



Upscale the Most Promising Materials for CO2 Capture

GENESIS Open Day 2020

www.genesis-h2020.eu

PRELIMINARY PROGRAMME

V1.4

24 November 2020

ZOOM digital platform



This project has received funding from European Union's Horizon 2020 research and innovation programme under grant agreement No 760899. This publication reflects only the author's view and the European Union is not liable for any use of that may be made of the information contained therein.



GENESIS Open Day 2020 Workshop

Date: 24 November 2020

Time: 09:30 – 16:30 CET

Place: ZOOM digital platform

This would be a great opportunity to learn about the progress of the project, meet the project partners and learn about materials and technologies they are developing related to the capture of carbon dioxide (CO₂) from the cement and steel industry to make it more sustainable and environmentally friendly.

The GENESIS project (www.genesis-h2020.eu) is a 4-year EU Horizon 2020 project that started in January 2018, it aims to develop and upscale some of the most promising material for CO₂ capture and demonstrate their performance, durability and reliability in industrial environments. GENESIS is built upon two previous ambitious EU projects that developed IPOSS and MOF membrane systems with a great performance for CC. GENESIS will take these technologies a step further by scaling up the most promising ones by demonstrating in relevant 0.45 MWe capture process for pre-combustion and 2 post-combustion applications and achieve at least 90% of CO₂ recovery at a cost of 15€/MWh in two carbon intensive industries (Schwenk & ArcelorMittal). GENESIS is building upon a multidisciplinary team of European technology centers, large enterprises, SMEs in a cross-border project. This will guarantee that the successful implementation of GENESIS and ensure the ambitious objectives will be achieved and impact will be realized in terms of a rapid market penetration of the developed materials and systems by overcoming technological barriers.

We have confirmed participation from external guests coming from *multinational organisations* and *leading technology companies* such as: Total SE; ENGIE Laborelec; Baker and Hughes; Dyckerhoff GmbH; Aggreko; Marion Technologies; C-Capture; Radical Fibres Ltd; HyGear; GRAPHENE-XT SRL; and leading *universities and research organisations* such as: Newcastle University; University of Manchester; Rutgers University; University of Amsterdam; CNRS Université de Lorraine; among others.

The *GENESIS Project partners* are: Leitat, TUDelft, SINTEF, UTwente, TNO, ICN2, EPFL, MOF Technologies Ltd., Funzionano AS., CTI, Orelis Environnement, YODFAT Engineers, CEMEX Research Group AG, ArcelorMittal, Cambridge Nanomaterials Technology Ltd and SCHWENK Latvija.



Participation to this event is free but registration is required. If you are interested in attending, you could get more information from the [project website](http://www.genesis-h2020.eu) and download the registration form. If you prefer you could send an email to the organisers at: info@cnt-ltd.co.uk. Please send the filled form back to info@cnt-ltd.co.uk in order to receive a confirmation of your registration and additional information.



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Preliminary Programme

Please take notice that all times shown in the agenda are CET

09:30 Welcome and Introduction to the GENESIS Open Day 2020 - Presentation of the agenda and Individual introduction of workshop participants

Marcel Boerrigter GENESIS Project Coordinator, LEITAT, Spain

Bojan Boskovic, Managing Director, Cambridge Nanomaterials Technology Ltd (CNT), UK
GENESIS Open Day 2020 Organiser

Jelena Aleksic, Senior Innovation Manager, Cambridge Nanomaterials Technology Ltd (CNT), UK
GENESIS Open Day 2020 Organiser & GENESIS Exploitation Manager

10:30 **Adam Dicken**, LEITAT, Spain (*GENESIS Partner*)

Title: An introduction to LEITAT

This presentation offers a brief introduction to LEITAT. Founded in 1906, it aims at Managing Technologies to create and transfer Social, Environmental, Economic and Industrial sustainable value for companies and entities through research and technology processes.

10:40 **Marcel Boerrigter** GENESIS Project Coordinator, LEITAT, Spain (*GENESIS Partner*)

Title: Introduction to the GENESIS Project

Atmospheric warming due to greenhouse gases has become a serious global concern. Current CO₂ capture technologies have been adopted in different parts of the world but there is still a long way to reach their full potential. Some of the most important barriers are large energy requirements and high cost. Advanced material solutions can play a significant role in price reduction and increase of efficiency and enable industries to use fossil fuel while reduce emission of GHG drastically. GENESIS project aims to develop and upscale some of the most promising material for CO₂ capture and demonstrate their performance, durability and reliability in industrial environments. GENESIS is built upon two previous ambitious EU projects that developed IPOSS and MOF membrane systems with a great performance for CC. GENESIS will take these technologies a step further by scaling up the most promising ones by demonstrating in relevant capture process for pre-combustion and post-combustion applications.

11:00 **Jose Casaban**, MOF Technologies, Spain (*GENESIS Partner*)

Title: MOF TECHNOLOGIES: Towards the commercial application of Metal Organic Frameworks for industrial decarbonisation.

Metal Organic Frameworks (MOFs) offer unparalleled adsorption properties due to their chemical tunability and unmatched porosity. MOF are consequently envisaged to play a key role in commercial gas storage and separation applications, including CO₂ sequestration. The incorporation of MOFs into mixed-matrix membranes offers an energy-efficient route for CO₂ capture with boosted permeance and selectivity. The production of MOF materials with suitable physical and sorption properties is enabling their incorporation into polymeric membranes at pilot scale for the first time. MOF Technologies will present a new environmentally friendly, cost-effective and scalable method for manufacturing MOFs with suitable particle size (<50 nm) that enables their incorporation in mixed-



matrix membranes. The influence of preparation conditions on the physical characteristics of the materials produced (crystallinity, gas sorption and particle size) will be presented and the production efficiencies (environmental and cost implications) will be benchmarked against state-of-the-art processes.

11:20 *Break*

11:40 **Alberto Tena**, EMI Twente, The Netherlands (*GENESIS Partner*)

Title: High-performance hollow fiber membranes for CO₂ capture in post-combustion processes

It is now generally accepted that global warming is caused by the emission of CO₂ and other greenhouse gases, which is to a large extent due to burning fossil fuels for power production or various other industrial processes such as the production of steel and cement. Although we will eventually shift to low or no carbon energy sources, to reach the climate targets set by the IPCC (i.e. ensuring global warming to stay below 2°C) carbon capture technology will play an important role in the next 50-100 years. The current state of the art for CO₂ capture technologies are mainly based on chemical absorbents which present significant environmental, technical and specially, economical limitations, due to the energy penalty. The development of high-performance membranes would significantly reduce the energy cost of the process making the CO₂ capture process economically realistic. Nevertheless, a technological breakthrough is needed to develop such membranes. The main challenge is to show that intrinsic material properties can be converted into an actual membrane product with proven performance. Here, we show the development and scale up of a thin-film composite hollow fiber membrane with high separation performance in post combustion CO₂-capture

12:00 **Marija Sarić**, TNO, The Netherlands (*GENESIS Partner*)

Title: Membrane technology to reduce CO₂ emissions in steel industry

The present work is related to the GENESIS project aims at using advanced membrane technology for carbon dioxide (CO₂) emission reduction in the steel industry. In this work potential of two types of membrane separation technologies: IPOSS (interfacial polymerization polyhedral oligomeric silsesquioxane) membranes for H₂ separation, and MOF (Metal Organic Framework) membranes for CO₂ separation in the steel industry is evaluated. The CO₂ reduction potential and economics of new processes are quantified and benchmarked with reference technologies.

12:20 **Jack Turner and Selina Ambrose**, Promethean Particles, UK (*Guest speaker*)

Title: A Scalable Route for Manufacturing MOFs and Nanomaterials at Tonne-Scale

12:40 *Lunch break*

13:40 **Claire Barbot**, Total SE, France (*Guest speaker*)

Title: Ongoing efforts and activities related to carbon capture at TOTAL

14:00 **Hélène Lepaumier**, ENGIE Laborelec, France (*Guest speaker*)

Title: Introduction to ENGIE and R&D activities related to CO₂ capture and utilisation.

14:20 **Santa Klava**, SCHWENK Latvija, Latvia (*GENESIS Partner*)





Title: Participation in GENESIS in Broceni Cement Plant – one of SCHWENK Initiatives Towards Green Economy

Presentation will include short update about GENESIS project in Broceni cement plant, as well as give insight in other initiatives SCHWENK Group is doing within Green Economy and for development of carbon capture technologies.

14:40 Danny Sherban, Yodfat Engineers, Israel (*GENESIS Partner*)

Title: Yodfat Engineers - Demonstration of large scale selective CO2 separation by membranas and re - utilization options.

- *Presentation of Yodfat Engineers Selective CO2 capture demonstration system, system specifics, technical overview, 3D design, process specifications and expected system performance and cost analysis.
- Introduction of Yodfat Engineers' system as a membranes testing platform capable of testing multiple types of CO2 selective membranes, with controlled feed gas conditioning, using real industrial emissions.
- Introduction of captured CO2 re-utilization options, required CO2 post treatment and available technological solutions.

15:00 José Luis Viviente, TECNALIA, Spain (*Guest speaker*)

Title: Introduction to TECNALIA and the MEMBER Project related to development of advance membranas and pre- and post- combustión CO2 capture

15:20 Leonardo Roses, HyGear, The Netherlands (*Guest speaker*)

Title: Introduction to HyGear activities related to development of advanced membranes and membrane assisted processes for pre- and post- combustión CO2 capture (Role of HyGear in the MEMBER Project)

15:40 Richard E. Riman, Rutgers University, USA (*Guest speaker*)

Title: Low cost portable method for direct air and industrial flue gas capture with a high density storage

16:00 *Discussion*

16:30 *End of session*

Note It is planned that all presentations would be followed by Q&A discussion. The organisers reserve the right to change the programme, speakers or venue should circumstances require. For any further enquires please do not hesitate to contact directly the **GENESIS Open Day 2020** organiser Dr Bojan Boskovic from Cambridge Nanomaterials Technology Ltd on info@cnt-ltd.co.uk or Bojan.Boskovic@CNT-Ltd.co.uk or on his mobile phone +447780874335.



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GENESIS Open Day 2020 – Speakers

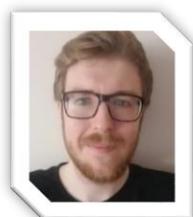


Marcel Boerrigter (*GENESIS Partner*)

LEITAT

Carrer Innovació, 2
08225 Terrassa (Barcelona),
Spain

Marcel Boerrigter (M) has a Bachelor of Science in Chemistry from the Hogeschool Enschede (Saxion University of Applied Sciences), Enschede, The Netherlands (1996). From 1997 until 2012 he worked at the European Membrane Institute (EMI) in The Netherlands. He performed confidential contract research for companies/institutes worldwide and research in various European projects, in the field of membrane science and technology. Since October 2012 he develops his career as Senior Researcher in the Materials Chemistry group at LEITAT Technological Center, where he is investigating and developing new membranes based on nanomaterials for water purification and gas separation for various European and National projects.



Adam Dicken (*GENESIS Partner*)

LEITAT

Carrer Innovació, 2
08225 Terrassa (Barcelona),
Spain

Adam Dicken is a Chartered Engineer who holds an MEng in Chemical Engineering from Heriot-Watt University (Scotland). He has worked as a chemical engineer in the UK with a focus on energy storage technologies. He has experience in the technical, administrative and financial management of H2O2 and National projects. He now developing his professional career in the International Projects team of LEITAT Technology Centre and coordinates the management of European R&D+I projects.



Dr Jose Casaban (*GENESIS Partner*)

MOF Technologies

63 University Road
BT7 1NF
BELFAST
United Kingdom

Dr Jose Casaban is the Chief Technology Officer at MOF Technologies where he oversees the company's strategic technical initiatives. Jose is an expert in Metal-Organic Frameworks (MOFs) having worked on porous materials for the last 10 years. He has specialist knowledge in the revolutionary mechanochemical synthesis of MOFs (by milling and extrusion) and has led MOFTECH's environmentally friendly production of MOFs. He is responsible for key intellectual property and strategic partner R&D initiatives within MOF Technologies with several patents and publications to his name. Jose holds a BSc (Hons) in Chemistry from the University of Valencia/Imperial College of London and a PhD from Queen's University Belfast in gas phase catalysis/mechanochemistry.





Dr Alberto Tena (*GENESIS Partner*)

EMI Twente
Drienerlolaan 5,
7522 NB Enschede,
The Netherlands

Dr Alberto Tena is senior researcher at the European Membrane Institute (EMI) at the University of Twente, where he is leading several R&D projects for industrial clients in the membrane science and technology field. Alberto holds a PhD from University of Valladolid (Spain) in the development of new polymeric membrane materials for CO₂ capture. He has worked in the field of gas separation for more than 14 years at various international locations (Spain, US, Italy, France, Germany and The Netherlands). He is the author of around 30 scientific publications and one patent in the low temperature thermally rearranged polymers. Alberto is an expert in the development of new materials for gas separation applications covering the range from the synthesis of the materials to the processing at a separation membrane, especially for CO₂ separation and capture.



Eng. Danny Sherban (*GENESIS Partner*)

Yodfat Engineers (1994) Ltd.
Hamerkaz 30
Yodfat,
Israel, 2018000

Eng. Danny Sherban is the Founder, owner & CEO of Yodfat Engineers Ltd, Israel from 1991. He has a B.Sc. degree in soil, water, environmental and agricultural engineering from the Technion-Haifa, Israel Technological Institute (1984). He Specialized in Waste Water & Water Treatment, Dredging & Contaminated Soils and River Sediments clean up (The Kishon River Reclamation), Drainage (Agriculture and landscape) & Water Supply for Large Scale International Irrigation Projects, Impounding Water Reservoirs, Pumping Stations, River Intake, Large Diameter Pipelines, Dams, Tunneling, Hydro Power (Dead Sea Power), River banks Stabilisation, Roads and Drainage Canals and Floating Solar PV Projects. Specialty in engineering of membranes modules and test facilities and full scale systems for selective capture of CO₂, Water Vapors, Hydrogen and other gases, from industrial flue gas (past and present experience with KEMA, DNV GL, NTNU, UTwente, Norcem Norway, Cemex, EDP, IEC, Gas Natural Fenosa, E-ON, LEITAT, The TechKnowledge Group Canada and others). He has been participating in EU funded programs for the last 15 years.



Dr Selina Ambrose (*Guest Speaker*)

Promethean Particles Ltd.
1-3 Genesis Park,
Midland Way
Nottingham NG7 3EF
UK

Dr Selina Ambrose is the Technical Manager at Promethean Particles. Following completion of her PhD in Chemical Engineering at the University of Nottingham in 2012, she joined the technical team at Promethean then took on the role as Technical Manager from 2018. Selina has extensive experience in materials research, as well as synthesis and analysis of nanomaterials – expertise she uses to manage Promethean's R&D projects and supervise the company's technical team. Selina has several joint publications in the field



of nanotechnology, published both during her PhD and while at Promethean, and she has represented Promethean at exhibitions, conferences, and tradeshows. At these events, she has joined panel discussions and presented the innovative work Promethean has conducted.



Dr Jack Turner (*Guest Speaker*)
Promethean Particles Ltd.
1-3 Genesis Park,
Midland Way
Nottingham NG7 3EF
UK

Dr Jack Turner is a senior research scientist at Promethean Particles. Following completion of a PhD in Chemistry at the University of Nottingham in 2017, he joined the technical team at Promethean. Since joining the company, Jack has worked on the synthesis and characterisation of a wide range of novel nanomaterials, with a particular interest in scaling up previously lab-scale batch methods to continuous processes producing kilograms or tons of nanomaterials per day.

Claire Barbot (*Guest Speaker*)
Total SE
PERL – Pôle D'Etudes et de Recherche de Lacq
Pôle Economique 2
BP 47 – RD 817
64170 LACQ
Lacq, 64170, France

Claire BARBOT is currently Total R&D post combustion CO₂ capture leader, focusing on adsorption technology. She has participated in the M4CO₂ H2020 project, and evaluated membrane for post combustion application at lab scale.



Dr H el ene Lepaumier (*Guest Speaker*)
ENGIE Laborelec
125, Rue de Rhode
1630 Linkebeek –
Belgium

Dr H el ene Lepaumier obtained a PhD in Chemistry in the field of Post-Combustion CO₂ Capture in collaboration with IFPEN (2008). After a research position at NTNU in Norway, H el ene joined the chemistry team of ENGIE Laborelec in 2010 and later the Emission team in 2016. She manages the achievement of technical projects in carbon capture and utilisation and has been involved in several CCUS National and European projects such as CESAR, CLEO, AEROSOLVE and more recently H2020-ECO and CONDOR. Her main expertise areas are related to carbon capture (solvent degradation, emission monitoring, environmental impact), CO₂ quality and carbon use.





Santa Klava (*GENESIS Partner*)

SCHWENK Latvija
Lielirbes 17A-28, Riga
Latvia, LV-1046

Santa Klava is a Environmental project department manager at SCHWENK Latvija. She joined cement plant in 2004, manages all the environmental issues in SCHWENK Latvija according with Latvian environmental rules. Her main fields of competence are: Manage Environmental impact assessment process, Nature tax calculation, implementing / controlling waste management system in plant and controls/ manages all issues regarding of CO2 emissions. Right now, she is responsible for managing the activities related to the GENESIS project from SCHWENK Latvia side.



Marija Sarić, (*GENESIS Partner*)

TNO
Westerduinweg 3
1755 LE Petten
The Netherlands

Marija Sarić, MSc. PDEng is a chemical process engineer with an over 10 years of experience in the conceptual design and techno-economic evaluation of energy conversion processes. Throughout her career she worked on the technical, energetic and economic assessment of energy conversion systems and modelling thereof using flow sheeting software, evaluating a large range of technologies such as power to X technologies, membrane reactor and separation technologies for application in H2, ammonia and methanol production, CO2 capture technologies, heat integrated distillation, (bio)gas treatment technologies and biorefineries.

Dr José Luis Viviente (*Guest Speaker*)

TECNALIA
Materials for Energy and Environment Department
Mikeletegi Pasealekua, 2
E-20009 Donostia – San Sebastián (Spain)



Dr Leonardo Roses (*Guest Speaker*)

HyGear
Westervoortsedijk 73, 6827AV Arnhem, Netherlands
6827AV Arnhem,
Netherlands

Dr Leonardo Roses has a PhD in Energy systems at Politecnico di Milano. He is a Project manager at HyGear.





Prof. Richard E. Riman (*Guest Speaker*)
Rutgers University
607 Taylor Road
Piscataway, NJ
USA

Prof. Riman is a distinguished professor whose research has led to numerous technologies commercialized by industry. His current focus is on material development that reduces CO₂ emissions in large amounts. Solidia Technologies and RRTC are start-up companies founded by Prof. Riman. Riman has received a lot of recognition for his achievements, earning membership into the National Academy of Inventors, Inventor's Hall of Fame, Fellow of the American Ceramic Society, World Academy of Ceramics and Industrial Achievement awards from Johnson and Johnson, Alcoa Foundation and Dupont.



Dr Jelena Aleksic (*Organiser & GENESIS Partner*)
Cambridge Nanomaterials Technology Ltd.
14 Orchard Way, Cambourne
Cambridge CB23 5BN
UK

Dr Jelena Aleksic is a Senior Innovation Manager at CNT Ltd. She has wide project management, R&D and teaching experience. While she was working as a scientific associate at the University of Applied Sciences in Stralsund, Germany she taught subjects Fluid Mechanics, Gas Dynamics and Mathematics. During her PhD studies in fluid mechanics related to crystal growth at the University of Rostock, Germany, she developed a new temperature measurement method for fluids based on thermochromic liquid crystals (TLC). Her thesis was awarded with the first prize at the South-eastern Conference on Theoretical and Applied Mechanics in Orlando, FL, USA. She organised scientific conferences and edited an internationally published science magazine. At the CNT Ltd. she has been working extensively on developing business strategies, and preparation of customised patent landscaping and market research reports in the field of nanomaterials. Dr Aleksic has also been working on management of European collaborative R&D projects (EC FP7 & H2020) involving tasks such as innovation management, Business Model and Plan development, identification and analysis of Key Exploitable Results, mapping and engagement with stakeholders and other relevant exploitation and dissemination tasks. Previously she worked in many different industries including renewable energies, construction and social media and she is fluent in English, German, Spanish and Serbo-Croatian.



Dr. Bojan Boskovic (*Organiser & GENESIS Partner*)
Cambridge Nanomaterials Technology Ltd
14 Orchard Way, Cambourne
Cambridge CB23 5BN

Dr Bojan Boskovic has more than 20 years of hands-on experience with carbon nanomaterials and composites from industry and academia in the UK and Europe. Previously, he worked as a R&D Manager at Nanocyl,. He also worked on carbon nanotube synthesis and applications as a Principal Engineer-Carbon





Scientist at Meggitt Aircraft Braking Systems, as a Research Associate at the University of Cambridge, and as a Senior Specialist at Morgan Advanced Materials. During his PhD studies at the University of Surrey he invented low temperature synthesis method for production of carbon nanomaterials that has been used as a foundation patent for the start-up company Surrey Nanosystems. He was a member of the Steering and Review Group for the Mini-IGT in Nanotechnology that advised the UK Government on the first nanotechnology strategy policy document. Dr Boskovic was working as an advisor for the European Commission (EC) on Engineering and Upscaling Clustering and on setting up of the European Pilot Production Network (EPPN) and European Materials Characterisation Cluster (EMCC). He has experience in exploitation and dissemination management on a number of FP7 and H2020 European projects, including UltraWire, NanoLeap, OYSTER, M3DLoC, Genesis and nTRACK. Also in UK Government InnovateUK funded projects, such as UltraMAT and GRAPHOSITE He is also a leader of a private Nano-Carbon Enhanced Materials (NCEM) consortium.

GENESIS Open Day 2020 – Partner Organisations

LEITAT



Web: projects.leitat.org/

LEITAT is a private technical institute with more than 110 years of experience in industrial innovation processes. We transform technological and scientific results into economic and competitive value for our clients and collaborating entities. Over 1500 customers benefit from our talent, creativity and strong commitment. We bring knowledge and innovation to our customers through applied research and technical testing in the fields of chemistry, energy, environment, materials, engineering and life sciences. We rely upon our 330 highly skilled team members who deliver flexible solutions to face any industrial challenge.

TU Delft



Web: www.cheme.tudelft.nl

TU Delft (Delft University of Technology) is the largest and oldest of the three technical universities in The Netherlands with a focus on applied sciences. The department of Chemical Engineering (ChemE) focuses on new future technologies relevant for the chemical and pharmaceutical industry and ranks 3th of European universities in the 2016 QS world ranking of Chemical Engineering. Building upon its proven strength in Chemical Engineering, the Department develops the science and technology of functional nanostructured systems, from molecules up to the design of products and processes.

SINTEF



Web: www.sintef.no

SINTEF is the largest independent research organization in Scandinavia. SINTEF is a broadly based, multidisciplinary research concern that possesses international top-level expertise in technology, medicine and the social sciences. SINTEF is an independent, non-commercial organization. The profits of their contract research projects are invested in new research, scientific equipment and competence development. SINTEF employs 2100 staff who comes from 68 different countries.



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UTwente

Web: www.membrane.nl

**UNIVERSITY
OF TWENTE.**

UTwente is a young, entrepreneurial research university. Together, 3,300 scientists and professionals carry out ground-breaking research, bring about socially relevant innovation, and provide inspiring teaching for more than 9,000 students. To us, entrepreneurship comes as second nature. The university's business park (Novel T), encourages and assists entrepreneurs to start new companies. Research ultimately combines scientific excellence with a sharp eye for economic and societal impact: the UT is highly successful as business generator, with over 50 new spin-off companies annually.

TNO

Web: www.tno.nl

TNO innovation
for life

TNO is one of the leading institutes in Europe concerning applied energy research. It's mission is to contribute to a future sustainable energy system by performing research and technology development and bringing it into implementation. TNO is experienced in the definition and execution of projects in the R&D area between universities and industries and is largely funded on a contract basis. TNO has about 600 employees that work in the field of solar and wind energy, geothermal energy, biomass conversion, clean use of fossil fuels, energy efficiency in industry and energy transition studies. The expertise group Biomass & Energy Efficiency develops within the roadmap CO2 neutral Industry amongst others energy efficient technology for the process industry.

Institut Català de Nanociència i Nanotecnologia (ICN2).

Web: icn2.cat/en/



The **Supramolecular NanoChemistry and Materials group (NANOup)** has been led by Prof. Dr. Daniel MasPOCH since 2009 within the **Institut Català de Nanociència i Nanotecnologia (ICN2)**. The Group focuses its research interests on controlling the supramolecular assembly of molecules, biomolecules and nanoscale building blocks at the nanometer scale for the design of novel functional architectures and devices. The use of supramolecular chemistry to control the fabrication of new nanomaterials is a key aspect for the future of Nanoscience and Nanotechnology, and the Group is therefore interested in using supramolecular chemistry as the underlying approach for exploring new methodologies that enable the synthesis of complex nanoscale supramolecular assemblies.

The "École Polytechnique Fédérale de Lausanne" (EPFL)

Web: www.epfl.ch/labs/lsmo/

EPFL

The **"École Polytechnique Fédérale de Lausanne" (EPFL)** is one of the two Swiss Federal Polytechnical Schools. A multi-cultural institution at the cutting edge of science and technology, EPFL fosters innovation and excellence. EPFL has a unique organisation that stimulates interdisciplinary research and fosters partnerships with other institutions and companies, with both theoretical and applied research being carried out. With more than 350 laboratories and research groups on campus, EPFL is one of the Europe's most innovative and productive technology institutes and is also renowned for the quality of its teaching and training programmes. In 2014 the Shanghai Jiao Tong ranking placed EPFL third in Europe and 19th worldwide in Engineering/Technology and Computer sciences, and many other global comparisons place it among the top European universities.



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MOF Technologies Ltd,

Web: www.moftechnologies.com



MOF Technologies Ltd, a SME spun out of Queens University in Belfast has developed a unique manufacturing method for producing metal organic frameworks (MOFs) that is simple, environmentally friendly and cost effective. We have developed a patented manufacturing technology that for the first time allows the synthesis of MOFs using little or no solvents and on greatly reduced timescales, by making use of mechano-chemistry. This provides two key benefits to the consumer: reduced costs and a dramatically reduced environmental impact from the manufacturing process. We are currently targeting the use of MOFs for natural gas storage for cars along with MOFs for storage of a range of gases. Additionally, MOFs have great utility in carbon capture, general gas storage and filtration processes, heat adsorption along with niche applications.

Funzionano AS

Web: www.funzionano.com



Funzionano AS was established as a private company on November 25th 2015 by SINTEF Venture IV AS in order to commercialize FunzioNano®-POSS at large scale. FunzioNano®-POSS have been developed by SINTEF in close collaboration with various companies since 2002 with more than 10 million Euro spent on R&D and product development. In 2016 agreements with chemical companies were established for toll production of Funzionano®. During the summer of 2016, Funzionano AS moved from SINTEF in Oslo to an industrial site at Porsgrunn (150 km southwest of Oslo). A team consisting of CEO, COO, CFO and Sales/Marketing Manager prepares the establishment of a production plant and market and production ramp-up.

CTI

Web: www.ctisa.fr



CTI is one of world leading manufacturer of ceramic membranes (micro, ultra and nanofiltration for liquid applications) for more than 20 years. CTI, is a SME of 85 employees (France). 80% of CTI turnover is due to exportation, mainly in Asia. CTI turnover was around 7 M€, in 2015. Created in 1990 on the basis of work on membranes and membrane supports for tangential and frontal filtration to purify liquids, CTI now the world's largest production capacity for ceramic membranes for liquid filtration. CTI also benefits from an internationally recognized expertise in the field of porous materials and surface activation for high temperature applications, which has enabled it to develop and industrialize new functionalized supports for catalysis as well as that the treatment and separation of gases.

Orelis Environnement

Web: www.orelis.com



Orelis Environnement is one of world leading manufacturer of organic membranes for liquid applications and plates and frames modules for more than 30 years. It is a SME of 15 employees (France). 70% of the turnover of Orelis Environnement (5M€ in 2015) is due to exportation, mainly in Europe and Asia.



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YODFAT Engineers

Web: yodfatengineers.com



YODFAT Engineers is a company specialized in providing novel, unconventional solutions to complex environmental and civil engineering problems. Yodfat Engineers' roots developed in agricultural, civil and environmental engineering, including irrigation, drainage, wastewater treatment and effluent. Our 22 years of experience in innovation solutions have allowed us to provide valuable design and consulting services to companies from the agri/sector in international markets, being already present in more than 20 countries, in five different continents.

CEMEX Research Group AG

Web: www.cemex.com



The **CEMEX Research Group AG (CX CRG)** in Brügg by Biel, Switzerland, is a subsidiary of CEMEX S.A.B. de C.V., Monterrey, Mexico. CX CRG hosts and manages all R&D activities of all CEMEX entities. It is responsible for the development and innovation of technologies and products in the context of the CEMEX Group in all areas of product development, process technology, processes, IT and sustainability in energy and emissions. Founded in 1906, CEMEX has a long experience in cement fabrication and is today one of the world's largest traders of cement and clinker. CEMEX manufactures cement in more than 50 countries across four continents and has annual sales of more than US\$15 billion.

ArcelorMittal

Web: www.arcelormittal.com



The **ArcelorMittal group** is the world's leading steel and mining company, with around 232,000 employees in more than 60 countries. ArcelorMittal is the leader in all major global steel markets, including automotive, construction, household appliances and packaging, with leading R&D and technology, as well as sizeable captive supplies of raw materials and outstanding distribution networks. An industrial presence in 20 countries exposes the company to all major markets, from emerging to mature. ArcelorMittal values geographical breadth, product diversity and raw materials security. Around 38% of our steel is produced in the Americas, 46% in Europe and 16% in other countries such as Kazakhstan, South Africa and Ukraine.

Cambridge Nanomaterials Technology Ltd (CNT)

Web: www.cnt-ltd.co.uk



Cambridge Nanomaterials Technology Ltd (CNT) is an innovation management and nanotechnology consulting company based in Cambridge, UK. The CNT Ltd helps companies, academic and government institutions to develop world-class innovative solutions for nanomaterials related R&D and IPR strategy, partnership, products, technologies, funding and markets. CNT Ltd is specialised in carbon nanomaterials R&D consulting and collaborative R&D project management, including exploitation and dissemination management, consortium and supply chain building. CNT has done a number of patent landscaping and market research analysis studies regarding production and use of various nanomaterials helping to link inventors and technology developers with end-users and investors.



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SCHWENK Latvija

Web: <https://schwenk.lv/>



SCHWENK Latvija is one of the country's leading manufacturers of cement, ready-mix concrete and aggregates. Drawing from the experience and knowledge of the Germany SCHWENK Group, SCHWENK Latvija recognizes international standards applied to production and management on the Latvian market. It provides construction materials of the highest quality. Its cement plant, located in Broceni, is one of the most modern cement plants in Europe, employing the most modern technology available in the sector. SCHWENK Latvija foot print is completed with 5 ready-mix plants and 5 aggregate quarries. The company employs nearly 350 people, produced in 2018 up to 1,2 million tons of cement, 150 thousand m³ of concrete and 827K tons of aggregates.

GENESIS Open Day 2020 – Participating Organisations

Newcastle University

Web: www.ncl.ac.uk



Newcastle University is a world-class research-intensive university. We deliver teaching and facilitate learning of the highest quality, playing a leading role in the economic, social and cultural development of the North East of England and beyond with additional campuses in Malaysia, Singapore and London. We exist to advance education and research and to help society tackle the many challenges it faces.

Aggreko

Web: www.aggreko.nl



Aggreko plc is a supplier of temporary power generation equipment and of temperature control equipment. Around the world, people, businesses and countries are striving for a better future. A future that needs power and the right conditions to succeed. That's why at Aggreko, we work round the clock, making sure you get the electricity, heating and cooling you need, whenever you need it – all powered by our trademark passion, unrivalled international experience and local knowledge. From urban development to unique commercial projects and even humanitarian emergencies, we bring our expertise and equipment to any location, from the world's busiest cities to some of the most remote places on earth.

University of Amsterdam

Web: www.uva.nl/en



UNIVERSITY OF AMSTERDAM

The University of Amsterdam is the Netherlands' largest university, offering the widest range of academic programmes. At the UvA, 30,000 students, 6,000 staff members and 3,000 PhD candidates study and work in a diverse range of fields, connected by a culture of curiosity.

CNRS Université de Lorraine

Web: lrqp-nancy.cnrs.fr



The Reactions and Chemical Engineering Laboratory (LRQP) is a joint unit of CNRS (National Center for Scientific Research) and Université de Lorraine. The laboratory has a 300-plus workforce, including 18 CNRS



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researchers, 82 research professors and lecturers, 43 technical and administrative employees as well as 180 non-permanent staff (contract researchers, 82 doctoral students, post-doctoral fellows and Master's students).

Marion Technologies

Web: www.mariontechnologies.com



MARION TECHNOLOGIES, French SME of 19 persons, is essentially dedicated to formulation, development and “tailor-made” production of nanostructured materials and ceramic powders for industrial use. Materials synthesized by “soft chemistry” point out better original and technical properties than the same materials synthesized by classical manufacturing processes. MARION TECHNOLOGIES is in charge of providing, for a specific application, a global response to a “Material” problem. The company carries out the process implementation, the development and the scaling-up. Powders and suggested materials are specifically optimized for each application, especially ceramic powders, from simple oxides to the most complex multi-elements. There are many applications: electronic ceramics, coatings, catalysis, energy storage, loads for paintings, cosmetics. Besides, MARION TECHNOLOGIES also has a wide range of facilities in its own Analysis Laboratory: X-Ray diffractometer, BET specific surface analyser, Inductive Coupled Plasma (ICP-AES), Laser Granulometer, Nanosizer.

Radical Fibres Ltd

Web: www.radicalfibres.com



Radical Fibres is a newly formed micro-company which specialises in the customisation, development and manufacture of nanofibre textiles. Its current main product listing is anti-viral nanofibre filters, composite toughening veils, and featherweight smart textiles.

HyGear

Web: www.hygear.com



HyGear supplies industrial hydrogen and nitrogen gas in bulk quantities. By combining advanced on-site generation technologies with conventional gas distribution methods, we offer a more cost-effective and reliable gas supply. To further reduce costs, our Hy.REC technology can be installed to recycle the spent gases from the process. HyGear is not a conventional gas supplier. We do it different, better and focus on the customers' needs. That is why HyGear has strong references worldwide and will keep on growing. Our partnership approach with the customer gives us the ability to design, engineer and construct the most optimal supply system for our clients. Together with the customer, HyGear defines the best gas supply, mixing and storage method.

C-Capture

Web: www.c-capture.co.uk



C-Capture was founded in 2009 as a spin-out company from the School of Chemistry at the University of Leeds. It was established, with support from IP Group, to develop work from Prof. Rayner's research group, where they had been building upon his nearly twenty years' experience working with CO₂ to find new solutions to the carbon capture problem. In late 2011, we appointed an experienced chemist, Douglas Barnes, and process engineer, Caspar Schoolderman, who worked together to develop our first-generation technology up to pre-pilot scale. Independent validation of the technology demonstrated it to be as good the





then state-of-the-art in terms of energy penalty. This close collaboration between chemists and engineers has been a defining strength and feature of the company from the very beginning.

Graphene-XT

Web: www.graphene-xt.com/en/



GRAPHENE-XT
NEXT GENERATION MATERIAL

Graphene-XT is an innovative startup that develops and produces high quality graphene. We strictly collaborate with our customers to improve product's characteristics and design personalized solutions. Through a multifunctional approach it provides new and better functionalities to conventional products. Graphene-XT uses graphene for several applications: lubricants, membranes, sensors, composites, coatings, inks, paints.

Total SE

Web: www.total.com



Total is a major energy player, which produces and markets fuels, natural gas and low-carbon electricity. Our 100,000 employees are committed to better energy that is safer, more affordable, cleaner and accessible to as many people as possible. Active in more than 130 countries, our ambition is to become the responsible energy major.

Combustion Gasification and Propulsion Laboratory, IISc Bangalore

Web: www.iisc.ac.in



Indian Institute of Science (IISc) is a public research university for higher education and research in science and engineering, located in South Indian state Karnataka. The institute has about 4000 students, with the contribution of Ph.D. candidates being 65%. The Indian Institute of Science (IISc) was established in 1909 by a visionary partnership between the industrialist Jamsetji Nusserwanji Tata, the Mysore royal family and the Government of India. Over the last 111 years, IISc has become India's premier institute for advanced scientific and technological research and education. Its mandate is "to provide for advanced instruction and to conduct original investigations in all branches of knowledge as are likely to promote the material and industrial welfare of India." In keeping with this guiding principle, the Institute has strived to foster a balance between the pursuit of basic knowledge and applying its research for industrial and social benefit.

University of Manchester

Web: www.manchester.ac.uk



The **University of Manchester** is the second largest university in the UK (out of 169 including the Open University), and the largest single-site university. The University of Manchester is a major centre for research and a member of the Russell Group of leading British research universities.

ENGIE Laborelec

Web: www.laborelec.com



ENGIE Laborelec is one of the two main R&D arms of the ENGIE Group, with key competencies more specifically focused on the whole electrical power value chain. The ENGIE Group (TO 60b€ 2019) is a global



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reference in low-carbon energy and services. Our purpose (“raison d’être”) is to act to accelerate the transition towards a carbon-neutral world, through reduced energy consumption and more environmentally-friendly solutions, reconciling economic performance with a positive impact on people and the planet. We rely on our key businesses (gas, renewable energy, services) to offer competitive solutions to our customers. With our 170,000 employees, our customers, partners and stakeholders, we are a community of Imaginative Builders, committed every day to more harmonious progress.

Baker and Hughes

Web: www.bakerhughes.com



Baker and Hughes are the leading energy technology company. We design, manufacture and service transformative technologies to help take energy forward. For more than a century, our inventions have revolutionized energy. We harness the power of engineering, data, and science to redefine what's possible.

Dyckerhoff GmbH

Web: www.dyckerhoff.com



Dyckerhoff GmbH is a Buzzi Unicem company (10,000 employees worldwide) and we are on the market for more than 150 years. Today, we belong to the leading international brands in the building materials industry. Dyckerhoff is an international manufacturer of cement and ready-mix concrete. We are a Buzzi Unicem company. Buzzi Unicem is a company based in Italy and operates plants in 14 countries with more than 10,000 employees worldwide. In Germany, we operate seven cement plants and about 110 ready-mix concrete plants. Further production sites are located in Luxembourg, the Netherlands, Poland, the Czech Republic and Slovakia, as well as in Russia and Ukraine.

Rutgers University

Web: mse.rutgers.edu/fac/richard-riman



Rutgers University, 20, Department of Materials Science and Engineering, Materials Processing, Materials that reduce global GHGs. Here at Rutgers-MSE, we have state of the art laboratories and several major research and education centers focused in critical areas, including energy storage, nanomaterials, optical composites, lightweight armor and computational materi

University of Alicante

Web: www.ua.es



The **University of Alicante** is a public university located on the Mediterranean coast. We are a multidisciplinary university with study programmes in all fields of knowledge organised in six faculties and a polytechnic school. Our university spirit is based on a humanist comprehensive education, triggered by the Enlightenment and Classicism movements. The university community is made up of about 3,800 academic and administrative staff members and over 32,000 students enrolled in official degrees.

Promethean Particles

Web: www.prometheanparticles.co.uk



Promethean Particles is a pioneer in the manufacture of high specification nanomaterials for a range of applications including pigments, printed electronics, energy capture and storage, functional nanoceramics



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and coatings. The company was founded 13 years ago and since then, Promethean has developed breakthrough innovations in nanoparticle technologies by designing safe and commercially viable liquid dispersions at its multi-material manufacturing plant. Located at Genesis Park, Nottingham, the site manufactures nanoparticles with capacities in excess of 1,000 tonnes per year through a patented continuous flow process. This makes it the largest reactor system of its kind in the world – a statement Promethean is very proud of. Advancements in technology over the years has made nanoparticles accessible to a variety of industries. Operating in a wide range of sectors, the company tailors its process to customer specification by using both large and small-scale reactors to continuously meet demand and maintain quality.

TECNALIA

Web: www.tecnalia.com/en



FUNDACION TECNALIA RESEARCH & INNOVATION (TECNALIA) is a private, non-profit and independent research organisation resulting from the merger of eight research organisations: Fundación Cidemco, Fundación European Software Institute, Fundación European Virtual Engineering, Fundación Fatronik, Fundación Inasmet, Fundación Labein, Fundación Leia and Fundación Robotiker. TECNALIA is the leading private and independent research and technology entity in Spain and the fifth largest in Europe. TECNALIA employs 1,437 people (164 PhDs) and its turnover is 121Me, it filed 53 patents, had 3800 clients and created 8 spin-offs in 2009. TECNALIA is very active in the Seventh Framework Programme (FP7) having already gained 150 projects, and coordinating 31 of them. Innovation Systems, Sustainable Development (Energy, Construction and Environment), Industry and Transport (Casting and iron & steel, Transport and Industrial Systems), ICT (Software, Telecom, Infotech and Information Society) and Health and Life Quality (Health and Life Quality) are the fields in which TECNALIA operates.



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