Institute on Membrane Technology
ITM-CNR

Harbin Institute of Technology
School of Municipal and Environmental Engineering
Dept of Municipal Engineering

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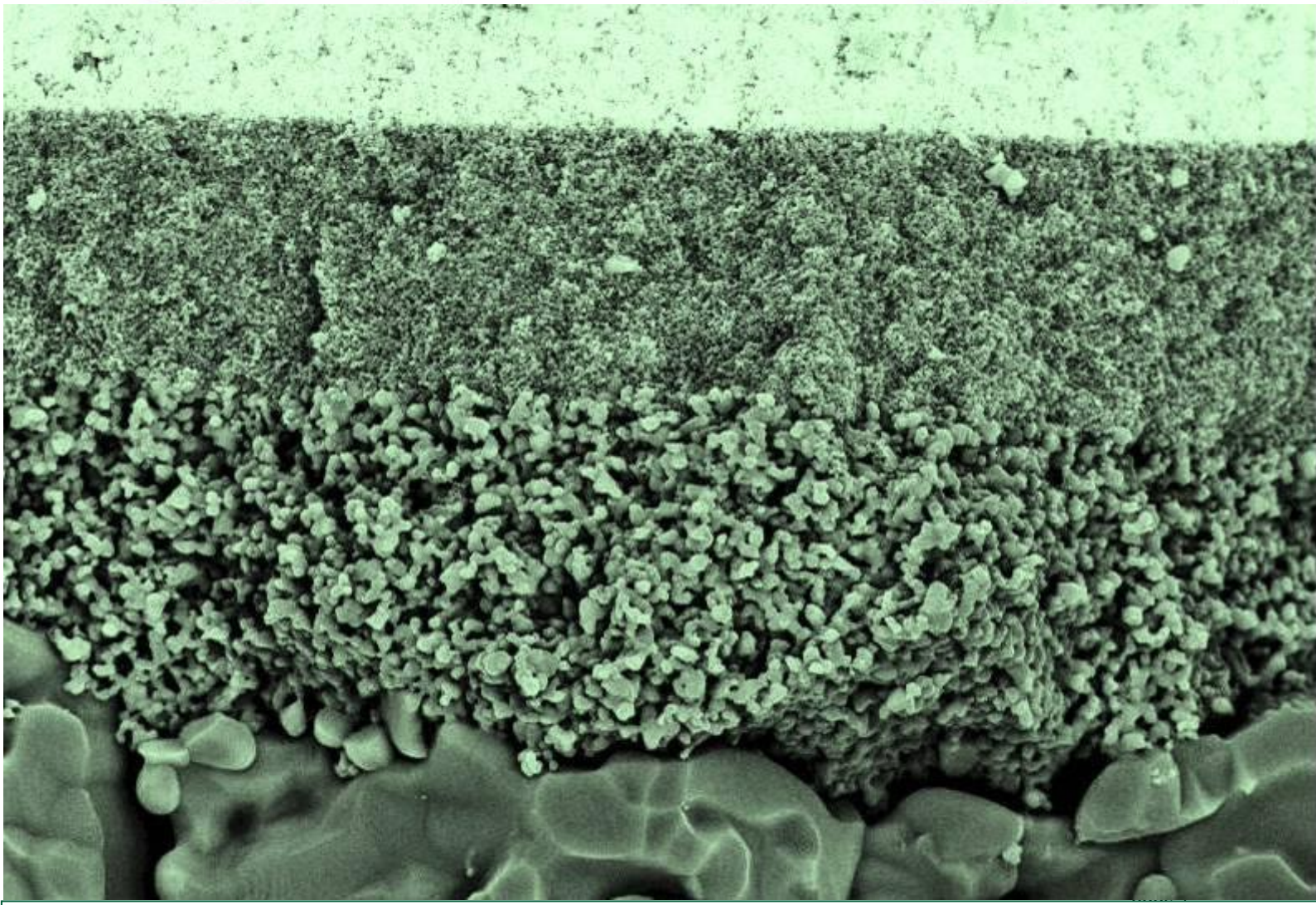

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Summary

From Europe

… News/Highlights

14th EU-China Joint Steering Committee on Science and Technology Cooperation and side events

Director General for DG RTD Mr Jean-Eric Paquet and Chinese Vice-Minister for Science and Technology Mr Zhang Jianguo, with the China and EU Delegates

The 14th meeting of the Joint Steering Committee of the EU-China Agreement for Scientific and Technological Cooperation took place in Beijing on 13 December 2018 under the cochairmanship of European Commission Director General for Research and Innovation Mr Jean-Eric Paquet and Chinese Vice-Minister for Science and Technology Mr Zhang Jianguo.

The two parties went through framework conditions for cooperation, the implementation of the Co-Funding Mechanism (CFM), and thematic areas including aviation, Food, Agriculture and Biotechnologies (FAB), biotechnologies and biomaterials, environment, sustainable urbanisation and Mission Innovation. Topics of potential future collaboration were also raised such as water, artificial intelligence (in particular ethical aspects), health, marine, and space.

There were also talks on personnel exchange and mobility and an agreement to develop a common cooperation roadmap.

The two sides also indicated their intention to renew the EU-China Agreement on Science and Technology cooperation that is due to expire by the end of 2019.

Representatives from the Ministry of Science and Technology, the Ministry of Industry and Information Technology, the Ministry of Water Resources, the National Natural Science Foundation of China, the Chinese Academy of Agricultural Sciences, the China Science and Technology Exchange Centre, the National Remote Sensing Centre, the National Science and Technology Evaluation Centre, the China International Talents Exchange Centre, the Chinese Aeronautical Establishment, the Chinese Mission to the EU, the European Commission Directorate-General for Research and Innovation and the Delegation of the European Union to China attended the meeting.

Director General Paquet also had a series of courtesy meetings with representatives from the National Natural Science Foundation (NSFC), the Chinese Academy of Social Sciences (CASS), the Ministry of Industry and Information Technology (MIIT) and the Chinese Academy of Sciences (CAS). The four meetings were opportunities to take stock of the present collaboration, present Horizon 2020 and the future plans for Horizon Europe and its international dimension, and exchange views on possible future cooperation.

In the EU-China Conference on Sustainable Urbanisation organised by the Horizon 2020 project Urban EU-China, Director General Paquet delivered a keynote speech and awarded a prize for the collaboration between the cities of Manchester and Wuhan. He also attended the 5th Science Slam event organised by EURAXESS in China and delivered a prize to a young researcher to visit Europe.
More information
- https://eeas.europa.eu/delegations/china/55706/eu-and-chinese-officials-meet-discuss-research-collaboration_en (EEAS Press release)
- http://www.most.gov.cn/kjbgz/201812/t20181219_144167.htm (in Chinese)

Second call for proposals published for 2018 under the EU-China Co-Funding Mechanism for Research and Innovation

On 22 October 2018, the Chinese Ministry of Science and Technology (MOST) published the second call for proposals for year 2018 under the EU-China Co-funding Mechanism for Research and Innovation (CFM), as part of the "Key Project on Intergovernmental International Science, Technology and Innovation (STI) Cooperation/STI Cooperation with Hong Kong, Macao and Taiwan" of China's National Key R&D Programme (NKP). The call seeks applications by China-based full participants in Horizon 2020 Work Programme 2018 proposals addressing nine broad priority areas for which around 15 projects are expected to be funded for a total budget of CNY50 million: new generation information network; intelligent and green manufacturing; safe, clean and efficient energy; advanced, effective, safe and convenient health technologies; marine equipment; space; new materials; large research infrastructures; and public security. Applications will be submitted in two stages including pre-applications and full applications. The deadline for submission of pre-applications is 10 December 2018.

Horizon 2020 WORK PROGRAMME 2018-20 TOPICS EXPLICITLY ENCOURAGING COOPERATION WITH CHINA

Research and innovation cooperation with China spans a wide variety of thematic areas. Through policy dialogue under the EU-China S&T Agreement several initiatives have been agreed and under Horizon 2020.

	TOPIC IDENTIFIER	TOPIC TITLE
2019	CE-BIOTEC-05-2019	Microorganism communities for plastics bio-degradation (RIA)
	CE-SFS-39-2019	High-quality organic fertilisers from biogas digestate
	LC-CLA-07-2019	The changing cryosphere: uncertainties, risks and opportunities
	LC-GV-05-2019	InCo flagship on “Urban mobility and sustainable electrification in large urban areas in developing and emerging economies”
	LC-MG-1-6-2019	Aviation operations impact on climate change
	LC-SC3-NZE-5-2019-2020	Low carbon industrial production using CCUS
	MG-2-9-2019	Integrated multimodal, low-emission freight transport systems and logistics (Inco Flagship)
	NMBP-15-2019	Safe by design, from science to regulation: metrics and main sectors (RIA)
	SFS-37-2019	Integrated approaches to food safety controls across the agri-food chain
	SU-SPACE-22-SEC2019	Space Weather
2020	NMBP-21-2020	Custom-made biological scaffolds for specific tissue regeneration and repair (RIA)
	SC5-25-2020	Strengthening EU-China cooperation on sustainable urbanisation: Enhanced natural treatment solutions for water security and ecological quality of water in cities
	SFS-40-2020	Healthy soils for healthy food production

Membrane related Projects in Europe

H2020 ONGOING PROJECTS

In the following section, H2020 ongoing projects relating to membrane research, started on 2018, are enclosed. Information about the projects started before 2018, are available in the same section of the previous issue of this newsletter.

- **Unprecedented spatial control of porosity and functionality in nanoporous membranes through 3D printing and microscopy for polymer writing (3D-FNPWriting)**

Project ID: 803758
Funded under: H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC)
Start date: 1 April 2019 End date: 31 March 2024
Total cost: € 1 499 844
EU contribution: € 1 499 844
Hosted by: TECHNISCHE UNIVERSITAT DARMSTADT (Germany)
Topic(s): ERC-2018-STG - ERC Starting Grant
Call for proposal: ERC-2018-STG
Funding scheme: ERC-STG - Starting Grant

Objective

Membranes are key materials in our life. Nature offers high performance membranes relying on a parallel local regulation of nanopore structure, functional placement, membrane composition and architecture. Existing technological membranes are key materials in separation, recycling, sensing, energy conversion, being essential components for a sustainable future. But their performance is far away from their natural counterparts. One reason for this performance gap is the lack of 3D nanolocal control in membrane design. This applies to each individual nanopore but as well to the membrane architecture. This proposal aims to implement 3D printing (additive manufacturing, top down) and complex near-field and total internal reflection (TIR) high resolution microscopy induced polymer writing (bottom up) to nanolocally control in hierarchical nanoporous membranes spatially and independent of each other: porosity, pore functionalization, membrane architecture, composition. This disruptive technology platform will make accessible to date unachieved, highly accurate asymmetric nanopores and multifunctional, hierarchical membrane architecture/ composition and thus highly selective, directed, transport with tuneable rates. 3D-FNPWriting will demonstrate this for the increasing class of metal nanoparticle/ salt pollutants aiming for tuneable, selective, directed transport based monitoring and recycling instead of size-based filtration, accumulation into sewerage and distribution into nature. Specifically, the potential of this disruptive technology with respect to transport design will be demonstrated for a) a 3D-printed in-situ functionalized nanoporous fiber architecture and b) a printed, nanolocally near-field and TIR-microscopy polymer functionalized membrane representing a thin separation layer. This will open systematic understanding of nanolocal functional control on transport and new perspectives in water/ energy management for future smart industry/ homes.

- **Energy-efficient membranes for carbon capture by crystal engineering of two-dimensional nanoporous materials (UltimateMembranes)**

Grant agreement ID: 805437
Status: Grant agreement signed
Start date: 1 June 2019 End date: 31 May 2024
Funded under: H2020-EU.1.1.
Overall budget: € 1 875 000
EU contribution:€ 1 875 000
Hosted by: ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE (Switzerland)
Programme(s): H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC)
Topic(s): ERC-2018-STG - ERC Starting Grant
Call for proposal: ERC-2018-STG
Funding Scheme: ERC-STG - Starting Grant

Objective

The EU integrated strategic energy technology plan, SET-plan, in its 2016 progress report, has called for urgent measures on the carbon capture, however, the high energy-penalty and environmental issues related to the conventional capture process (amine-based scrubbing) has been a major bottleneck. High-performance membranes can reduce the energy penalty for the capture, are environment-friendly (no

chemical is used, no waste is generated), can intensify chemical processes, and can be employed for the capture in a decentralized fashion. However, a technological breakthrough is needed to realize such chemically and thermally stable, high-performance membranes. This project seeks to develop the ultimate high-performance membranes for H2/CO2 (pre-combustion capture), CO2/N2 (post-combustion capture), and CO2/CH4 separations (natural gas sweetening). Based on calculations, these membranes will yield a gigantic gas permeance (1 and 0.1 million GPU for the H2 and the CO2 selective membranes, respectively), 1000 and 10-fold higher than that of the state-of-the-art polymeric and nanoporous membranes, respectively, reducing capital expenditure per unit performance and the needed membrane area. For this, we introduce three novel concepts, combining the top-down and the bottom-up crystal engineering approaches to develop size-selective, chemically and thermally stable, nanoporous two-dimensional membranes. First, exfoliated nanoporous 2d nanosheets will be stitched in-plane to synthesize the truly-2d membranes. Second, metal-organic frameworks will be confined across a nanoporous 2d matrix to prepare a composite 2d membrane. Third, atom-thick graphene films with tunable, uniform and size-selective nanopores will be crystallized using a novel thermodynamic equilibrium between the lattice growth and etching. Overall, the innovative concepts developed here will open up several frontiers on the synthesis of high-performance membranes for a wide-range of separation processes.

- **Novel binder-ionomer-free electrodes enable ultra-low Pt loading electrodes for low cost High Temperature proton exchange membrane fuel cells based in phosphoric acid-doped polybenzimidazole membranes (LOWCOST-PBI-HTPEMFC)**

Grant agreement ID: 796272
Status: Ongoing project
Start date: 15 August 2018 End date: 14 August 2020
Funded under: H2020-EU.1.3.2.
Overall budget: € 212 194,80
EU contribution: € 212 194,80
Coordinated by: DANMARKS TEKNISKE UNIVERSITET (Denmark)
Programme(s): H2020-EU.1.3.2. - Nurturing excellence by means of cross-border and cross-sector mobility
Topic(s): MSCA-IF-2017 - Individual Fellowships
Call for proposal: H2020-MSCA-IF-2017
Funding Scheme: MSCA-IF-EF-CAR - CAR – Career Restart panel

Objective
In spite of the promising prospects as future green energy conversion device, low temperature-proton exchange membrane fuel cells (LT-PEMFCs) based in perfluorosulfonic acid membrane have achieved a penetration in the energy market rather low, being cost and durability the main barriers to the worldwide commercialization. As an alternative, high temperature- (HT-) PEMFCs based in phosphoric acid-doped polybenzimidazole membranes are gaining much of attention due to the benefits over the LT-PEMFCs (e.g. no need of auxiliary humidification system, much higher CO and sulfur tolerance, very suitable for cogeneration in combined heat and power systems, easier thermal management, etc.). However, the main drawback is the high Pt content of the electrodes that, according to the state-of-the-art, is greater than 0.5 mgPt cm-2 (2-5 times higher than LT-PEMFCs state-of-the-art). This project aims to develop a novel configuration of the HT-PEMFC electrode that enable the achievement of low cost ultra-low Pt loading electrodes (≤ 0.1 mgPt cm^{-2}) with competitive power output and durability. A paradigm shift is proposed in the structure and composition of the catalytic layer of the HT-PEMFC electrode as no ionomer or binder is incorporated, only the catalyst and the electrolyte (phosphoric acid) are present. The absence of Pt site-blockers, as the binder or the ionomer polymers, significantly enhance the electrochemical surface area at ultra-low Pt loadings enabling a reasonable performace output. Results of this project have a strong potential to be transferred to the electrode production in the emerging industry of HT-PEMFCs. The project involves a number of analytic techniques and specific equipment that ensures the transfer of knowledge and the training to the experienced researcher while the candidate will bring his expertise in LT-PEMFCs as a positive feedback to the HT-PEMFCs research field.

- **Enhanced under water superoleophobicity by micro/nano topography and hydrophilic polymer brushes for high efficiency oil-water emulsion separation (HYDRA)**

Grant agreement ID: 793574
Status: Ongoing project
Start date: 1 November 2018 End date: 31 October 2020
Funded under: H2020-EU.1.3.2.
Overall budget: € 195 454,80

EU contribution: € 195 454,80
Coordinated by: UNIVERSITY OF BRISTOL ROYAL CHARTER (United Kingdom)
Programme(s): H2020-EU.1.3.2. - Nurturing excellence by means of cross-border and cross-sector mobility
Topic(s): MSCA-IF-2017 - Individual Fellowships
Call for proposal: H2020-MSCA-IF-2017
Funding Scheme: MSCA-IF-EF-ST - Standard EF

Objective
Superhydrophilic-underwater superoleophobic membrane is a kind of functional separation membranes based on special wettability, with very promising application prospect in oil/water separation. The stability of the material is the key factor in its performance. This proposal aims to develop stable membranes with superhydrophilicity-underwater superoleophobicity design, by combining synergistically the stupendous hydrated polymer brushes and anisotropic micro-/nano-structures on a surface. We will suppress the wetting transition due to oil penetration via the stable hydration shell of the polymer brush on the vertical direction, and directional oil droplet transmission via the anisotropic surface structures tangential to a surface. Our results aim to reveal the relationships between the molecular brush structure, anisotropic micro-/nano-structure on the surface, and wettability in the oil-water-solid three phase system, illustrating the nature of science of wetting transition and transition suppression, understanding the mechanism of superhydrophilic-underwater superoleophobic surfaces under pressure in multiple phase systems, and ultimately establishing the design strategy for effective membranes for oil-water separation important in many applications of significant economic and societal impact.

- **Enhanced MUlti-Functional Membranes for Water Treatment and Desalination (Enhanced-MUMs)**

Grant agreement ID: 800317
Status: Ongoing project
Start date: 25 June 2018 End date: 24 June 2020
Funded under: H2020-EU.1.3.2.
Overall budget: € 168 277,20
EU contribution: € 168 277,20
Coordinated by: CONSIGLIO NAZIONALE DELLE RICERCHE (Italy)
Programme(s): H2020-EU.1.3.2. - Nurturing excellence by means of cross-border and cross-sector mobility
Topic(s): MSCA-IF-2017 - Individual Fellowships
Call for proposal: H2020-MSCA-IF-2017
Funding Scheme: MSCA-IF-EF-ST - Standard EF

Objective
Enhanced-MUMs targets the development of advanced multifunctional and low-cost polymeric membranes for water treatment and desalination. The main innovation resides in the combination of enhanced structural properties (high porosity and reinforcement) for improved desalination characteristics and light-induced antifouling and antimicrobial activity based on the loading of photosensitizers in the polymeric membrane. The economy of the approach is guaranteed by the polymeric material chosen for the realization of the membrane: PVC. The proposed breakthrough relies on the complementary expertise of the Experienced Researcher on polymer chemistry and nanofibers fabrication and of the supervisor's group on polymeric materials characterization, photochemistry of organic materials and photosensitizers for photodynamic treatments. Enhanced-MUMs is a multidisciplinary project that aims at bringing high innovation in the forefront research area of water treatment and desalination. In the frame of the project the Experienced Researcher will widen her scientific skills and technological know-how with significant improvement for the development of her career.

- **Multiphysics study of the dynamics, resistance and targeted therapy potential of deformable Micro-Capsules (MultiphysMicroCaps)**

Grant agreement ID: 772191
Status: Ongoing project
Start date: 1 June 2018 End date: 31 May 2023
Funded under: H2020-EU.1.1.
Overall budget: € 1 999 470
EU contribution: € 1 999 470
Hosted by: CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS (France)
Programme(s): H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC)

Topic(s): ERC-2017-COG - ERC Consolidator Grant
Call for proposal: ERC-2017-COG
Funding Scheme: ERC-COG - Consolidator Grant

Objective
Encapsulation consists in enclosing an internal medium in a solid semi-permeable membrane to protect it and control the exchanges with the environment. Being at the source of innovative applications in the fields of biotechnologies, pharmacology, energy storage and food industry, capsules offer tremendous potential in the process engineering world. But scientific challenges remain to be met, such as finding the optimal compromise between payload and membrane thickness, characterizing the membrane resistance and controlling the moment of rupture.
The project explores the use of deformable liquid-core capsules of micrometric size to efficiently transport active material, with a primary focus on health-related applications. We will design innovative sophisticated numerical models and high-tech experiments, needed to determine the potential of such vectors for the protection of active substances, predict membrane breakup to control the delivery, and optimize their properties for specific industrial and biomedical applications. The project will, for the first time, study the effect of a finite wall thickness on the dynamics of elastic microcapsules, propose advanced modelling approaches and microfluidic experiments of their deformability and breakup under hydrodynamic stresses, account for the inherent size variability of given capsule populations, and introduce reduced-order models to facilitate real-time simulations. As a specific application, we will study the potential of liquid-core microcapsules to encapsulate antioxidants for food enrichment.
The project outcomes will be (i) new advanced three-dimensional numerical models of the fluid-structure interactions and rupture of a microcapsule, taking into account a finite wall thickness, (ii) microcapsule optimization tools based on reduced-order models, (iii) microscopic techniques to measure the capsule mechanical properties, and (iv) an applied study of optimization of antioxidant encapsulation in microcapsules.

- **Feasibility study for industrial scale-up of the novel high-efficiency biocompatible and easy-to-operate water treatment membrane (PureWater)**

Grant agreement ID: 826775
Status: Ongoing project
Start date: 1 August 2018 End date: 31 January 2019
Funded under: H2020-EU.3., H2020-EU.2.3., H2020-EU.2.1.
Overall budget: € 71 429
EU contribution: € 50 000
Coordinated by: BLUACT TECHNOLOGIES GMBH (Switzerland)
Programme(s): H2020-EU.3. - PRIORITY 'Societal challenges
H2020-EU.2.3. - INDUSTRIAL LEADERSHIP - Innovation In SMEs
H2020-EU.2.1. - INDUSTRIAL LEADERSHIP - Leadership in enabling and industrial technologies
Topic(s): EIC-SMEInst-2018-2020 - SME instrument
Call for proposal: H2020-SMEInst-2018-2020-1
Funding Scheme: SME-1 - SME instrument phase 1

Objective
The main objective of the PureWater project is the verification of technological and business viability of a novel disruptive and universally adoptable water purification technology possessing close to 100% efficiency and not requiring capital investments.
The operation of technology is based on an adsorption membrane produced from environmentally friendly materials (milk protein and activated carbon) and is therefore poised to replace current water purification approaches, thereby contributing to the greening of the EU economy and to facilitating the transition to a resource efficient and climate-smart industry.
The technology can be considered infrastructure-free as the membrane fit into existing water treatment equipment (filter press) and does not require any pre- nor post-treatment (unlike to all currently adopted membrane filtering technologies).
The components used are low cost materials which makes the proposed concept extremely competitive with respect to currently existing solutions.
The focus of the PureWater project will be the validation of the viability of the proposed concept with reference to heavy metals purification. However, the full potential of the technological concept covers almost all the organic and inorganic water pollutant coming from both, industrial and municipal sectors.

Our ambition is thus to become the global landmark in the water treatment technology, introducing a single step bio-based, universal, yet simple, cheap and scalable technology for water decontamination.
The PureWater's mid-term ambition is to overcome all persisting challenges of water purification without requiring any modification of the existing pipelines: i) household purification of drinking water; ii) purification of industrial wastewater streams; iii) decontamination and purification of water contaminated from heavy metals and nuclear waste for agricultural purposes.

- **Innovative Biodegradable Poly(ionic liquid)s for Bioelectronics (iPILs4Bionics)**

Grant agreement ID: 745734
Status: Ongoing project
Start date: 1 September 2018 End date: 31 August 2020
Funded under: H2020-EU.1.3.2.
Overall budget: € 170 121,60
EU contribution: € 170 121,60
Coordinated by: UNIVERSIDAD DEL PAIS VASCO/ EUSKAL HERRIKO UNIBERTSITATEA (Spain)
Programme(s): H2020-EU.1.3.2. - Nurturing excellence by means of cross-border and cross-sector mobility
Topic(s): MSCA-IF-2016 - Individual Fellowships
Call for proposal: H2020-MSCA-IF-2016
Funding Scheme: MSCA-IF-EF-ST - Standard EF

Objective
Poly(ionic liquid)s or PILs are expanding classical property profiles of polymers and stirring great interest in the development of diverse areas, as green chemistry, energy, biotechnology, materials or membrane science. One of the common concerns of PILs consist of its biodegradability due their bioaccumulation and negative effects to the environment and the human body. The main goal of this project is to develop the first generation of biodegradable PILs. The most successful biodegradable polymeric backbones such as polycarbonates or polyesters will be combined with readily biodegradable cholinium-based ionic liquids. The polymers will be synthesized by controlled ring-opening polymerization using recently developed organocatalysis tools. The most promising biodegradable PILs will be investigated as ion conductive soft membranes in bioelectronic devices.
This MSCA Fellowship will open the best career possibilities for the Experienced Researcher (ER), and excellent young female scientist. After a successful PhD and 2 years Post-Doc in ionic liquid-based materials and gas separation membranes at ITQB-Universidade Nova de Lisboa (Portugal), she decided to move to a different environment, where she can exploit all her materials science expertise. The Innovative Polymers Group directed by Prof. David Mecerreyes at POLYMAT-University of the Basque Country (Spain) is one of the top-class groups in the emerging area of PILs. This multidisciplinary project will broaden the scientific knowledge of the ER and help her to grow and expand her network in order to reach a future group leader position in the materials science field.

- **Taking to market a novel filtration system for air purification (mTAP)**

Grant agreement ID: 811822
Status: Ongoing project
Start date: 1 June 2018 End date: 31 May 2020
Funded under: H2020-EU.3. , H2020-EU.2.3. , H2020-EU.2.1.
Overall budget: € 2 855 125
EU contribution: € 1 998 587,50
Coordinated by: SMART SEPARATIONS LTD (United Kingdom)
Programme(s): H2020-EU.3. - PRIORITY 'Societal challenges
H2020-EU.2.3. - INDUSTRIAL LEADERSHIP - Innovation In SMEs
H2020-EU.2.1. - INDUSTRIAL LEADERSHIP - Leadership in enabling and industrial technologies
Topic(s): EIC-SMEInst-2018-2020 - SME instrument
Call for proposal: H2020-SMEInst-2018-2020-2
Funding Scheme: SME-2 - SME instrument phase 2
Objective
Smart Separations (SSL) has developed a proprietary ceramic filter that can be tailored to suit many different applications in the underdeveloped, yet global microfiltration industry.
This unique and patented ceramic membrane structure consists of highly ordered and self-assembled microchannels that transverse the entire membrane cross-section. It can be made into a filter system to

provide a more controlled, versatile, and low-cost solution for several industries, including indoor air purification.
SSL has identified the application of the technology to purifying indoor air by heavily reducing carbon particulates, dust, pollen, odours and chemicals in air more efficiently and affordably than current methods - to be our entry market (an established substantial global market currently worth over €15 billion annually).
Our innovative product can be retrofitted into existing air ventilation units, regardless of their brand or size. This will mean that the existing market can continue to flourish, while SSL will "simply" plug their new product into existing pipeline to improve the quality of the air people breathe – it is worth to note that current technologies do not yet supply purified air, which we intend to deliver.
We have established strong business partnerships with important players of the global indoor air ventilation market, which present a huge opportunity for the fast market uptake of our technology. Our clients and partners have high interest in our solution, which will gve the a innovtion leading role among their customers with disruptive novel applications that are more reliable, durable and cost-efficient.
Within 5 years, after this Phase 2 grant ends, the company will reach a turnover in excess of €6m annually. This will be accompanied by an increasing number of employed staff, growing from 7 to 36. We are committed to keeping our RDI, Manufacturing and Management operations in Europe.

- **Active nanofluidics towards ionic machines (SHADOKS)**

Grant agreement ID: 785911
Status: Ongoing project
Start date: 1 July 2018 End date: 30 June 2023
Funded under: H2020-EU.1.1.
Overall budget: € 2 431 000
EU contribution: € 2 431 000
Hosted by: CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS (France)
Programme(s): H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC)
Topic(s): ERC-2017-ADG - ERC Advanced Grant
Call for proposal: ERC-2017-ADG
Funding Scheme: ERC-ADG - Advanced Grant

Objective
Filtering and water purification rely traditionnally on the concept of passive sieving across properly decorated nanopores. Such basic separation principle contrasts with the highly advanced membrane processes existing in Nature, which harness the full subtleties of active transport across channels. This involves advanced functions like ionic pumps, ultra-high selective channels, or voltage-gated nanopores, which all play a key role in many vital needs and neuronal functions.
The Shadoks project aims at developing the concept of artificial ionic machines, based on active nanofluidic transport. This is an experimental project targeting a fundamental proof of concept. It moreover involves a strong theoretical counterpart, essential to experimental advances and prototyping. I will investigate a wealth of strongly non-equilibrium transport phenomena occurring at the nanoscales, taking advantage of our unique know-how in building nanofluidic heterostructures, in particular made of carbon and boron-nitride. I target ionic Coulomb blockade, on/off voltage-gated nanopore, ionic pumps, dynamical osmosis. These processes allow to tune ionic fluxes against the gradients and induce out-of-equilibrium charge separation, hereby conceiving active sieving as a novel route for separation and desalination. Those new building blocks will subsequently be assembled to create advanced bio-inspired membrane functionalities. We will use ionic pumps to store and deliver charge carriers on demand, akin to the triggered electric shock of the electric eel. Furthermore we use the active nanofluidics building blocks to mimic a basic machinery of neuronal processes. I target in particular to build an artificial dendritic spine, as an ionic information transmitter. As an ultimate goal, this is a route towards elementary neuronal computational processes based on the artificial ionic machines.

- **Water Recovery from Industrial Gas Streams at Moderate Temperatures (RECOVERY)**

Grant agreement ID: 792628
Status: Ongoing project
Start date: 1 September 2018 End date: 31 August 2020
Funded under: H2020-EU.1.3.2.
Overall budget: € 158 121,60
EU contribution: € 158 121,60
Coordinated by: AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS (Spain)

Programme(s): H2020-EU.1.3.2. - Nurturing excellence by means of cross-border and cross-sector mobility
Topic(s): MSCA-IF-2017 - Individual Fellowships
Call for proposal: H2020-MSCA-IF-2017
Funding Scheme: MSCA-IF-EF-ST - Standard EF

Objective
The emission of greenhouse gases is gradually changing the climate and the temperature of the Earth. As a consequence, droughts are increasingly occurring and freshwater is becoming a scarce natural resource. Water scarcity is actually a major issue in the south of the European Union (EU) territory. Since industry is one of the main water users in Europe, the purpose of this Fellowship is to recover water from industrial gas streams at moderate temperatures around 200–300 degrees Celsius using porous aluminium oxide membranes. Assuming that this challenging separation is successfully achieved, the project will have major impact on the industrial water footprint and management. In addition, this Fellowship also aims to give the Fellow, Dr Masó, the opportunity to develop new technical and transferable skills in the state-of-the-art membrane methodology and incorporate him into the EU academic/industrial membrane community.

- **Advanced graphene nanodevices with functional hydrogels for DNA sequencing (GRAPHNANOGEL)**

Grant agreement ID: 749671
Status: Ongoing project
Start date: 1 September 2018 End date: 31 August 2020
Funded under: H2020-EU.1.3.2.
Overall budget: € 177 598,80
EU contribution: € 177 598,80
Coordinated by: UNIVERSITEIT LEIDEN (Netherlands)
Programme(s): H2020-EU.1.3.2. - Nurturing excellence by means of cross-border and cross-sector mobility
Topic(s): MSCA-IF-2016 - Individual Fellowships
Call for proposal: H2020-MSCA-IF-2016
Funding Scheme: MSCA-IF-EF-ST - Standard EF

Objective
With this proposal, I propose a new chemical approach inspired by DNA gel electrophoresis to slow down DNA translocation through a graphene nanopore or a nanogap, and to reduce the mechanical fluctuations of the graphene membrane as DNA translocates. Thus far using graphene nanodevices to sequence DNA molecules in real time has been hampered by two major drawbacks: i) the too fast translocation of single DNA molecules through a graphene nanodevice, and ii) the very large low frequency electronic noise presumably due to mechanical vibration of the free-standing graphene membrane in aqueous buffers. Both these phenomena prevent single nucleotide identification (at least compared to biological nanopores). The direct chemical functionalization of graphene film with functional polymeric hydrogels will i) induce electrostatic and chemical affinities between DNA and the functional polymer hydrogel and ii) stabilize mechanically graphene from vibrating. The host group of Dr. Schneider was the first to propose graphene nanopores as single molecule DNA sensors in 2010 and has gained a lot of experience in this field. Dr. Schneider's group is now approaching DNA sequencing with graphene nanostructures with a strong chemistry component. Schneider's lab in Leiden is therefore, at the moment, the best place in the world to make this research proposal a success. I do believe this proposal has the potential to lead toward ground-breaking applications in nanopore-based biosensors, particularly for high throughput next generation sequencing applications with graphene nanogaps.

- **VolThinSens. Challenging societal needs involving ions detection: New strategies for the development of Voltammetry ion Sensors based on Thin membranes (VolThinSens)**

Grant agreement ID: 792824
Status: Grant agreement signed
Start date: 1 March 2019 End date: 28 February 2021

Funded under: H2020-EU.1.3.2.
Overall budget: € 185 857,20
EU contribution: € 185 857,20
Coordinated by: KUNGLIGA TEKNISKA HOEGSKOLAN (Sweden)

- **Smart multisensor embedded and secure system for soil nutrient and gaseous emission monitoring (SARMENTI)**

Grant agreement ID: 825325
Status: Ongoing project
Start date: 1 January 2019 End date: 31 December 2021
Funded under: H2020-EU.2.1.1.
Overall budget: € 3 979 431,25
EU contribution: € 3 979 431,25
Coordinated by: COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES (France)
Programme(s): H2020-EU.2.1.1. - INDUSTRIAL LEADERSHIP - Leadership in enabling and industrial technologies - Information and Communication Technologies (ICT)
Topic(s): ICT-07-2018 - Electronic Smart Systems (ESS)
Call for proposal: H2020-ICT-2018-2
Funding Scheme: RIA - Research and Innovation action

Objective
"SARMENTI develops a multisensor, low power IoT secure node to provide decision support to farmers by monitoring in real-time and in situ soil nutrients and gaseous emission. From this data measured on a daily basis over crop lifecycles, the farmer will timely perform appropriate actions regarding fertilisation, with direct impact on crop growth, soil & water quality and farmer income.
The SARMENTI system will embed electrochemical sensors to measure e.g. NOx, POx, NH4, K, urea, pH, moisture, temperature. They will stay ideally during the crop lifecycle in the soil with packaging issues to protect them from their environment. A hygroscopic membrane will attract water from the soil, avoiding integration of a power hungry active pump usually used to exact water from a soil sample. SARMENTI will also monitor N2O (may appear in the nitrate cycle) and CH4 (generated by decomposition of manure under anaerobic conditions) just above the ground. These gases are greenhouse ones with higher warming potential than CO2.
SARMENTI is part of the IoT (e.g. LoRa, BLE connexion). Data integrity is guaranteed by developing a secure node via combination of attack detection and automatic countermeasures application.
Partners bring SoA prototypes of electrochemical and gas sensors and communication submodules, know-how in security for IoT nodes, and expertise in Agriculture. SARMENTI will further improve the prototypes (power, usage duration, hygroscopic membrane, packaging, sensitivity, selectivity) and integrate them with advanced processing in a connected secured device. Cloud Decisions support will allow evaluate the overall solution, SARMENTI demonstrator being tested in real fields.
SARMENTI directly addresses ICT-7 challenge: “develop and validate new generation of cost-effective ESS ...”, RIA aim: “demonstrate ESS bringing intelligence ... integration of sensor systems, processors, computing and networking elements...”" and “verification"", ""exploitation... clearly identified"".

- **Bifunctional Zeolite based Catalysts and Innovative process for Sustainable Hydrocarbon Transformation (BIZEOLCAT)**

Grant agreement ID: 814671
Status: Ongoing project
Start date: 1 January 2019
End date: 31 December 2022
Funded under: H2020-EU.2.1.3. , H2020-EU.2.1.2.
Overall budget: € 6 571 837,50
EU contribution: € 6 571 837,50
Coordinated by: FUNDACIO EURECAT (Spain)
Programme(s): H2020-EU.2.1.3. - INDUSTRIAL LEADERSHIP - Leadership in enabling and industrial technologies - Advanced materials
H2020-EU.2.1.2. - INDUSTRIAL LEADERSHIP - Leadership in enabling and industrial technologies – Nanotechnologies
Topic(s): CE-NMBP-24-2018 - Catalytic transformation of hydrocarbons (RIA)
Call for proposal: H2020-NMBP-ST-IND-2018
Funding Scheme: RIA - Research and Innovation action

Objective
In the past there have been a number of semi-industrial trials and even commercial processes to obtain on-purpose petrochemical feedstocks from methane and/or propane (more generally, C1-C4 hydrocarbons). However, their commercial success has been limited due to several reasons: from technical drawbacks (low

conversions and selectivity) to economics (high capital investment and high operation costs are often obtained). Furthermore there is a need for lowering the carbon footprint of gas and oil industry, i.e. refining industry, contributing to an evolving scenario of sustainable economy in such field. BIZEOLCAT is addressing the use of light alkanes as raw material for specialty chemical industry and not as feedstock for fuels in the current oil refining process, becoming part of this transition.
BIZEOLCAT will aim developing 4 new processes of light alkanes (methane, propane and butane) conversion to olefins (propylene, butadiene) and to aromatics demonstrating higher performance, cost efficiency and environmental sustainability, using innovative methodologies for catalysts preparation and membrane reactor design. A refining company, TUPRAS, will run the pilot unit experiments. Two large companies, CEPSA and PERSTORP, will validate propylene and propylene and benzene, respectively as part of TR5 validation.
sLCA have demonstrated that the expected reduction in the greenhouse emissions related to the manufacturing of propane dehydrogenation developed within the project and also the Aromatization process in comparison to current Oleflex® and benzene production from a reformate plant is far over the target value of 20%.
A joint venture creation is part of BIZEOLCAT exploitation plan.
The BIZEOLCAT consortium comprises 14 partners: 2 technology centres, 2 research institutes, 3 universities, 1 Standardization body, 1 international association and finally 4 large industry and 1 SME from 10 countries (7 EU members, 2 associated countries to H2020, 1 third country).

- CarbON Valorisation in Energy-efficient Green fuels (CONVERGE)

Grant agreement ID: 818135
Status: Ongoing project
Start date: 1 November 2018 End date: 30 April 2022
Funded under: H2020-EU.3.3.3.
Overall budget: € 5 087 031,25
EU contribution: € 5 087 031,25
Coordinated by: POLITECNICO DI MILANO (Italy)
Programme(s): H2020-EU.3.3.3. - Alternative fuels and mobile energy sources
Topic(s): LC-SC3-RES-21-2018 - Development of next generation biofuels and alternative renewable fuel technologies for road transport
Call for proposal: H2020-LC-SC3-2018-RES-SingleStage
Funding Scheme: RIA - Research and Innovation action

Objective
The CONVERGE project will validate an innovative value chain for the production of green biodiesel. The innovative configuration will reduce the total number of unit operations needed to achieve the conversion of secondary biomass and waste streams into green biodiesel, while simultaneously producing additional intermediate green refinery products. The CONVERGE project will demonstrate 5 unit operations in 3 grouped processing steps (pre-processing, valorization & enhanced methanol), taking these new combinations from the discovery stage (TRL3) to development stage (TRL5). The combination of these technologies will increase the biodiesel production from secondary biomass by 12% together with biodiesel production will be reduced by up to 2100 M€ across Europe. In this project, risks are mitigated from the very start; each unit can be implemented as a stand-alone function within a modified state-of-the-art technology chain and thus provide immediate performance and energy efficiency improvements. Moreover, the units when used together have synergies that allow even more efficiency gains. The new units to be taken from discovery to development are: CCT: Catalytic cracking of tars from a gasifier to below green C8, integrated with BITS: Recovery of refinery products including aromatics for green C6-C8 fraction (BTX). Then, SER: Sorption-Enhanced Reforming is adopted for H2 and CO2 separation, integrated with EHC: Highly efficient electrochemical compression of green H2 with by-product fuel EMM: Enhanced Methanol Membrane synthesis to ensure green biodiesel production. The technology will be validated for more than 2000 cumulated hours. The CONVERGE consortium covers the whole value chain from secondary biomass supply to biodiesel production, demonstrating the new unit operations on site within an ambitious 42 months period.

- **Hydrogen-Methanol Ship propulsion system using on-board pre-combustion carbon capture (HyMethShip)**

Grant agreement ID: 768945
Status: Ongoing project
Start date: 1 July 2018 End date: 30 June 2021
Funded under: H2020-EU.3.4.
Overall budget: € 9 288 310

EU contribution: € 8 438 110
Coordinated by: LEC GMBH (Austria)
Programme(s): H2020-EU.3.4. - SOCIETAL CHALLENGES - Smart, Green And Integrated Transport
Topic(s): MG-2.1-2017 - Innovations for energy efficiency and emission control in waterborne transport
Call for proposal: H2020-MG-2017-Two-Stages
Funding Scheme: IA - Innovation action

Objective
The HyMethShip project reduces drastically emissions and improves the efficiency of waterborne transport at the same time. This system will be developed, validated, and demonstrated on shore with a typical engine for marine applications in the range of 2 MW (TRL 6).
The HyMethShip system will achieve a reduction in CO2 of more than 97% and will practically eliminate SOx and PM emissions. NOx emissions will be reduced by more than 80%, significantly below the IMO Tier III limit. The energy efficiency of the HyMethShip system is more than 45% better than the best available technology approach (renewable methanol as fuel coupled with conventional post-combustion carbon capturing).
The HyMethShip system innovatively combines a membrane reactor, a CO2 capture system, a storage system for CO2 and methanol as well as a hydrogen-fueled combustion engine into one system. The proposed solution reforms methanol to hydrogen, which is then burned in a conventional reciprocating engine that has been upgraded to burn multiple fuel types and specially optimized for hydrogen use.
The HyMethShip project will undertake risk and safety assessments to ensure that the system fulfills safety requirements for on-board use. It will also take into account the rules and regulations under development for low flashpoint fuels.
The cost effectiveness of the system will be assessed for different ship types and operational cases. For medium and long distance waterborne transport, the HyMethShip concept is considered the best approach available that achieves this level of CO2 reduction and is economically feasible.
The HyMethShip consortium includes a globally operating shipping company, a major shipyard, a ship classification society, research institutes and universities, and equipment manufacturers. Further stakeholders will be represented in the External Expert Advisory Board and will be addressed by dissemination activities respectively.

- **ADVANCED NANOMEMBRANES FOR EXACT POLYMER PRODUCTION (EXACTYMER)**

Grant agreement ID: 786398
Status: Ongoing project
Start date: 1 July 2018 End date: 30 June 2023
Funded under: H2020-EU.1.1.
Overall budget: € 2 499 814
EU contribution: € 2 499 814
Hosted by: IMPERIAL COLLEGE OF SCIENCE TECHNOLOGY AND MEDICINE (United Kingdom)
Programme(s): H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC)
Topic(s): ERC-2017-ADG - ERC Advanced Grant
Call for proposal: ERC-2017-ADG
Funding Scheme: ERC-ADG - Advanced Grant

Objective
The production of synthetic polymers with precisely defined monomer sequences – exact polymers, which I call “exactymers” – is highly challenging. Iterative synthesis, in which specific monomers are added one-at-a-time to the end of a growing polymer chain, affords exquisite control over the final sequence, but requires accurate purification of the growing polymer with each and every cycle. EXACTYMER will create new super-stable, ultra-selective nanomembranes, with high permeances, enabling rapid, repeated purifications, which will transform exactymer fabrication. Multiple growing polymer chains will be attached to a central hub molecule to create a macromolecular homostar with enhanced molecular size, promoting accurate separation of the growing exactymer from reaction debris via nanomembrane processing. Automation and engineering will enable rapid, accurate and precise cycles of exactymer chain growth. EXACTYMER objectives will be achieved through curiosity-driven research into (1) the creation of nanomembranes with exquisite molecular selectivity between growing homostars and monomer plus reaction debris; (2) advancing the chemistry of iterative synthesis by creating strategies for step-wise growth of polyethers, polysiloxanes, and polyesters, and side chain functionalised monomers of these species; (3) combining iterative chemistry and nanomembranes together in an automated homostar nanofiltration platform, and; (4) exploring the use of exactymers in healthcare, nanotechnology and information storage. EXACTYMER will undertake pioneering research at the boundaries of membrane technology, polymer synthesis, process engineering

and nanotechnology. The most profound anticipated outcome is a new capability to produce synthetic polymers, over 20 monomers in length, with exactly defined monomer sequences to an unprecedented accuracy, at multi-gram scale. New scientific insights will derive from the properties and performances of these newly accessible molecules.

- **MultiphasIc NanoreaCtors for HEterogeneous CataLysis via SmArt ENGinEering of TaiLored DispersiOns (MICHELANGELO)**

Grant agreement ID: 771586
Status: Ongoing project
Start date: 1 October 2018 End date: 30 September 2023
Funded under: H2020-EU.1.1.
Overall budget: € 1 956 720
EU contribution: € 1 956 720
Hosted by: CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS (France)
Programme(s): H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC)
Topic(s): ERC-2017-COG - ERC Consolidator Grant
Call for proposal: ERC-2017-COG
Funding Scheme: ERC-COG - Consolidator Grant

Objective
Gas-liquid-solid (G/L/S) multiphasic reactors are extensively used in the chemical industry for catalytic processes. However, conventional reactors, such as packed beds and slurry reactors, typically suffer from resilient mass/heat transfer limitations due to their low specific interface areas, long mixing times, and a reduced accessibility of the gas reactants to the catalyst surface. To overcome these limitations, continuous flow microreactors and catalytic membrane reactors have been considered for increasing the G/L interface area, but these systems require complex equipment and still do not guarantee an efficient L/S contact at the catalyst surface. For a major improvement on current systems in terms of cost efficiency and energy savings, G/L/S reactors operating at the nanoscale are required.
The aim of this ERC project is to design robust particle-stabilized G/L dispersions (i.e. micro/nano-bubbles and liquid marbles) as highly efficient G/L/S nanoreactors for conducting catalytic reactions at mild conditions.
We will (i) prepare NPs with defined sizes, shapes, hydrophilic-lipophilic balance (HLB), including catalytic functions; (ii) generate particle-stabilized bubbles and liquid marbles affording highly active and selective reactions at the G/L/S interface with NP recycling after each catalytic cycle using external stimuli; examine the interplay between the NP assembly at the G/L interface and the catalytic properties along the reaction by combining well-designed experiments with simulations; and (iv) reengineer G/L/S multiphasic reactors using our particle-stabilized nanoreactors to achieve a high catalytic performance at milder operation conditions compared to conventional reactors while keeping a high degree of stability and flexibility at reduced layouts.
Through innovation on both amphiphilic catalysts and process intensification, MICHELANGELO will deliver a radical step change towards a higher efficiency and competitiveness in the process industry.

- **EXPLORING NONLINEAR DYNAMICS IN GRAPHENE NANOMECHANICAL SYSTEMS (ENIGMA)**

Grant agreement ID: 802093
Status: Ongoing project
Start date: 1 November 2018 End date: 31 October 2023
Funded under: H2020-EU.1.1.
Overall budget: € 1 422 598
EU contribution: € 1 422 598
Hosted by: TECHNISCHE UNIVERSITEIT DELFT (Netherlands)

Objective
Micro and nanomechanical systems are being adopted in billions of products, that address a wide range of sensor and actuator applications in modern technology. The advent of graphene, and the ability to fabricate single atom thick membranes, promises further device downscaling, enabling ultimate sensing capabilities that until recently seemed utopical. But, these atomically thin membranes are in essence nonlinear and exhibit nonlinear dynamic behavior at forces of only a few pN, which needs to be understood to harness their full potential.
Although the field of nonlinear dynamics dates back several centuries, its implications at the atomic scale have remained relatively unexplored. Thermal fluctuations due to Brownian motion and nanoscale forces

become dominant at this scale, and when combined with graphene's exotic elasticity, give rise to phenomena that are not observed before, and cannot be explained by classical approaches. Our poor understanding of these complex features at the same time, have made characterization of graphene very challenging. An example is its bending modulus that is evaluated orders of magnitude higher than theoretical predications, by the available experimental methods.
In this project, I aim at providing full understanding of nonlinearities of these one atom thick membranes, not only to unveil the enigmatic behavior of graphene but also to improve current nanomaterial characterization methods. The distinguishing feature of my methodology is that on the one side, it will be based on atomistic simulations combined with modal order reduction techniques, to predict the complexities at the single atom level; on the other side, experimental nonlinear dynamic data will be analyzed for evaluating nonlinear effects and extracting material properties using nonlinear resonances in the MHz range. My methodology will have the potential to serve as the next generation of characterization techniques for nanomaterial science and nanomechanics communities.

- **Towards a next generation of water systems and services for the circular economy (NextGen)**

Grant agreement ID: 776541
Status: Ongoing project
Start date: 1 July 2018 End date: 30 June 2022
Funded under: H2020-EU.3.5.2.3. , H2020-EU.3.5.4. , H2020-EU.3.5.2.2.
Overall budget: € 11 389 106,04
EU contribution: € 9 965 230,51
Coordinated by: KWR WATER B.V. (Netherlands)
Programme(s): H2020-EU.3.5.2.3. - Provide knowledge and tools for effective decision making and public engagement
H2020-EU.3.5.4. - Enabling the transition towards a green economy and society through eco-innovation
H2020-EU.3.5.2.2. - Developing integrated approaches to address water-related challenges and the transition to sustainable management and use of water resources and services
Topic(s): CIRC-02-2016-2017 - Water in the context of the circular economy
Call for proposal: H2020-CIRC-2017TwoStage
Funding Scheme: IA - Innovation action

Objective
The NextGen initiative will evaluate and champion innovative and transformational circular economy solutions and systems that challenge embedded thinking and practices around resource use in the water sector. We will produce new understandings to underpin the exploitation of techniques and technologies that enhance our ability to recover, refine, reuse, repurpose, capture value from, and extend the use-life of, an ever-increasing range of resources and products, thereby projecting the European water and allied sectors as global circular economy pioneers. NextGen will demonstrate innovative technological, business and governance solutions for water in the circular economy in ten high-profile, large-scale, demonstration cases across Europe, and we will develop the necessary approaches, tools and partnerships, to transfer and upscale.
The circular economy transition to be driven by NextGen encompasses a wide range of water-embedded resources: water itself (reuse at multiple scales supported by nature-based storage, optimal management strategies, advanced treatment technologies, engineered ecosystems and compact/mobile/scalable systems); energy (combined water-energy management, treatment plants as energy factories, water-enabled heat transfer, storage and recovery for allied industries and commercial sectors) and materials (nutrient mining and reuse, manufacturing new products from waste streams, regenerating and repurposing membranes to reduce water reuse costs, and producing activated carbon from sludge to minimise costs of micro-pollutant removal).
The project mobilises a strong partnership of water companies, industry, specialised SMEs, applied research institutes, technology platforms, city and regional authorities and builds on an impressive portfolio of past research and innovation projects, leveraging multiple European and global networks guaranteeing real impact.

Open Calls of Horizon 2020 Programme

Open and Forthcoming call of potential issue

	Types of action	Topic	Opening date	Deadline
Excellent Science	ERC-POC Proof of Concept Grant	ERC-Proof of Concept	16 October 2018	22 January 2019 25 April 2019 19 September 2019
	ERC-ADG Advanced Grant	any field of research	21 May 2019	29 August 2019
	RIA Research and Innovation action	FET Open: Challenging Current Thinking	07 November 2017	24 January 2019 18 September 2019 13 May 2020
	CSA Coordination and support action	FET Innovation Launchpad	07 November 2017	08 October 2019 14 October 2020
	MSCA-RISE	Research and Innovation Staff Exchange	04 December 2018	02 April 2019
	MSCA-IF-GF Global Fellowships; MSCA-IF-EF-ST Standard European Fellowships; MSCA-IF-EF-SE Society and Enterprise panel; MSCA-IF-EF-RI Reintegration panel; MSCA-IF-EF-CAR Career Restart panel	Individual Fellowships	11 April 2019	11 September 2019
	MSCA-COFUND-FP Fellowship programmes; MSCA-COFUND-DP Doctoral programmes	Co-funding of regional, national and international programmes	04 April 2019	26 September 2019
Industrial Leadership	IA Innovation action	Fast Track to Innovation (FTI)	07 November 2017	21 February 2019 23 May 2019 22 October 2019 19 February 2020 09 June 2020 27 October 2020
	IA Innovation action	Advanced materials for additive manufacturing (Focus area: Digitising and transforming European industry and services)	16 October 2018	22 January 2019 03 September 2019
	CSA Coordination and support action	Sustainable Nano-Fabrication (Focus area: Digitising and transforming European industry and services)	16 October 2018	03 September 2019

Societal Challenges	RIA Research and Innovation action, IA Innovation action, CSA Coordination and support action	FCH-01-1-2019: Demonstrating the blueprint for a zero-emission logistics ecosystem; FCH-01-2-2019: Scaling up and demonstration of a multi-MW Fuel Cell system for shipping; FCH-01-3-2019: Cyber-physical platform for hybrid Fuel Cell systems; …	15 January 2019	23 April 2019
	RIA Research and Innovation action	Strongly improved, highly performant and safe all solid state batteries for electric vehicles	24 January 2019	25 April 2019
	RIA Research and Innovation action	Strengthening EU materials technologies for non-automotive battery storage	24 January 2019	25 April 2019
	RIA Research and Innovation action	Modelling and simulation for Redox Flow Battery development	24 January 2019	25 April 2019
	RIA Research and Innovation action	Advanced Redox Flow Batteries for stationary energy storage	24 January 2019	25 April 2019
	RIA Research and Innovation action	Research and innovation for advanced Li-ion cells (generation 3b)	24 January 2019	25 April 2019
	RIA Research and Innovation action	Li-ion Cell Materials & Transport Modelling	24 January 2019	25 April 2019
	RIA Research and Innovation action; PCP Pre-Commercial Procurement	SC1-BHC-07-2019: Regenerative medicine: from new insights to new applications; SC1-BHC-10-2019: Innovation Procurement: Next generation sequencing (NGS) for routine diagnosis.	26 July 2018	16 April 2019
	RIA Research and Innovation action	Mining big data for early detection of infectious disease threats driven by	26 July 2018	16 April 2019

		climate change and other factors		
Societal Challenges	RIA Research and Innovation action	The Human Exposome Project: a toolbox for assessing and addressing the impact of environment on health	26 July 2018	16 April 2019
	CSA Coordination and support action	Actions in support of the International Consortium for Personalised Medicine	26 July 2018	16 April 2019
	IPr Inducement Prize	EIC Horizon Prize for 'Fuel from the Sun: Artificial Photosynthesis	12 December 2017	03 February 2021
	IPr Inducement Prize	Horizon prize for CO2 reuse	05 July 2016	03 April 2019
	IPr Inducement Prize	FutureEnginePrize-01-2016	20 April 2016	20 August 2019
	CSA Coordination and support action	Structuring R&I towards zero emission waterborne transport (Focus area: Building a low-carbon, climate resilient future)	04 December 2018	25 April 2019
	IA Innovation action	Low-emissions propulsion for long-distance trucks and coaches (Focus area:Building a low-carbon, climate resilient future)	04 December 2018	25 April 2019
	CSA Coordination and support action	Multi-stakeholder dialogue platform to promote nature-based solutions to societal challenges: follow-up project	14 November 2018	04 September 2019
Science with and for Society	CSA Coordination and support action	EURAXESS TOP V	11 December 2018	02 April 2019
	CSA Coordination and support action	Research innovation needs & skills training in PhD programmes	11 December 2018	02 April 2019
	RIA Research and Innovation action	Exploring and supporting citizen science	11 December 2018	02 April 2019

From China

… News/Highlights

National Natural Science Fund – 2019 annual application guidelines

he National Natural Science Fund is China's largest fund for supporting basic research and applied research in natural sciences, particularly in the fields of physics and mathematics; chemistry; life sciences; earth sciences; engineering and materials; information sciences; and management sciences.

The Fund is administered by the Natural Science Foundation of China ("NSFC"), which was founded in 1986 under the State Council, and now under the supervision of MOST. The NSFC, which has a strong reputation of fairness and rigor in the management of scientific projects and grants, is responsible for directing, coordinating and making effective use of the National Natural Science Fund while stimulating free exploration, identifying and fostering scientific talents and teams, and promoting science and technology development in line with the country's strategies and needs.

Funding agency
National Natural Science Fund

2019 programmes and application
The 2019 annual project guidelines cover 14 different programmes, grouped under three categories: research promotion; talents fostering; and research environment. Each programme has its own specific research topics, priorities, and requirements for application. More details can be found on the NSFC website (link below).

Among these programmes, the most significant for European actors are:

General Programme: supporting researchers to conduct innovative explorative research on open topics within certain areas. The average funding per project is 500k-600k RMB.
Young Scientist Fund: similar to the General Programme, but exclusively targeting young scientists. The average funding per project is 200k-250k RMB per project.
Key Programme: medium-sized projects supporting prospective and frontier studies to achieve major breakthroughs in priority industries and technologies. The average funding per project is 2.5-3 million RMB.
Major Research Plan: medium- and large-sized projects of strategic value to economic and social development in national priority areas, featuring a strong top-down design.
International (Regional) Cooperation and Exchange Programmes: supporting joint research with top researchers and institutions world-wide. It is divided into three sub-groups of projects, one of which targets exclusively international young scientists (see below for more details).
Requirements
Vary depending on the specific programme.

International cooperation
Nearly the totality of the NSFC programmes target registered China-based actors, meaning that China-based affiliates of European institutes and European scientists working in China can apply too. Extensive evidence of European participation was identified especially within the General Programme and the Young Scientist Fund, and on a lesser extent within the Key Programme and the Major Research Plan.

In addition, one of the NSFC programmes targets exclusively international cooperation. Specifically, the International (Regional) Cooperation and Exchange Programme is designed to support joint research and exchanges between Chinese scientists and top researchers and institutions around the world. The Programme is divided into three main sub-programmes, each targeting different actors and serving different purposes:

Key International (Regional) Joint Research Projects: encouraging and supporting innovative China-based researchers to conduct basic research in priority areas in cooperation with international research structures and scientists based abroad.
International (Regional) Cooperation and Exchange Programmes under framework agreements: encouraging and supporting excellent Chinese scientists to conduct joint research in the partner's country and facility, or to organise international conferences in China or abroad (note: the NSFC currently has framework agreements with 86 institutions in 44 countries worldwide, including with 17 EU Member States,

the EU Commission's Directorate-General for Research, the European Research Council, CERN, as well as international organisations based in Europe).
Research Fund for International Young Scientists: encouraging excellent international young scientists based abroad to come to mainland China to conduct basic research in natural sciences. The aim is to promote sustainable academic collaboration and exchanges between Chinese scholars and foreign young scientists (note: new calls for applications are published every year in the NSFC annual project guidelines. An English version of the guidelines is also usually published: see latest example at this link).
Date of publication
29 December 2018

How to apply
The programmes included in the NSFC annual guidelines follow a "centralised application" mechanism, namely all applications must be submitted by 20 March 2019. Applications must be submitted by the Principal Investigator (PI) through the NSFC's system, but must be pre-examined and pre-approved by the institution to which the PI is affiliated ("host institution", or yituo danwei). This often means that applications are expected to be completed by the PI way before the deadline indicated in the annual project guidelines, as host institutions often stipulate their own internal deadlines to which any affiliated PIs must abide by.

Note: An official account must be created by the applicant PI on the NSFC's Internet-based Science Information System through his/her host institution. The host institution will be able to generate for the PI an username and activation link only if it has previously registered on the same system.

Application period
1 – 20 March 2019
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From: http://english.cas.cn/

Chinese Scientists Develop New Moisture-wicking Fabric

Chinese scientists have developed a new moisture-wicking fabric with ultrafast water evaporation and quick-dry performance.

Moisture-wicking fabric can pull moisture away from the skin to the exterior of the clothing. It dries quickly and provides a comfortable environment for the human body in hot or humid environments. There is a growing market demand for this material.

Scientists from Shanghai-based Donghua University developed an assembly strategy to create a biomimetic nanofibrous membrane with ultrafast evaporation and quick-dry performance.

It exhibits an outstanding water evaporation rate, 2.1 times that of Coolmax fabric, a popular moisture-wicking fabric currently on the market.

The research serves as a source of inspiration for the development of high-performance moisture-wic

Besides sportswear, the research has applications in optimizing functional textiles such as wound dressing materials and diapers, according to the research team.

The research was published in the journal ACS Nano. (Xinhua)

Scientists Develop High Performance Blue-Energy Nano-Harvester

A research team led by JIANG Lei from Technical Institute of Physics and Chemistry (TIPC) of the Chinese Academy of Sciences, in collaboration with Jilin University, reported an ultrahigh performance of blue-energy nano-generator based on 3D porous Janus membrane.

Results were published in Science Advances in an article entitled "Unique ion rectification in hypersaline environment: A high-performance and sustainable power generator system".

Pattle pointed out that huge Gibb's energy was lost when the sea meets the river, early in 1954. However, still now, the huge potential (30 TW all over the world) is not properly utilized for low conversion efficiency and poor power density. The past references and technical development mainly focus on the selectivity of the membrane.

Here, the researchers have designed a versatile strategy for creating a scale-up Janus three-dimensional (3D) porous membrane–based osmotic power generator system.

The output power density of this membrane-based generator reaches 2.66 W/m2 (mixing seawater and river water) and up to 5.10 W/m2 at a 500-fold salinity gradient (i.e., flowing salt lake into river water).

The uniqueness of the membrane is facile fabrication of the membrane and as-obtained high power density. The underlying mechanism is effective ion selectively and highly rectified current (one-way ionic transport) in hypersaline solution.

They claim that developing single nanopore system into Janus 3D porous membrane which moves a big step for practical application, especially the membrane is with excellent stability and facile to be scale-up.

This unique ionic transport properties build a model to study the fundamental ionic behavior in confined environment and further shed light on energy conversion membrane.

This work is supported by the Key Research Program of the Chinese Academy of Sciences, National Science Foundation of China, and Frontier Science Key Projects of CAS.

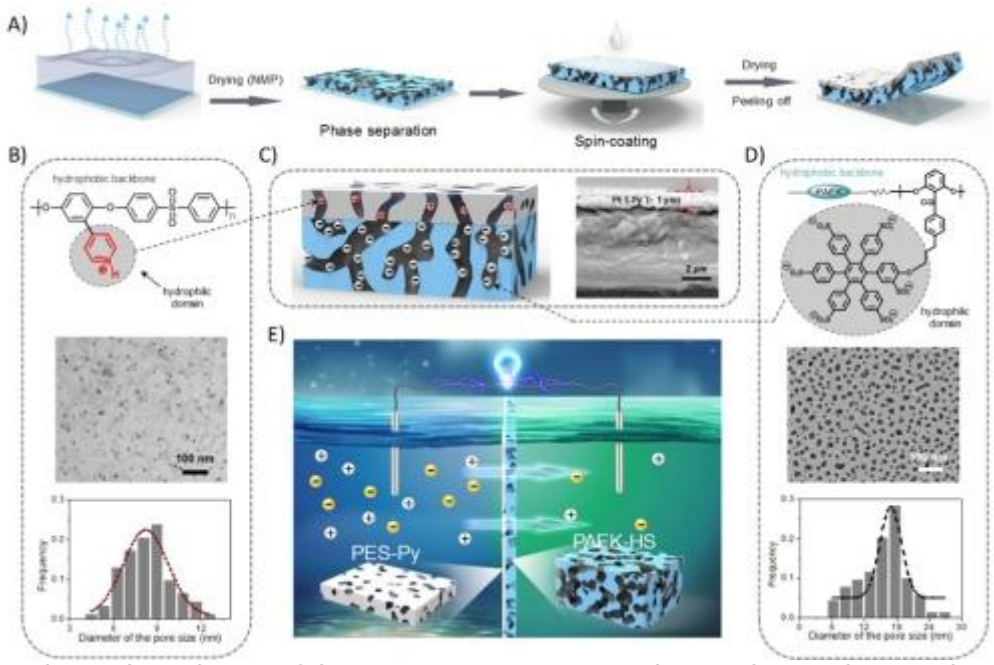


Fig. 1 The scheme of the Janus 3D porous membrane. (Image by TIPC)

Scientists Release Production Technology of High-purity Tea Saponin

Oil-tea camellia is a unique woody oil-bearing crop in China. The oil-tea camellia processing industry is a pillar industry that energetically develops green agriculture and modern agriculture in Jiangxi, Hunan and Hubei and other main oil-tea camellia producing areas. In addition to tea seed oil, oil-tea camellia seed also contains 12-18% tea saponin, which is an excellent natural non-ionic surfactant with high economic value.

At present, due to the oil-tea camellia seed is mostly used as a single oil-bearing crop, the tea saponin extract raw material oil-tea meal is mostly treated as waste, resulting in waste of resources and environmental pollution. Therefore, processing and producing high-purity tea saponin and realizing the high-value comprehensive utilization of oil-tea are industrial problems to be solved urgently.

Recently, a research team led by WANG Jianxun of biobased material group from Qingdao Institute of Bioenergy and Bioprocess Technology (QIBEBT), Chinese Academy of Sciences (CAS), has developed a preparation method of high-purity tea saponin.

The key technology for industrialization of high-purity tea saponin is produced by waterless compound solvent flash extraction hybrid membrane.

The new waterless compound solvent greatly avoids the influence of impurities such as protein and polysaccharide, improves the purity of tea saponin and improves the color of tea saponin products; flash extraction technology can realize the rapid and thorough extraction of tea saponin at lower temperature.

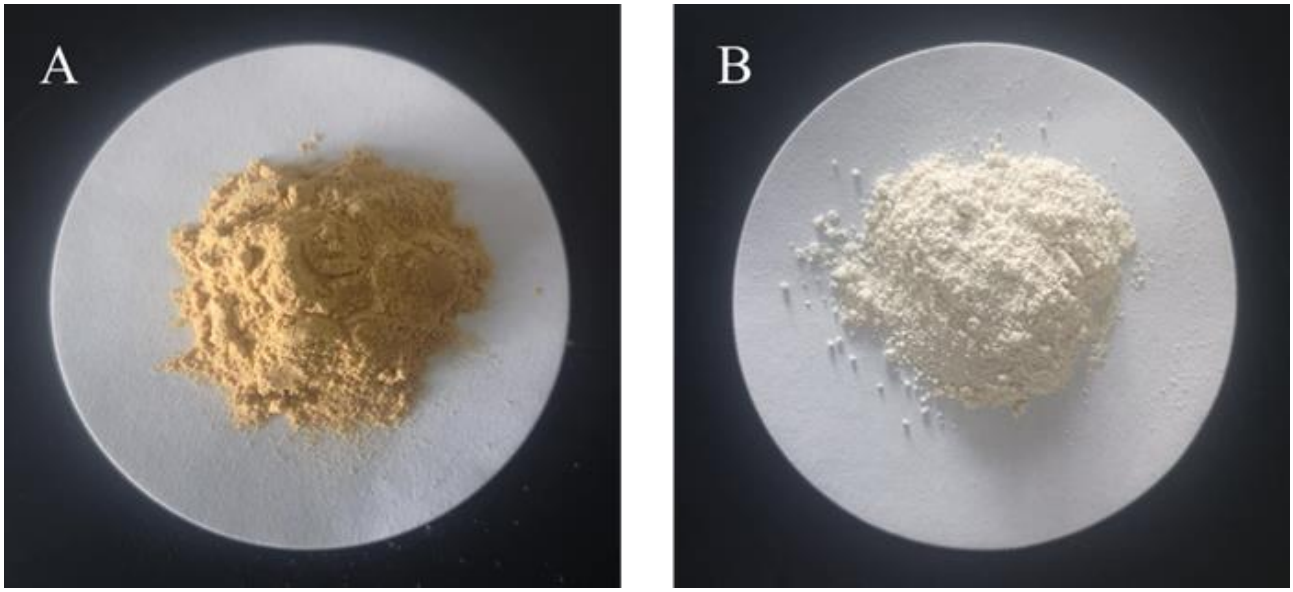
The method has high extraction rate of tea saponin, and at the same time, the obtained tea saponin has less impurities and higher purity.

On this basis, the research team further carried out engineering research. They completed the model selection and design of the corresponding key equipment, which had formed a mature technology package that could be used for industrialization promotion and demonstration.

At the same time, on the basis of obtaining high-purity tea saponin products, the research group developed and studied the application of the tea saponin, using the excellent surface activity and natural antibacterial function of tea saponin, through the combination of various natural active functional ingredients and micellar miscibility technology.

They also designed three kinds of tea saponin high-end toiletries with natural ingredients, strong detergency, no residue, bactericidal, nourishing, skin care and other functions.

The related series of research have obtained the support of the regional key projects of the Chinese Academy of Sciences and the technology service network plan.



A. Commercially available tea saponin, which containing polysaccharides, proteins and other magazines, with a poor color. B. Tea saponin obtained by the research group, with less impurities and white color. (Image by XUN Mingyue and WANG Jianxun) (Text by XUN Mingyue and WANG Jianxun)

2018 International Science and Technology Cooperation Award

For the first time, an international scientist has been awarded during the annual ceremony of the government of Jiangsu province (China) for science and technology. As a pioneer in the field of membrane technology, Prof. Drioli has put forward a variety of innovated high-efficiency membrane process and membrane materials by the integration of chemical engineering, material chemistry and other disciplines. Professor has long been committed to promoting the application of membrane technology to solve the crisis in the fields of water resources, energy, and environment, actively carrying out strategic research, exploring and grasping the future development trend and application direction of membrane technology. Prof. Drioli is known as the “evangelist” of membrane technology, and has made outstanding contributions to the popularization and development of membrane technology in the world, especially in China. As a foreign professor at Nanjing Tech University, this award also achieved a breakthrough in the International Science and Technology Cooperation Award for Nanjing Tech University.

Membrane Science and Technology (MST) Research Center

Founded in 1994, the research center is mainly engaged in the following research fields: inorganic ceramic membrane development; membrane application and membrane integration technology development; membrane catalysis and inorganic porous materials development and so on. Under the academic leadership of Professor Xu Nanping, an academician of the Chinese Academy of Engineering, the research center boasts a high-level research team.

The center has undertaken more than 40 research projects including national key scientific and technological projects, project 863, and National Outstanding Youth Fund Program. It has also finished building the largest-scale national production base for ceramic membrane, and its products have been successfully applied in such areas as biochemistry, chemical industry, petrochemical industry, foods, and environmental protection. The center has achieved many prominent fruits, reaching the world advanced level and filled the vacancy in such area. Up to now, many fruits have been listed in the ninth five-year Plan key Achievements, national "spark" plan, and national "torch" plan and acquired the certificate for national key products.

The Membrane Science and Technology Research Center of NanjingTech has achieved 5 "first" in the area of national inorganic membrane: the first to establish the center for the industrial production base of inorganic membranes; the first to promote the full-set industrial inorganic membrane equipment; the first to finish the inorganic ceramic membrane research project and pass the ministerial evaluation; the first to get the national Inorganic Membrane Science and Technology Progress Award; and the first to win the national Inorganic Membrane Technological Innovation Award.

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Many international scientists have been invited to give a speech to MST in the first half year of 2019.

Name	Institution	Title of speech	Date
Dr. Jungkyu Choi	Korea University, Korea	Zeolite-Based Membranes And Catalyst	2019.01.16
Prof. Mikihiro Nomura	Shibaura Institute Of Technology, Japan	Improvement Of Gas Separation Properties Through MFI Membranes	2019.01.22
Prof. Churl-Hee Cho	Chungnam National University, Korea	Synthesis Of Crystallographically b-Axis Oriented MOR Zeolite Membrane For Solvent Dehydration	2019.01.22
Prof. Freek Kapteijn	Delft University of Technology, Netherland	Elements Of Catalysis Engineering	2019.05.08
Dr. Dan Zhao	National University Of Singapore, Singapore	Mixed Matrix Membranes For Gas Separation And Water Treatment	2019.05.23
Prof. Rong Wang	Nanyang Technological University, Singapore	Development Of Novel Membranes For Effective Water Reuse, Desalination And Energy Harvesting	2019.05.25
Prof. Mikel C. Duke	Victoria University, Australia	Ceramic Membrane Materials For Molecular Scale Separations, Catalysis And Drug Delivery	2019.05.31

EU-CHINA Past events

2018 EU-China Workshop on the Research and Application of Membrane
October 29-30, 2018

With great support of European Membrane Society, Institute on Membrane Technology (ITM-CNR), as well as Membrane Industry Association of China, Weihai Municipal Government, 2018 EU- China (Weihai) Cooperation Conference on Membrane Technology Innovation & the 3rd National Workshop on Hydrophobic Membrane Technology and Engineering Applications have been successfully held at Weihai, China on Oct. 29-30, 2018.

The theme of the conference is “New Era, New Technology, New Cooperation, New Industry”, which mainly focused on “Hydrophobic Membrane Technology and Engineering Applications”. 22 experts in membrane fields from both Europe and China as well as Australia gave wonderful presentations in the conference and about 260 participants took part in this event. During the conference, the “Europe-China (Weihai) Industrial Park on Water Treatment and Membrane Technology Innovation” was launched and 8 cooperation intents had been signed. The participants who paid a visit to the Park showed great interests to involve in.

The “Europe-China (Weihai) Industrial Park on Water Treatment and Membrane Technology Innovation” was initiated by Weihai Municipal Government, and would also gather resources from Membrane Industry Association of China, European Membrane Society, Harbin Institute of Technology (Weihai) as well as other organizations and companies to promote its development. The park is located in Huancui Science and Technology Industrial Park of Weihai City with planned investment of 360 million yuan, total construction site area of 152592 square meters, and total building area of 115623.19 square meters, the duration of construction is 3 years. Construction of the project would be in 2 phases, the first phase of construction land of 66708 square meters with an area of 44421.39 square meters started in May 2018. Up to now, the main building, expert apartment, 2 pilot plants, 2 production workshops has been basically completed.

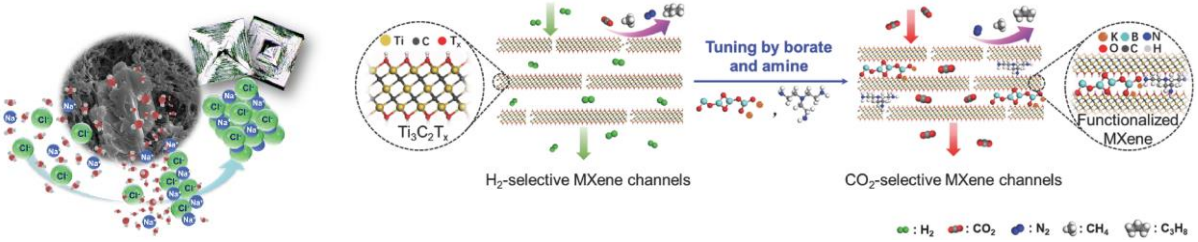
First meeting Joint Italian-Chinese Collaborative Research Project 2DMEMPUR (MAECINSFC)

The kick-off meeting of the Joint Italian-Chinese Collaborative Research Project 2DMEMPUR (Prot. nr. MAE0088962), entitled ‘Novel nanostructured 2D materials-based membranes for new-concept fruitful fresh water production and gaseous streams purification’ and funded under the Memorandum of Understanding between the Ministry of Foreign Affairs and International Cooperation (MAECI) and the National Natural Science Foundation of China (NSFC), took place at the Conference Center of State Key Lab of Nanjing Tech University on 25-26th October 2018.

Prof. Wanqin Jin and Prof. Enrico Drioli opened the meeting by welcoming delegates from the Institute on Membrane Technology of the Italian National Research Council (CNR-ITM) and Nicolaus Copernicus University in Torun, the latter involved in a parallel China-Poland Joint Project.

Prof. Wanqin Jin and Dr Annarosa Gugliuzza, as a scientific responsible from Chinese and Italian side respectively, gave an overview of targets, strategies, activities and first results achieved within the frame of the joint MAECI-NSFC project 2DMEMPUR according to the aims hereafter:

1. Consolidation of the cooperation between CNR-ITM and Nanjing Tech University through the establishment of a Joint-Laboratory on shared issues such as natural resources reuse and reduced eco-impact;
2. Impulse to young research mobility and training to endorse cutting-edge knowledge, mutual learning and genuine exchanges, new ideas and concepts;
3. Collaborative and complementary actions to explore the potential of new 2D materials in new ultra-fast and high efficiency water desalination and gas separation.



Assisted Bi2Se3 membrane crystallization and Gas transport of H2-selective and CO2-selective MXene nanofilms.

Among assembled participants, Dr Elena Tocci from CNR-ITM and Prof. Gongping Liu together with young PhD students from Nanjing Tech University discussed some further accomplishments of the research as a part of the project reports.
During the visit, Prof Henny Bouwmeester from University of Twente was also invited to give a speech on 'Long-term oxygen transport characteristics of mixed ionic-electronic conducting materials', so adding contribution to the discussion on innovative materials in membrane technology.
The visit of the Italian researchers delegation, accompanied by Dr Ming Zhou, was concluded with a technical tour through the Membrane Industry Park wherein large-scale membrane production and modules assembly is currently carried out for commercialization.

F. Macedonio, A. Politano, E. Drioli, A. Gugliuzza, Mater. Horiz., 2018, 5, 912
J. Shen, G. Liu, Q. Liu,….J. Yang, W. Jin, Adv. Funct. Mater.2018, 28, 1801511

As the high-quality environmental exhibition platform, WieTec becomes of the authoritative environmental exhibition platform in China. During decades of internationalization and specialization, Wie Tec, ranking as the prestige environmental protection platform worldwide, has remained growing exponentially and annually with excellent quality.

Besides, the international significance and influence of Wie Tec continues to grow annually, which will continue to develop and maintain its position at the forefront of the world's environmental protection industry. The total scale of Wie Tec 2019 will surpass 250,000 m². More than 3,500 exhibitors and 120,000 visitors from home and abroad will join this incredible environmental protection event platform.

Formed by the union of five international exhibitions: AQUATECH CHINA, FLOWTECH CHINA (SHANGHAI), BUILDEX CHINA (SHANGHAI), ECOTECH CHINA AIR (SHANGHAI), and ECOTECH CHINA WASTE (SHANGHAI).

AQUATECH CHINA: Crowned with the global leading water industry pioneer, AQUATECH CHINA focuses on water treatment, sewage treatment, membrane, and point of use.

FLOWTECH CHINA (SHANGHAI): China's premier exhibition for valves, pumps, and pipes.

BUILDEX CHINA (SHANGHAI): The cutting-edge professional exhibition in China for the building water supply and drainage industry.

ECOTECH CHINA WASTE (SHANGHAI): The high quality international trade exhibition in China for the fields of solid waste treatment and waste gas treatment.

ECOTECH CHINA AIR (SHANGHAI): The professional air technology platform in China.

WATRES CHINA (SHANGHAI): Development of Water Resources Driven by Scientific Innovation

EU-CHINA Upcoming events

2019 EU-China (Weihai) Cooperation Conference on Membrane Technology Innovation

2019 EU-China (Weihai) Cooperation Conference on Membrane Technology Innovation is going to be held at Weihai, China on July. 09-10, 2019. For this year the conference would concentrate on the application of membrane technology on water treatment.
In parallel to this event, the China-Europe Industrial Park for Water Treatment and Membrane Innovation at Weihai will be inaugurated. A delegation of ITM-CNR represented by Enrico Drioli, Lidietta Giorno, Alberto Figoli and Elena Tocci will participate.

List of Future Events of potential interest for Membrane Engineer

DATE	PROGRAM TITLE	LOCATION	MORE INFO
JUNE 3–5, 2019	Aquatech China 2019	Shanghai, China	https://www.aquatechtrade.com/china/
JULY 11-12, 2019	International Conference on Biopolymers & Polymer Chemistry (ICBPC-2019)	Las Vegas, USA	https://scientificfederation.com/cms/pdfs/201-ICBPC-2019-tentative_program.pdf
JULY 22-24, 2019	International Congress on Advanced Materials Sciences and Engineering (AMSE-Japan)	Osaka, Japan	https://www.istci.org/icamse2019/
JULY 29-30, 2019	8th Edition of International Conference and Exhibition on Separation Techniques	Dublin, Ireland	https://separationtechniques.euroscicon.com/
AUGUST 19- 22, 2019	International Conference on Advances in Functional Materials (AAAFM-UCLA)	Northwest Auditorium/Carnesale Commons 251 Charles E. Young Drive West Los Angeles, CA. 90095	http://aaafm.org/conf/2019
AUGUST 20- 22, 2019	International Conference on Functional Materials (CAFM 2019)	Xìan, China	https://www.eventbrite.com/e/intl-conference-on-advanced-functional-materials-cafm-2019-tickets-55201210306
SEPTEMBER 4–7, 2019	16th International Conference on Environmental Science and Technology	Rhodes, Greece	https://cest2019.gnest.org/
SEPTEMBER 4–7, 2019	2019 International Conference on Smart Structures and Systems (ICSSS19)	International Convention Center (ICC) Jeju Island, Korea	http://asem19.org/
APRIL 19-21, 2019	2019 Seminar for New Membrane Materials, Processes and Applications/	Qingdao, China	
APRIL 20-24, 2019	13th World Filtration Congress, WFC13,	San Diego, USA	https://wfc13.societyconference.com/v2/
MAY 10-12, 2019	China Membrane Industry Development Summit	Ningbo, Zhejiang Province	
JUNE 13-14, 2019	14th International Conference, MST 2019,	Nanyang Technological University, Singapore	https://memsis.org/mst2019
JUNE 16-20, 2019	6th Nano Today Conference,	Lisbon, Portugal	https://www.elsevier.com/events/conferences/nano-today-conference

JUNE 23-27, 2019	9th International Water Association (IWA) Membrane Technology Conference, IWA-MTC 2019,	Toulouse, France	https://mtc2019.sciencesconf.org/
JUNE 14-17, 2019	6th International Scientific Conference on PV, VP, GS, and MD 2019, PV-VP-GS-MD'19,	Torun, Poland	http://www.ptmem.eu
JUNE 23-28, 2019	10th International Conference on Materials in Advanced Technologies, ICMAT 2019	Singapore	http://icmat2019.mrs.org.sg
JUNE 25-27, 2019	Artificial Water Channels Faraday Discussion	Glasgow, United Kingdom	http://www.rsc.org/events/detail/26212/artificial-water-channels-faraday-discussion
JUNE 25-28, 2019	2019 Qingdao International Conference	Qingdao, China	http://www.cda-apdwr2009.com/english/conference.html
JULY 2-5, 2019	The 12th conference of the Aseanian Membrane Society (AMS 12),	Ramada Plaza Jeju Hotel, Jeju, Korea	http://www.ams12.org/index.php
JULY 8-11, 2019	14th International Conference on Catalysis in Membrane Reactors, ICCMR-14	Eindhoven, The Netherlands	https://www.iccmr14.com/home
JULY,14-19 2019	Gordon Conference on Molecular Membrane Biology	Andover, NH, USA	https://www.grc.org/molecular-membrane-biology-conference/2019/
AUGUST 20-22, 2019	The 5th Int'l Conference on Biomaterials and Applications (ICBA 2019)	XI'AN, CHINA	http://www.wsaugust.org/conference/ICBA2019/
AUGUST 25-29, 2019	American Chemical Society (ACS) 258th National Meeting, San Diego,	California, USA	https://www.acs.org
SEPTEMBER 8-11, 2019	4th International Conference on Ionic Liquids in Separation and Purification Technology,	Sitges, Spain	https://www.journals.elsevier.com/journal-of-membrane-science/conferences/ilsept-4th-international-conference-ionic-liquids
SEPTEMBER 15-19, 2019	12th European congress of chemical engineering & 5th European congress of applied biotechnology, ECCE12 & ECAB5	Florence, Italy	http://www.ecce12-ecab5.org/
SEPTEMBER 23-24, 2019	3rd International Conference on Membrane Science and Technology	Barcelona, Spain	https://membranescience.conferenceseries.com/
OCTOBER 20-24, 2019	IDA World Desalination Conference	Dubai	https://wc.idadesal.org/
OCTOBER 20–22, 2019	9th Annual World Congress of Nano Science & Technology-2019 (Nano	Suzhou, China	http://www.bitcongress.com/nano2019/default.asp

	S&T-2019		
OCTOBER 22–24, 2019	FILTECH - THE FILTRATION EVENT 2019	Cologne – Germany	https://filtech.de/
OCTOBER 28-30, 2019	7th International Conference on Organic Solvent Nanofiltration	University of Twente, The Netherlands	https://www.utwente.nl/en/tnw/osn-2019/
NOVEMBER 10-15, 2019	2019 AIChE Annual Meeting	Hyatt Regency, Orlando, USA	https://www.aiche.org/conferences/aiche-annual-meeting/2019
DECEMBER 1-4, 2019	4th International Conference on Desalination using Membrane Technology,	Esplanade Hotel Freemantle, Perth, Australia	https://www.elsevier.com/events/conferences/desalination-using-membrane
DECEMBER 1-6, 2019	Materials Research Society (MRS) Fall Meeting	Boston, MA, USA	https://www.mrs.org/fall2019
FEBRUARY 2–6, 2020	IMSTEC 2020	Sydney, Australia	https://www.imstec2020.com/
JULY 12-17, 2020	International Congress on Membranes & Membrane Processes 2020, ICOM 2020,	London (UK)	http://www.icom2020.co.uk/
SEPTEMBER 12- 16, 2021	EUROMEMBRANE 2021	Copenhagen, Denmark	https://www.copenhagencvb.com/euromembrane-2021-gdk1104385

EVENTS IN EVIDENCE

It is a great pleasure for us to invite you to the international conference MELPRO 2020. The conference will be held in the premises of hotel International in Prague, Czech Republic on April 12 – 15, 2020.

Important Dates:

- Registrations open - **July 1, 2019**
- Abstract Submission Deadline - **February 2, 2020**
- Notification of Acceptance - February 28, 2020
- Early Registration Deadline - March 6, 2020
- Conference - **April 12-15, 2020**

Chairman of the conference:
prof. Enrico Drioli (IMT Rende, Italy)

Vice chairmen of the conference:
Dr. Elena Tocci (IMT Rende, Italy)
Dr. Pavel Izak (ICP Prague, Czech Republic)
Dr. Lubos Novak (MEGA a.s., Czech Republic)

Venue:
Prague is the capital of the Czech Republic, the City of Hundred Spires, a UNESCO monument and the sixth most visited city in the region, drawing in more than 4 million visitors each year. Prague is gorgeous any time of the year, but as it is one of the most pedestrian friendly cities in the world, it is certainly delightful to walk through the city in spring and explore its corners.

We invite you to visit, among other places, the unique large complex of Prague Castle overlooking the city from one of its hills, to walk over the Charles Bridge built in the 14th century, or to wander the narrow romantic streets of the Lesser Town and Old Town.



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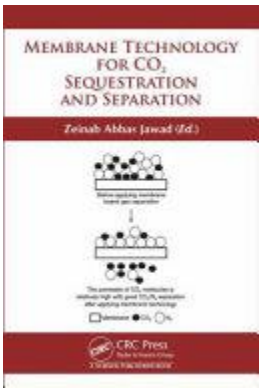
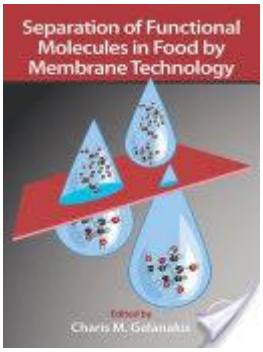
Overview of Books on Membrane Technology



MEMBRANE TECHNOLOGY FOR CO2 SEQUESTRATION
Zeinab Abbas Jawad
Taylor & Francis Group, 15 mar 2019

Membrane Technology for CO2 Sequestration discusses the key aspects of membrane gas separation, which has attracted the attention of both engineers and researchers in recent years. This book is a comprehensive guide of the state-of-the-art geological media chosen for CO2 sequestration. With topics ranging from capturing and storage processes to leakage due to the loss of integrity, this book is a good source of information for CO2 long-term storage in subsurface layers and the synthesis process of polymeric, organic, and mixed matrix membranes for CO2 separation. Additionally, it addresses the challenges of modeling, simulation, and optimization of membrane separation.



SEPARATION OF FUNCTIONAL MOLECULES IN FOOD BY MEMBRANE TECHNOLOGY
Charis Galanakis
Academic Press, 14 nov 2018

Separation of Functional Molecules in Food by Membrane Technology deals with an issue that is becoming a new research trend in the field of food and bioproducts processing. The book fills in the gap of transfer knowledge between academia and industry by highlighting membrane techniques and applications for the separation of food components in bioresources, discussing separation mechanisms, balancing advantages and disadvantages, and providing relevant applications. Edited by Charis Galanakis, the book is divided in 13 chapters written by experts from the meat science, food technology and engineering industries.

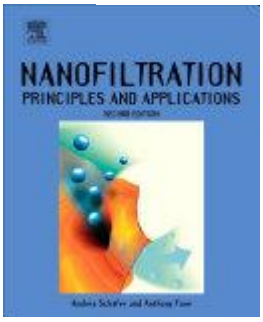
- Covers the 13 most relevant topics of functional macro and micro molecules separation using membrane technology in the food industry
- Brings the most recent advances in the field of membrane processing
- Presents the sustainability principles of the food industry and the modern bioeconomy frame of our times

RECENT ADVANCES IN EMERGING MEMBRANE SCIENCE AND TECHNOLOGY: PRINCIPLES AND APPLICATIONS OF MEMBRANE PROCESSES
Vaibhav Kulshrestha, Vinod Kumar Shahi, Ravi P. Pandey
Elsevier, 1 feb 2019

Recent Advances in Emerging Membrane Science and Technology: Principles and Applications of Membrane Processes provides an overview of membrane-based processes for industrial applications with special reference to separation, water desalination/purification and membrane-based energy devices. The book provides a brief history of membranes and explains the preparation, characterization, modification and applications of these important membranes.
This book proves a valuable resource for researchers in academia and industry, and engineers in chemical engineering, environmental engineering, biotechnology, technical chemistry, chemical technology and biotechnology working with advanced membrane-based techniques and membrane forming materials.

- Serves as a single source of information covering advanced techniques and troubleshooting of membrane-based processes
- Features recent findings in membrane-based technology, including fuel cells, reverse electrodialysis and batteries
- Discusses the development of future applications, including gas separation membranes

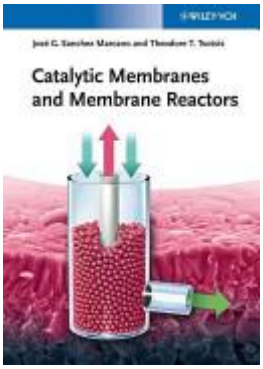
- Includes a brief history of membranes and explains the associated preparation, characterization, modification and applications



NANOFILTRATION: PRINCIPLES AND APPLICATIONS
Andrea Schäfer, Tony Fane
Elsevier, 1 apr 2019

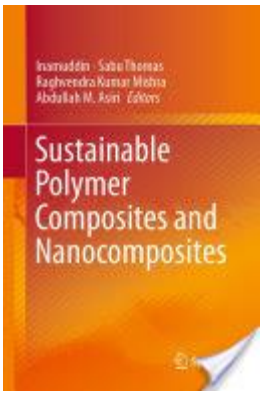
Nanofiltration: Principles and Applications, Second Edition, examines nanofiltration from the genesis of the field to current developments. The book covers the history of nanofiltration, preparation of membranes, module design, characterization, performance modelling and fouling. Application sections encompass nanofiltration as pretreatment and hybrid processes, water treatment, reuse, food industry, chemical processing, pulp and paper, textiles, landfill leachate, bioreactors, photocatalysis, acid recovery, trace contaminant removal and non-aqueous applications. New chapters in this edition focus on renewable-powered operation of nanofiltration, as well as a look into future materials.

- Reviews the different principles and applications of nanofiltration
- Features updated chapters containing the most recent developments in the field
- Contains three new chapters on retentate treatment, future nanofiltration materials and renewable energy powered nanofiltration
- Provides comprehensive reviews of the various aspects of nanofiltration
- Includes chapters written by international experts in their areas of specialization



CATALYTIC MEMBRANES AND MEMBRANE REACTORS
José G. Sanchez Marcano, Theodore T. Tsotsis
Wiley, 2019 - 320 pagine

Membrane reactors are an inherently multidisciplinary concept combining chemical reaction engineering, separation technology, materials science, and mathematical modelling aspects. They couple chemical reactions with membrane separation and provide a more compact and less capital intensive system design. Often also improved performance in terms of enhanced selectivity or yield results from their use. This authoritative work encompasses a broad treatment of the field, including the basic principles of membrane reactors, a comparative study of these and other, classical reactors, modelling, industrial applications, emerging applications, etc. This is the first point of reference when it comes to applying the membrane reactor concept to research or to production: Novices can grasp the elementary concepts, and professionals can familiarize themselves with the most recent developments in the area. For the industrial practitioner the book covers all important current and potential future applications.



SUSTAINABLE POLYMER COMPOSITES AND NANOCOMPOSITES

Inamuddin, Sabu Thomas, Raghvendra Kumar Mishra, Abdullah M. Asiri
Springer, 1 feb 2019

This book presents emerging economical and environmentally friendly polymer composites that are free of the side effects observed in traditional composites. It focuses on eco-friendly composite materials using granulated cork, a by-product of the cork industry; cellulose pulp from the recycling of paper residues; hemp fibers; and a range of other environmentally friendly materials procured from various sources.

The book presents the manufacturing methods, properties and characterization techniques of these eco-friendly composites. The respective chapters address classical and recent aspects of eco-friendly polymer composites and their chemistry, along with practical applications in the biomedical, pharmaceutical, automotive and other sectors. Topics addressed include the fundamentals, processing, properties, practicality, drawbacks and advantages of eco-friendly polymer composites.

Featuring contributions by experts in the field with a variety of backgrounds and specialties, the book will appeal to researchers and students in the fields of materials science and environmental science. Moreover, it fills the gap between research work in the laboratory and practical applications in related industries.

From Journal of Membrane Science

The most downloaded articles from Journal of Membrane Science in the last 90 days.

Perspective on 3D printing of separation membranes and comparison to related unconventional fabrication techniques- Open access
1 February 2017
Ze-Xian Low | Yen Thien Chua | Brian Michael Ray | Davide Mattia | Ian Saxley Metcalfe | Darrell Alec Patterson

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A review of reverse osmosis membrane materials for desalination—Development to date and future potential
15 March 2011
Kah Peng Lee | Tom C. Arnot | Davide Mattia

Application and modification of poly(vinylidene fluoride) (PVDF) membranes – A review
1 August 2014
Guo-dong Kang | Yi-ming Cao

Forward osmosis: Principles, applications, and recent developments
15 September 2006
Tzahi Y. Cath | Amy E. Childress | Menachem Elimelech

Selectivity of ion exchange membranes: A review
1 June 2018
Tao Luo | Said Abdu | Matthias Wessling

Fabrication of reduced graphene oxide membranes for water desalination
15 February 2019
Hsin-Hui Huang | Rakesh K. Joshi | K. Kanishka H. De Silva | Rajashekar Badam | Masamichi Yoshimura

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Progress in the production and modification of PVDF membranes
15 June 2011
Fu Liu | N. Awanis Hashim | Yutie Liu | M.R. Moghareh Abed | K. Li

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Permeability thickness dependence of polydimethylsiloxane (PDMS) membranes - Open access
1 May 2015
G. Firpo | E. Angeli | L. Repetto | U. Valbusa

Interfacial polymerization of covalent organic frameworks (COFs) on polymeric substrates for molecular separations
15 November 2018
Rui Wang | Xiansong Shi | Ankang Xiao | Wei Zhou | Yong Wang

Ion exchange membranes: New developments and applications
15 January 2017
Jin Ran | Liang Wu | Yubin He | Zhengjin Yang | Yaoming Wang | Chenxiao Jiang | Liang Ge | Erigene Bakangura | Tongwen Xu

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Covalent organic frameworks (COFs)-incorporated thin film nanocomposite (TFN) membranes for high-flux organic solvent nanofiltration (OSN)
15 February 2019
Can Li | Shuxuan Li | Long Tian | Jinmiao Zhang | Baowei Su | Michael Z. Hu

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Anion exchange membranes for alkaline fuel cells: A review
15 July 2011
Géraldine Merle | Matthias Wessling | Kitty Nijmeijer

The upper bound revisited
15 July 2008
Lloyd M. Robeson

The solution-diffusion model: a review
15 November 1995
J.G. Wijmans | R.W. Baker

Recent progress on fabrication methods of polymeric thin film gas separation membranes for CO2 capture
15 February 2019
Ke Xie | Qiang Fu | Greg G. Qiao | Paul A. Webley

Self-assembled MOF membranes with underwater superoleophobicity for oil/water separation
15 November 2018
Jialin Cao | Yanlei Su | Yanan Liu | Jingyuan Guan | Mingrui He | Runnan Zhang | Zhongyi Jiang

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Effects of GO and MOF@GO on the permeation and antifouling properties of cellulose acetate ultrafiltration membrane
1 January 2019
Shujuan Yang | Qinfeng Zou | Tianhao Wang | Liping Zhang

Polymer-matrix nanocomposite membranes for water treatment
1 April 2015
Jun Yin | Baolin Deng

Predicting performance of constant flow depth filtration using constant pressure filtration data - Open access
1 June 2017
Stephen Goldrick | Adrian Joseph | Michael Mollet | Richard Turner | David Gruber | Suzanne S. Farid | Nigel J. Titchener-Hookerì

Mixed matrix membranes containing MOF@COF hybrid fillers for efficient CO2/CH4 separation
1 March 2019
Youdong Cheng | Yunpan Ying | Linzhi Zhai | Guoliang Liu | Jinqiao Dong | Yuxiang Wang | Mark Prasath Christopher | Sichang Long | Yaxin Wang | Dan Zhao

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Advances in biopolymer-based membrane preparation and applications
15 October 2018
Francesco Galiano | Kelly Briceño | Tiziana Marino | Antonio Molino | Knud Villy Christensen | Alberto Figoli

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Covalent organic frameworks (COFs) functionalized mixed matrix membrane for effective CO2/N2 separation
15 February 2019
Ke Duan | Jing Wang | Yatao Zhang | Jindun Liu

High-efficiency water-selective membranes from the solution-diffusion synergy of calcium alginate layer and covalent organic framework (COF) layer
15 February 2019
Guanhua Liu | Zhongyi Jiang | Hao Yang | Changdong Li | Hongjian Wang | Meidi Wang | Yimeng Song | Hong Wu | Fusheng Pan

Fabrication of superhydrophilic and underwater superoleophobic membranes via an in situ crosslinking blend strategy for highly efficient oil/water emulsion separation
1 January 2019
Yang Deng | Ganwei Zhang | Renbi Bai | Shusu Shen | Xiaoji Zhou | Ian Wyman

Graphene oxide-assisted membranes: Fabrication and potential applications in desalination and water purification
15 June 2015
Hanaa M. Hegab | Linda Zou

News of interest

AAAFM-UCLA AWARDS 2019:
Call for Nominations

AAAFM-UCLA honors and recognizes international scientists and students who have shown, during the course of their professional careers, outstanding achievements in the fields of Functional Materials.

The following 3 Awardsare on offer:

- **AAAFM-Heeger Award:** -The AAAFM-Heeger Award (Alan J. Heeger, Nobel Laureate) is a prestigious prize conferred on an outstanding, dynamic young researcher (PhD, Postdoc, Junior Scientist level) for their outstanding achievements and contributions to the field of Functional Materials. The maximum age considered is 45 years.
- **AAAFM-Nakamura Award:** -The AAAFM- Nakamura Award (named after the Nobel Prize winner Shuji Nakamura) is a prestigious prize conferred on an outstanding, dynamic researcher for their outstanding achievements and contributions to the field of Functional Materials. The age of the candidates must fall within this age bracket 46-65 years.
- **Outstanding Poster Presentation Award 2019 -** The Outstanding Poster Award has been established in 2017, to highlight good quality posters presented at the AAAFM-UCLA conferences. AAAFM-UCLA aims at setting a platform for all the budding scientists and researchers to present their real-time work and share their views and aspects related to the theme of the conference.

More information are available here: http://aaafm.org/conf/2019/aaafm-awards/

Open Position

Visiting Reserch Assistant - Applied Biocatalysis
Slovak University of Technology in Bratislava, Department of Chemical and Biochemical Engineering, Bratislava, Slovakia

Job description
 Research in the frame of a project for whole-cell immobilized recombination biocatalyst design for the production of chemical specialties using biocatalytic cascade reactions.
 Study of kinetics and oxygen tranfer in biocatalytic oxidation reactions in two-phase liquid-gas reactors and three-phase solid-liquid-gas reactors.
 Work in a project team with partners from other institutions.
Temporary position till December 2019 with possible extension. A start of PhD. study during the project with continued financing by the faculty after the project end is possible.

Desired skills and experience
Master degree in chemical engineering, biotechnology or similar study programs is a minimum prerequisite.
Experience in cell cultivation, fermentation or bioreactors is welcome.

About the employer
Slovak University of Technology is the top technical university in Slovakia with a rich collaboration with universities in Western Europe and industry

Research Scientist in Electrochemical energy conversion based on metal-free nanoporous electrocatalysts
LE STUDIUM Loire Valley Institute for Advanced StudiesLAVOISIER ARD2020 Programme
Orléans, France

CONTEXT
LE STUDIUM Loire Valley Institute for Advanced Studies recruits an international experienced researcher for the LAVOISIER Programme (LAboratory with a VOcation for Innovation of the Safety and Industrialization of Renewable Energy) dedicated to research and technology transfer in the field of energy materials. It focuses on the production and storage of hydrogen and materials and assemblies of energy materials designed for energy conversion and the storage of electrical energy. The successful candidate will be invited for a one-year fellowship to work under the leadership of the CEMHTI Laboratory (UPR 3079), CNRS, Orléans, France. S/he will be part of an outward looking and stimulating pluri-disciplinary scientific and international community.
SCIENTIFIC RESEARCH
POR2E research group settled at CEMHTI (CNRS) in Orléans is a multidisciplinary group with research activities supported by several excellence regional, national and European research programs (ERC, H2020). POR2E group has distinctive research strengths in the design, characterization and testing of nanoporous materials with controlled pore architectures and functionalization, applied in gas sensing, energy storage and conversion, and environmental protection. The research fellow will provide a novel vision and/or research strategy and leadership within the POR2E group, representing its research expertise, skills, interests, and fostering a team spirit helping the group to capitalize on its strengths and maximize the impact of its activities.
The rapid inter-conversion of electricity into chemical energy offers an important avenue in the use of renewable energy. The generation of electricity in fuel cells from the electrochemical reaction of H2 and O2, coupled with the photoelectrochemical water splitting to produce oxygen and hydrogen gases, offers a viable approach to produce electricity using water and sunlight. CO2 has the potential to be used in the manufacture of fuels and high added value chemical feedstocks (e.g., formic acid, methanol, methane), prompting a new economy approach based on lower fossil fuel consumption. However, being a thermodynamically stable molecule, the electrochemical reduction

of CO2 needs to overcome kinetic barriers to lower overpotentials, increase faradaic efficiency and promote products selectivity. This project aims to design, formulate and characterize new metal-free electrocatalysts based on nanoporous carbons for a sustainable CO2 conversion into fuels or feedstock. The goals are to explore the transformation of CO2 and H2O into sustainable fuels at a multiscale level, going from (i) the understanding of the nano-microscale phenomena that govern the (photo)electrocatalytic process; (ii) to the macroscopic level by designing photo(electro)catalytic reactors (e.g., bench scale) with electrodes operating in a continuous regime.

Desired skills and experience
The successful candidate will be a dynamic research leader with a proven track record of internationally leading research evidenced by publications, esteem and funding. We welcome applications from candidates with research interests in all areas of electrochemical energy conversion including advanced electrochemical characterization of materials, electrodes based on nanoporous carbons (preparation, electrochemical characterization), photoelectrochemical interface coupling and so on. S/he will also be expected to take on supervising responsibilities commensurate with the position, and to demonstrate the ability to carry out activities to a high standard. Senior researcher profile with:
publications and significant international networks;
ability to mobilize the literature and to build a testable hypothesis;
research experience in the field of study, able to innovate and interact with diverse stakeholders including industry;
Proven ability to control the whole chain of research from the definition of the problem to the communication of results, both for academic, industrial R & D and non-academic audiences;
Experience and motivation for team work and ability to establish fruitful scientific exchange with researchers and actors of different technical and scientific cultures;
Strong experience and background in applied electrochemistry;
Strong experience in nanoporous carbon materials synthesis and characterization;
Able to initiate new projects in the field of electrochemical energy conversion (beyond the use of metallic catalysts);
Strong organizational and time management skills - able to prioritize work, manage time effectively and deliver results on time;
Excellent written and verbal communication skills, including the ability to make clear and concise presentations and prepare compelling grant proposals.

ICREA Research Professor –Senior Researcher in Chemical Engineering - Universitat Rovira i Virgili, Department of Chemical Engineering
Universitat Rovira i Virgili, Department of Chemical Engineering, Tarragona, Spain

Job description
The Chemical Engineering Department at University Rovira i Virgili, as host institution, is seeking to recruit an ICREA research professor.
We are looking for an outstanding and motivated research leader who has a broad knowledge in any area of Chemical Engineering or any other closely related field.

Conditions:
Applicants considered to join the Department are expected to:

- Take a leading position in developing his/her subject area through world-class research and innovation.
- Build up a fully independent research group.
- Be able to attract national and international research funding.
- Provide or create an active international academic and industrial network.
- Contribute to the postgraduate formation by actively supervising doctoral candidates.
- Teach in our postgraduate courses.

We Offer:
A budget over 215000€ for three years to launch the research group, which includes:

- 60000€ start-up budget for eligible research costs.
- 2 pre-doctoral fellowships (3 years each) equivalent to 110000€.
- 45000 euros for recruiting a postdoctoral researcher (1 year)
- Laboratory space according to the needs.
- Office and complements for research and teaching activity.
- Additional office space for personnel under supervision.

The offer is for a permanent, tenured position in the ICREA foundation (https://www.icrea.cat/en) obtained by competition into its recently opened ICREA Senior call (https://www.icrea.cat/en/calls) with deadline on Thursday, 14 March 2019. Check the information there to assess your eligibility.

Information:
The Rovira i Virgili University (Tarragona, Spain, www.urv.cat/en/) is a very active young university ranked 78 in the "150 under 50" classification of the Thames Higher Education and also well positioned in other world-class rankings (THE, ARWU, CWTS Leiden). The Department of Chemical Engineering is a research-focused centre holding outstanding results in research and teaching (see the DEQ at ResearchGate).
For more information, please contact:
Dr. Josep Font, Head of the Chemical Engineering Department (ddeq@urv.cat)

Ikerbasque Group Leaders - Call 2019Ikerbasque

The Basque Foundation for Science,would like to inform you that we have launched a new international call to reinforce research and scientific career in the Basque Country (Europe). We offer:
10 permanent positions for experienced researchers: Group Leaders
Permanent positions within any of the Basque Research Institutions
Researchers with a solid research track and leadership capabilities
The applicants must have their PhD completed before January 2011
Support letter from the host Institution is mandatory
Deadline: September 17th at 13:00 CET

For further information, please visit calls.ikerbasque.net We would appreciate your help in disseminating this information, in case you know about any colleague that could be interested and meets the requirements of the call.