Institute on Membrane Technology
ITM-CNR

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

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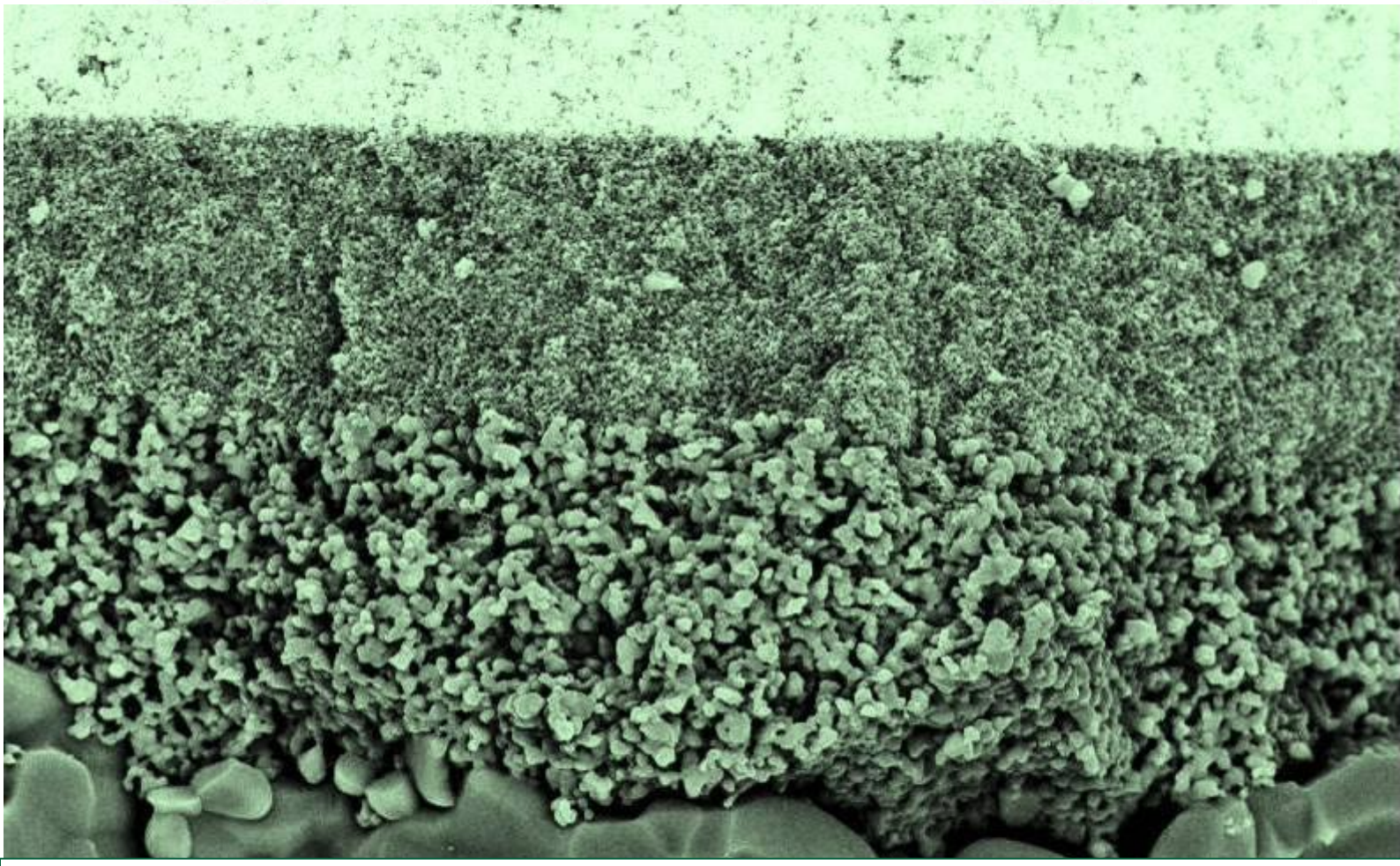

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Sponsored by

Sino-EU Membrane Science and Technology Research and Development Center, Weihai (China)

Summary

From Europe

… News/Highlights

FROM HORIZON EUROPE (HORIZON) COMPLEMENTARY FUNDING MECHANISMS IN THIRD COUNTRIES VERSION 2.0

Available national programmes or funds that could provide support to Horizon Europe participants from the **People's Republic of China**.

Flagship initiatives and priority areas for EU-China S&T cooperation

EU-China STI cooperation is carried out through joint research projects under specific flagship initiatives that address thematic priorities agreed in the Joint EU-China Roadmap for future STI cooperation. The EU and China intend to bring forth two flagship initiatives under Horizon Europe, namely:

- Food, Agriculture and Biotechnologies
- Climate Change and Biodiversity.

Through the future Co-Funding Mechanism (CFM), the Chinese Ministry of Science and Technology (MOST) will provide financial support to Chinese mainland participants in Horizon Europe projects under the flagship initiatives and potentially other priorities to be jointly defined. The exact terms and conditions of MOST CFM calls will be published by the Ministry of Science and Technology of the People's Republic of China on its website when the specific details are finalized.

Food, Agriculture and Biotechnologies (FAB) flagship initiative

The EU China research and innovation flagship initiative on food, agriculture and biotechnologies (FAB) is a comprehensive research and innovation cooperation programme launched in 2013 to tackle sustainable agriculture, food security and safety in the EU and China. Common priorities and WP topics have been jointly identified and co-funded by the EU with CAAS and MOST. This has been translated into 16 Horizon 2020 topics dedicated to cooperation with China with a total EU budget of €122 M. As a result, 21 joint projects have been launched involving 125 Chinese organizations. Given the good results achieved under H2020, it was agreed to continue the FAB flagship under Horizon Europe. The Horizon Europe Work Programme 2021-2022 included four topics targeting Chinese participation, for a total EU contribution of €32 M:

- EU-China international cooperation on integrated pest management in agriculture (opening date 22 June 2021; deadline date 06 October 2021)
- EU-China international cooperation on unlocking the potential of agricultural residues and wastes for circular and sustainable bio-based solutions (opening date 28 October 2021; deadline date 15 February 2022)
- EU-China international cooperation on nature-based solutions for nutrient management in agriculture (opening date 28 October 2021; deadline date 15 February 2022)
- EU-China international cooperation on increasing the resilience of forests (opening date 22 June 2021; deadline date 06 October 2021)

Discussion are currently underway to include additional FAB topics in the Horizon Europe Work Programme 2023-24.

C**limate Change and Biodiversity (CCB) flagship initiative**

The Climate Change and Biodiversity flagship with China was agreed by the European Commissioner for Innovation & Research, Mariya Gabriel, and the Chinese Minister of Science and Technology, Wang Zhigang, during the High Level Dialogue on Research and Innovation in January 2021. Discussions between the two sides on the formulation of the flagship are expected to be launched at the beginning of 2022.

Other areas eligible for MOST Co-Funding Mechanism

MOST Co-funding mechanism can also be used to promote Chinese participation in other topics, targeting low TRL projects (up to TRL4 = Technology validated in lab) and linked to the domains covered by the two flagship initiatives agreed, although not labelled as topics of the two flagship initiatives. For more information, contact in MOST Ms. WANG Yingshi, Email: wangys@most.cn Tel. +86.10.58881357 or Ms. ZHANG Lengyang Email: lyzhang@most.cn Tel. +86.10.58881352; or in the China Science and Technology Exchange Centre (CSTEC) Mr. XIN Bingqing E-mail: xinbq@cstec.org.cn Tel: +86.10. 68598010 or Ms. LIN Xiyan Email: linxy@cstec.org.cn Tel: +86.10.68573441.

ERC-NSFC Implementing arrangement

In line with what already done for Horizon 2020, the European Research Council (ERC) and the National Natural Science Foundation of China (NSFC) will continue the cooperation to boost excellence-based and bottom-up collaboration in frontier research based on the Implementing Arrangement signed in June 2015 between the European Commission and the NSFC to facilitate the use of the ERC-funded projects to host Chinese researchers, and holders of NSFC grants. Selected Chinese researchers will be incorporated in the research teams of the European Principal Investigators who are already supported through the ERC grants and who have expressed an interest in hosting Chinese researchers in their research teams. Potential Chinese participants are encouraged to contact NSFC to seek support for their participation in Horizon Europe. For more information, contact in the NSFC Ms. FAN Yingjie, Email: fanyj@nsfc.gov.cn, Tel: +86.10.62325309 or Ms. SHEN Jie, Email: shenjie@nsfc.gov.cn, Tel: +86.10.62327017 or write to the ERC at ERC-IMPLEMENTINGARRANGEMENTS@ec.europa.eu. General information is also available on the ERC website.

Useful links:

- Ministry of Science and Technology of the People's Republic of China (MOST) 中华人民共和国科学技术部 (most.gov.cn)
- EU Delegation to China: About the EU Delegation in China - European External Action Service (europa.eu); Vojko Bratina, Policy Officer, Chargé de mission, Delegation of the European Union to China, Vojko.BRATINA@eeas.europa.eu
- Horizon Europe: A Practical Guide for China: https://op.europa.eu/en/web/eulaw-and-publications/publication-detail/-/publication/3f5d8bd9-d358-11eb-ac72- 01aa75ed71a1

THE EU AND CHINA HAVE SIGNED AN ADMINISTRATIVE ARRANGEMENT TO SUPPORT COOPERATION

On 22 April 2022, the EU and China have signed an administrative arrangement for the period 2021-2024 to support collaborative research projects under two jointly agreed research flagship initiatives: the Food, Agriculture, and Biotechnology as well as the new Climate Change and Biodiversity flagships.

The projects under the administrative arrangement reflect the interests of both sides and will contribute to the advancement of key EU priorities such as addressing the Sustainable Development Goals, with a focus on climate change and biodiversity loss. The flagship initiative topics will be jointly drafted and will focus on research.

This is in line with the outcomes of the 23rd EU-China Summit, the EU-China A Strategic Outlook Communication of 2019, the 2021 Global Approach to Research and Innovation Communication and the ongoing discussions on the EU-China Joint Roadmap for the Future of Science, Technology, and Innovation Cooperation.

Expansion of the selected areas of cooperation beyond 2024 will be dependent on the progress achieved on the roadmap discussions and on the overall state-of-play of EU-China bilateral relations. The roadmap exercise aims at rebalancing cooperation and at bringing forth the advancement of a fair innovation ecosystem, defined by reciprocity and a level-playing field while respecting fundamental values and high ethical and science integrity standards.

EU and China to hold the 15th Joint Steering Committee Meeting on Science and Technology Cooperation

On 17 May 2022, the EU will virtually host the 15th EU-China joint steering committee meeting on science and technology cooperation. The meeting will touch upon the ongoing discussions and next steps with regards to the EU-China joint roadmap for the future of science, technology, and innovation cooperation.

The roadmap exercise aims at rebalancing cooperation and at bringing forth the advancement of a fair innovation ecosystem, defined by reciprocity and a level-playing field while respecting fundamental values and high ethical and science integrity standards.

This is in line with the outcomes of the 23rd EU-China Summit, the EU-China A Strategic Outlook Communication of 2019, and the 2021 Global Approach to Research and Innovation Communication.

The Joint Steering Committee Meetings on Science and Technology cooperation are aimed at overseeing the implementation of the EU-China science and technology cooperation agreement originally signed in 1998.

EFCE SECTION ON MEMBRANE ENGINEERING

The EFCE Section on Membrane Engineering, chaired by Prof. Enrico Drioli, organised a Spotlight Talk, held online on April 21, 2022. Lectures covered exergy analyses and new metrics for membrane units (Dr. A. Criscuoli, CNR-ITM), the potential of membrane systems in the biofuel production (Dr. A. Brunetti, CNR-ITM), molecular dynamic simulations as tools to better control scaling issues inside membrane plants (Dr. E. Tocci, CNR-ITM) and basic process control on membrane processes (Prof. M. Stoller, Università la Sapienza, ROMA). An attendance of 70 participants was registered.

The record of the Spotlight Talk is online on EFCE Youtube at https://www.youtube.com/watch?v=Qw7MHhcwQpg

Industrial Membrane Plants realized/utilized during the last two years at Artes Ingegneria S.p.A. (Cannon Artes), is a leading company specialized in engineering & manufacturing of water & waste water treatment plants.

PROJECT NAME AND DESCRIPTION
<u>NPCC Seawater UF – year: 2022 (in progress)</u> **EPC for Belbazem block development project, ZIRKU ISLAND.**
The package is designed to treat seawater for the removal of suspended solids by means of ultrafiltration membranes (UF) in compliance with requirements for water utilization as injection water (to be used as pressurizing agent for the formation). Seawater is prefiltered up to 50 microns and is treated in a UF package constituted by 6 racks and each rack is provided with 32 modules. UF system capacity is equal to 889 m3/h at outlet of the package and allows to reach a final TSS concentration and turbidity respectively equal to 0.1 ppm and 0.1 NTU. Moreover, treated water by UF is further treated by deareation system for O_2 removal before its utilization as injection water.
<u>SK Libs WTP – year: 2022 (in progress)</u> **DABROWA GORNICZA, SLASKIE, POLAND**
The system is designed to produce water with a final composition in compliance with utilization in processes for the production of components for electric batteries (Lithium Ion Battery Separators). In details, inlet well water is previously heated by means of heat exchangers and then treated by ultrafiltration (UF) membranes for suspended solids removal up to a final concentration of 10 ppm and by reverse osmosis (RO) membranes up to a final dissolved solids (TDS) concentration of 15 ppm (and final conductivity of 20 mS/cm). The package has a total capacity of 60 m^3/h and consist of 2 trains and 2 stages (15 ton/h each train x 2 trains x 2 phases).
<u>MG TEC INDUSTRY wwtp – year: 2020 (working)</u> **New Papermill – Dej Romania**
Biological wastewater plant (capacity: 135 m3/h) constituted by MBR membranes (membrane biological reactor) for the treatment of wastewater coming from process of the tissue paper machines and from the process of the stock preparation line for tissue. Because of the high solids content of this kind of wastewater and inlet water composition variability, the water flows to rotary screen and equalization chest before being treated by biological treatment with membranes. The utilization of MBR instead of traditional biological system allows to treat the high organic load and to reach better quality of the final effluent (considering that sludge concentration in the MBR system is higher than that used in traditional oxidation tank).
<u>LAB SA – year: 2019 (working)</u> **Orsted – Herning Power Station -DENMARK**
The process is designed for the treatment of flues gas wastewater from biomass fired plant to reach suitable composition for discharge. Part of the treated, clean condensate is used for producing Demineralized water for reuse in the plant.

The system is fully focused on membranes utilization: the water is preliminary treated by UF Membranes for TSS removal and then CO_2 removal is carried out by membrane contactors and then treated by RO membranes (capacity is equal to 40 m^3/h). In addition, there is Demi make up line treated with Electro-deionization (EDI) and then oxygen removal with membrane contactor (capacity: 22 m^3/h).

infn – year: 2019 (working)
Experiment Borexino-Laboratory Gran Sasso Assergi (AQ)

Membrane degassing for radon removal from water lightly radioactive cooling water (Capacity 2.5 m3/h) consisting of 3 vessels (working in parallel) installed on skid.
The project shows high elements of innovation not only because the degassing takes place with membrane contactors technology but also because radon is not a gas commonly removed by means of this technology (as CO_2 or O_2).

NESTE – year: 2021 (commissioning)
SINGAPORE EXPANSION PRJ – SINGAPORE

Biological Wastewater treatment, composed by Aeration MBR membranes, activated carbon filters for phenols removal and sludge treatment (thickener + centrifugal decanter). Inlet wastewater with design flowrate of 60 m^3/h passes through Aeration Basin Influent Screen (1mm pore size) which purpose is to ensure that all sharp-edged and agglutinating particles are removed, in order to protect MBR membranes. Screened wastewater is sent to a Selector Section of the Biological Aeration Basin to avoid the growth of filamentous bacteria where are dosed nutrients (phosphorous and urea) caustic soda for alkalinity adjustment and the antifoam to prevent foaming which can cause serious problems to MBR operation.

DOPET – year: 2021 (commissioning)
EPIC FOR DEAREATOR AT NGL- 3, DOHA

The package consists in an innovative deareation system based on the utilization of membrane contactors for the removal of dissolved oxygen from demineralized water. The system (capacity: 3.2 m^3/h) is able to reduce the O_2 concentration from water in order to meet the required specification of less than 50 ppb to avoid any corrosion in the downstream AGR unit. The membrane contactors contain thousands of microporous polypropylene hydrophobic hollow fibers that impede liquids to penetrate the membrane pores thus allowing liquid-gas separation. The selected process for this package is a combination of stripping gas (N2) in vacuum condition “Sweep-Assisted Vacuum (Combo Mode)”. The package includes two membrane contactors, two vacuum pumps and a separator tank.

Membrane related Projects in Europe

In the following section, H2020 ongoing projects relating to membrane research, started on 2022, are enclosed. Information about the projects started before and during 2018-2021 are available in the same section of the previous issues of this newsletter.

- **Friends or foes? The role of Biofilm microbiomes in industrial anaerobic membrane bioreactors to MAXimise bioenergy production (BioMAX)**

Start date: 1 April 2022
End date: 31 March 2024
Funded under: EXCELLENT SCIENCE - Marie Skłodowska-Curie Actions
Total cost: € 172 932,48
EU contribution: € 172 932,48
Coordinated by: UNIVERSITAT DE BARCELONA (Spain)
Programme(s): H2020-EU.1.3. - EXCELLENT SCIENCE - Marie Skłodowska-Curie Actions; H2020-EU.1.3.2. - Nurturing excellence by means of cross-border and cross-sector mobility
Topic(s): MSCA-IF-2020 - Individual Fellowships
Call for proposal: H2020-MSCA-IF-2020
Funding Scheme: MSCA-IF-EF-ST - Standard EF

Study reveals how biofilm formation could enhance the performance of anaerobic membrane bioreactors.
Industrial wastewater with high concentrations of organic matter is a valuable energy source if treated anaerobically. Anaerobic digestion membrane bioreactors offer great potential for treating such wastewater streams and producing high-quality effluent. Moreover, the methane-rich biogas produced can be used as a renewable source of power or heat. Funded by the Marie Skłodowska-Curie Actions programme, the BioMAX project will systematically study the identity, dynamics and ecophysiology of planktonic and biofilm microbiomes that are found on these bioreactors. Project findings could reveal how microbial biofilms could improve the performance, robustness and economic feasibility of anaerobic digestion membrane bioreactors.
Transforming the European Union into a competitive low-carbon economy by 2050 requires the industry sector to continue implementing energy-efficient processes, especially for the valorisation of biodegradable waste and wastewater. Anaerobic digestion membrane bioreactors (AnMBR) is an emerging technology combining the production of methane-rich bioenergy and high-quality effluents free of particles, colloids and pathogens. However, the presence of biocidal or inhibitory compounds found in many industrial wastewaters hinders the implementation of AnMBR associated to low process efficiencies and instability. Additionally, the adhesion of particles and formation microbial biofilms into the membrane surface results in increased operational energy requirements. Biofilm formation may be exacerbated when treating industrial wastewaters containing high concentrations of inhibitory compounds since biofilm formation is a widespread microbial survival strategy to thrive under unfavourable conditions. However, are biofilms friend or foe? A controlled biofilm formation may be beneficial to improve AnMBR robustness and methane yields since the protection given by the biofilm structure allows microorganisms to function in harsher conditions. Understanding the interaction between biofilm formation and functionality in anaerobic biotechnologies is key for the success of AnMBR technology and the valorisation of heavily polluted industrial wastewaters. To this aim, I will systematically study the identity, dynamics and ecophysiology of planktonic and biofilm microbiomes occurring in AnMBR treating pharmaceutical wastewater. Harnessing this knowledge will allow the quantification of the role and potential of microbial biofilms to improve AnMBR performance, robustness and economic feasibility. The experience gained from combining microbial and engineering approaches will lay the foundations to develop and improve biofilm management strategies for a successful AnMBR implementation.

Open Calls of HORIZON EUROPE Programme

	CALL	OPENING DATE	DEADLINE
Excellence Science	**MSCA POSTDOCTORAL FELLOWSHIPS 2022**	13 April 2022	14 September 2022
	MSCA DOCTORAL NETWORKS 2022	03 May 2022	15 November 2022
	MSCA STAFF EXCHANGES 2022	06 October 2022	08 March 2023
	MSCA COFUND 2022	11 October 2022	09 February 2023
Global Challenges and European Industrial Competitiveness	**ACTIONS FOR THE IMPLEMENTATION OF THE MISSION RESTORE OUR OCEAN AND WATERS BY 2030 -** *TYPES OF ACTION: INNOVATION ACTION (IA); COORDINATION AND SUPPORT ACTION (CSA)*	12 May 2022	27 September 2022
	RESEARCH AND INNOVATION ACTIONS IN SUPPORT OF THE IMPLEMENTATION OF THE ADAPTATION TO CLIMATE CHANGE MISSION - *TYPES OF ACTION: RESEARCH AND INNOVATION ACTIONS (RIA); INNOVATION ACTION (IA)*	12 May 2022	27 September 2022
	RESEARCH AND INNOVATION ACTIONS TO SUPPORT THE IMPLEMENTATION OF THE SOIL HEALTH AND FOOD MISSION - *TYPES OF ACTION: RESEARCH AND INNOVATION ACTIONS (RIA); INNOVATION ACTION (IA)*	12 May 2022	27 September 2022
	CROSS-SECTORAL SOLUTIONS FOR THE CLIMATE TRANSITION (BATTERIES) - *TYPES OF ACTION: INNOVATION ACTION (IA); COORDINATION AND SUPPORT ACTION (CSA)*	28 April 2022	06 September 2022
	SUSTAINABLE, SECURE AND COMPETITIVE ENERGY SUPPLY (HORIZON-CL5-2022-D3-02) - *TYPES OF ACTION: RESEARCH AND INNOVATION ACTION (RIA); INNOVATION ACTION (IA)*	26 May 2022	27 October 2022
	SUSTAINABLE, SECURE AND COMPETITIVE ENERGY SUPPLY (HORIZON-CL5-2022-D3-03) - *TYPES OF ACTION: RESEARCH AND INNOVATION ACTION (RIA); INNOVATION ACTION (IA)*	06 September 2022	10 January 2023
Innovative Europe	**EIC PATHFINDER CHALLENGES 2022 -** *TYPES OF ACTION: EIC GRANTS*	16 June 2022	19 October 2022

From China

… News/Highlights

THE SUCCESSFUL APPLICATION OF JIUYING MEMBRANE IN THE SEAWATER DESALINATION PROJECT OF VINH TAN POWER PLANT IN VIETNAM HAS ESTABLISHED THE REPUTATION OF DOMESTIC ULTRAFILTRATION MEMBRANE AS A RELIABLE BRAND.

At present, human beings are widely plagued by the lack of fresh water resources. Seawater desalination and utilization is an important measure to alleviate the contradiction between water supply and demand in coastal areas. Seawater contains a large amount of salts such as chlorides, sulfates etc., mainly sodium chloride, as well as minerals and metal substances, which bring great difficulties to seawater desalination and high requirements to membrane quality.

The water source of this project is seawater from the South China Sea of Vietnam. The double-membrane method, namely "ultrafiltration + reverse osmosis" treatment process is adopted, in which the ultrafiltration membrane component is the core part. The high-pollution resistant PVDF hollow fiber membrane component independently developed by Jiuying is used to replace the internationally well-known ultrafiltration membrane. Since the replacement of the Jiuying ultrafiltration membrane, the project has been operating very well. The turbidity of ultrafiltration effluent is ≤ 0.1 NTU and SDI ≤ 3.0, which prolongs the chemical cleaning cycle and service life of the subsequent reverse osmosis membrane, and effectively reduces the system operation costs. The implementation of this project shows that Jiuying highly-antifouling PVDF membrane exerts better performance and quality in seawater desalination, which solves the weak situation of domestic ultrafiltration membrane in seawater desalination projects.

SCALE-UP FABRICATION AND PILOT TEST OF ZEOLITE MEMBRANES FOR BUTANE ISOMERS SEPARATION BY NANJING TECH UNIVERSITY

The energy consumption of the separation process accounts for about 60% of the total chemical energy consumption, of which 95% is consumed by the distillation process. It is expected to reduce 60-90% of the energy consumption replaced by advanced membrane separation technology. The separation of butane or pentane isomers is energy-intensive and cost-intensive by distillation.

Recently, the industrial-scale tubular MFI zeolite membrane elements and corresponding gas separation technology were developed for the separation of butane isomers by the research group of Prof. Rongfei Zhou at Membrane Science and Technology Research Center of Nanjing Tech University. About 72 pieces of one-meter-long tubular MFI zeolite membranes (~3 m^2) are prepared in one batch. And the reproducibility of membrane synthesis is over 90%. The world's first pilot-scale setup (2.5 kg/h) with membrane area of 2.5 m^2 for butane isomers separation has been installed in Shandong Chambroad Petrochemical Co., Ltd in 2020. This system maintained stable operation in the continuously sideline field test for more than one month. The purity of isobutane in the retentate is as high as 99%. Compared with the distillation process, separation energy by membrane reduced by more than 65%. An on-going enlarged pilot test with capacity of 100 kg/h and membrane area of 100 m^2 is finished by 90% and is planned to run this autumn. Membrane technology can play a key role in making separation energy-saving and economically feasible in the separation of many industrially important hydrocarbon mixtures.

Photos of one-meter-long tubular MFI zeolite membranes (left) and pilot-test membrane system (right) for on-site butane isomer separation at Shandong Chambroad Petrochemical Co., Ltd in Boxing, China.

TIANGONG UNIVERSITY OF TECHNOLOGY HAS SUCCESSFULLY DEVELOPED AUTOMATIC HOLLOW FIBER MEMBRANE SPINNING EQUIPMENT

The team of Professor Jianxin Li from the State Key Laboratory of Separation membranes and Membrane Process/National Center for International Joint Research on Separation Membranes of Tiangong University has successfully developed and tested the fully automatic experimental spinning equipment of non-solvent phase separation (NIPS) hollow fiber membrane. The equipment realizes "one machine with two membranes", which can simultaneously spin polymeric microfiltration/ultrafiltration hollow fiber membrane and hollow fiber composite membrane with lining/surface coated. The equipment realizes the fully-automatic computational control of technical parameters of hollow fiber membrane preparation in the whole process, and has the characteristics of operation page visualization, host computer process monitoring, data exchange and centralized information processing. The automatic control system realizes the independent control of the key technology of the hollow fiber membrane preparation equipment, which greatly improves the stability and accuracy of the spinning effect, and also reduces the error rate of the product and the expenditure of labor cost.

Hollow fiber membrane device

Professor Jianxin Li's team has long been committed to the research and development of "intelligence, integration and miniaturization" of membrane experimental equipment, adhering to interdisciplinary intersection and integration, and international cooperation and exchange. With the special support of China-South Africa intergovernmental international science and Technology Cooperation (2010-2013), the team developed an automated equipment for multi-channel hollow fiber membrane preparation based on LabView and PLC automation through the cooperation with University of Stellenbosch in South Africa. From 2018 to 2019, based on the experimental

automation spinning equipment of preparing hollow fiber membrane by NIPS and TIPS method, which was jointly developed with the University of South Africa, through continuous improvement and innovation, we developed a fully automatic equipment that can simultaneously spin two types of hollow fiber membrane, which is of great significance to improve the intelligent level of hollow fiber membrane experimental equipment and the research level of separation membrane in China.

XIA HUANG'S TEAM FROM THE SCHOOL OF ENVIRONMENT, TSINGHUA UNIVERSITY HAS MADE NEW PROGRESS IN THE RESEARCH OF CORONAVIRUS IN SEWAGE

The global Covid-19 pandemic has caused 500 million infections and more than 6 million deaths. Coronavirus spreads mainly through spray and contact, and can also enter the drainage system through excreta. The occurrence state of Coronavirus in the drainage system and its epidemic warning and prediction based on the detection of nucleic fragments of sewage virus have always been a hot topic of concern.

Professor Xia Huang's team began to carry out research on the occurrence and detection of Covid-19 in sewage at the beginning of the outbreak of Coronavirus in March 2020, and carried out on-site detection of Coronavirus in sewage during the outbreak of the epidemic in Wuhan and Beijing. Relevant research results were published in *Journal of hazardous materials* and *Engineering* of the Academy of engineering.

Based on the previous research work on the detection of Coronavirus in sewage, the team was responsible for the preparation of the standard of ultrafiltration centrifugal concentration method in *the standard for enrichment and concentration of Coronavirus in sewage and nucleic detection methods*, and standardized the operation process of centrifugal ultrafiltration concentration of sewage viruses. The standard was issued and implemented on March 24, 2022, providing the basis and guidance for the detection of Coronavirus in sewage in China.

ZERO DISCHARGE WATER TREATMENT TECHNOLOGY OF BEIJING NATIONAL INSTITUTE OF CLEAN-AND-LOW-CARBON ENERGY IN HUBEI POWER PLANT HAS BEEN SUCCESSFULLY APPLIED!

Recently, the zero discharge project of desulfurization wastewater crystallization and salt separation at room temperature of air cooling units in extremely cold areas of Inner Mongolia Hubei company undertaken by Beijing national Institute of Clean-and-low-carbon Energy (hereinafter referred to as the low carbon Institute) successfully passed the 168 hours running test assessment, marking the successful demonstration of the first set of zero discharge project of desulfurization wastewater of the low carbon Institute.

Zero discharge technology of desulfurization wastewater of low carbon institute includes Crystalline nanofiltration (ATC-NF®) Salt softening under room temperature and high salty solution reverse osmosis (HSRO®), two patented technologies and innovative integrated process of membrane technology.

This technology does not need to add sodium carbonate, and the cost of pretreatment drug consumption is reduced by 40-70%; Efficient separation of monovalent and divalent salts, and high-quality calcium sulfate and sodium chloride as resources could be recycled; There is no phase change of water in the crystallization process at room temperature, and the investment and energy consumption are low; HSRO® Process design and the reverse osmosis membrane can make the concentration limit of wastewater reach 15%, and the operating pressure of the system does not exceed 7 MPa, which is safe and reliable.

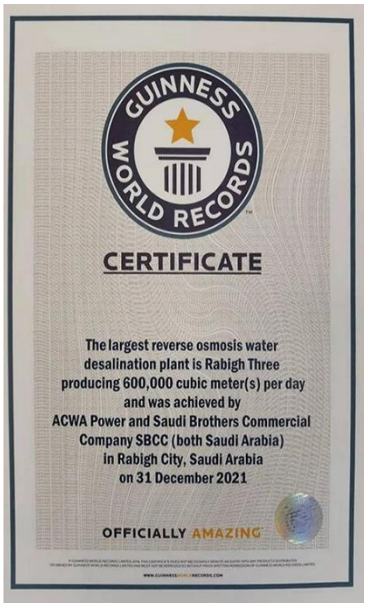
10000 TON/YEAR! BEIJING ORIGINWATER TECHNOLOGY CO., LTD. (BOW) WON THE BID FOR THE QINGHAI MEMBRANE LITHIUM EXTRACTION PROJECT OF MINMETALS SALT LAKE COMPANY

The salt lake lithium extraction project adopts domestic membranes to replace imports, which marks that China's membrane technology has achieved a high level of scientific and technological self-reliance, and solves the "bottleneck" problem of long-term dependence on imports of domestic salt lake lithium nanofiltration membranes.

The project includes the supply of nanofiltration membrane and accessories, guidance of installation and commissioning, quality assurance (including meeting the original production and standard operation conditions). The membrane adopts a proprietary composite membrane, and the quantitative coating process is used to accurately control the charging, hydrophilicity and separation accuracy of the composite PA layer, breaking the technical threshold of the industry.

The use of nanofiltration membrane in this project will help promote the application and promotion of domestically developed membrane technology in the field of lithium extraction from salt lakes, and accelerate the industrialization and large-scale application.

GUINNESS WORLD RECORD! THE WORLD'S LARGEST MONOMER REVERSE OSMOSIS DESALINATION UNDERTAKEN BY POWER CONSTRUCTION CORPORATION OF CHINA HAS BEEN CERTIFIED



Recently, the Saudi Arabian Rabigh's phase III seawater desalination project, which is the general contractor of Shandong Electric Power Construction third Company under the Power Construction Corporation of China, received the Guinness world record certificate, officially becoming the world's largest monomer reverse osmosis seawater desalination project.

Saudi Arabia Rabigh's phase III seawater desalination project is the first large-scale seawater desalination project undertaken by Chinese enterprises overseas. It adopts 100% reverse osmosis seawater desalination technology, with a daily water output of 600000 tons per unit. It undertakes the task of supplying water to Mecca and Jeddah. It officially entered commercial operation in December 2021, and is an important local livelihood project in Saudi Arabia.

ORIGINWATER AND BELGIUM WATERLEAU COMPANY WON THE BID OF MACAO CROSS-BORDER INDUSTRIAL SEWAGE TREATMENT PROJECT

Recently, Originwater, a high-tech environmental protection enterprise, and Waterleau, a well-known Belgian water company, formed a consortium, which stood out from the fierce bidding of five domestic and foreign water treatment enterprises. With a bid price of 133 million MOP, it won the project of "Operation and maintenance of sewage treatment stations in Macao cross border industrial zone" again.

The service contract of the project lasts for 5 years. Originwater will continue to use the independently developed core technologies such as MBR and ultrafiltration membrane to ensure the high and stable operation of the project.

THE 19TH EUROPE-CHINA COOPERATION CONFERENCE ON MEMBRANE INDUSTRIAL TECHNOLOGY INNOVATION WAS SUCCESSFULLY HELD

On June 14, the 19th Europe-China Cooperation Conference on Membrane Industrial Technology Innovation was successfully held in Weihai City. Prof. Enrico Drioli, Honorary President of EMS, Director of ITM-CNR, Italy; Mr. Ma Jun, Member of Chinese Academy of Engineering, Professor of Harbin Institute of Technology, and Dean of European-Sino Membrane Technology Research Institute; Mr Liang Kailong, Deputy Chief of Department of Science and Technology of Shandong Province; Mr. Lin Qiang, Member of the Standing Committee and Executive Deputy Mayor of Weihai Municipal People's Government attended the opening ceremony.

In his speech, Liang Kailong emphasized that the Europe-China Cooperation Conference on Membrane Industrial Technology Innovation has been held for 18 consecutive sessions, gathering a number of domestic and foreign innovation resources in the field of membrane technology to help the transformation, upgrading and innovative development of the membrane industry in Shandong province. On the occasion of this conference, we sincerely invite all guests to work with Shandong to continue to focus on the development frontier of the world membrane industry, deepen cooperation in research and development, achievement transformation and platform building, and strive to achieve greater breakthroughs. Department of Science and Technology of Shandong Province will provide you with the best policies, the greatest platform and the most considerate services to jointly promote the membrane industry in Shandong to take the lead and open a new chapter.

Lin Qiang pointed out that the membrane industry is an emerging key industry that mainly developed by Weihai. The membrane technology industry has experienced a development process from small business to large industry, achieving the "three steps"- from academic to research and then to industrialization. Taking this conference as a platform, we sincerely hope that the European Membrane Society, relevant universities and enterprises will continue to give full play to their scientific research advantages in the field of membrane industry, deepen all-round cooperation with Weihai, accelerate the transformation and application of key technologies in the industry, promote more high-quality innovation achievements and high-end talents to gather in Weihai, and let more high-quality industrial projects settle and expand in Weihai. Weihai will also give full support to accelerate the construction of the industrial park, strengthen the "actual support" and "soft environment", promote the deep integration and collaborative innovation of membrane technology innovation chain, industrial chain, supply chain, talent chain and capital chain, continuously improve the industrial level, realize characteristic and cluster development, and strive to build China's high-end membrane industry and technology innovation base and a world-class membrane high-tech industry cluster.

The conference was held in a combination of online and offline with global live broadcast, attracting more than 10,000 participants in total. At the conference, Enrico Drioli and Ma Jun gave keynote reports on the current situation of membrane industry development. Four projects were signed and six projects were presented. At the same time, a parallel meeting on investment promotion of the membrane industry was held simultaneously with Huancui District.

Membrane related Projects in China

- **Title**: **High-efficient membrane separation technology and the complete equipment for bioethanol manufacturing**

Funding Source: National Key R&D Program of China
Duration: 01/07/2021-30/06/2024
Description: The project is launched for energy-efficient membrane separation technology and equipment in bioethanol production process. It is aimed to breakthrough the membrane technology with high efficiency and low pollution for bio-based ethanol resource in the new-energy era. Membrane technology with the complete set of industrial equipment is being developed with the reduced cost in clean bioenergy production and membrane operation process. The product yield in fermentation process would be improved with high separation efficiency and low pollution emission.

- **Title: Aluminum plastic film project for new energy battery**

Signed date: June 12, 2022
Company: Tongguan district government and Zhixin Boyuan New Material Technology Co., Ltd.
Total investment: 6 billion yuan
The total planned land: 220,000 m2
Description: The project is constructed in two phases. Each phase plans to invest 3 billion yuan to build 8 complete aluminum-plastic film production lines, respectively. When all of them are put into production, the project will form an annual production capacity of 480 million m2 of aluminum-plastic film, and achieve an output value of more than 10 billion yuan.

- **Title: Photosensitive dry membrane project**

Signed Date: June 7, 2022
Company: Guangdong foster new materials Co., Ltd
Place: Xinhui District, Jiangmen City, Guangdong province, China
Description: The project with an annual output of 420 million m2 of photosensitive dry membrane and the project with an annual output of 614,500 t of synthetic resin and additives

- **Title: Sewage resuse**

PI: Peng Liang
Affiliation: Tsinghua University
Time: 2022-2026
Source: National Science Fund for distinguished young scholars, NSFC

- **Title: Component characteristics and ultra-high standard treatment technology of organic matter in reverse osmosis produced water of polluted water source**

PI: Hongying Hu
Affiliation: Tsinghua University
Time: 2021-2024
Source: NSFC general project, 52070110

- **Title: Development of electrically controlled self-cleaning g-C3N4 loose nanofiltration membrane and its water purification mechanism**

PI: Huachun Lan
Affiliation: Tsinghua University
Time: 2020/01-2023/12

Source: NSFC general project, 51978373

- **Title: Development of electrically controlled adsorption membrane and its removal mechanism for weakly polar trace organic pollutants**

PI: Huachun Lan
Affiliation: Tsinghua University
Time: 2021/01-2024/12
Source: NSFC general project, 52170003

- **Title: Research on antifouling performance and mechanism of carbon nanotube composite ultrafiltration membrane**

PI: Meng Sun
Affiliation: Tsinghua University
Time: 2021/05-2023/5
Source: an open topic of the Key Laboratory of new membrane materials industry and information technology

- **Title: Principles and methods of short-term and efficient water purification with double-sided electrocatalytic membrane**

Participation (backbone): Meng Sun
Affiliation: Tsinghua University
Time: 2019/12-2024/12
Source: National Science Foundation project (NSF)

List of Future Events of potential interest for Membrane Engineer

DATE	PROGRAM TITLE	LOCATION	MORE INFO
AUGUST, 22-24 2022	International Conference, 2022 Materials, The Building Block For The Future	University of California, Los Angeles, USA	https://aaafm.org/ucla2022 | ucla2022@aaafm.org
AUGUST, 22-25 2022	26th International Congress of Chemical and Process Engineering CHISA 2022,	Praghe, Czech Repuplic	www.chisa.cz/2022
MAY 27-29, 2022	4th IEEE Eurasia Conference on Biomedical Engineering, Healthcare and Sustainability 2022 (IEEE ECBIOS 2022)	Chia Nan University of Pharmacy and Science, Tainan, Taiwan	www.ecbios.asia ecbios.office@gmail.com
SEPTEMBER, 4-8 2022	32nd International Conference on Diamond and Carbon Materials	Lisbon, Portugal	https://www.elsevier.com/events/conferences/international-conference-on-diamond-and-carbon-materials
SEPTEMBER 14-15, 2022 |	International Conference on Materials Science and Engineering	Toronto, Canada	https://www.globalscientificforum.com/conferences/material-science-engineering
SEPTEMBER, 18-21 2022	MELPRO 2022	Prague, Czech Republic	https://www.melpro.cz/
OCTOBER 03 -05, 2022	3rd International Conference on Polymer and Composite Materials	Rome, Italy from	https://polymersconference.yuktan.com>
OCTOBER 27-29, 2022	World Symposium on Smart Materials Sciences and Engineering 2022 (SMSE)	HILTON MUNICH CITY, Germany	https://www.smaterialsym.com/agenda/
OCTOBER, 19 -22, 2022	Seventh International Conference on Multifunctional, Hybrid and Nanomaterials	Genoa, Italy	https://www.elsevier.com/events/conferences/international-conference-on-multifunctional-hybrid-and-nanomaterials
OCTOBER, 26 – 28, 2022	The 7th Ed. of the Smart Materials and Surfaces - SMS 2022 Conference	Athens - Greece	https://www.setcor.org/conferences/sms-2022
NOVEMBER 23– 24 2022	18th Aachener Membran Kolloquium − AMK, the international conference	Aachen University, Germany	http://www.amk.rwth-aachen.de/
DECEMBER 4-8, 2022	IMSTEC 2022	Melbourne, Australia	https://www.imstec2022.org/
DECEMBER 9-10, 2022	2022 9th International Conference on Energy Engineering and Environmental Engineering (ICEEEE2022)	Sanya, China	https://www.iceeee.org/
DECEMBER, 10-14 2022	International Congress on Separation and Purification Technology	Arizona, Scottsdale, USA	https://www.elsevier.com/events/conferences/international-congress-on-separation-and-purification-technology
DECEMBER 16-18, 2022	The 8th Int'l Conference on Thin Film Technology and Applications (TFTA 2022)	SANYA, CHINA	https://www.janconf.org/conference/TFTA_D2021/
JANUARY 9 – 12, 2023	Development of Functional Materials for a Better World	KYUSHU UNIVERSITY SCHOOL OF MEDICINE, KYUSHU, JAPAN	https://functionalmaterials.org/afm2022/

MARCH, 26-31, 2023	Imagine Membrane 2022/2023	Sao Miguel, Azores Islands	https://www.imaginemembrane.eu/
MARCH 16-18, 2023	International Forum on Chemical Engineering and Catalysis, (CECFORUM2023)	Las Vegas, USA during	https://www.continuumforums.com/2023/cecforum

EVENTS IN EVIDENCE

EuroMembrane 2022

The EMS, at the beginning ESMST (European Society of Membrane Science and Technology), was founded by a group of few visionary membrains, F. Aptel from University Sabatier in France, H. Strathmann from University Tubingen in Germany, G. Tragardh from Lund Institute of Technology-Food Engineering in Sweden, and E. Drioli from University Naples in Italy who served as the President. The Society was registered as a legal entity at the prefecture of Toulouse in 1982.

At that time, the growing interest and the tremendous progress for Membrane Science and Technology suggested to better organize the scientific efforts at the European level.

The overall goal of the Society was (and is today) to promote education and communication among membrane scientists and technologists at the European and International level.

Forty years later, we acknowledge with gratitude at the founding members, board members and the overall membrane community who helped the EMS in promoting the free exchange of membrane science within the Europe and worldwide.

Happy 40th Anniversary EMS, and ad majora semper.

Conference Chair

Enrico DRIOLI
Honorary President of EMS

Conference Co-Chair

Pierre AIMAR
Permanent EMS
Secretary

Organizing Committee Chairs

Lidietta GIORNO, Cristiana BOI, Alberto FIGOLI

Important dates and terms

Abstracts Submission Deadline: June 10, 2022
Notification of Acceptance: July 10, 2022
Early Bird Registration: August 10, 2022
Tentative program online: August 30, 2022
Final program online: September 15, 2022

ICOM 2023
International Congress on Membranes & Membrane Processes 2023,

Secretariat

Nippon Travel Agency Co., Ltd
East Japan Corporate Sales Division
Nihonbashi, Fukawa BLDG. 2F, 10-11, Nihonbashi-kodenmacho, Chuo-ku, Tokyo
E-mail: icom_2023@nta.co.jp

14th European Congress of Chemical Engineering and 7th European Congress of Applied Biotechnology

The next ECCE/ECAB will take place as a face-to-face event from 17-23 September 2023 at the CityCube in Berlin/Germany. Make a note of this date in your calendar and look forward with us to interesting presentations, interactive exchange with colleagues, the diverse range of exhibitors and sponsors as well as a supporting programme that offers plenty of time for networking.

https://ecce-ecab2023.eu/

THE SECOND ROUND OF THE 11TH CHINA CONGRESS ON MEMBRANES AND MEMBRANE PROCESSES

Time: August 5, 2022 - August 9, 2022 (check in all day on August 5)

Place: Xiangyu Hotel, Chengdu (No. 103, Xinnan Road, Wuhou District, Chengdu, Sichuan Province), China

Conference website: https://hy.castscs.org.cn/conf/index/info/1366

Receipt and Abstract deadline: June 20, 2022

The conference was co-sponsored by China membrane Society (Preparatory) and China Membrane Industry Association, and co-hosted by Sichuan University. "The 11th China Congress on membranes and membrane processes (CCOM 2022)" will display the latest achievements in the development of membrane technology in China in the past three years, and promote academic exchanges and technological innovation.

1) Conference theme

Topic 1: membrane materials, membrane preparation methods and membrane structure characterization

Topic 2: membrane transport mechanism

Topic 3: reverse osmosis, forward osmosis, nanofiltration, ultrafiltration and microfiltration

Topic 4: gas separation, pervaporation, hydrophobic membrane and process

Topic 5: medical, pharmaceutical and biological separation membranes

Topic 6: ionic membranes and processes

Topic 7: membrane integration process and membrane pollution prevention

Topic 8: new membranes and new membrane processes

2) Please submit the receipt and Abstract by email address: membrane2022@163.com

The email title is named "CCOM 2022 - conference subject serial number - name - unit - Title - receipt / Abstract".

Contacts: Rui Xie: Sichuan University 13689093672

Zhuang Liu Sichuan University 18615777808

E-mail: membrane2022@163.com

MEMBRANES RESEARCH CENTERS AROUD THE WORLD

MEMBRANE RESEARCH GROUP OF KOREA RESEARCH INSTITUTE OF CHEMICAL TECHNOLOGY (KRICT)

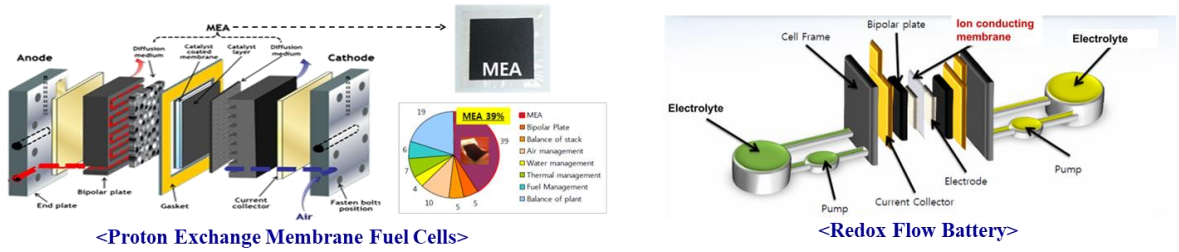
The Membrane Research Group of the Korea Research Institute of Chemical Technology was established in 1990 by Dr. Kew-Ho Lee (Former President of KRICT) and has been conducting various researches ranging from basic research on membranes to practical studies for commercialization (Now 25 Staff members and over 30 postdoctors and students).
The Membrane Research Group of KRICT is organized around five broad topics: 1) Membranes for environmental conservation and resource secure, 2) Membranes for Energy Efficiency in Industrial Processes, 3) Membranes for healthcare, 4) Membranes for energy, and 5) Support for membrane characterization and performance evaluation
The detailed research field are as follows.

1. **Membrane fabrication technologies to reduce environmental pollution and to secure future resources**
   - Core materials (ceramic and polymeric membranes, and draw solutes) for seawater desalination membranes (pretreatment, reverse osmosis, forward osmosis, and membrane distillation)
   - Energy harvesting technologies based on osmotic gradient (pressure retarded osmosis, reverse electrodialysis) to secure new and renewable energy resources
   - Membrane technologies to capture fine particles and to reduce white plumes
   - Ion-exchange membranes to produce ultrapure deionized water
   - Optimization of membrane processes for biomethane separation and greenhouse gas reduction.
2. **Development of membrane materials for separation and purification processes in chemical industry**
   - Development of hybrid membrane processes for organic solution-based separation and purifications in fine chemistry
   - Development of carbon membranes for olefin/paraffin separation in petrochemical industry
   - Development of artificial lung membranes for blood oxygenation

Fig 1. Membranes for Environment and Industry

3. Development of ion-transfer materials as core materials for energy industry

- Development of ion-exchange materials for redox-flow batteries
- Development of membrane materials for fuel cells (PEMFC, AEMFC, URFC)
- Development of membrane materials for sodium batteries and ultra-batteries
- Development of polymer electrolytes for super-capacitors



<Proton Exchange Membrane Fuel Cells>

<Redox Flow Battery>

Fig 2. Membranes for Energy

4. Establishment of analysis, evaluation, and verification infrastructure for expansion of membrane industry

- Characterization of membrane properties and performance; development of standardized characterization protocol; and educational support for industry, university, and government-funded research institute
- Support and facilitate lab-to-industry scale-up process in membrane industry

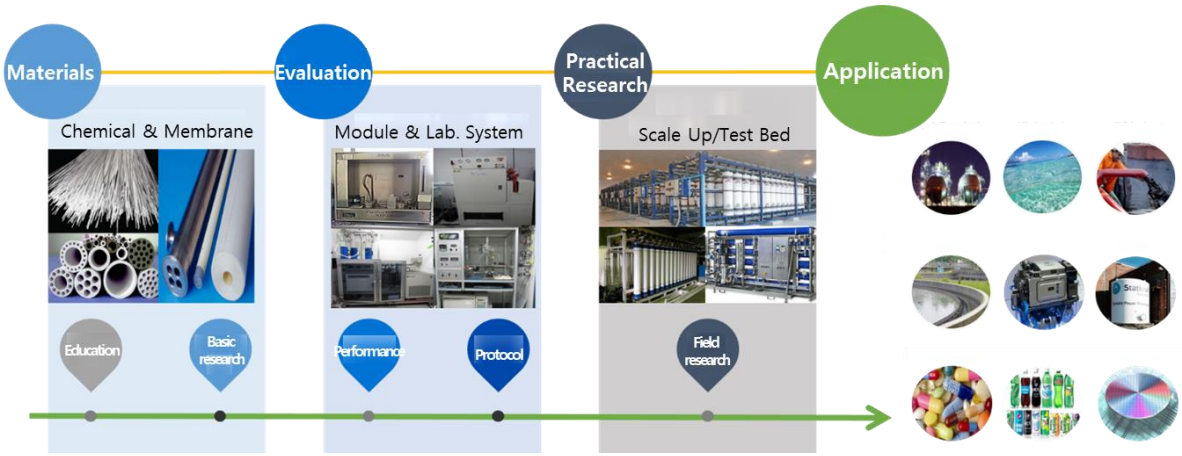


Fig 3. Support for membrane characterization and performance evaluation

MEMBRANE GROUP AND MEMLAB AT LUND UNIVERSITY

Introduction

Research in membranes and membrane processes started at Lund University already in the beginning of the 1970ies by Prof. Bengt Hallström (1924 - 2019). Later, this research was successfully continued by Prof. Gun Trägårdh in Food Engineering and Prof. Ann-Sofi Jönsson in Chemical Engineering. Since, 2017 Prof. Frank Lipnizki is continuing this work by heading the Membrane Group and MemLab - Industrial membrane process research and development centre – at Lund University. The membrane research at Lund University has a proud history with Prof. Nils Alwall (1904 – 1986) developing the first practical dialysis machine which led to the foundation of Gambro (now Baxter Health Care) and the successful collaboration with Prof. (hon.) Rud Fried Madsen (1930 – 2003) the former director of the Danish Sugar Industry promoting commercialization of membrane processes through his involvement in DDS Filtration (now Alfa Laval) and Filmtec (now Dupont Filmtec). Furthermore, Prof. Miguel López Leiva performed some fundamental work on dynamic membrane processes. Today the Membrane Group at Lund University is the largest membrane group in Sweden, and its research focus is on the **water, energy and food** security nexus combined with United Nation's Sustainable Development Goals.

Research in the Membrane Group

The focus of the research in the Membrane Group at Lund University is on the integration and optimisation of membrane processes for the food, biotech, pulp and paper industry as well as water and wastewater treatment plus fouling and cleaning of membranes.

In the area of **food** applications, the group is working on the processing of vegetable proteins (e.g. rapeseed, soya and quinoa proteins) from underutilised by-products. Furthermore, the group continues to work on dairy applications, in particular the fouling and cleaning of membranes.

In the field of **energy** applications, the group is working closely together with the biorefinery group in the department. Among others, the focus is on the development of new solutions for the pulp and paper industry, e.g. the valorisation of side streams like lignin from the kraft processes. Related to this, the group is heading the Annex XVII "Membranes in Biorefineries" by IETS – a collaboration program of the International Energy Agency.

The research on **water** covers both drinking water and wastewater. In the area of wastewater, the group works e.g. on the development of Direct Membrane Filtration (DMF) – an innovative concept to treat water with membranes without biology – and the removal of micropollutants ranging from microplastics to pharmaceuticals in combination with both DMF and membrane bioreactors. For drinking water, the group works on the upgrading of rain and stormwater to utilise it in applications requiring high quality water but not necessarily drinking water quality, e.g. toilet flushing or gardening.

Apart from national projects, the Membrane Group is working on several international projects. As such the group is currently part of two European projects – REWAISE (EU grant agreement No 869496) and DESOLINATION (EU grant agreement No. 101022686). In the REWAISE project the Membrane Group is developing a membrane-based solution for storm- and rainwater harvesting, see Figure 1, and in the DESOLINATION project a new concept for membrane-based desalination is developed. Beyond Europe, the group has on-going collaboration projects with Japan, Chile, South Africa, India and Egypt.

Figure 1: REWAISE pilot for storm- and rain water harvesting.

Research infrastructure: MemLab

Key to success of the Membrane Group is MemLab. - Industrial membrane process research and development centre. MemLab consolidates more than 40 years' experience with membranes and membrane processes from the Swedish Foundation for Membrane Technology via the Centre for Membrane Technology at Lund University, to the Membrane R&D Centre of today. The infrastructure located in the pilot hall of the Department of Chemical Engineering, see Figure 2, has membrane equipment able to handle feed solution volumes in the range of ml to m^3. Membrane processes covered include among others microfiltration, ultrafiltration, nanofiltration, reverse osmosis, forward osmosis, electrodialysis and membrane distillation. The equipment is flexible can handle e.g. polymeric and ceramic membranes. All conventional module configurations plus shear-enhanced modules (rotating and vibrating) plus pre-treatment equipment such as drum-filters, centrifuges and filter presses are available. The centre owns further several equipment and analysis instruments and has access to additional through co-operations within the department and throughout the university.

Figure 2: View on MemLab in Chemical Engineering pilot hall.

Links:

Industrial membrane process research and development centre — Lund University

Membrane Group LU (@chemeng_lu) / Twitter

RESEARCH CENTER FOR MEMBRANE AND FILM TECHNOLOGY OF KOBE UNIVERSITY IN JAPAN

The Research Center for Membrane and Film Technology (MaFTech Center) of Kobe University is the first and the largest faculty-driven membrane research center in Japan. It is located at Kobe University's main campus in Kobe city of the Hyogo prefecture. The MaFTech center was established in April of 2007, with the aim at enhancing membrane research and education, as well as the international academic collaboration. The center has evolved into a university wide integrated research unit directly under university's administration. Directed by Prof. Matsuyama, currently there are 26 faculty members are engaging in a wide spectrum of advanced membrane research.

The MaFTech center is committed to enhancing membrane research and education, international collaboration as well as new technology's industrialization. The center organizes various international activities for collaborative research, academic information sharing, and young researchers training. Additionally, it also holds industrial activities for transferring latest research outcomes to company partners as well as providing professional education opportunities for researchers from industry.

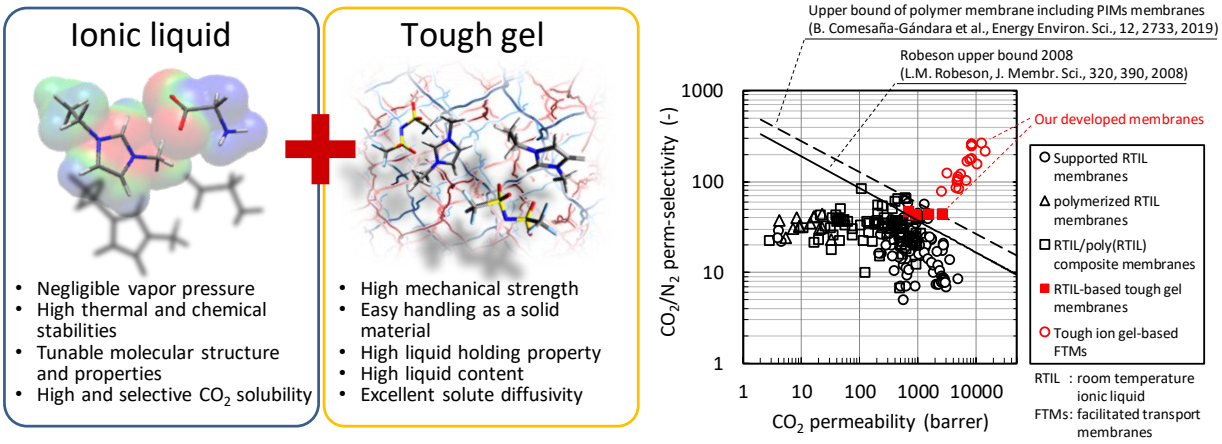
Currently, the MaFTech center has 7 research divisions dedicated to various areas of membrane and film-related studies: water treatment, bio-process, organic thin film, coating, membrane material synthesis, gas separation, and commercialization promotion.

Featured research activities:

1. CO_2 separation membrane

In our research group, we have been developing polymer-based high performance CO_2 separation membranes. Especially, in the latest 15 years, we have been focusing on ionic liquids as a powerful CO_2 separation medium of the CO_2 separation membrane. As the pioneering work, in 2008, we reported a facilitated transport membrane with an ionic liquid-based CO_2 carrier for the first time in the world (S. Hanioka *et al.*, *J. Membr. Sci.*, **314**, 1-4, 2008). The development of the ionic liquid-based facilitated transport membrane was continued thereafter, and in 2012, we developed a unique facilitated transport membrane containing an amino acid ionic liquid as a novel ionic liquid-based CO_2 carrier and reported the characteritic performance (S. Kasahara *et al.*, *Chem. Commun.*, **48**, 6903-6905, 2012). The developed facilitated transport membrane overcame the significant decrease of the CO_2 permeance along with the decrease of humidity, which was the one of the most serious drawbacks of the conventional facilitated transport membranes. We designed several kinds of ionic liquids to improve the CO_2 permeability and CO_2/other light gas selectivity (S. Kasahara *et al.*, *J. Membr. Sci.*, **454**, 155–162, 2014, S. Kasahara *et al.*, *Ind. Eng. Chem. Res.*, **53**, 2422-2431, 2014, S. Kasahara *et al.*, *J. Membr. Sci.*, **503**, 148-157, 2016, E. Kamio *et al.*, *Separ. Sci. Technol.*, **52**, 209-220, 2017). Furthermore, in order to maximize the performance of an ionic liquid-based CO_2 separation membrane, we tried to develop a tough gel membrane containing a large amount of an ionic liquid. Starting with the development of a tough gel membrane composed of a specific

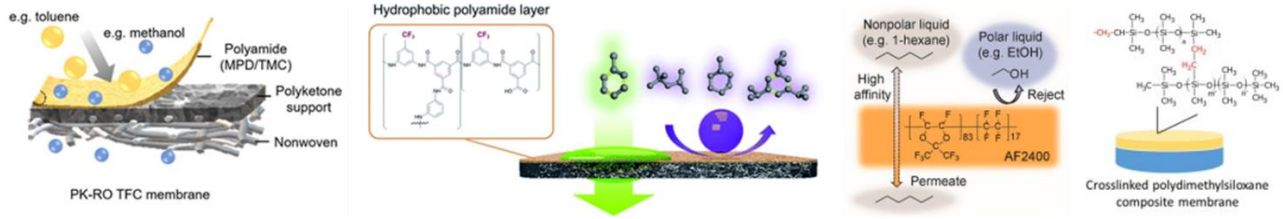
interpenetrating polymer network, termed double-network, and more than 80 wt% of an amino acid ionic liquid (F. Moghadam *et al.*, *Chem. Commun.*, **51**, 13658-13661, 2015), until now, we developed several kinds of tough ionic liquid-based gel membranes (E. Kamio *et al.*, *Adv. Mater.*, **29**, 1704118, 2017, J. Zhang *et al.*, *Ind. Eng. Chem. Res.*, **61**, 13, 4648-4658, 2022, E. Kamio *et al.*, *Soft Matter*,**18**, 4725-4736, 2022). Thanks to the outstanding mechanical strength, the ionic liquid content of our developed gel membrane exceeds 95 wt%. Such an ion gel membrane can be regarded as a quasi-liquid membrane and has extremely high CO_2 permeability of about 67% of the theoretical maximum the ionic liquid-based membrane because of the extraordinary high CO_2 diffusivity in the gel. The tough ion gel membranes with the preferable properties of ionic liquids and the excellent diffusivity of gel materials are promising candidate for a high-performance CO_2 separation membrane that can contribute to the global challenge of the reduction of CO_2 concentration in the atmosphere.



2. Organic solvent separation membranes

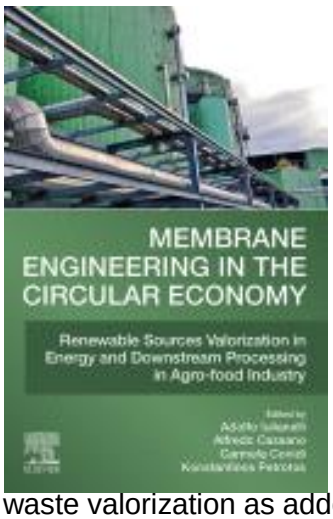
Organic liquid mixture separation is an important process in various industries, and the market currently relies heavily on energy-intensive thermal separation methods, i.e., evaporation and distillation. Membrane separation processes have therefore been developed to provide sustainable, economical, and environmentally benign solutions. Among these membrane separation processes is organic solvent reverse osmosis (OSRO), which, like the aqueous reverse osmosis (RO) process, allows the separation of substances mainly due to their differences in sorption and/or diffusion behavior in the membranes (C. Liu *et al., J. Membr. Sci,* **620**, 118882, 2021). In order to further develop OSRO into commercialization and larger-scale implementation, development of suitable organic liquid separation membranes is necessary. Organic solvent separation targets include polar/nonpolar mixtures, aromatic/aliphatic mixtures, and isomer mixtures. In order to address the requirements of various separation targets, the MaFTech Center has, to date, developed a number of membranes for OSRO and organic liquid separation. We first designed a conventional aliphatic polyketone-supported polyamide RO membrane, whose chemically stable and highly crosslinked selective layer was able to separate large nonpolar molecules from smaller polar molecules (C. Liu *et al., ACS Appl. Mater. Interfaces*, **12**(6), 7586-7594, 2020). The performance of this thin film composite (TFC) membrane was even further enhanced by simple heat treatment, which efficiently decreased the pore size and enhanced the hydrophilicity of the polyamide selective layer (C. Liu *et al., J. Membr. Sci.,* **618**, 1187, 2021). The hydrophilic polyamide-based TFC membrane, however, posed certain limitations, due to non-permeability of nonpolar organic liquids. A hydrophobic fluorine-incorporated TFC membrane was prepared with 5-trifluoro-1,3-phenylenediamine as the hydrophobic diamine monomer during interfacial polymerization (W. Kushida *et al., J. Mater. Chem.*, **10**, 4146-4156, 2022). This hydrophobic TFC membrane allowed the permeation of nonpolar solvents, such as aliphatic and aromatic hydrocarbons, which could not permeate through the conventional TFC membrane. This membrane also exhibited outstanding separation of toluene from larger nonpolar molecules. Aside from polyamide-based TFC membranes, other materials are also currently being developed at MaFTech center for organic liquid separation. Teflon polymer, AF2400, was spin coated onto a polyketone substrate, and the nonpolar AF2400 selective layer allowed the permeation of nonpolar liquids and inhibited the transport of polar liquids (C. Liu *et al., J. Membr.*

Sci., **628**, 119270, 2021). Polydimethylsiloxane (PDMS) composite membranes were also developed using cross-linked PDMS and applied for separation of azeotropic hexane and alcohol mixtures (R. Gonzales *et al., Sep. Purif. Technol.*, **285**, 120369, 2022). The membranes prepared at the MaFTech center can be used for highly efficient organic liquid separation.



Along with our global vision, MaFTech Center warmly welcomes students, academic researchers and industries around the world. Feel free to explore our website for the latest information on our activities: https://www.research.kobe-u.ac.jp/eng-membrane/center/en/

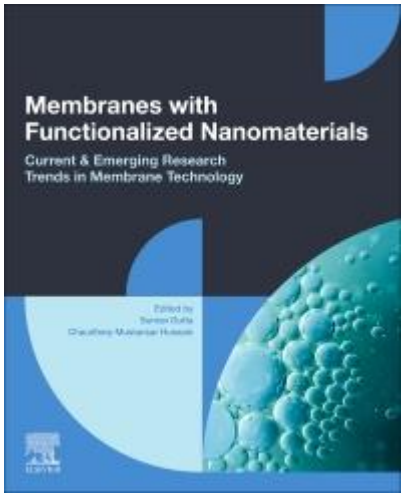
Overview of Books on Membrane Technology



Membrane Engineering in the Circular Economy
Renewable Sources Valorization in Energy and Downstream Processing in Agro-Food Industry
12 apr 2022
Edited by: Adolfo Iulianelli, Alfredo Cassano, Carmela Conidi, Konstantinos Petrotos
eBook ISBN: 9780323885522
Paperback ISBN: 9780323852531

Description
Membrane Engineering in the Circular Economy: Renewable Sources Valorization in Energy and Downstream Processing in Agro-food Industry describes the modification of the general concept of "waste," including waste valorization as added-value products that are useful for energy production and biotechnology industries. Speaking to the relevance of this new vision, the book highlights the fundamentals of membrane operations in the exploitation of renewable sources for energy production and the valorization of agro-food waste at the industrial level. This book is an excellent resource for researchers, biologists, membranologists and engineers in chemistry, biochemical engineering, food sciences and the agro-food refinery industry.

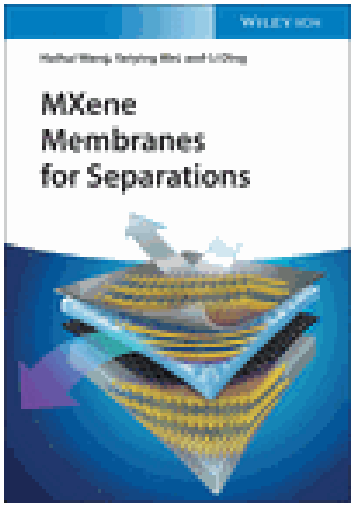
Key Features
Discusses membrane engineering for agro-food wastes' transformation into added-value products
Presents circular and zero-waste economy principles pursued by membrane technology and applied to the agro-food industry
Includes potentialities of agro-food wastes for renewable and energy production via membrane operations



Membranes with Functionalized Nanomaterials
Current and Emerging Research Trends in Membrane Technology
1st Edition - April 13, 2022
Editors: Suman Dutta, Chaudhery Mustansar Hussain
Paperback ISBN: 9780323859462
eBook ISBN: 9780323859424

Description
Membranes with Functionalized Nanomaterials: Current and Emerging Research Trends in Membrane Technology provides researchers and practitioners with basic and advanced knowledge of sustainable membrane technology. The book summarizes recent progress made in novel functionalized nanomaterials (FNMs) used in modern membrane technology. It gives a comprehensive overview of state-of-the-art technologies in the field of nanomaterial-based membranes and provides in an in-depth and step-by-step way the foundational scientific knowledge on various sustainable membranes with FNMs technologies and their impact on society and in various industries. In addition, readers get a handbook in a compact form with various aspects of FNMs-based sustainable membranes.
Key Features
Explores innovative strategies to fabricate functionalized nanomaterials-based membranes

Evaluates the advanced functionalized nanomaterials-based membranes and other transformational options
Offers a detailed spectrum of applications of sustainable functionalized nanomaterials-based membranes



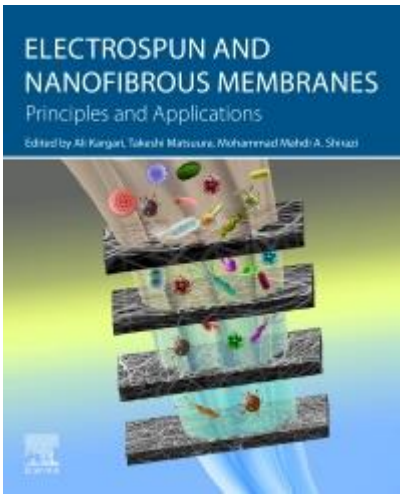
MXENE MEMBRANES FOR SEPARATIONS

Author(s):
Haihui Wang, Yanying Wei, Li Ding
First published:14 January 2022
Print ISBN:9783527347940 |Online ISBN:9783527828845 |DOI:10.1002/9783527828845

Explore critical and groundbreaking MXene applications and technologies
In *MXene Membranes for Separations,* a team of distinguished researchers delivers a comprehensive and instructive summary of the latest research and techniques in the development of MXene. It offers an insightful view of MXene properties as a membrane in separation applications, including gas separation, ion sieving, solvent dehydration, nanofiltration, and ultrafiltration.
Covering various aspects of two-dimensional membranes based on MXene materials, the book summarizes the separation mechanism, compares separation performances, and analyzes the advantages and disadvantages of different approaches. It also considers the research and industrial prospects of current MXene membranes for separation applications on nanofiltration, gas separation, ion sieving, solvent dehydration, and water/oil separation.
The book also includes:

- A thorough introduction to 2D membranes, including membrane development, separation mechanisms, and fabrication methods
- Comprehensive explorations of MXene nanosheets and membranes, including the preparation and characterization of MXene nanosheets and membranes
- Practical discussions of MXene membranes for the isolation of antibiotics, including explorations of physical adsorption and advanced oxidation
- In-depth examinations of MXene membranes for ion separation

Perfect for membrane scientists, materials scientists, and inorganic chemists, *MXene Membranes for Separations* will also earn a place in the libraries of complex chemists and engineering scientists seeking a timely overview of critical MXene applications.



Electrospun and Nanofibrous Membranes Principles and Applications

1st Edition - September 1, 2022
Editors: Ali Kargari, Takeshi Matsuura, Mohammad Shirazi
Paperback ISBN: 9780128230329

Description
Electrospun and Nanofibrous Membranes: Principles and Applications covers the fundamental basic science and many engineering aspects of electrospun membrane technology and nanofibers, membrane design and membrane processes. The book comprehensively reviews a wide range of applications including pressure-driven processes, MD process, batteries, oil-water separation, air filtration, drug delivery, fuel-cells, and ion-exchange membranes, as well as antimicrobial membranes. Electrospun and Nanofibrous Membranes will be useful for a range of audiences: chemical, polymer, and materials

engineers; professors and graduate students working on membrane-based separation technology and electrospun nanofibers; as well as R&D engineers in industry working with applications including water and wastewater treatment, desalination, drug delivery and tissue engineering, new generation of batteries, fuel cells, and air filtration.

Key Features

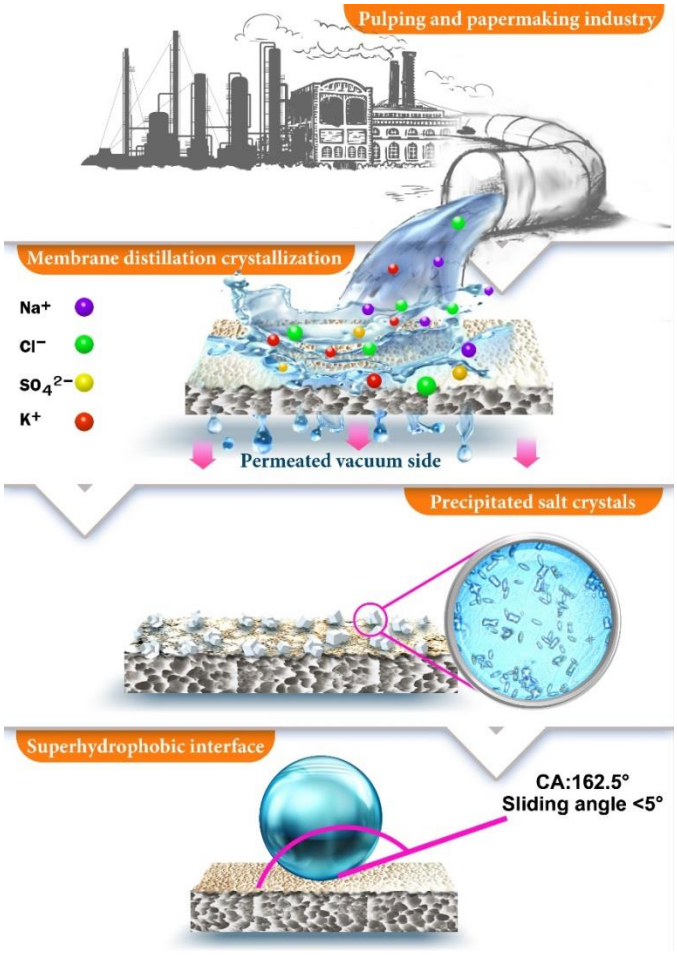
Introduces comprehensively the principles of electrospinning and electrospun membranes
Reviews and evaluates the different configurations of electrospinning
Discusses scale-up strategies for nanofiber production

Focus on Research

NEW ACHIEVEMENTS OF ENHANCED PVDF MEMBRANES FOR RO BRINE TREATMENT IN NANJING TECH UNIVERSITY!

In pulping and papermaking wastewater, large amounts of lignin, hemicellulose, organic matter and inorganic salts are present. Therefore, treatment and discharge of pulping wastewater are important. Nanjing Tech University has designed and developed the world's first zero liquid discharge (ZLD) system for it based on pretreatment-membrane-evaporative crystallization integrated technologies. However, for the treatment of high salty reverse osmosis (RO) brine, there are still challenges that need to be addressed.

Recently, the feasibility of using membrane distillation crystallization (MDC) process to treat high saline RO brine was investigated. Two different coating materials, Hyflon AD 40H and perfluoropolyether (PFPE), were applied to improve the membrane surface hydrophobicity for stable and efficient performance. Due to the complex composition of feed brine and insufficient hydrophobicity of commercial PVDF membranes, membrane fouling and membrane wetting occurred during MD operation. Yet, coating membranes with Hyflon and PFPE could improve the hydrophobilicity, operating cycle of the process and the quality of the permeate water significantly. The surface water CA and adhesion force were measured. The CA values of the composite Hyflon/PVDF and PFPE/PVDF membranes were 138.4° and 157.7°, respectively. The composite PFPE/PVDF membranes showed the best repellency toward RO brine and its adhesion force in RO and concentrated brine were 78.48 and 110.85 μN, respectively. The composite PFPE/PVDF membrane was tested for treatment of concentrated RO brine (initial TDS=25 g/L) by MDC. During 70 hours of operation, no membrane wetting occurred. After 72 h, there was a steep decrease in the permeate flux, and salt crystals began to precipitate and were detected in the feed tank. As MDC progressed, the crystals continued to grow, accumulate and deposit. The shape and size of the crystals were observed by optical microscopy and most crystals were cubic. From 72 h to 73 h, the calculated *CV* value increased from 28.3% to 38.6%, indicating the continuous nucleation and growth of crystals during the MDC process. Finally, the salts were extracted and analyzed. The purity of NaCl was as high as 94 wt%. In general, the improved MDC process could be used to achieve ZLD in pulping brine treatment.

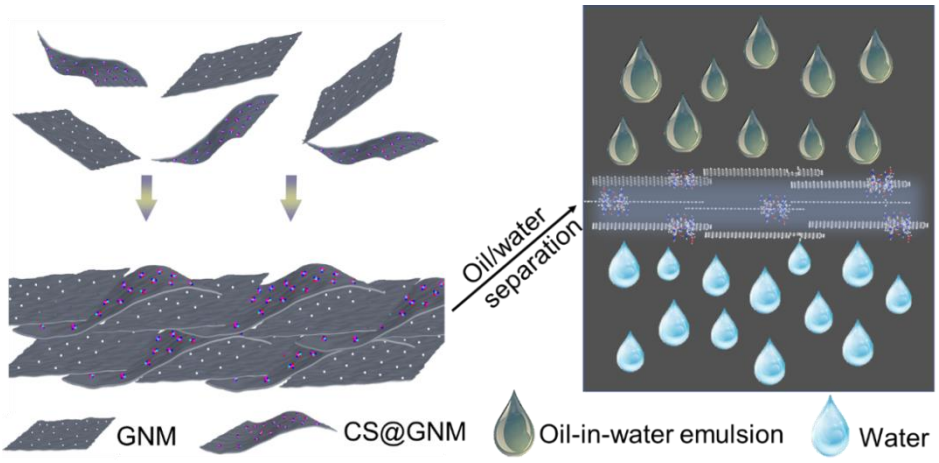


This work was recently published on *Desalination*: Jun Pan[1], Min Chen[1], Xianli Xu, Shi-Peng Sun, Zhaohui Wang, Zhaoliang Cui*, Weihong Xing*, Naser Tavajohi, *Enhanced anti-wetted PVDF membrane for pulping RO brine treatment by vacuum membrane distillation*, DOI: https://doi.org/10.1016/j.desal.2021.115533.

PROFESSOR YANAN LIU, SCHOOL OF CHEMICAL ENGINEERING, HAINAN UNIVERSITY, HAS PUBLISHED THE LATEST RESEARCH RESULTS ON AFM: GRAPHENE NANOMESH MEMBRANE FOR FAST SEPARATION OF OIL-IN-WATER EMULSIONS

Recently, Professor Yanan Liu of the school of Chemical Engineering and Technology of Hainan University published a research paper entitled *"Cell membrane-inspired graphene nanomesh membrane for fast separation of oil-in-water emulsions"* in the international journal *Advanced Functional Materials* (IF=18.808).

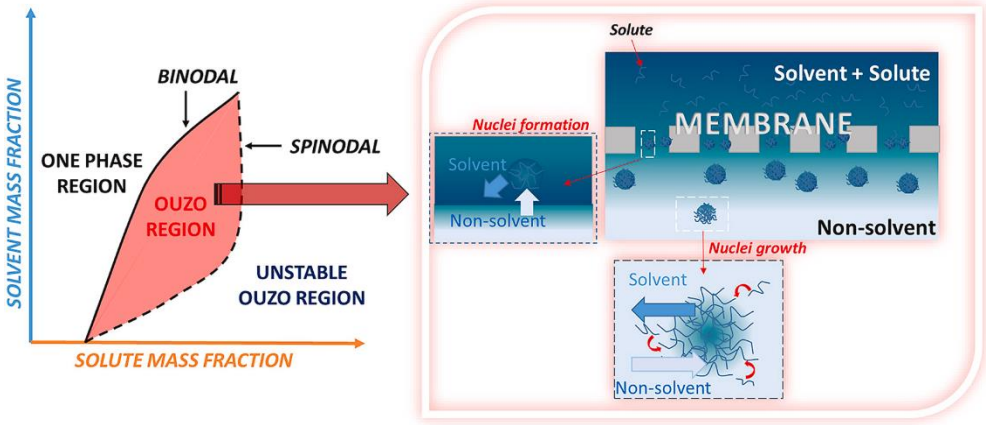
Inspired by the cell membrane structure (including hydrophilic gates for selective transport and aquaporins with hydrophobic channels for low friction with water), Professor Yanan Liu of Hainan University and Professor Marc-Olivier Coppens of UCL in the United kingdom prepared a graphene nanomesh (GNM) membrane through a vacuum assisted self-assembly device. Graphene Nanomeshs were prepared by constructing nanopores on GO nanosheets to increase the number of mass transfer channels and reduce the length of mass transfer channels. Combined with the low friction between graphene sheet and water, ultra-fast and selective water flux is achieved. Hydrophilic chitosan is used to modify GNM to construct a hydrated layer, thereby inhibiting pollutants from contacting the membrane surface. Therefore, the permeate flux of the graphene nanomesh membrane is almost 4000 L m^{-2} H^{-1} Bar^{-1}, which is about 260 times than that of the GO membrane. The membrane showed excellent antifouling performance in separating oil-in-water emulsions stabilized by various surfactants. The water flux recovery rate of various emulsions exceeded 96.7%, and remained above 95.2% after three cycles.



MEMBRANE NANOPRECIPITATION: FROM BASICS TO TECHNOLOGY DEVELOPMENT

Emma Piacentini, Beatrice Russo, Fabio Bazzarelli, Lidietta Giorno
National Research Council of Italy, Institute on Membrane Technology, CNR-ITM, Via P. Bucci, 17/C, 87036, Rende, Cosenza, Italy

Journal of Membrane Science, Volume 654, 15 July 2022, 120564



- Membrane nanoprecipitation (MN) is an emerging membrane contactor process.
- The membrane promotes efficient mixing of solvent and non-solvent at the pore opening.
- The membrane acts as a high throughput supersaturation system.
- The formation of nanoparticles (NPs) is determined by the thermodynamics of the system.
- NPs with size smaller than the pore size are obtained.

Abstract
The high potential of nanomaterials in different fields, from aerospace applications to healthcare technology and medical diagnostics, requires new production methods to build and control particle structure properties in large-scale manufacturing with lower energy and material consumption to enable wide penetration of the industrial sector. Membrane technology is an extremely promising, environmentally friendly and scalable method for nanoparticles (NPs) production with tremendous impact in terms of formulation quality, energy consumption reduction and waste minimization. Among the membrane-based processes for particles production, membrane nanoprecipitation (MN) is emerging as a scalable and efficient method for particles engineering at nanoscale. This review provides a detailed analysis of the current developments and efforts in the application of membrane technology for the fabrication of NPs (polymeric, liposomes and drug nanocrystals) by nanoprecipitation. In the MN process, two miscible phases (called “solvent” - which contains a solute - and “non-solvent” - which does not dissolve the solute) are separated by a membrane and meet at the pore mouth, where they mix and cause precipitation of the solute in the form of NPs. This review aims to highlight the mechanism of MN and identify the parameters that control the process. The influence of chemical parameters (such as type of solvent, non-solvent and solute), fluid-dynamic parameters (flux, wall shear stress, flow mode of operation) and membrane parameters (pore size, membrane surface wettability, pore shape and interpore distance) on the resulting nanoparticle size and size distribution was analysed. The performance of MN and other methods for producing NPs (mixing devices and microfluidics) was compared. The emerging studies on nanoprecipitation combined with membrane technology open a new window for the application of membrane science in the production of NPs to achieve a fine control of the mixing process with good accuracy and high productivity.

SOME RECENT RESEARCH ACTIVITIES AT SCHOOL OF MARINE SCIENCE AND TECHNOLOGY, SINO-EUROPE MEMBRANE TECHNOLOGY RESEARCH INSTITUTE, HARBIN INSTITUTE OF TECHNOLOGY (WEIHAI, PR CHINA)

1) Superwetting membranes for oil/water separation membranes

The authors designed serious superwetting nanofiber membranes for ultrafast oil/water separation through electronspun technology. With superwetting properties, the nanofiber membranes provide ultrafast channels for water or oil passing through while reject oil or water droplets because of the Laplace repulsion [1-4]. Consequently, the membranes shows strong promise in separating of oil-water mixtures.

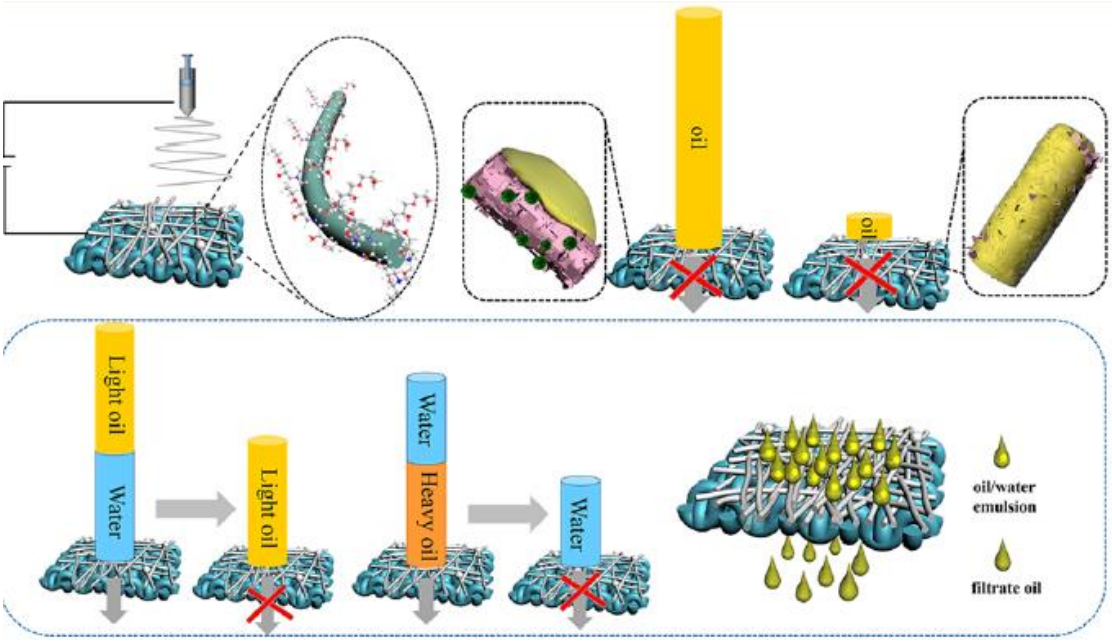


Figure 1 The design and separation process of the superwetting Janus membranes

[1] Sun Z K, Zhou Y X, Jiao Y, et al. Multi-hydrophilic functional network enables porous membranes excellent anti-fouling performance for highly efficient water remediation. Journal of Membrane Science, 2020, 608, 11891.

[2] Cheng X Q, Sun Z K, Yang X, et al. Construction of superhydrophilic hierarchical polyacrylonitrile nanofiber membranes by in situ asymmetry engineering for unprecedently ultrafast oil–water emulsion separation. Journal of Materials Chemistry A, 2020, 8: 16933-16942.

[3] Cheng X Q, Jiao Y, Sun Z K, et al. Constructing Scalable Superhydrophobic Membranes for Ultrafast Water–Oil Separation, ACS Nano, 2021, 15: 3500-3508.

[4] Chen X. Ye Y, Li Z,et al, Constructing Environmental-Friendly “Oil-Diode” Janus Membrane for Oil/Water Separation, ACS Nano, 2022, 16,3: 4684-4692.

2）Recent work on MOFs assisted nanofiltration membranes

To enhance permeance of nanofiltration membranes, we developed a serious of polyelectrolyte (PEs) modified MOFs and incorporated the MOFs into the selective layer of separation membranes. With the assistance of Pes, the MOFs could be dispersed uniformly in the selective layer during the formation of the selective layer. Because of the intrinsic porous structure and the rigid structure of the MOFs, the existence of the MOFs could increase the molecular transmission channel, improve the affinity between the membranes and the solvents, and prevent swelling of the selective layer, thereby enhancing the permeance of the membranes [1-3] without compromising the selectivity. The membranes show strong promise in molecular-scale separation, such as active pharmaceutical ingredients, active dyes, and CO_2 captures [1-3].

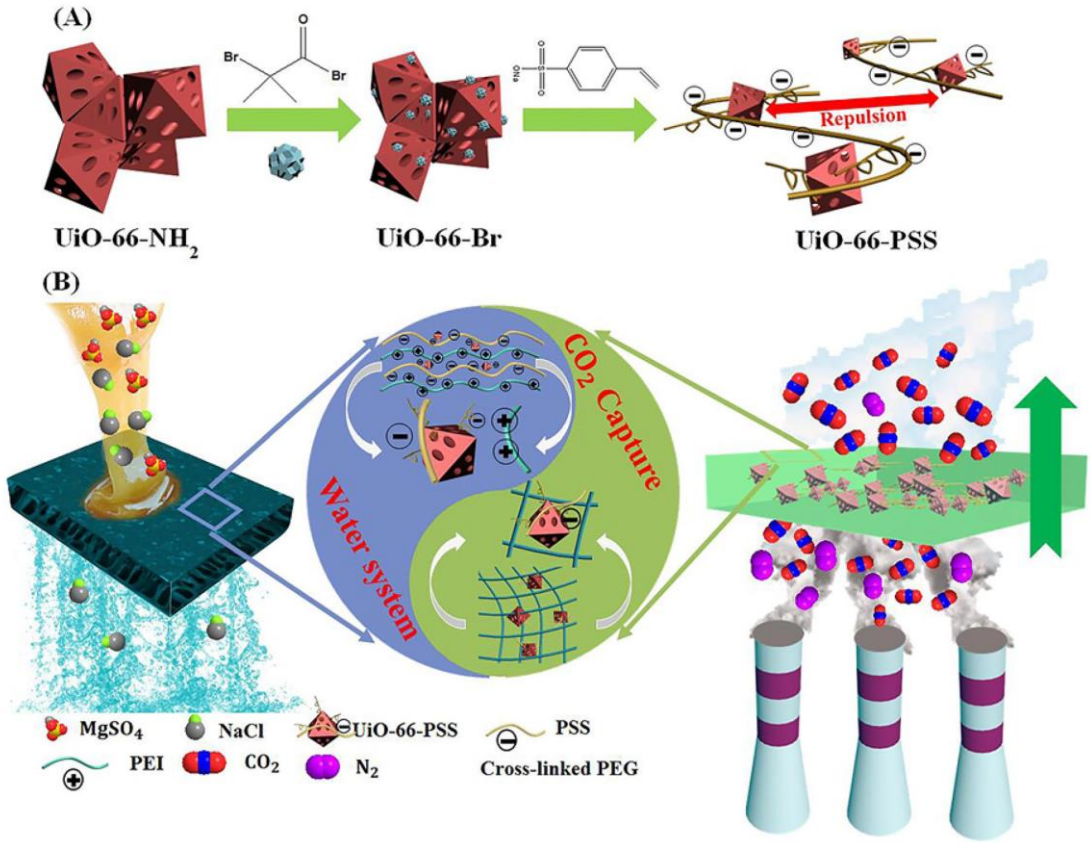


Figure. 2 The design and separation performance of the PEs modified MOFs incorporated membranes for molecular separation.

[1] Huang J. H., Cheng X. Q., Zhang Y., Wang K., Liang H., Wang P., Ma J., Shao L., Polyelectrolyte Grafted Metal-Organic Frameworks Enable Conjugated Membranes for Molecular Separation Applications in Dual Solvent Systems, Cell Reports Physical Science, 1 (2020) 100034.
[2] Huang J. H., Cheng X. Q., Bai Q., Zhang Y. J., Wang K., Ma J., Shao L., Ultrafast Poly(sodium methacrylate)-Grafted UiO-66-Incorporated Nanocomposite Membranes Enable Excellent Active Pharmaceutical Ingredient Concentration, Industrial Engineering Chemistry Research, 2021, 60,6287-6297
[3] Cheng X. Q., Li S., Bao H., Yang X., Li Z., Zhang Y., Wang K., Ma J., Ullah A., Shao L., Poly(sodium-p-styrenesulfonate)-grafted UiO-66 composite membranes boosting highly efficient molecular separation for environmental remediation, Advanced Composites & Hybrid Materials, 2021, 4(3), 562-573

3) *Research on development of nanoparticles enhanced ceramic membranes*

We are trying to bring the attractive properties of nanomaterials into ceramic membrane to enhance the membrane performance in the field of water treatment and desalination. Zero-dimensional (0D) carbon dots has been integrated into different nanomaterials due to their advantages such as low toxicity, high chemical stability, and rapid electron transfer properties. 2D covalent-organic frameworks (COFs) have been proposed as alternative candidates for molecular sieving membranes due to their abundant and well-ordered in-plane pores chemical stability. Therefore, 0D carbon dots and 2D COFs have been adopted as selective layer supported on the ceramic membranes to obtain nanofiltration membranes with excellent separation performance. (The research is in progress.)

Figure 1. Carbon dots is supported on the ceramic membrane.

Figure 2. COFs are grown on the ceramic membrane.

News of interest

EMS Best Paper Award 2022 – Deadline June 30th, 2022

he EMS Best Paper Award 2022 (1000 € plus a certificate) aims at rewarding original journal papers on Membrane Science and Engineering (from fundamentals and theoretical study of membrane-related phenomena to membrane development, applications and engineering) published during years 2020 and 2021, that made a significant contribution to the field. The paper is addressed in particular to researchers at an early career stage.

Deadline:

June 30th, 2022.

Eligibility:
– The Award is intended for original journal papers (review papers are not eligible).
– Candidates must be EMS members at the time applying for the prize and the major contributors of the paper (as described in a statement signed by all authors).
– Candidates must be Students or Young Academics, according to the definition given in the EMS Grants and Awards webpage.
– The year of the publication will be assessed based on the DOI's date.

Application:

Candidates should submit:
– Copy of their paper.
– Proof of their Student or Young Academic status, such as Student Card or PhD certificate.
– Cover letter detailing in less than 150 words the scientific quality, originality and impact of the publication, the personal contribution and any other detail useful for the evaluation of the work.
– Statement signed by all authors indicating that the applicant is the major contributor to the paper.
– Proof of EMS membership.

To the addresses: avolkov@ips.ac.ru; ems@chimie.ups-tlse.fr; e.lasseuguette@ed.ac.uk

Evaluation
Proposals will be selected against their scientific quality, originality and impact by the EMS Council members. Any conflict of interest between the contestants and the evaluators will be avoided.

The EMS Council reserves the right to decide the number of prizes to award.

Awards from MPDI Journal

membranes

MEMBRANES 2023 BEST PAPER AWARD FOR REVIEW AND RESEARCH ARTICLES

Dear Colleagues,

We are pleased to announce the "Membranes 2023 Best Paper Award" for research and review articles published in Membranes from 1 January 2021 to 31 December 2021. One review and Two research articles will each receive an award. The papers will be selected after thorough evaluation by the journal's Award Committee led by the Editor-in-Chief, Prof. Dr. Spas D. Kolev, and the winners will be announced in April 2023.

Eligibility for the Awards:
– Papers published in Membranes from 1 January 2021 to 31 December 2021;
– Open to all career levels;
– Both regular and Special Issue submissions will be considered.

Selection Criteria:
The papers will be selected by the journal's Award Committee according to the following criteria (data source: Web of Science (Clarivate Analytics)):
– Scientific merit and broad impact;
– Originality of the research objectives and/or the ideas presented;
– Creativity of the study design or uniqueness of the approaches and concepts;
– Clarity of presentation;
– Citation and download rates in 2022.

Prizes:
– One review award: 500 CHF and a chance to publish a free paper in Membranes in 2023;
– Two research articles award: 500 CHF and a chance to publish a free paper in Membranes in 2023;
– Each winner will also receive a certificate.

The winners will be announced on the journal's website in April 2023.

MEMBRANES 2023 YOUNG INVESTIGATOR AWARD FOR JUNIOR SCIENTISTS

Dear Colleagues,

We are pleased to announce that Membranes is now inviting nominations for the Membranes 2023 Young Investigator Award. This prize will be given to one young investigator in recognition of their excellence in the field of membrane technology and its applications. All nominations will be assessed by an Evaluation Committee led by the Editor-in-Chief, Prof. Dr. Spas D. Kolev.

The Prize:
− 2000 CHF (Swiss Francs);
− Option to publish one paper free of charge in Membranes after peer review before the end of 2024;
− An engraved plaque.

Eligibility and Requirements:
− Must have a PhD degree;
− Must be below 35 years of age by 31 December 2022;
− Must have produced ground-breaking research and made a significant contribution to the advancement of membrane technology and its applications;
− Candidates must be nominated by senior scientists.

List of Documents for Nomination:
– Detailed Curriculum Vitae, including an updated publication list and a list of the researcher's own research grants;
− Birth certificate or other proof of age;
− Scanned copy of doctorate certificate;
− Signed nomination letters from two established senior scientists.

Schedule:
Open for nominations: 20 January 2022
Nomination deadline: 31 March 2023
Winner announcement: 31 May 2023

How to submit nominations?
Nominations must be submitted online at https://www.mdpi.com/journal/membranes/awards. Please do not hesitate to contact membranes@mdpi. com with any question. We look forward to receiving your nominations.

Contact
Kind regards,
Membranes Editorial Office

March 22nd, 2022

CCG Book Launch Welcomes 20 Ambassadors to China

On March 15th, CCG held the launch of its latest publication China and the World in a Changing Context: Perspectives from Ambassadors to China, welcoming ambassadors from over 20 countries to witness the launch and participate in an Ambassadors Roundtable to further the discussion begun in the book.

Part of CCG's "China and Globalization" series, published in conjunction with with Springer Nature, this open access book presents China and a changing globalized world from the perspective of 23 ambassadors to China on topics including ranging from economic growth to foreign policy and SDG-related themes.

Ambassadors in China are de facto bridges between the Middle Kingdom and the outside world, sharing their first-hand experiences while in country and helping their home governments make sense of the China puzzle, working to make sure everyone makes the most of China's future. China and the World in a Changing Context has worked hard to create a balanced global perspective by gathering the views of ambassadors from both North and South countries that represent developing and developed economies.

Dr. Mabel Lu Miao, Secretary-general of CCG and co-editor of the series, gave welcoming remarks. Representing the book's publisher, Mr. William Achauer, Editorial Director for Business, Economics, Political Sciences and Law at Springer Nature, also gave his own remarks on the book and its

meaning for Springer Nature. The official launch of the book was then conducted by Dr. Wang Huiyao, CCG President and series co-editor, followed by his insights drawn from China's recent "Two Sessions". This culminated in a roundtable that included ambassadors who contributed to and supported work on China and the World in a Changing Context.
Aside from sharing commentaries on the book, the event also served as an open platform for foreign envoys to share views among themselves and with the wider community in what has become an increasingly limited stage for exchange on recent shifts and changes in the international context. Topics of discussion touched upon globalization, bilateral relations between China and other countries, the Russia-Ukraine conflict and its implications for different countries, the pandemic and resulting issues of mobility, South-South cooperation, and multilateral international cooperation in global health, trade and investment, agriculture, and climate change.

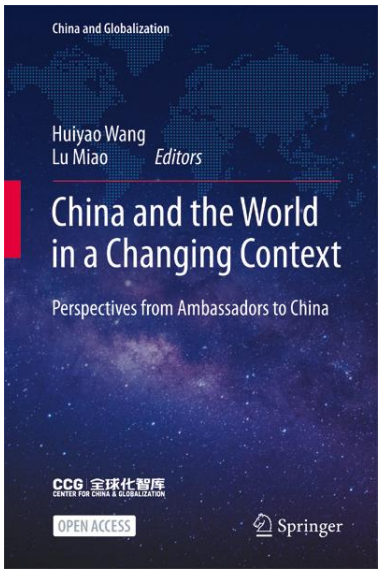
List of roundtable participants (in country order):

H.E. Rahamtalla Mohamed Osman, Permanent Representative of the African Union to China
H.E. Nicolas Chapuis, European Union Ambassador to China
H.E. Paulo Estivallet de Mesquita, Ambassador of Brazil to China
H.E. ZHAN Yongxin, President of China National Committee for Pacific Economic Cooperation (CNCPEC)
Mr. GOU Haodong, CCG Senior Fellow; former Deputy Representative of the Chinese Mission to the African Union
H.E. Luis Diego Monsalve, Ambassador of Colombia to China
H.E. Carlos Miguel Pereira Hernández, Ambassador of Cuba to China
H.E. Mohamed Elbadri, Ambassador of Egypt to China
H.E. Teshome Toga Chanaka, Ambassador of Ethiopia to China
H.E. Leena-Kaisa Mikkola, Ambassador of Finland to China
H.E. Laurent Bili, Ambassador of France to China
H.E. Archil Kalandia, Ambassador of Georgia to China
H.E. Raja Dato' Nushirwan Z.A., Ambassador of Malaysia to China
H.E. Jesús Seade Kuri, Ambassador of Mexico to China
H.E. Signe Brudeset, Ambassador of Norway to China
H.E. José Augusto Duarte, Ambassador of Portugal to China
H.E. Basil Constantinescu, Ambassador of Romania to China
H.E. James Kimonyo, Ambassador of Rwanda to China
H.E. Alenka Suhadolnik, Ambassador of Slovenia to China
H.E. Rafael Dezcallar de Mazarredo, Ambassador of Spain to China
H.E. Bernardino Regazzoni, Ambassador of Switzerland to China

List of observers (in alphabetical order):

Mr. Mustapha Abid, Chargé d'Affaires a.i., Embassy of Tunisia to China
Mr. Amr Abuahmed, First Secretary, Embassy of Egypt to China
Mr. Kosmachev Alexey, Second secretary, Embassy of the Russian Federation
Mr. Andrea Anastasi, Counsellor & Deputy Head Political Section, Embassy of Switzerland to China
Mr. Ruben Beltran, Head of International Cooperation, Embassy of Mexico to China
Mr. João Martins de Carvalho, Deputy Head of Mission, Embassy of Portugal to China
Mr. Mazen Flaifl, Counsellor, Embassy of Egypt to China
Mr. Fuji Taro, Counselor, Embassy of Japan to China
Mr. Óscar Gasca, Counsellor, Embassy of Colombia to China
Ms. Mari Korhonen, Commercial Counsellor, Embassy of Finland
Ms Aire KORK, First Secretary, Political Section, Delegation of EU to China
Mrs. Natthira Krasaesarn, Minister-Counsellor, Embassy of Thailand to China
Ms. Henriette Kristensen, Counselor, Embassy of Denmark

Mr. Thomas Langelaar, Delegation of EU to China
Dr. Leana Li, Regional Director, China, Springer Nature
Mr. LUO Cheng, Director of Secretariat, China National Committee for Pacific Economic Cooperation (CNCPEC)
Mr. Hasan Mammadov, Third Secretary, Embassy of Azerbaijan to China
Mr. Garrett McDonald, Agricultural Attaché, Office of Ag. Affairs, U.S. Embassy to China
Mr. Celso de Tarso Pereira, Minister Counsellor, Embassy of Brazil to China
Mr. David Pipinashvili, Minister Counsellor, Ambassador of Georgia to China
MR. Riaz Abdul Razak, Counsellor, Embassy of Malaysia to China
Ms. Sara Rezoagli, First Counsellor, Embassy of Italy to China
Ms. SUN Juan, Deputy-Director, Department of European Affairs, Ministry of Foreign Affairs of PRC
Mr. SUN Mingxi, Counselor of Department of European Affairs, Ministry of Foreign Affairs of PRC
Dr. Miraji Ukuti Ussi, Minister Plenipotentiary, Embassy of Tanzania to China



Series Editors: Huiyao Wang Lu Miao
Publisher: Springer Nature Publishing Group

Open Position

ASSISTANT PROFESSOR IN MATERIALS CHEMISTRY/WISE FELLOW WITH FOCUS ON SYNTHESIS OF INORGANIC MATERIALS FOR GREEN ENERGY APPLICATIONS (LUND UNIVERSITY, LTH)

Subject: Materials Chemistry.

Subject description: The successful candidate will conduct research into the synthesis of new or novel materials for green energy applications. Specific focus will be on applications involving the harvesting, conversion or storage of energy from light, such as photocatalytic, photoelectrochemical or photovoltaic applications. The materials relevant to this position will be solid-state inorganic materials, but the specific choice of materials to study will be determined by the research interests of the successful candidate. Sustainability of the materials to be synthesized will be an important focus, and for instance factors such as recyclability and toxicity are important to address. Research projects that combine synthesis with materials design and modeling are also welcome. Additional efforts into materials synthesis for other types of green energy applications, such as fuel cells or batteries, are also welcome as a complement to the primary focus.

Work duties:
Employment as an Assistant Professor is a career development position, which aims for the holder to develop his or her independence as a researcher and educator. The work duties mainly involve research and teaching. The position shall include the opportunity for five weeks of training in higher education teaching and learning.
Work duties include:

- ✓ Research within the subject area.
- ✓ Teaching in the first, second and third cycles of studies.
- ✓ Supervision of degree projects and doctoral students.
- ✓ Actively seeking external research funding.
- ✓ Collaboration with industry and wider society.
- ✓ Administration related to the work duties listed above.
- ✓ Qualification requirements
- ✓ Appointment to Assistant Professor requires that the applicant has a PhD, or acquired corresponding research expertise.

Priority should be given to applicants who have completed their degree or acquired the equivalent expertise no more than five years before the last date for applications.

Assessment criteria
For appointment to Assistant Professor, the following shall form the assessment criteria:

- ✓ A good ability to develop and conduct high quality research.
- ✓ Teaching skills.
- ✓ Additional requirements
- ✓ Very good oral and written proficiency in English.
- ✓ Extensive experience with the synthesis of solid-state inorganic materials.
- ✓ Experience of postdoctoral research in a research environment other than the university at which the applicant obtained their PhD

Other qualifications
Experience with inorganic materials synthesis for the purpose of harvesting, conversion or storage of energy from light Documented ability to acquire external funding.
Consideration will also be given to ability to cooperate, drive and independence, and how the applicant's experience and skills complement and strengthen ongoing research, education and innovation within the department, and how they stand to contribute to its future development.

As part of their application the applicant is to submit a research plan clearly describing the research that will be conducted during the employment within the topic of Synthesis of inorganic materials for green energy applications. The plan should also describe how the applicant's research could complement and reinforce research at the Department of Chemistry. The quality of the research plan shall be given substantial weight in the selection of candidates. Relevance of the research plan to the specific thematic area of the position as well as the broader goals of Materials Science for Sustainability will be part of the evaluation.

Terms of employment: This is a full-time, fixed-term employment of 6 years. The employment is regulated in accordance with Chapter 4 Section 12a§ HEA.

Instructions on how to apply: Applications shall be written in English. Please draw up the application in accordance with LTH's Academic qualifications portfolio – see link below. Upload the application as PDF-files in the recruitment system. Read more:
http://www.lth.se/english/working-at-lth/to-apply-for-academic-positions-at-lth/
Key words: materials chemistry, synthesis, inorganic materials, solid-state chemistry, materials science

Promotion to Senior Lecturer in Materials Chemistry
During the period of employment, an Assistant Professor can apply for promotion to a permanent position as Senior Lecturer if he or she has the required qualifications listed below, and is deemed suitable. An Assistant Professor can only apply for promotion once.

Qualification requirements:
- ✓ Appointment to Senior Lecturer requires that the applicant has:
- ✓ A PhD or corresponding research competence or professional expertise considered important with regard to the subject matter of the post and the work duties it will involve.
- ✓ Demonstrated teaching expertise.
- ✓ Completed five weeks of training in higher education teaching and learning, or acquired equivalent knowledge by other means.

Assessment criteria
The assessment criteria specify the aspects to be taken into account, and the level to be achieved, in order for the assessment criteria to be deemed fulfilled. The following assessment criteria must be fulfilled for appointment to senior lecturer:
- ✓ A good national and international standing as a researcher. The requirement for international experience shall be assessed with consideration to the character and traditions of the subject.
- ✓ Good teaching ability, including a good ability to conduct, develop and lead teaching and other educational activities on different levels and using a variety of teaching methods.

- ✓ An ability to supervise doctoral students to achieve a PhD.
- ✓ An ability to collaborate with wider society and communicate his or her activities.
- ✓ A good general ability to lead and develop activities.

Additional requirements

- ✓ Good ability to co-operate, independence and drive.
- ✓ The applicant has shown scientific indepdence by producing several publications without their previous supervisors or mentors, where the applicant has clearly had a leading (PI) role.
- ✓ Ability to actively, independently and successfully seek external funding as main applicant This means that the applicant has received multi-year research grants from large national or international funders such as ERC, KAW, VR, Formas, etc. If the applicant has not received such funding as main applicant they must be able to show very good evaluations from the application process.

LTH forms the Faculty of Engineering at Lund University, with approximately 9 000 students. The research carried out at LTH is of a high international standard and we are continuously developing our teaching methods and adapting our courses to current needs.

We kindly decline all sales and marketing contacts.

Type of employment :Temporary position longer than 6 months
Contract type: Full time
First day of employment: As soon as possible
Salary: Monthly
Number of positions 1
Working hours 100 %
City: Lund
County: Skåne län
Country: Sweden
Reference number PA2022/1727
Contact
Leif Bülow, +46462229594
Union representative
SACO:Saco-s-rådet vid Lunds universitet, 046-2229364,kansli@saco-s.lu.se
OFR/ST:Fackförbundet ST:s kansli, 046-2229362,st@st.lu.se
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ikerbasque
Basque Foundation for Science

10 positions for independent researchers: Ikerbasque Permanent Positions 2022
We are launching a new international call to strengthen scientific research in the Basque Country.

Permanent Positions

PhD degree
before Jan 2014

Applications from women
are especially welcomed.

Deadline
September 8th

Should you know any colleague who meets the call requirements and may be interested, please do share

Location: University of Basque Country, Spain
Position: PhD

1. Project details

Description: Development of new supported Pd alloys membranes for H2 production.

Starting date will be end of June 2022, although it can be postponed few weeks in case needed to finish MSc or its thesis.

Most of the research tasks will be done within Membrane Technology Group at Tecnalia R&D facilities at San Sebastián (Spain). Eventually, some of the work related to the membrane manufacturing optimization, will take place at H2SITE facilities at Loiu (Spain). We are opened to those research stays aligned with the project goals proposed by the student or supervisors.

2. Guidance

PhD title will be obtained in Department of Chemical and Environmental Engineering at University of Basque Country (UPV-EHU).
There will be daily support from H2SITE (dr. Jon Meléndez). Supervision by dr. Alfredo Pacheco Tanaka (from TECNALIA R&D Center) will be carried out too.

3. Objectives and planning
The main goals to be carried out by means of the PhD position are:
• Develop new Pd membranes alloys (i.e Ru, V, Y, Nb,) by electroless plating, electroplating (EP) or physical vapour deposition (PVD) on commercial porous supports. Selective layer no thicker than 5 µm.
• Study of new Pd membrane alloy deposition process parameters and work toward their optimization.
• Definition of quality control values to be implemented in an industrial scale production line and assess their integration in membrane reactors.
• Characterization of main permeation membrane properties under single gas and mixed gas composition, targeting the most interesting applications (industry driven).
• Long-term stability study of Pd-based membranes under fluidization conditions.

Main characterization techniques that will be used all along the PhD are SEM, TEM, XRD, Capilary Flow Porometry, Gas permeation tests (room and high temperature, up to 550 °C) and ICP. Other techniques that can help to tackle the goals described above, are not ruled out.

Results and objectives are aligned both with patenting and publishing in order to strengthen the Intellectual Property of H2SITE and to give your work visibility among scientific community in order to get the PhD title.

4. Requirements
Education: Chemist, Chemical Engineering, Material Engineering or similar. Master's degree on similar in a period of less than 3 years
Languages: High level of spoken and written English.
Personal skills: Interpersonal skills, ability to function in a multidisciplinary environment and with a spirit of teamwork, conflict resolution. Goal-oriented and self-sufficient work style

5. Contact
Please, send your CV and cover letter to: jon.melendez@h2site.eu;
Tlf: +34 667 11 96 39

Deadline to receive CVs: 31/07/2022

ASSISTANT PROFESSORE MEMBRABNE PROCESS DESIGN (UNIVERSITY OF TWENTE, ENSCHEDE, NETHERLANDS)

Job description
The Membrane Science & Technology (MST) cluster of the University of Twente has a long, strong and pioneering history in membrane science and technology. The MST cluster is looking for an ambitious and inspiring colleague at the level of assistant professor to contribute to our research and education activities in the area of membrane process design.

Membrane processes have successfully entered several markets, e.g., gas separation, drinking water production and food processing, providing sustainable separation solutions. Further implementation of attractive membrane technology involves clever process design based on state-of-the-art membrane characteristics. The candidate will propose and investigate improvements and new designs of relevant separation processes, related to future challenges including water stress, resource recovery, concentrate disposal and reducing industrial process energy demands in an environmentally-friendly manner. Within your research line you will have ample opportunity to collaborate with the other staff members within the MST cluster that can bring in complementary expertise on membrane materials, process design, mass transport and applications.

In addition to research, you will significantly contribute to the education of our students, by coordinating, developing and teaching courses in the Bachelor and Master programmes of Chemical Engineering.

Moreover, you will actively contribute to a safe, inspiring and collaborative atmosphere within the MST cluster, the faculty of TNW and the university as a whole.

Your profile
You should possess an excellent scientific track-record, as demonstrated by high-quality output in the form of publications, theses or other peer-reviewed materials. A successful candidate will also demonstrate their intrinsic motivation and strong abilities for teaching at the bachelor and master level. For this reason, the candidate is expected to be an excellent and motivational lecturer. To promote gender diversity in our team and research cluster, we specifically invite women to apply.

You have a PhD in chemical engineering or a related discipline with a proven track record of scientific publications in the area of separation processes.
You are motivated by practical applications of your research both in industry as well as society at large, with a focus on environmental and sustainability challenges.
You have strong abilities for high-quality research, a clear vision for education and a strong affinity with teaching?
You have a demonstrated ability of initiating research / research proposals and projects.
You are a team worker, capable of strengthening the MST cluster.
You are fluent in spoken and written English. Fluency, or willingness, to learn Dutch is an advantage.
You have a University Teaching Qualification (UTQ, Dutch: BKO) or equivalent or are willing to acquire one within three years.
Our offer

We offer a fulltime, structural position, starting with a temporary appointment with the prospect of a permanent position after a positive evaluation.
You will work in a lively, inspiring and dynamic working environment in an organization focusing on collaboration and inclusion, where you will have a high degree of responsibility and independence.
Our terms of employment are in accordance with the Dutch Collective Labor Agreement for Universities (CAO) and include a holiday allowance of 8% of the gross annual salary and a year-end bonus of 8.3 %.
Depending on your relevant background and experience, the gross monthly salary on a full-time basis ranges from € 3.974,- to € 6.181,- per month.
A minimum of 29 leave days in case of full-time employment based on a formal workweek of 38 hours. A fulltime employment in practice means 40 hours a week, therefore resulting in 96 extra leave hours on an annual basis.
A family-friendly institution that offers parental leave (both paid and unpaid) and career support for partners.
Furthermore, we offer excellent professional and personal development programs.
Information and application
To promote gender diversity we strongly encourage female scientists to apply. This is part of the University of Twente's strategy and our faculty boards commitment to increase the proportion of women among its faculty and to create a working environment that is diverse and inclusive and supportive of excellence in research and teaching.

Are you interested in joining our team? Please submit your application before September 30, 2022 via the "Apply Now" button below, including:

A curriculum vitae, including at least three relevant academic references.
A plan highlighting the applicants future directions in both teaching and research (3-5 pages).
A cover letter in which you describe your motivation and qualifications for the position.
You are welcome to contact prof. dr. Wiebe M. de Vos via w.m.devos@utwente.nl, for any questions you might have.

About the department
The Membrane Science and Technology Cluster

Membrane science has been an important focus point at the University of Twente for over 50 years. Research and education on this important topic is embodied by the MST cluster, where over 60 researchers collaborate, sharing infrastructure, expertise and knowledge. The MST cluster has a flat organizational structure where all staff members are involved in strategic and organizational decisions. The aim of the MST cluster is to be the world leader in membrane education and research through: 1) The creation of an attractive, inclusive and stimulating research environment. 2) Training of students in a safe environment to become responsible engineers with a critical attitude. 3) Research that combines a high degree of novelty with clear societal relevance.

Faculty of Science and Technology

Our scientists are recognized worldwide for their high quality research. Within the Faculty of Science and Technology, research is focused on nanotechnology, biomedical engineering, clinical technology, sustainable energy technology and smart devices. There is a strong collaboration with

industrial partners and other national and international research institutes. Research is funded to a large extent by industrial and other external partners, as well as science foundations. We offer a range of bachelor and master courses in Chemical Engineering, Applied Physics, Biomedical Technology, Technical Medicine, Advanced Technology and a master in Nanotechnology.

About the organization

The Faculty of Science & Technology (Technische Natuurwetenschappen, TNW) engages some 700 staff members and 2000 students in education and research on the cutting edge of chemical technology, applied physics and biomedical technology. Our fields of application include sustainable energy, process technology and materials science, nanotechnology and technical medicine. As part of a people-first tech university that aims to shape society, individuals and connections, our faculty works together intensively with industrial partners and researchers in the Netherlands and abroad, and conducts extensive research for external commissioning parties and funders. Our research has a high profile both in the Netherlands and internationally and is strengthened by the many young researchers working on innovative projects with as doctoral candidates and post-docs. It has been accommodated in three multidisciplinary UT research institutes: Mesa+ Institute, TechMed Centre and Digital Society Institute.