topics of this congress.

Our thanks go to worldwide renowned scientists who accepted to participate to this congress as well as all the contributors and attendees.

We are thankful to the constant support of the University Paris-Saclay and MSH Paris-Saclay, and particularly indebted to the sponsors of this Congress.

We wish you all fruitful scientific discussions to tackle the challenges of the Energy of tomorrow.

Loïc Assaud, Hynd Remita, Guilhem Dezanneau, Emmanuelle Deleporte, Patrick Schembri, Magali Gauthier, Marc Petit, Virginie Tallio

Steering committee of the Institute for Sustainable Energy

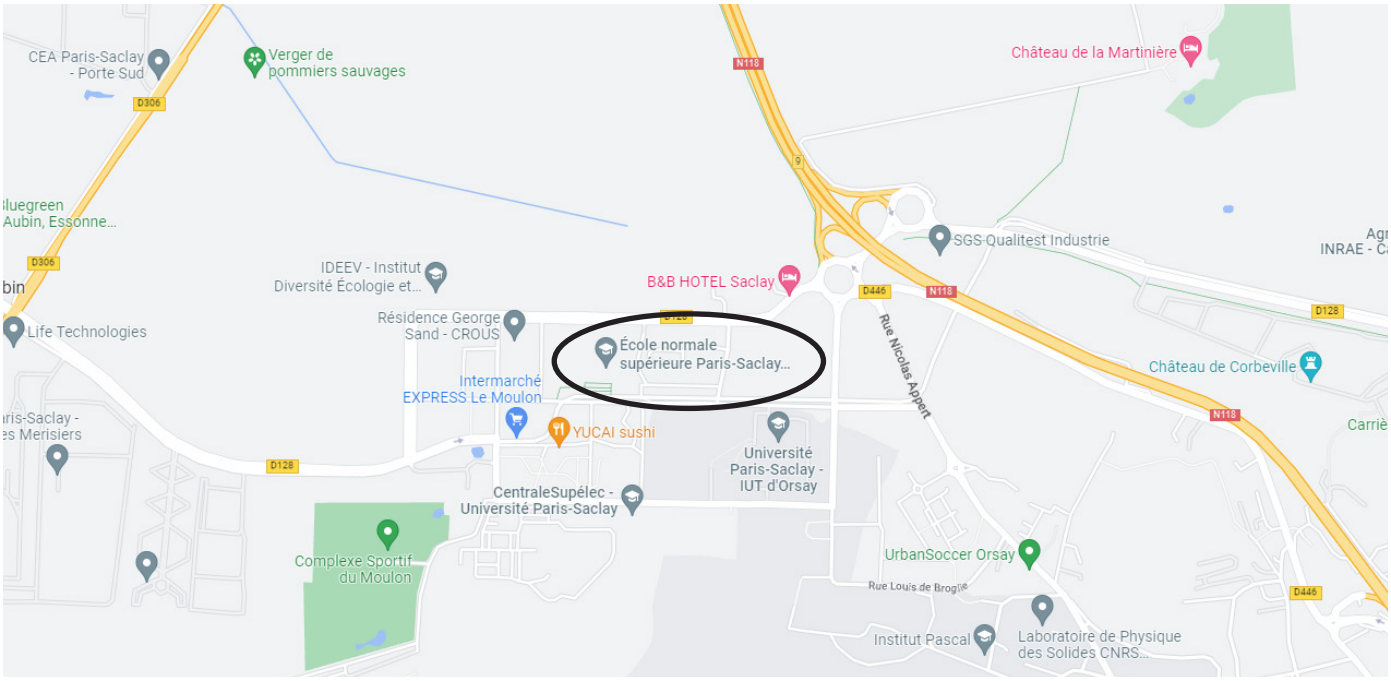
PRACTICAL INFORMATION

The Congress will take place at the ENS Paris-Saclay.

The Congress will be held in the rooms Room 1B26, Room 1B36, and Grand Amphithéâtre.

The coffee breaks, lunches and the cocktail on the 8th of March will be held at Emmy Noether Hall.
The different congress rooms will be clearly indicated.

Address: ENS Paris-Saclay, 4, avenue des Sciences, 91400 ORSAY, France.



To reach ENS:

BY TRAIN:
- International and national trains: Railway station MASSY TGV, then take the bus 91.06 (Christ de Saclay) or 91.06 (St Quentin en Yvelines). Bus stop: Moulon
- Regional trains (RER): RER B Le Guichet station, then take bus 9 (Christ de Saclay/Gare de Jouy en Josas/ Campus HEC). Bus stop: Moulon or Bus 9106 (Gare de Massy Palaiseau), Bus stop: Université Paris Saclay

RER B or RER C Massy-Palaiseau station, then take one of the following buses : 91.06 (Christ de Saclay) or 91.10 (St Quentin en Yvelines) Bus stop: Moulon or 91.06 (Gare du Guichet), Bus stop: Université Paris-Saclay.

BY BUSES: lines 91.06 (Christ de Saclay/Gare de Massy Palaiseau), 91.10 (St Quentin en Yvelines-Orly), 9 (Christ de Saclay/Gare de Jouy en Josas/Campus HEC). Bus stop: Moulon
Line 7 (Plateau de Moulon-Corbeville). Bus stop : Université Paris-Saclay
Line 11 (Parc Orsay Université-Gare de Gif-sur-Yvette). Bus stop: Centralesupélec

BY CAR: Through N118
You can park at the «Digiteo» parking. The access (there is a road sign) is via Raimond Castaing street.

BY AIRPLANE: There are two airports in Paris: Roissy-Charles de Gaulle and Orly.
From Roissy-Charles de Gaulle, take the RER B (St Rémy les Chevreuse) to Massy-Palaiseau or Le Guichet.
From Orly, take Orlyval to Antony and then take the RER B (St Rémy les Chevreuse) to Massy-Palaiseau or Le Guichet.

BY CAR-POOLING: There are several applications proposing car-pooling. The most known is Blablacar.

SUSTAINABILITY ENGAGEMENTS OF THE IES

The engagements towards sustainability are of very high interest at the Université Paris-Saclay. They are detailed in the Charte Développement Soutenable[1], endorsed on the 6th of July 2021.

The mission of the Institute for Sustainable Energy (IES) is to connect academics working on sustainable ways to produce, store, convert, distribute and use energy, and to support industrials, start-ups, and territorial stakeholders towards the energy transition. In that regard, it is strongly committed to support the sustainability engagements of the Université Paris-Saclay.

GOODIES

It has been decided to considerably diminish the number of goodies given at the congress, and the communication supports. You will find at the end of this leaflet a few pages to take notes. There will be only a few abstract books available at the counter. You can otherwise download the abstract book on the congress website.

CARBON FOOTPRINT

As a matter of fact, travel is the most environmentally costly when organizing a conference, especially when participants are travelling by plane. Nevertheless, the IES acknowledges that some trips can only be done by airplane.

Several carbon mitigation programs exist. Please consider to mitigate your carbon footprint by giving to one of these programs. The IES is aware of the multiple flaws of carbon mitigation[2] but it is considered as well that, when airplane travel is the only solution, mitigating the carbon footprint by giving to such programs is acceptable.

This program has been chosen on the basis that its positive carbon mitigation impact is not done at the expense of other environmental and/or social impacts.
https://CO2solidaire.org/

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[1] https://cirrus.universite-paris-saclay.fr/s/r7L3RdRsiB7z4QB

[2] https://www.cirad.fr/les-actualites-du-cirad/actualites/2021/compensation-et-neutralite-carbone

PROGRAM: DAY 1

Emmy Noether Hall

8:30 - 9:30 **Welcome coffee**

Grand Amphithéâtre Chairwoman / Chairman: Hynd Remita / Loïc Assaud

9:30 - 10:00 Introductive words: UPSaclay, IES, MSH

10:00 - 10:45 **PLENARY #1:** Hydrogen from Water electrolysis for a Changing World: Elena BARANOVA

10:45 - 11:15 **KEYNOTE #1:** Reinforcement learning for electrical markets and the energy transition: Damien ERNST

11:15 - 11:35 **ORAL #1:** Chalco-POM based catalysts: from fundamentals to hydrogen evolution real-life application: Emmanuel CADOT

11:35 - 11:55 **ORAL #2:** Status and perspectives of photovoltaics: Jean-Paul KLEIDER

11:55 - 12:10 Short presentations: booths

Emmy Noether Hall

12:10 - 14:00 **Lunch**

Grand Amphithéâtre Chairwoman: Magali Gauthier

14:00 - 14:45 **PLENARY #2:** Sodium-ion Batteries: challenges and opportunities for an alternative sustainable energy storage technology: Ivana HASA

14:45 - 15:15 **KEYNOTE #2:** Geologic hydrogen: sources, fluxes and relationships with deep microbial activity and abiotic organic synthesis: Bénédicte MENEZ

15:15 - 15:45 **KEYNOTE #3:** Synchrotron Radiation at the Crossroads of the Sustainable Energy Science from Today to Tomorrow: Valérie BRIOIS

Emmy Noether Hall

15:45 - 16:15 **Coffee Break**

3 PARALLEL SESSIONS:

Grand Amphithéâtre **SESSION 1: ENERGY PRODUCTION - PHOTOVOLTAICS** Chairman: Emmanuel Cadot

16:15 - 16:30 **ORAL #3:** Routes for low cost III-V solar cells: Lise WATRIN

16:30 - 16:45 **ORAL #4:** Solid-state monolithic dye-sensitized solar cell exceeding 10 % of power conversion efficiency using a copper-complex HTM and a carbon counter-electrode : Fatima SANTOS

16:45 - 17:00 **ORAL #5:** High bandgap triple mesoscopic perovskite solar cell: Sookyung KANG

17:00 - 17:15 **ORAL #6:** Study of the formation of 2D/3D perovskite heterostructures for solar cells: Thomas CAMPOS

17:15 - 17:30 **ORAL #7:** Promising Ultra-wide Bandgap Spinel $ZnGa_2O_4$ for Energy Storage and Conversion: Zeyu CHI

Room 1B26 **SESSION 2: ENERGY STORAGE - BATTERIES / SUPERCAPS** Chairman: Fabien Miomandre

16:15 - 16:30 **ORAL #8:** Deep eutectic solvents as sustainable electrolytes for supercapacitors: Xavier MASCARENHAS

16:30 - 16:45 **ORAL #9:** Functionalizing graphene with tetrazine derivatives to desing new materials for supercaps: Margarita BOSMI

16:45 - 17:00 **ORAL #10:** A multiscale study of the electronic and ionic transport processes influencing the performance of Lithium-ion batteries: Julius AKINRIBIDO

17:00 - 17:15 **ORAL #11:** A study of sulfide-based solid electrolytes (SSEs) sensitivity towards humidity: gas evolution quantification and degradation mechanisms investigation: Ivan LETEYI MFIBAN

17:15 - 17:30 **ORAL #12:** Fundamental understanding of concentrated aqueous electrolytes for batteries: Malaurie PAILLOT

17:30 - 17:45 **ORAL #13:** Multi-scale study of lithium diffusion in garnet-type solid electrolyte: Neutron powder diffraction and NMR spectroscopy analysis: Said YAGOUBI

Room 1B36 **SESSION 3: ENERGY AND SOCIETY** Chairman: Pierre Guibentif / Patrick Schembri

16:15 - 16:30 **ORAL #14:** Alternative scenario for the energy transition: Jean-Marc SALOTTI

16:30 - 16:45 **ORAL #15:** Local narratives and energyscapes. Energy transition seen from the margins of a coal region: Elena APOSTOLI CAPPELLO

16:45 - 17:00 **ORAL #16:** Measuring the ecological impacts of digital organisations: Organisational learning and indirect effects: Cedric GOSSART

17:00 - 17:15 **ORAL #17:** Testing the impacts of disaggregated renewable energy sources on economic growth: evidence of spatial spillover effects for developing countries: Katia RADJA

17:15 - 17:30 **ORAL #18:** The impacts of combining incentives on carpooling for commuting in Paris Metropilitan area: Fawaz SALIHOU

Emmy Noether Hall

17:45 - 19:45 **Poster session #1 + Cocktail**

PROGRAM: DAY 2

3 PARALLEL SESSIONS:

Grand Amphithéâtre — **SESSION 1: ENERGY NETWORKS** Chairman: Marc Petit

9:00 - 9:15	**ORAL #19:** Evaluation of industrial hubs designs to enable the infrastructure for a hydrogen market: Gabriela NASCIMENTO DA SILVA
9:15 - 9:30	**ORAL #20:** From energy technology complexity to socio-technical approach: the bioenergy example: Clément LASSELIN
9:30 - 9:45	**ORAL #21:** Use of reversible pump-turbines (RPT) as an alternative to expand «submotorized» hydropower plants (HPP) in Brazilian Electric System - Case Study of Foz do Areia: Murilo CARDOSO DE MIRANDA
9:45 - 10:00	**ORAL #22:** Scalability of an Integrated-PEC for high efficiency Hydrogen production: Angela R. A. Maragno

Room 1B26 — **SESSION 2: ENERGY CONVERSION - HYDROGEN** Chairman: Johnny Deschamps

9:00 - 9:15	**ORAL #23:** Bandgap tuning of Graphdiyne to promote photogenerated charge separation and Photocatalytic Hydrogen Production: Mohamed Nawfal GHAZZAL
9:15 - 9:30	**ORAL #24:** Highly Porous Iridium Oxides Electrocatalysts for Proton Exchange Membrane Water Electrolyzers: Jennifer PERON
9:30 - 9:45	**ORAL #25:** Ruthenium nanocatalysts for electrocatalytic hydrogen evolution reaction: Karine PHILIPPOT
9:45 - 10:00	**ORAL #26:** Challenge and prospects for the development of hydrogen and renewable Gases in France: Clothilde MARIUSSE

Room 1B36 — **SESSION 3: ENERGY AND CO_2 CONVERSION** Chairwoman: Anne Dolbecq

9:00 - 9:15	**ORAL #27:** Density Functional Studies on Photocatalytic Methane Coupling over Au/TiO_2: Dorota RUTKOWSKA-ZBIK
9:15 - 9:30	**ORAL #28:** Selective electrochemical reduction of CO to n-propanol and ethanol by nitride-derived bimetallic catalysts: Hong Phong DUONG
9:30 - 9:45	**ORAL #29:** Shaping the Electrocatalytic Performance of Metal Complexes for CO_2 Reduction: Philipp GOTICO
9:45 - 10:00	**ORAL #30:** Forming multiple C-C bonds upon electrocatalytic reduction of CO_2 by molecular transition metal macrocycles: Si Thanh DONG

Emmy Noether Hall

10:15 - 10:45 **Coffee Break**

Grand Amphithéâtre Chairwoman: Yara Hodroj

10:45 - 11:30	**PLENARY #3:** The challenges of rare earths in the energy transition: Stéphane GOUTTE
11:30 - 12:00	**KEYNOTE #4:** Offshore energy hubs: Nicolaos A. CUTULULIS
12:00 - 12:05	**DIM MaTerRE:** Anne DOLBECQ

Emmy Noether Hall

12:05 - 14:00 **Lunch**

INNOVATION SESSION

Grand Amphithéâtre Chairman / Chairwoman: Stanilas Pommeret / Elsa Couderc

14:00 - 14:30	**PLENARY #4:** Vertically Aligned Carbone Nanotubes – a new material for energy, from the lab to mass production: Pascal BOULANGER
14:30 - 15:30	Airthium, an engine to decarbonize the planet: Andrea KLOCHKO
	Innovation across organizational and disciplinary boundaries at Lemon Energy: enhancing industrial energy performance based on data: Ana ROCHA
	Low-electricity Hydrogen Production with Methane Pyrolysis Catalyzed by NanoPulsed Plasma: Erwan PANNIER
	SoY PV: the photovoltaic innovation in action: Daniel LINCOT / Jean-Michel LOURTIOZ
	H_2YAM: Combustion engines, the only viable and scalable means of decarbonizing maritime mobility immediately: Alexandre MARC
15:30 - 16:30	Round Table : **Energy at the crossroads**

Emmy Noether Hall

16:30 - 18:00 **Poster session #2**

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20:00 - 23:00 **GALA DINNER IN PARIS**
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PROGRAM: DAY 3 AM

Grand Amphithéâtre	Chairwoman: Emmanuelle Deleporte
9:30 - 10:15	**PLENARY #5:** Perovskite Photovoltaics for Electricity and Fuel Generation from Sunlight: Michael GRÄTZEL
10:15 - 10:45	**KEYNOTE #5:** Cybersecurity in the Energy sector: Challenges, Perspectives and Policy Approaches: Arnault BARICHELLA
Emmy Noether Hall	
10:45 - 11:15	**Coffee Break**

3 PARALLEL SESSIONS:

Grand Amphithéâtre	**SESSION 1: BIO-INSPIRED ENERGY PRODUCTION** Chairman: Philipp Gotico
11:15 - 11:30	**ORAL #31:** Microbial electrochemical technologies for taking advantage of the energy and carbon content of organic waste to fuel the bioeconomy sector: Théodore BOUCHEZ
11:30 - 11:45	**ORAL #32:** Microalgae for CO_2 capture: Catherine EVEN
11:45 - 12:00	**ORAL #33:** Development of the Biofuel industry in Europe: interactions with the oil industry and the agricultural supply through a modeling approach: Frederic LANTZ
12:00 - 12:15	**ORAL #34:** Bio-Inspired Bimetallic Cooperativity Through a Hydrogen Bonding Spacer in CO_2 Reduction: Chanjuan ZHANG
Room 1B26	**SESSION 2: ENERGY PRODUCTION - ELECTROCATALYSIS / PHOTOELECTROCATALYSIS** Chairwoman: Dorota Rutkowska-Zbik
11:15 - 11:30	**ORAL #35:** Solar to chemical energy conversion - what is the potential of photocatalysis?: Wojciech MACYK
11:30 - 11:45	**ORAL #36:** Sulfur-doped carbon nitride hybrid materials tested under green light for photoelectrocatalytic benzylamine oxidation and oxygen evolution reactions: Pablo JIMENEZ-CALVO
11:45 - 12:00	**ORAL #37:** Synthesis developments and performances of non-noble metal ORR electrocatalysts by ammonia induced CO_2 laser pyrolysis of liquid droplet aerosol: Henri PEREZ
12:00 - 12:15	**ORAL #38:** Tuning the syngas composition obtained via electrochemical reduction of CO_2 by in situ potential cycling: Catia AZENHA
Room 1B36	**SESSION 3: ENERGY PRODUCTION AND STORAGE - HYDROGEN** Chairman: Guilhem Dezanneau
11:15 - 11:30	**ORAL #39:** Conducting Polymer-Based Heterojunction for Photocatalytic Hydrogen Generation: Srabanti GHOSH
11:30 - 11:45	**ORAL #40:** Corrosion of metallic bipolar plates and porous transport layers in proton exchange membrane water electrolyzer anodes: Michel PRESTAT
11:45 - 12:00	**ORAL #41:** Development of a High-Throughput Approach for the Research of Materials for Protonic Ceramic Cells: Giulio CORDARO
12:00 - 12:15	**ORAL #42:** Hydrogen storage in clay materials: Pascale LAUNOIS
Emmy Noether Hall	
12:30 - 14:00	**Lunch**

PROGRAM: DAY 3 PM

Grand Amphithéâtre **Chairwoman: Hynd Remita**

14:00 - 14:45 **PLENARY #6:** Structure-Reactivity Relationship for Pt-Rare Earth Nanoalloy Electrocatalysts for Fuel Cell Cathodes: Sara CAVALIERE

14:45 - 15:15 **AWARDS CEREMONY & ACKNOWLEDGEMENTS** Chairman: Ally Aukauloo

3 PARALLEL SESSIONS:

Grand Amphithéâtre **SESSION 1: ENERGY PRODUCTION - SOLAR FUELS** Chairman: Macyk Wojciech

15:15 - 15:30 **ORAL #43:** Analysis of Low Temperature Combustion (LTC) process in internal combustion engines: Fadila MAROTEAUX

15:30 - 15:45 **ORAL #44:** Bifunctional earth-abundant catalysts for solar to hydrogen fuel production: Maria MENDEZ

15:45 - 16:00 **ORAL #45:** Unveiling the Mechanism of the Photocatalytic Reduction of CO_2 to Formate Promoted by Porphyrinic Zr-Based Metal-Organic Frameworks: Amanda Lyn ROBINSON

16:00 - 16:15 **ORAL #46:** Synthesis of p-Silicon/Agx Cu100-x Photocathodes applied to light-assisted CO_2 reduction: Encarnacion TORRALBA

Room 1B26 **SESSION 2: ENERGY HARVESTING - MICRODEVICES** Chairman: Remith Pongilat

15:15 - 15:30 **ORAL #47:** Diamond semiconductor: its challenging n-type doping: Marie-Amandine PINAULT-THAURY

15:30 - 15:45 **ORAL #48:** Influence of GaN NW diameter on their piezo-conversion properties: Effect of the surface charges: Quang-Chieu BUI

15:45 - 16:00 **ORAL #49:** Micro-device optimization for energy harvesting applications: Ann-Lenaig HAMON

16:00 - 16:15 **ORAL #50:** Unlocking the photophysics of mesoporous graphitic-carbon nitride (mpg-CN): Jokotadeola ODUTOLA

Room 1B36 **SESSION 3: ENERGY TRANSITION** Chairwoman: Natalia Zugravu

15:15 - 15:30 **ORAL #51:** On Robust Optimization, Blackouts and the Law: Dirk LAUINGER

15:30 - 15:45 **ORAL #52:** Predator-Prey model of a technological renewable-based energy transition: Diana MONROY

15:45 - 16:00 **ORAL #53:** A meta-analysis of the concept of “green jobs”: the search for sustainable development paths in developing countries: Alexandre MATHIEU

16:00 - 16:15 **ORAL #54:** Damping analysis of Floating Offshore Wind Turbine (FOWT): a new control strategy reducing the platform vibrations: Matteo CAPALDO

POSTER SESSION: DAY 1

P#1	**Perazio Alessandro**	Acidic Electroreduction of CO_2 to Multi-Carbon Products with Continuous CO_2 Recovery from Carbonate
P#2	**Plantevin Olivier**	Strain and Optoelectronic tuning in Mixed Halide Perovskites with Ion Irradiation
P#3	**El Khoueiry Maria**	Characterization of molecular catalysts by Atomic Force Microscopy combined to Scanning Electrochemical Microscopy for the Hydrogen Evolution Reaction
P#4	**Naciri Yassine**	Compositional, Structural, and Surface Characterization of Titanium doped Imogolite Clay Nanotubes: Implications for Photocatalytic Hydrogen Production
P#5	**Segura Yutzil**	Copper-based nanoparticles for CO_2 electroreduction
P#6	**Zafar Sharyal**	Decentralized Control of EVs in Smart Grid using Multi-Agent Multi-Armed Bandits
P#7	**Dias Fernandes Marie-Sophie**	Direct Synthesis and Electrochemical Characterization of Nasicon-Type Li2NaV2(PO4)3 Cathode
P#8	**Mary Caroline**	Doping influence on g-C3N4 based heterojunction for hydrogen production by water splitting under solar irradiation
P#9	**Meziani Narimane**	Effect of hydration on the properties of a superionic conductor M2Ti2O5.(H_2O)x
P#10	**Stephan Emma**	Electrical behavior and stability under real outdoor working conditions of triple-mesoscopic perovskite solar cells.
P#11	**El Semaan Elio**	State estimation of low voltage networks using machine learning techniques
P#12	**Ihlal Ahmed**	Experimental investigations on atmospheric water harvesting using composite desiccant-based solar collector
P#13	**Bach Alexandre**	Fault location on MV distribution grids with distributed measurements
P#14	**Ullah Wahid**	Graphdiyne quantum dots: new metal free co-catalyst for efficient photocatalytic hydrogen generation
P#15	**Attia Mahmoud**	Investigations of diffusion and NMR properties in LLAZO through a multiscale simulations approach linked to experimental data
P#16	**Rocha Ana**	Innovation across organizational and disciplinary boundaries at Lemon Energy: enhancing industrial energy performance based on data analysis
P#17	**Smith Adrien**	Metalloporphyrins bearing imidazolium groups for CO_2 reduction
P#18	**Xi Qingyang**	Molecular engineering of hole transporting molecules for high efficient and enhanced thermal stability perovskite solar cell
P#19	**Lopez Girlie Eunice**	Photocatalytic Oxygen Reduction to Hydrogen Peroxide from Oxygen and Water by Metal- free Nano-Polypyrrole
P#20	**Rashid Haroon**	Polymeric porphyrin-based material for the activation and reduction of CO_2
P#21	**Khan Alisha**	Porous Composite Nanomaterials Based On MOFs For Green Hydrogen Production
P#22	**Emile Emery**	Power Grid Structure for the Energy Transition
P#23	**Mendez Medrano Ana Andrea**	Enhancement of Photocatalytic Hydrogen Generation on TiO_2 by AuPd nanoalloys
P#24	**Nakamae Sawako**	Thermogalvanic Energy Conversion Improvement in Ionic Liquids Redox Solvation and Coordination Chemistry
P#25	**Harvey Catherine**	Towards the Electrolysis of Seawater by Iridium and Iridium Mixed Based Oxide Nanoclusters for the Generation of the Hydrogen Energy Carrier
P#26	**Scola Joseph**	Interfacial properties of a ZnO-polymer nanocomposite for PENG applications
P#27	**Stanescu Dana**	Intrinsic photoanode band engineering: surface segregation mediated enhanced solar water splitting efficiency in Ti-doped hematite nanorods
P#28	**Julius Akinribido**	A multiscale study of the electronic and ionic transport processes influencing the performance of Lithium-ion batteries

POSTER SESSION: DAY 2

P#29	**Watrin Lise**	Routes for low cost III-V solar cells
P#30	**Matmati Hanah**	3 generation of green gas: from the circular economy of the territory to the resilience of gas networks
P#31	**Quach Vien-Duong**	Artificial strong metal-support interaction on plasmonic core-shell nanostructures for photo(electro)catalytic reaction
P#32	**Votat Sébastien**	Bioremoval of dyes in a microbial fuel cell by the fungus Trichoderma harzanium : a sustainable approach in energy production
P#33	**Chevillard Amaury**	GaN nanowire-based piezoelectric devices for energy harvesting: Impact of the NW/polymer matrix composite
P#34	**Wang Xingze**	Heterometallic (MIV/MII) MOFs as a versatile platform for the photocatalytic overall water splitting reaction
P#35	**Pinault-Thaury Marie-Amandine**	Ionic analysis of phosphorus doped-diamond homoepilayers grown with different carbon isotopic abundances
P#36	**Pinault-Thaury Marie-Amandine**	Locally Ion Implantation and Annealing Effects in Diamond
P#37	**Bui Thanh-Tuan**	Molecular engineering of hole transporting molecules for high efficient and enhanced thermal stability perovskite solar cell
P#38	**Haake Matthieu**	Selective Aqueous Electrocatalytic CO_2-to-CO Reduction with a Cobalt-based Molecular Cathode
P#39	**Wang Cong**	Structure-Engineered TiO_2: Harvesting Light for Photocatalytic H_2 Production
P#40	**Le Pivert Marie**	ZnO nanostructures based photocatalytic civil engineering materials development for urban pollution remediation
P#41	**Delachaux Valentin**	Why are photovoltaic/thermal solar collectors (PVT) yet on the way to be a key technology of buildings energy transition, especially for DHW preparation?
P#42	**Benyahia Raihana**	Nickel based anodes for the electro-oxidation of urea and synthetic urine in alkaline media
P#43	**El Sied Moataz**	The way to 100% MW scale renewable power systems: future challenges and promising solutions
P#44	**Xie Peigen**	Smart building simulation and control
P#45	**Dubouis Nicolas**	How R&D Can Help us Transform into a Clean H_2 Economy
P#46	**Chatelet Corentin**	Vertically aligned carbon nanotubes on aluminum foils: one-step synthesis from bio-sourced precursors and electrochemical characterization
P#47	**Ferreira Lauro**	Operation of Power Diodes at Cryogenic Temperature
P#48	**Duong Viet Dung**	Semiconducting conjugated oligomers for photo-driven water oxidation
P#49	**Kumar Ashutosh**	Thermoelectric Properties of high-entropy rare-earth cobaltates
P#50	**Matmati Hanah**	3rd gas revolution: challenges and prospects for the development of renewable gases
P#51	**Pugliese Eva**	Photo-induced Fe(III)-hydroperoxo generation for oxygen atom transfer reaction
P#52	**Yuan Xiaojiao**	Molecular imprinted butterfly-shaped micromotors for selective target recognition
P#53	**Lhostis Florian**	High-rate CO_2 reduction to formic acid using bismuth-based electrocatalysts
P#54	**Bathia Ankush**	New insights on the charge storage mechanism of thin films electrode materials by Raman spectroscopy

ABSTRACTS OF THE PLENARY AND KEYNOTE SESSIONS

PLENARY SESSIONS

ELENA BARANOVA

Hydrogen from Water electrolysis for a Changing World

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To accelerate the transition to the low carbon future based on renewable energy, e.g., solar and wind energy, more effort is required to ensure flexible storage and usage options of this intermittent energy. Converting and storing the excess renewable electrical energy into chemicals is an essential constituent in this challenge. Hydrogen is a unique chemical and fuel that can play a key role in the transition to low-carbon technologies. One promising path for green hydrogen production is water electrolysis. Hydrogen generation by water electrolysis can potentially satisfy renewable energy storage and transportation with high efficiency and low cost. Two primary commercially available technologies for water electrolysis are liquid alkaline systems, which have a long history in large-scale installations using Nickel-based electrodes and Proton Exchange Membrane (PEM) water electrolyzers that have a compact design, operate at high current densities but employ expensive Platinum Group Metal (PGM) catalysts. These two technologies have several benefits but also technical challenges and require considerable total cost reduction for large-scale hydrogen generation.

An emerging technology for hydrogen production is an alkaline membrane water electrolysis (AMWE) promises to use an anion exchange membrane (AEM) to combine the benefits of alkaline and PEM electrolyzers to produce hydrogen at high current densities, high efficiency using low-cost, non-PGM catalysts.

Nanostructured Ni-based catalysts are promising non-noble metal catalysts for both anodic (oxygen evolution reaction, OER) and cathodic (hydrogen evolution reaction, HER) reactions in AEM water electrolyzers due to their high activity, stability in alkaline media and low cost. In an AEMWE, Ni nanoparticles form a catalytic layer bound together using an anion exchange ionomer (AEI), providing hydroxide ion transport throughout the layer. AEMWE technologies show promising performance using non-PGM catalysts for both OER and HER. This talk will discuss the opportunities for green hydrogen generation in AEM water electrolysis and the technical challenges related to electrode materials, membrane, ionomer, and gas-diffusion layer (GDL) that need to be solved to design commercial systems for hydrogen production at a lower cost using renewable energy.

BIOGRAPHY

Elena Baranova is a Full Professor in the Department of Chemical and Biological Engineering and a Director of Nexus for Quantum Technologies (NexQT) Institute at the University of Ottawa, Canada. She received her Ph.D. from École Polytechnique Fédérale de Lausanne (EPFL) in 2005. She was an NSERC post-doctoral fellow with the National Research Council (NRC), Canada (2005-2007) before joining University of Ottawa in 2008 as a tenure-track Assistant Professor. Her field of research is Electrochemical Engineering, Energy and Catalysis. Dr. Baranova has authored over 130 publications, three book chapters and holds one US patent. She is an Executive Editor of the Journal of Chemical Technology and Biotechnology, JCTB (SCI, Wiley) and a Member of the Editorial Board of the Journal of Solid State Electrochemistry (Springer Nature).

ABSTRACTS OF THE PLENARY AND KEYNOTE SESSIONS

PLENARY SESSIONS

IVANA HASA

Sodium-ion Batteries: challenges and opportunities for an alternative sustainable energy storage technology.

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The increasingly growing demand of lithium-ion batteries (LIBs) for electromotive and stationary storage application, has been raising concerns about the future and long-term availability and cost of the critical raw material employed in LIB production, such as cobalt, nickel, lithium, graphite and copper [1]. In this scenario, sodium-ion batteries (SIBs) have the potential to become the next green, low cost, environmentally friendly electrochemical storage system. Indeed, owing to their potential lower cost and higher sustainability compared to the current lithium-based technology, SIBs have the potential to dominate the future stationary energy storage market filling the gap between clean energy production and utilization, and the electrified transport sector [2].

Due to the similarity in and the operating principles, a transfer of knowledge from LIBs to SIBs has allowed a rapid progression of the latter. Indeed, SIBs have already demonstrated great potential with several companies working toward their commercialisation [3]. However, to meet the requirements for practical application, development and optimization of novel electrode materials and electrolytes is required.

This presentation gives an overview on the journey toward the development of SIBs linking chemistry and electrochemistry of the employed materials with key performance indicators of cells approaching commercialization. Challenges on the transition from lab to scaled-up processes and the development of industrially relevant cell prototype are also presented.

BIOGRAPHY

Ivana Hasa is Assistant Professor of Electrochemical Materials in WMG at the University of Warwick. She is a chemist by background and for the past ten years her research activities have been focused on the development and characterization of battery materials and their implementation in cell prototypes. She completed her PhD in 2015 on the design and characterization of sodium-ion battery materials at Sapienza University of Rome (Italy). She has gained broad experience in electrochemical energy storage systems during her postdoctoral appointments at the Lawrence Berkeley National Laboratory (California, USA) and at the Helmholtz Institute Ulm (Germany).
Her research activities in WMG are directed towards the understanding of the processes governing sodium-ion batteries. At the Energy Innovation Centre, she is working toward the development and scale up of new battery chemistries from concept to full proven cell prototypes.

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ABSTRACTS OF THE PLENARY AND KEYNOTE SESSIONS

PLENARY SESSIONS

STÉPHANE GOUTTE

The challenges of rare earths in the energy transition

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Under the Paris Agreement scenario, keeping the world below a 2°C rise in temperature relative to pre-industrial levels will require the decarbonisation of the energy system at an unprecedented scale. This accelerated transition to mitigate climate change will need a growing supply of critical raw materials, such as rare earth elements (REEs). Rare earths are a group of 17 chemicals, that possess unique properties of value in catalysts, optical materials, magnets, batteries, and lighting applications, amongst others. Regarding the energy transition, four REEs are of interest: neodymium, praseodymium, dysprosium, and terbium. Often used in permanent magnets called neodymium-iron-boron magnets (NdFeB), these rare earths are critical elements in the manufacturing of wind turbines and hybrid/electrical vehicles. Their use benefits green technologies by increasing, efficiency, power density and reducing weight.

However, a balance problem is rising in the REEs market. Demand is growing, driven by developed economies eager to achieve their energetic transition plans, but also by other expanding sectors such as ICT or defence. Supply is geospatially concentrated, the majority of REE mining and purification, as well as most permanent magnet production, are concentrated in China. Even if REEs mining projects are booming worldwide, most processing unities facilities remain in China, and the development of new ones is at issue due to environmental concerns and the long-time frames for their development. In other words, western economies aim to diversify their REEs supply chain to reduce their dependency on Chinese importations and respond to their growing demand, whereas they struggle to find sustainable mining and processing plants.

Substitute to NdFeB magnets and recycling of REEs in retired wind turbines and electric cars might offer a solution to the supply shortage. But, as of today, all forecasting studies have shown a short-term mismatch between REEs supply and clean energy ambitions.

BIOGRAPHY

Stéphane Goutte has two PhDs, one in Mathematics and one in Economics. He is full professor at Université Paris-Saclay, UVSQ, France. He is adjunct professor at University of Calgary, Canada. He received his Habilitation for Supervising Scientific Research (HDR) in 2017 at University Paris Dauphine. He is a Senior Editor of Energy Policy (JEPO), a Senior Editor of Finance Research Letters (FLR); an Associate Editor of International Review of Financial Analysis (IRFA) and Research in International Business and Finance (RIBAF); a Subject Editor of Journal of International Financial Markets, Institutions and Money (JIFMIM). His interests lie in the area of mathematical finance and econometric applied in energy or commodities. He has published more than 70 research papers in international academic review. He has also been a Guest Editor of various special issues of international peer-reviewed journals and Editor of many handbooks. He is expert of the High Council for Evaluation of Research and Higher Education (Hcéres) and member of the Graduate School of Economy and Management of University Paris-Saclay.

ABSTRACTS OF THE PLENARY AND KEYNOTE SESSIONS

PLENARY SESSIONS

PASCAL BOULANGER

Vertically Aligned Carbone Nanotubes a new material for energy, from the lab to mass production

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Energy transition is the challenge of the century. It will require great innovations and new materials to face minerals scarcity and CO_2 intensive mining production processes. In this context, nanotechnologies have already played a major role in opening new doors with less material needed and more efficient products and processes. Amongst new nanomaterials, nanocarbons have been at the center of many discoveries with fullerenes, nanotubes and more recently graphene. In particular, Vertically Aligned Carbon NanoTubes (VACNT) have demonstrated outstanding potentialities as novel material to elaborate multifunctional materials for a wide range of applications such as membranes, composites but also for energy conversion and storage.

Through NAWATechnologies's story, a breakthrough born here in Saclay, its founder will describe the various steps that lead the company to be the world leader in VACNT production and what challenges the company is still facing :the first steps to demonstrate the proof of concept, the intermediate step to validate the manufacturing process up to the coming production and commercialization. As a pioneer in Deeptech, NAWA had to face challenges that nobody addressed before and for which scientific knowledge is the key.

Basics of the use of VACNT as a component of nano-3D "Ultra-Fast Carbon Electrode" for next generation of supercapacitors and lithium batteries as well as a reinforced material for fibers enhanced composite materials will be highlighted by our recent results.

We will present our vision on how this new generation of material can lead to better applications in the field of energy and transportation, cheaper, safer, more reliable, with the added advantage of being more environmentally friendly.

BIOGRAPHY

Mathematician/physicist by training, Pascal is graduated from ENSEA and Ecole Superieure d'Electricité. He defended his PhD in applied mathematics for signal processing 1986 and worked for 25 years as a researcher at the French Atomic Energy Commission (CEA) in various sectors, nuclear energy but also very early on in solar energy and renewable energies, contributing to the development programs of the European Commission. He travels the world to evaluate photovoltaic projects as an expert and then worked for 4 years at the Banque Publique d'Investissement (now BPI France) to finance innovation in small and medium-sized companies. Back at the CEA in 2005, he held management positions at IRAMIS -Institut Rayonnement Matiere de Saclay) at CEA for 5 years in the nanoscience field, But he quickly decided to «go back to the lab» on a business creation project that has given birth to NAWATechnologies in 2013.

Pascal is founder of NAWATechnologies and technical director.

ABSTRACTS OF THE PLENARY AND KEYNOTE SESSIONS

PLENARY SESSIONS

MICHAEL GRAETZEL

Perovskite Photovoltaics for Electricity and Fuel Generation from Sunlight

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Metal halide perovskites of the general formular ABX3 where A is a monovalent cation such as caesium, methylammonium or formamidinium, B stands for divalent lead, tin or germanium and X is a halide anion, have shown great potential as light harvesters for thin film photovoltaics This new and revolutionary generation of solution-processable thin film solar cells emerged directly from dye sensitized solar cells about 10 years agi [1-4]. Amongst a large number of compositions investigated, the cubic α-phase of formamidinium lead triiodide (FAPbI3) has emerged as the most promising semiconductor for highly-efficient and stable perovskite solar cells (PSCs). Maximizing the performance of α-FAPbI3 has therefore become of vital importance for the perovskite research. Using formate ions as pseudo-halides to mitigate lattice defects and to augment film crystallinity, we attain a power conversion efficiency (PCE) of 25.6 % (certified 25.2%) with a cell architecture of n-i-p configuration. We further enhanced light capture and largely suppressed non-radiative recombination by SnO_2 quantum dots as electron transport layer and an amphiphilic ammonium passivating agent at the perovskite hole conductor interface enabling PSCs with a PCE of 25.7 % (certified 25.4 %) [5] as well as intense electroluminescence reaching external quantum efficiencies of 12.5 %. Recently we have achieved a new record for the operational stability of perovskite solar cells by maintaining over 95 % of their initial stability during 3'300 hours of continued full solar light exposure at 75° C [6]. Our findings provide a facile access to solution processable films with unprecedented opto-electronic performance. These fundamentally new concepts have been applied to solar driven generation hydrogen from water as well as converting CO_2 to CO or ethylene. Combining perovskite photovoltaics in a tandem with silicon has allowed reaching a solar to hydrogen conversion efficiency of close to 19 %. The current research status of this field will be presented.

BIOGRAPHY

Michael Graetzel is a Professor at EPFL, where he investigates systems that generate electricity and chemical fuels from sunlight. Michael graduated with a doctoral degree in natural science (Dr.rer.nat) from the Technical University of Berlin and was a postdoctoral fellow at the University of Notre Dame, USA. After a brief return to Berlin, where he obtained his Habilitation (Dr. habil) at the Free University he moved to Lausanne, where he joined the EPFL faculty as a Professor of physical chemistry. There, he started his pioneering research on colloidal semiconductor nanocrystals and their use for solar energy conversion and storage which generated several new research fronts worldwide. The large impact of his studies is documented by over 45'000 publications and over 3000 patents that appeared in the photovoltaic domain alone.

Michael is well known for his discovery of mesoscopic dye-sensitized solar cells (DSCs) named after him "Graetzel cells", which in turn engendered perovskite solar cells constituting the most exciting breakthrough in the recent history of photovoltaics. Their advent triggered a second revolution in photovoltaics. Michael played a pivotal role in the stunning rise of PSCs, making key contributions to their phenomenal increase in efficiency from < 4 % to > 25 % within the last decade and to the dramatic improvement of their operational stability enabling practical applications. Today's prevalent and most efficient PSC embodiments borrowed their design concept and choice of components from Michael's solid state version of the DSC He is one of the laureates of the 2022 Rank Prize in Optoelectronics (UK) for "pioneereing the development of new solar cell technology based on perovskite semiconductors, which promises to play a key role in the future of solar power to the benefit and well-being of mankind.»

ABSTRACTS OF THE PLENARY AND KEYNOTE SESSIONS

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Michael received numerous prestigious awards, including the. BBVA Foundation Frontiers of Knowledge Award in Basic Science, Marcel Benoist Prize, August Wilhelm von Hofmann Memorial Medal of the German Chemical Society, Global Energy Prize, Rusnano Prize, Zewail Prize and Medal in Molecular Science, Leonardo da Vinci Medal of the European Academy of Science, Paracelsus Prize of the Swiss Chemical Society, Ordre de mérite du canton de Vaud, Switzerland, King Faisal International Science Prize, Samson Prime Minister's Prize for Innovation in Alternative Fuels (Israel), First Leigh-Ann Conn Prize in Renewable Energy (USA) Paul Karrer Gold Medal, Switzerland, Albert Einstein World Award of Science, Swiss Electric Research Award, Wilhelm Exner Medal, Gutenberg Research Award, Galileo Galilei Award, Balzan Prize, Galvani Medal, Millennium Technology Prize, Balzan Prize, the Harvey Prize and the Calveras Award for Leapfrog Photovoltaics (NREL,USA). He received honorary doctor's degrees from 12 European and Asian Universities.

Michael is an elected member of the Swiss Academy of Technical Sciences, the German Academy of Science (Leopoldina), the Royal Society (UK), the Chinese Academy of Science. the Royal Spanish Academy of Engineering and several other learned societies. He is a honorary member of the European Academy of Science, the Société Vaudoise de Sciences Naturelles and the Israeli Chemical Society. His over 1800 publications had a major impact on the renewable energy research field. A recent bibliometric ranking by Stanford University places Michael first amongst 100'000 world-wide leading scientists across all fields of science. According to the Web of Science (2022), he is currently the most highly cited chemist in the world.

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ABSTRACTS OF THE PLENARY AND KEYNOTE SESSIONS

PLENARY SESSIONS

SARA CAVALIERE

Structure-Reactivity Relationship for Pt-Rare Earth Nanoalloy Electrocatalysts for Fuel Cell Cathodes

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The widespread adoption of proton exchange membrane fuel cells (PEMFCs) strongly relies on a significant enhancement of electrocatalyst mass activity for the sluggish oxygen reduction reaction (ORR) and stability in the fuel cell operating conditions. With this aim, carbon supported Pt-based nanoalloys are widely developed allowing to reduce the noble metal loading in PEMFC cathodes while keeping a high activity. Alloys of Pt with rare-earth metals (REM) have been demonstrated as one of the most promising candidates with high ORR activity and durability with respect to pure Pt and Pt-alloys with late transition metals1,2. However, Pt-REM synthesis by conventional chemical methods is challenging, since REM have very low reduction potentials and high oxygen affinity leading to the formation of oxides rather than alloys.
In recent work, we prepared a series of carbon supported Pt-REM nanomaterials with a solid-state method3, characterized them by physico-chemical techniques and evaluated them towards the ORR in acidic medium. In particular, we have undertaken a systematic investigation of the influence of the type of rare earth metal (Y, Gd, Nd), of the Pt:REM ratio4, and of the post-synthesis treatment5, on the structural, morphological and electrochemical properties of the prepared electrocatalysts. The nature of the carbon support used during the synthesis also played a crucial role driving the formation of different phases and morphologies of particles. Operando synchrotron-based wide-angle X-ray scattering and X-ray absorption spectroscopy were used to investigate structural evolution of the nanoalloys during the electrochemical experiments, providing evidence for the structural transitions and strain dynamics that govern the electrocatalytic activity towards the ORR.
In this presentation we will give an overview of the results obtained on these carbon-supported Pt-REM nanostructured electrocatalysts and of the challenges to be tackled for their application at the cathode of proton exchange membrane fuel cells.

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The research leading to these results has received funding from the IMMORTAL project, which receives funding from the Fuel Cells and Hydrogen 2 Joint Undertaking (now Clean Hydrogen Partnership) under Grant Agreement No. 101006641. This Joint Undertaking receives support from the European Union's Horizon 2020 research and innovation programme, Hydrogen Europe and Hydrogen Europe Research.

BIOGRAPHY

Sara Cavaliere is Professor at the University of Montpellier, Charles Gerhardt Institute for Molecular Chemistry and Materials. She received her PhD in Chemistry and Materials Science in 2006 in Versailles, France.
Her work aims at developing advanced nanostructured materials to enhance performance and durability of electrochemical energy conversion and storage devices, including fuel cells and electrolysers. Current research directions include the development of new electrolyte and electrode materials for proton and anion exchange membrane fuel cells and water electrolysers. In particular, the group is dealing with design and preparation of nanostructured and nanofibrous materials e.g. obtained by electrospinning, and new membrane-electrode assembly architectures. Techniques for metal deposition and surface functionalisation are also implemented to prepare materials with improved properties relevant to the targeted applications.
In 2017 Prof. Cavaliere was awarded the CNRS bronze medal and appointed junior member of the Institut Universitaire de France. She co-authored over 70 scientific papers with a h-index of 28, 2 patents, 5 book chapters, and edited one book.
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ABSTRACTS OF THE PLENARY AND KEYNOTE SESSIONS

KEYNOTE SESSIONS

DAMIEN ERNST

Reinforcement learning for electrical markets and the energy transition University of Liège

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In this talk, Professor Damien will talk about reinforcement learning, a subfield of artificial intelligence, and the many applications these techniques could have in solving decision-making problems related to energy markets and the energy transition. He will present, among other things, recent research results obtained using such RL techniques for the design of intelligent agents for intraday electricity trading. He will also present a new class of reinforcement learning algorithms that can calculate what are the optimal investments to be made in new complex energy systems, such as renewable energy communities or remote renewable energy hubs.

BIOGRAPHY

Damien Ernst received the M.Sc. and Ph.D. degrees in engineering from the University of Liège, Belgium, in 1998 and 2003, respectively. He is currently Full Professor at the University of Liège and Visiting Professor at Télécom Paris. His research interests include electrical energy systems and reinforcement learning, a subfield of artificial intelligence. He is also the CSO of Haulogy, a company developing intelligent software solutions for the energy sector. He has co-authored more than 300 research papers and two books. He has also won numerous awards for his research and, among which, the prestigious 2018 Blondel Medal. He is also regularly consulted by industries, governments, international agencies and the media for its deep understanding of the energy transition.

ABSTRACTS OF THE PLENARY AND KEYNOTE SESSIONS

KEYNOTE SESSIONS

BÉNÉDICTE MENEZ

Geologic hydrogen: sources, fluxes and relationships with deep microbial activity and abiotic organic synthesis

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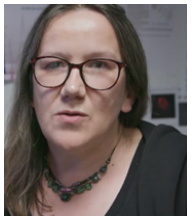
Molecular hydrogen (H_2) forms widely on Earth through well established processes, including for the major ones, (i) large-scale reduction of water during the oxidation of ferrous iron in silicate or sulfide minerals; this mainly occurs in oceanic hydrothermal systems operating from low temperature and low pressure (LT-LP) at mid ocean ridges to great depths in subduction zones; (ii) radiolytic splitting of water molecules (via □, □, or □ radiations induced by the decay of radioactive elements) in sediments as well as oceanic and continental rocks; H_2 production via water radiolysis proceeds at all temperature and pressure conditions under which water is stable, even when it is ice, vapor, or bound in hydrated salts; (iii) degassing of magma at low pressures that favor SO_2 and H_2 production at the expense of H_2O + H_2S; and (iv) reaction of water with surface radicals during the mechanical breaking of silicate rocks; H_2 can hence be generated continually or episodically during slip events in orogenic belts, subduction zones, continental rifts, passive margins, spreading centers, transform faults, and fracture zones (i.e., up to high temperature and high pressure).

Although some of these mechanisms have been identified for decades, the current challenges that hinder the exploitation of natural (or geologic) hydrogen are, among others, to understand if the yields associated with these long-standing geological processes are high enough for H_2 to constitute a sustainable resource, and if this hydrogen is produced continuously or if it is formed punctually and accumulates in reservoirs not yet identified in the Earth's crust. Another major challenge is related to the fact that H_2 is a reductant capable of supporting a large diversity of microbial metabolisms in oxic as well as in anoxic conditions. Knowing now that the first kilometers of the subsurface, where natural H_2 is generated, are home to more than 70% of the terrestrial microorganisms for which H_2 represents a choice energy resource, it becomes crucial to evaluate the impact of this deep microbial activity on the potentially exploitable emissions of natural H_2 as well as on the underground storage of this resource as it is envisaged in the years to come. In addition, the strong reducing power of H_2 gives it the capacity to initiate abiotic (i.e., purely chemical) organic synthesis in the lithosphere. This process is now acknowledged to lead to the non-biological production of various organic compounds with diverse composition and structure depending on the redox conditions under which they were formed and the minerals they are associated with. Competing with hydrogenotrophic (i.e., H_2-consuming) autotrophic microbial activity at a temperature compatible with the development of life, which similarly transforms inorganic carbon compounds, such as carbon mono- and di-oxide (CO and CO_2, respectively), into organic compounds, abiotic organic synthesis can nonetheless occur up to very high pressure and temperature and has the potential to similarly impact natural H_2 emissions.

In this keynote we will review all these concepts to identify the current knowledge barriers to exploration and exploitation of natural $H_2$and the geological storage of this gas.

BIOGRAPHY



Pr Bénédicte Ménez is a geobiologist with expertise in high resolution microimaging techniques that allow to characterize microbe-mineral interactions over time and to identify traces of life within rocks. She received her PhD degree in Geochemistry (with Honors) from Paris Diderot University in 1999. After a two-year postdoc at the Commissariat à l'Energie Atomique (CEA, France), she first joined the French National Center for Scientific Research (CNRS) as a Research Scientist and the Institut de physique du globe de Paris (IPGP) in 2001 and was recruited as Full Professor from Paris Diderot University in 2011. She dedicated the first 10 years of her career at developing innovative and interdisciplinary approaches with the aim to unlock some of the barriers hampering the study of deep biosphere, now acknowledged to host >70% of the Earth's microbial life. These developments were funded by several national or international projects she led or participated to as co-PI and were rewarded by several awards. Since then, she has been working at the interface between (bio)geochemistry, mineralogy, petrology, microbiology and molecular ecology with the aim to study the deep biosphere hosted in the oceanic lithosphere and its relationship with the origin of life. She has headed the geomicrobiology group of IPGP between 2010 and 2019 and was one the former Directors of the Centre of Research on CO_2 geological storage funded by IPGP-TOTAL-SCHLUMBERGER and the ADEME agency.

KEYNOTE SESSIONS

VALÉRIE BRIOIS

Synchrotron Radiation at the Crossroads of the Sustainable Energy Science from Today to Tomorrow

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Energy-related materials used for production and storage are complex and heterogeneous systems in which interfaces play a key role. Those systems are dynamical over a wide range of temporal scales and are organized over multi length scales, each scale having to be characterized to gain a full understanding of their functioning. The SOLEIL Synchrotron Radiation facility located on the Saclay plateau provides access to powerful techniques, such as X-ray Absorption Spectroscopy (XAS) or X-ray microscopy (XRM) to cite only few of them, for gaining chemical and structural information on the systems with micron to sub-micron meter spatial resolution in in situ or operando conditions with sub-second time resolution. A few examples of the current studies carried out at SOLEIL in the field of batteries [1] and catalysts used for H_2 production [2] or greenhouse mitigation [3] will be first presented.

Understanding the formation of Solid Electrolyte Interface in Na-ions batteries or solving the large-scale fabrication and durability of perovskite solar cells are recognized to make practical implementation still problematic for large scale deploying of clean energy technologies. In the recently published Conceptual Design Report for the upgrade of the current 3rd SOLEIL generation facility into a 4th generation [4], the opportunities offered by the expected increase in brightness and coherence of the SOLEIL-II source have been discussed. Coherent-based imaging techniques with improved spatial and temporal resolution will be available providing a powerful lever to overcome the aforementioned bottlenecks, as briefly discussed in the perspective and conclusion section of this keynote.

BIOGRAPHY

Valérie Briois received her PhD from the Paris VI University (Paris) in 1991. She worked at LURE (1991-2004) and now at SOLEIL, the French Synchrotron Radiation facilities. CNRS Research Director, she is the head of the ROCK quick-EXAFS beamline at SOLEIL. She works on the operando quick-EXAFS characterizations of catalysts and contributes to the spread of MCR-ALS applied to quick-EXAFS analysis. Her current research activities are focused on hydrodesulfurization and ethanol steam reforming catalysts.

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ABSTRACTS OF THE PLENARY AND KEYNOTE SESSIONS

KEYNOTE SESSIONS

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Offshore energy hubs

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Europe has set very ambitious targets for deployment of offshore wind power, which will form the backbone of power generation in a decarbonized power system. To facilitate a cost-efficient connection of such massive amounts of offshore wind power, Denmark is revolutionizing the grid connection concept for offshore wind. In 2020, the Danish Parliament decided to develop and build two energy islands: one on the natural island of Bornholm in the Baltic Sea and a second as an artificial island in the North Sea. Other countries, like Belgium, have announced their own plans of building energy islands.

The talk with give an update on the status of the development of the energy islands, addressing the challenges but also the innovation opportunities that come with these massive infrastructure projects, including the connection with green hydrogen production.

BIOGRAPHY

Nicolaos A. Cutululis is Professor in Offshore Wind Power Integration, based in the Department of Wind and Energy Systems at the Technical University of Denmark. He holds a M.Sc. (1998) and a Ph.D (2005) in Automatic Control.

His main research area is integration and operation of wind power moving towards 100% RES power systems, with a special focus on offshore wind and HVDC. He has authored/co-authored extensively in his research field and is currently serving as Chief Editor for Wind Energy Science journal, associated editor for IEEE Trans on Sustainable Energy and Deputy Subject Editor for IET RPG.

He is scientific director in the DTU TotalEnergies Excellence Center of Clean Energy (DTEC). He is active in shaping the wind and power research agenda at European level, being a MB member of EERA JP Wind and Ex-co member for ETIPWind. He is also co-chairing the SET Plan IWG drafting the first Implementation Plan for HVDC. He represents Denmark in IEA Wind Task 25 – Design and Operation of Power Systems with Large Amounts of Wind Power.

ABSTRACTS OF THE PLENARY AND KEYNOTE SESSIONS

KEYNOTE SESSIONS

ARNAULT BARICHELLA

Cybersecurity in the Energy sector: Challenges, Perspectives and Policy Approaches

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As digitization accelerates in our societies, cybersecurity has become an increasingly important issue that touches on nearly all sectors and activities. The energy sector possesses its own particular characteristics, which are complementary but often different from those in other sectors. Information and communication technologies (ICTs) have only gradually been integrated into energy infrastructure. Yet, the need to rationalize production, distribution and consumption processes to manage an increasing amount of data, has contributed to the progressive deployment of ICTs. This digitization has allowed for important efficiency gains by optimizing the supply chain. At the same time, the deployment of ICTs has also considerably increased the risk of cyberattacks. The energy sector has evolved from relatively isolated industrial systems to an open network relying on technologies connected with the Internet.

Cybersecurity includes both protection from computer viruses intended to cause physical and material damage, as well as from hacking and theft of personal data for commercial profit. Moreover, the strategically critical role of the energy industry for all vital State functions (defense, communications and healthcare for example) has turned this sector into an increasingly privileged target for cyberattacks, often in relation to geopolitical confrontations. This is partly because it is often difficult to attribute with precision responsibility for a cyberattack, which allows a State to rely on mass spying or to cause major damage while remaining undetected. Thus, Russia is the prime suspect behind a series of devastating cyberattacks over the last few years that have hit the energy sector in Ukraine, along with Europe and North America. These include the Black Energy and NotPetya viruses targeting Ukraine in 2015 and 2017 respectively, or the Colonial Pipeline hacking impacting the US in 2021, amongst others. Due to the globalization of trade and digital technologies, cyberattacks aimed at Ukraine subsequently spread globally.

In order to manage these growing threats, countries around the world have progressively put in place a number of regulations, laws and institutions to protect the energy industry from cyberattacks. In is notable how each country or group of countries has tended to develop a particular approach to cybersecurity in this sector. For instance, the US has adopted a strategy of 'security in depth' focusing on strict and detailed regulations in specific fields, implemented by institutions possessing coercive powers. By contrast, the EU has chosen a more flexible and holistic strategy, favoring the protection of a wide range of different sectors (low-carbon technologies, data and privacy, etc.), whilst providing member states with broad autonomy in the implementation process. As the digitization of critical infrastructure accelerates, cybersecurity in the energy sector will be of seminal importance in the years to come. This is especially the case due to the unstable context of international relations, where a notable increase in cyberattacks has accompanied the rise in tensions between the great powers, as highlighted by the current war in Ukraine.

BIOGRAPHY

Arnault Barichella is completing his PhD in Political Science at Sciences Po Paris with the Center for European Studies and Comparative Politics. He obtained his Masters' degree in European Affairs from Sciences Po Paris, and received a BA degree in Modern History from Oxford University. Arnault was a Visiting Fellow at Harvard in 2018-19, affiliated with the Department of Government.

EVENTS OF THE CONGRESS

INNOVATION SESSION (MARCH, 9TH)

One of the afternoons will be dedicated to Innovation. During this afternoon, several events will take place around the idea of Innovation and Entrepreneurship.

POSTER AWARDS

Two Poster sessions are organized during the congress. They will take place on the 8th and the 9th of March, in the Emmy Noether Hall. At the end of the congress, five Poster Awards and one Innovation Poster Award will be granted to the best contributions.

STUDENT WORKSHOPS

Different workshops are organized for the University Paris-Saclay Graduate Schools students.
Registration is compulsory and places are limited.
Registration can be done at momentom2023@sciencesconf.org.

Comment écrire pour un public non-spécialiste et partager ses recherches avec le plus grand nombre ?

Cet atelier, animé par un journaliste de *The Conversation*, permet aux chercheuses et chercheurs d'approfondir leur connaissance de ce média et de s'approprier des outils de vulgarisation.

Dans un premier temps, l'intervenant détaille des outils concrets de vulgarisation, basés sur des exemples d'articles publiés sur le site. Des outils pour trouver le bon angle, intéresser, simplifier sa recherche sans la dénaturer et construire un article accessible.

Puis chacun est invité à dire un mot de ses recherches, voire à proposer une idée d'article. Le journaliste aide à affiner les angles afin d'aboutir à une proposition de papier pour *The Conversation*. L'objectif est qu'à l'issue de cet atelier, un maximum de participants puissent proposer un article et, à terme, être publiés dans *The Conversation*.

Open science: Publications to Data and Numerical Identity

This workshop is divided into two parts: open science and insights into numerical identity.
In the first part, we will see what open science is, what its implications are for researchers, what their obligations (with respect to institutions or funding agencies) are, what benefits they will have and how to train oneself (in the context of Université Paris-Saclay).

For the second part, we shall focus on your numerical ID (ORCID, for instance), the use of different platforms (both academic ones, like ResearchGate, or professional ones, like LinkedIn) and how you appear on the web.

The objective of this workshop is to train the future researchers with respect to the different aspects of open science, the implementation of recommendations to the full extent, and whom to contact in case of specific problems.

EVENTS OF THE CONGRESS

Pourquoi penser design pour un monde soutenable ?

Cet atelier est proposé par Design Spot. Le design est une approche globale et systémique qui aborde une problématique par l'interaction d'une solution avec son environnement. Celui-ci permet de répondre à un besoin par la forme pour en maximiser l'efficacité.

Dans cet atelier, nous vous proposons de comprendre son fonctionnement et de l'expérimenter à travers des objets du quotidien. Venez expérimenter la pensée «design» au service d'un développement soutenable !

THE GALA DINNER

The gala dinner will take place at the Train Bleu, in Paris. Places are limited. Attendance is free and upon registration.

Le Train Bleu is a gastronomic restaurant at the Gare de Lyon, and one of the most famous in Paris. Built in 1900 for the Universal Exhibition, the Buffet de la Gare becomes Le Train Bleu in 1963. Its rooms still have the original features of La Belle Epoque, and some of them are classified as Monument historique.

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