Institutions/Companies Description

MemBridge - First Partnering conference

December 7, 2009, Brussels, Belgium

1. Aquamarijn Micro Filtration (The Netherlands)

Aquamarijn is engaged in developing micro filtration membranes based on semiconductor fabrication technology. Aquamarijn is also very active in the development of microstructured polymeric flat sheet and capillary membranes in close collaboration with the University of Twente. Both type of membranes open up a whole new area of filtration applications that have not been possible before: separation of cells or particles on size; low pressure filtration thereby minimising fouling rate; a low internal membrane volume thus no protein loss during processing; an extremely smooth membrane surface that declines the anchoring of cells or fouling to it. An application on beer clarification has been pursued with Grolsch since 1997. Milk filtration experiments started since 2000 with Friesland Coberco Foods.

Currently Aquamarijn works towards microstructured capillary membranes for ultrafiltration of water together with the Membrane Technology Group of the University of Twente.

Also new applications came across: the membranes enabled users to generate monodisperse droplets, either to study emulsification processes or to generate aerosols.

Aquamarijn researchers are experts in their own specific but diverse fields of chemistry, electrical engineering, MEMS and physics, but they don't refuse to look 'over the fence' and get that specific knowledge or technology that customers need.

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2. Céramiques Techniques et Industrielles S.A. (France)

CTI is born in 1990. The first aim of the society was the manufacture of porous ceramic supports and membranes for ultra and microfiltration. Then the activity of the society has grown up and now CTI is specialized in perfecting the design of a wide range of technical ceramics often porous, whose applications are mainly in environment, filtration and catalysis fields. These include:

- Liquids filtration: membranes supports in ultra and micro filtration.
- Gas and particles filtration: tubular, flat, honeycomb, foam filtration carriers.
- Catalysts supports: granules with high specific surface area, honeycombs, smooth and grooved porous rings.
- Liquid metals filtration: honeycombs and foams refractories.
- Special refractories: withstanding temperatures higher than 1600C°-33 and 34 class bricks.
- Special ceramic coatings for catalysis and SOFC applications

CTI is not only producing its own products but is also involved actively, through several European Programs, in the third millennium ceramics optimisation like catalytic diesel exhaust treatment, new exhaust pipes catalysts, new organic/inorganic membranes for gas filtration and separation and SOFC.

CTI is a ceramic supplier and the various fields in which CTI is involved gives it a know how in porous supports design (tubular, flat, foams, honeycombs, etc.) in a large variety of materials (Al_2O_3, TiO_2, SiC, ZrO_2, Y_2O_3, cordierite, mullite, etc.) with a porosity and pores size distribution well controlled.

Its activity in catalysis and membrane fields also gives to CTI learning in coatings with various oxides mainly with fluorite or perovskite structures with an electronic/ionic conductivity or catalytic activity as CeO_2, LSM or zeolites. CTI develops its coating activity with new nanomaterials.

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3. DECHEMA (Germany)

The DECHEMA (Society for Chemical Engineering and Biotechnology) is a non-profit making scientific and technical society based in Frankfurt on Main. It was founded in 1926. Nowadays it has over 5000 private and institutional members. Its aim is to promote research and technical advances in the areas of chemical engineering, biotechnology and environmental protection.

Its work is interdisciplinary, with scientists, engineers, and technologists working together under one roof. Experts from science, business, and government departments cooperate in working parties and subject divisions. This is the strongest society in Europe and it holds a leader position in the framework of the European Federation of Chemical Engineering (EFCE – 25,000 members). It has today a specific interest in membrane technologies. Through it, tight contacts may be expected with the largest chemical companies in Europe and the SUSCHEM platform, the European Technology Platform for Sustainable Chemistry. This platform brings together a wide spectrum of organizations and individuals, looking to boost sustainable chemistry, industrial biotechnology and chemical engineering research, development and innovation in Europe.

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4. ENMIX

European Nanoporous Materials Institute of Excellence INSIDE-PORes, ENMIX is the Durable Integrated Structure created to insure the mid-long term durabilility of the INSIDE-PORes Euroepan Network of Excellece. Founding members: University of Antwerp, TUDelft, SINTEF, University of Alicante, University of Stuttgart, University of Hannover, University of Leipzig, CERTH, Demokritos, IFE.

The objectives of ENMIX are to promote excellence and to coordinate research in the area of preparation, characterization and industrial applications of nanoporous materials.

The ENMIX mission is to offer: innovative technological solutions, unique scientific measuring expertise and facilities and science-based advice and training with the goal of stimulating sustainable development and strengthening the economic and societal development in Europe.

Contact person: Prof Etienne VANSANT (etienne.vansant@ua.ac.be)

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5. EURODIA Industrie S.A. (France)

Eurodia Industrie is a dynamic and innovative French separation process company with over eighteen years of experience in the design, construction, and operation of plants featuring: Electrodialysis, Electrodialysis Reversal, Electrodialysis with Bipolar Membranes, Ion Exclusion Chromatography, Microfiltration, Nanofiltration / Ultrafiltration, Ion Exchange Resins.

The principal mission of Eurodia Industrie is to select, evaluate, and apply a combination of processes to provide the best technical and economical solutions to its customer separation problems.

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6. European Membrane House, EMH

The European Membrane House is a non-profit making international association set up in 2008 by universities and research institutes in 10 European countries working together within the framework of NanoMemPro (FP6 Network of Excellence, the EMH is the Durable Integrated Structure created to insure the mid-long term durabilility of the Network action after the end of the EC project (end of February 2009). The European Membrane Society is also an EMH founding member.

The European Membrane House coordinates MemBridge project on behalf of all 13 institutions making part of the NoE NanoMemPro (among the most important scientific institutions in the field of membranes in Europe) and the European Membrane Society (EMS).

EMH is dedicated to enhance the industrial implementation of membrane-based technologies. It also wants to help develop a coherent and structured European system for membrane research and technological innovation. This we achieve thanks to: institutional lobbying, developing research and industry partnerships and offering facilitation services.

Contact person: Prof Gilbert RIOS (gilbert.rios@iemm.univ-montp2.fr)

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7. European Membrane Society, EMS

The « European Membrane Society », founded in 1982, is an international scientific non-profit association whose aim is to promote cooperation between European Scientists and Engineers involved in research and development in the field of synthetic and artificial membranes and membrane processes. The Society shall pursue its objective using various means, including:

- Organising conferences, periodic meetings, workshops and study groups
- Publishing and circulating books, papers and newsletters containing information of interest to workers in the membrane field
- Contributing to the development of a common language among scientists of the different disciplines (physical chemistry, chemical engineering, biology, bioengineering, medicine, ...);
- Developing Membrane and membrane processes,
- Stimulating exchange visits between membrane scientists and engineers of different countries
- Analysing the development of activities in the field of membranes in order to work out guidelines and give advice to various Councils and funding agencies. If the need arises, the Society could assure the dissemination of results of European programs of study or research.

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8. Institute on Membrane Technology, ITM-CNR (Italy)

The Institute for Membrane Technology (ITM-CNR) is a structure created by the National Research Council of Italy (CNR - Consiglio Nazionale delle Ricerche) for the development, at national and international level, of membrane science and technology. The Institute is located in the existing structure of the University of Calabria, Rende (Cosenza), with a section located at the University of Padova.

ITM-CNR is a multidisciplinary Institute based on backgrounds in chemical engineering, process engineering, chemistry (organic and physical), biological science, food science, material science and physics. The main research activities are: Membrane preparation and characterisation, Fundamental studies of transport phenomena in inorganic, polymeric and biomimic membranes, Catalytic membranes and membrane reactors, Integrated membrane operations, Membrane distillation and Membrane Contactors, Bio-artificial organs and bio-medical devices, Polymeric membranes as coatings and in packaging.

The ITM-CNR is also partner in several projects founded by the European Community. The Institute actively cooperates with many national and international industrial groups.

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9. Kuban State University, Membrane Institute (Krasnodar, Russia)

The Membrane Institute at Kuban State University (KubSU) is known by its contribution to fundamental as well as applied aspects of **electromembrane processes**. The staff is composed of 35 persons, including 10 Doctors of Sciences and 8 Candidates of Sciences (equivalent to PhD), and 12PhD students. There is equipment and long-term experience in ion-exchange membrane synthesis and modification, in experimental and theoretical study of transport phenomena in membrane systems.

Many efforts were applied in improving experimental measuring methods and elaborating cells for electrochemical measurements and membrane characterisation. There is a group of applied mathematicians who develop methods specially intended for resolving transport problems in membrane systems. Numerical and analytical methods have been elaborated for treating the problems based on the Nernst-Planck, Poisson and Navier-Stokes equations in 2D. There are several softwares developed: a data base on ion-exchange membrane properties accumulating the data for more than 40 different membranes fabricated by all leading companies; a data base on results of ED and EDI stacks characterisation permitting to compare different apparatuses and make the simulations/predictions; a tool for modelling the ED processes of natural waters treatment; and other.

The team is working as well in applied areas by using ED and EDI for treating natural waters and for other applications. In this project, KubSU will be responsible for bridging cooperation between European and NIS institutions in the field of ion-exchange membranes and electric driven membrane processes. The responsible of the team involved in MemBridge is Prof. Victor V. NIKONENKO.

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10. MEGA a.s. (Czech Republic)

MEGA a.s. (Inc.) is a company providing comprehensive services in the field of environment protection, administratively divided into five branch-oriented divisions. The company offers deliveries of membrane technologies for water treatment, surface finishing and ecological services. Individual divisions are further structured into departments consisting of specialised workplaces. MEGA a.s. engages continuously in development and innovation activities. This area represents the most important part of trade and commercial activities.

The research activities in MEGA a.s. itself, carried out mainly through the Center of Research and Development, are focused on all commercial areas of the company and include basic and applied research in membrane materials, membranes, separation methods and technologies and membrane processes, as well as the field of measurements' laboratories methods that complements the comprehensive membrane program in certain aspects. Administratively, the Center of Research and Development is a part of MEGA a.s. as the independent Division and the work of its members is supported by direct links to other divisions, providing production, service and commercial activities. This creates an organizational structure capable of solving individual areas effectively and introducing the research results in industrial practice.

The achievements up to now are connected with the long-time cooperation with universities and other research institutions in the Czech Republic and abroad, which is crucial for accomplishing particular tasks and achieving desired targets (IMCH Prague, ICT Prague, University of Pardubice, etc.).

It is also very active in the field of popularization of membrane technologies in the Czech Republic, proceeding in accordance with the Czech Membrane Platform (CZEMP) and substantially funding the operation of this organization.

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11. MTB Technologies Sp. z. o.o. (Poland)

MTB Technologies Ltd - established in 2002, is a designer and producer of industrial membrane filtration systems, membrane microfiltration modules, microfiltration membranes and melt-blown filter cartridges.

- Filtration systems: for MF, UF, NF and RO / automatic or hand operated / stationary or mobile / large design experience: water processing, waste water purification (incl. MBR), liquid food processing, dairy industry, breweries and others.
- Membrane modules: containing polymeric or ceramic microfiltration membranes / submerged solutions or comprising housings / numerous industrial applications ranging from water purification, wine and juice clarification to biotechnology.
- Membranes: for cross-flow microfiltration / made in polypropylene / capillary shape / semi-symmetrical design.
- Filter cartridges: melt-blown technology / for depth filtration / absolute or nominal rated / made in polypropylene or polyamide / containing centre core or coreless.

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12. Nanocyl (Belgium)

Nanocyl is the leading global manufacturer of specialty and industrial Carbon Nanotubes Technologies (CNTs).

Nanocyl focuses its technology and know-how on the practical application of Carbon Nanotubes. It integrates the Carbon Nanotubes into new and existing materials, resulting in the improved performance of polymers, metals, composites and biomaterials.

Nanocyl offers a host of high performance, Carbon Nanotubes-based products which go beyond our customers' expectations. For example, Nanocyl produces synthetic materials and manufacture equipments for the automotive and electronic industries. Moreover, it is developing tailor-made solutions for the aeronautic, construction, sports, and marine industries.

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13. ORELIS Environnement (France)

ORELIS Environnement manufactures and sales Pleiade / Persep / Kleansep: Flat Sheet, Spiral Wound and Multi Channels Tubular Organic and Mineral Membranes.

It is a 20 people company dedicated to environmental applications in various markets as Automotive, Chemistry, Metal Working, Pharmacy, Agro-Food, Paper, and Small Collectivities.

ORELIS Environnement Team is an expert of membrane processes used in depuration and recycling of liquids.

ORELIS Environnement is active in membrane processes for more than 30 years.

As examples ORELIS Environnement has been involved in new technologies development as External Loop Membrane Bio Reactors, coupling membrane and hyper oxidation, Oily Water Separation, recycling of various products inside the process.

ORELIS Environnement is manufacturing and supplying membranes, modules, skids which will be integrated in waste water treatment plant or recycling installations.

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14. ReCO2 (France)

ReCO2 company was founded to develop a series of technologies for CO2 recycling from specific places where it is generated. Indeed, if large source solutions have at least theoretical, small average emissions and have yet to find solutions in particular vehicles and residential boilers.

ReCO2 aims with a team of scientists and technicians of high value, to implement its own technology.

Apart from this program, ReCO2 is rich with a great knowledge in application of bipolar membranes for chemical reactions generating residual salts, with return to acids and bases recyclable.

ReCO2 has acquired the rights to use patents "TETRACAT" whose application the treatment of open-air voice for innovative environments most polluted.

ReCO2 is associated with numerous correspondents throughout Europe and in the world which ensures a technology watch in real time. ReCO2 is willing to open its capital to investors and solid visionary, capable of supporting a critical phase of the boot powerful potential of its technology.

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15. Regional Inter-branch Centre YugTechInform - YTI (Russia)

Krasnodar Region is a dynamically developing Russian Region possessing high industrial, agricultural, recreational and innovation potential. The economics of the Kuban is highly diversified with inherent considerable growth rate.

Successful realization of certain strategy is possible only on condition of exercising the policy targeted at the increase of investment attractiveness of projects, Russian producers of high-tech products and suppliers of similar services support and promotion of their products and services at domestic and international markets. The ideas appearing in scientific spheres must reach production spheres and find their consumer.

With this exact purpose in mind and on the initiative of Krasnodar Region Administration Regional Inter-Branch Center «Yugtechinform» was established. Its activities are aimed at increase of competitiveness and commercial attractiveness of products of the Kuban enterprises due to use of high-technologies and realization of “science-manufacture” succession. Our company has the staff of like-minded employees including experts, scientists, technologists, economists and financiers. They have experience of work both in Russia and internationally projects.

Contact person: Prof Yuri N. KARZHAVIN (yuri_vien@list.ru)

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16. Shubnikov Institute of Crystallography, RAS (Russia)

The Membrane Technology Department (MTD) of Shubnikov Institute of Crystallography, RAS, Moscow, is known as a research center in the field of track nanomembranes on international level. The research axes comprise:

- the structure of swift ion tracks in polymers and inorganic crystals,
- the mechanism of pore forming in irradiated polymers under track chemical etching process,
- the surface properties and their effect on track nanomembrane operational properties,
- the methods of preparation and physicochemical modification of track nanomembranes, asymmetrical membranes and membranes with regular pore arrangement,
- the development of track nanomembranes appropriate to template nanostructures,
- the modeling and simulation of membrane separation processes,
- the applications of track nanomembranes.

In Russia, MTD is working in close collaboration with Flerov laboratory of nuclear reactions of Joint institute for nuclear research (Dubna), Topchiev institute of petrol- chemical synthesis of RAS, State scientific center of RF Leypunskiy physical-power institute (Obninsk), Ioffe physical-technical institute of RAS (St.-Petersburg), Tomsk polytechnic institute (Tomsk). There are many links with foreign scientific organizations in USA, United Kingdom, Germany, France, Poland, Belgium, China, Japan, and Korea.

Shubnikov Institute provides the Russian National Contact Point for the third thematic priority of the Sixth Framework Programme "Nanotechnologies and nanosciences, knowledge-based multifunctional materials and new production processes and devices" (FP6-NMP).

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17. SIA "**Radon**" (Russia)

Moscow State Unitary Enterprise - united ecological, scientific and research centre of decontamination of radioactive waste and environmental protection (SIA "Radon").

SIA Radon is included in structure of Engineering Complex Moscow Government. The enterprise has been created in 1961 for the purpose of the centralised removal of a radioactive waste in territory of Moscow and territories of 10 areas of the Central European part of Russia of radioactive substances formed at use and radio isotope sources of an ionising radiation in various industries. SIA "Radon" collects transports, processes and storages radioactive waste of low and medium activity.

Since the middle 80s in SIA "Radon" they started the design and construction of mobile liquid radioactive waste (LRW) processing facilities based on the processes of filtration, sorption, ultrafiltration, electrodialysis, etc. Starting from the 1984, over 3000 m^3 of LRW has been decontaminated using the mobile "Radon" facilities. The stationary electrochemical complex with large electrodialysis units for desalination and concentrating of 5 m^3/hr LRW has been developed, constructed and put into operation at SIA "Radon" to upgrade the existing special effluent decontamination layout.

At SIA "Radon" the "Kirus-1" facility for the underground water demineralization has been designed and successfully operated at Cyprus at an agricultural enterprise.

In 2007 at SIA "Radon" the technology for processing regeneration solutions of the ion exchange LRW decontamination stage has been developed and an experimental electromembrane complex has been constructed consisting of two electromembrane units as follows: 1) the unit for nitric acid production from regeneration solutions of the ion exchange LRW decontamination stage; 2) the unit for concentrating alkaline regeneration solutions of the ion exchange LRW decontamination stage.

During the last 5 years at SIA "Radon" enterprise the following production prototypes of new membrane units were designed and constructed:

- EDN-50 – desalination electrodialysis unit with the dilution cells loaded by the ion exchange fiber filler,
- EDK-40 – electroosmotic concentrating unit with ion exchange membranes,
- EDMA-30/175 – modular desalination electrodialysis unit.

SIA "Radon" in cooperation with partners produces ion-exchange membranes.

In State Unitary Enterprise "Radon" work about 2800 employees. Among them nearby 1200 persons have higher education, more than 120 from them have scientific degrees of doctors and candidates of sciences.

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18. Stiftelsen SINTEF (Norway)

Stiftelsen SINTEF is a multidisciplinary contract research organisation that performs research and development in technology. SINTEF is one of the largest European research institutes (staff of 2000) with an annual turnover of about 220 m€, originating from industrial research contracts as well as European and National research projects. The Department of Energy conversion and Materials belongs to the Materials and Chemistry (MC) division of SINTEF which has around 400 employees, with about 90% being scientists and technicians.

The Department of Energy conversion and Materials has extensive activities in the fields of membranes for gas separation at low and high temperature, sorbents development, hybrid materials, nano-particles, and coatings.

The department has experience from several national and European R&D programs within the 5th, 6th and 7th as coordinator and core partner. The department has significant R&D activities in the areas of CO2 capture and H2 production, as highlighted with its participation in several European projects (Compose, Encap, CACHETI-II, DECARBit, iCap and CAESAR). The department conducts leading-edge studies on low and high temperature CO2 selective membranes, high temperature metallic-based H2 membranes, high temperature ceramic H2 conducting membranes, materials for chemical looping combustion, CO2 chemisorbents and O2 selective membranes. The department has well-equipped laboratories, and experienced personnel for these purposes.

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19. A.V.Topchiev Institute of Petrochemical Synthesis - Russian Academy of Science, TIPS (Russia)

Topchiev Institute (TIPS) is the leading centre in Russia involved in diverse fundamental and applied studies in membrane science and technology covering the following directions:

- gas separation membranes and processes, pervaporation, nanofiltration (non-aqueous),
- membrane catalysis and catalytic membrane reactors (including bio-reactors),
- membrane contactors.

The membrane R&D in the Institute started in early 70s, later on these activities are carried out at Membrane Research Center (MRC) within the Institute. An important feature of MRC is that it includes all the necessary components for the development of membrane materials, membranes themselves, and separation processes. The laboratories of MRC are engaged in directed synthesis of polymers as prospected membrane materials, development of novel methods for membrane formation (membranes with nano-size and fractal structures), membrane materials studies including mathematical modelling and multi-scale simulation. A Database “Gas permeation parameters of polymers” was created (730 polymers); it enables us to predict the transport parameters of membrane materials on the basis of their chemical structure. An important direction of applied research is integrated systems for environmental protection.

MRC comprises the staff of about 60 persons including 12 Doctors of Science, 18 Candidates of Science (PhD), about 25 junior researchers and PhD students.

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Prof Vladimir V. VOLKOV (vvvolkov@ips.ac.ru)

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20. University of Bologna (Italy)

Contact person: Giulio C. SARTI (Giulio.sarti@mail.ing.unibo.it)

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21. University of Paris 12 (France)

The laboratory Laboratory of Ion Exchange Materials (LMEI) of the University of Paris 12 is specialized for several years in the characterization and modeling of ion exchange membranes and some processes that use them. The main areas of research LMEI are:

- Static and dynamic characterization of ion exchange membranes (IEM)
- Modeling of transport phenomena through the MEI
- Development of new membrane processes

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22. VITO (Belgium)

VITO, Flemish Institute for Technological Research, implements client-driven research projects and develops innovative products and processes. Specific problems are addressed within VITO's centres of expertise dealing with energy consumption in processes, new materials and environmental protection and innovation. The centre of expertise Environmental and Process technology supports and improves industrial technological processes. Specific expertise has been build up in the field of membrane technology. The Membrane Technology group has a long background and a solid reputation.

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23. Vladipor (Russia)

Vladipor is the successor of NPO "Polymersintez" and MNTK "Membrany", which were the leading institutions of the USSR in problems of development and creation of membranes and technological processes. 49% of the authorized capital of Vladipor is the intellectual property in immaterial goods, duly registered. The staff of Vladipor constitutes 106 people, including 38 researchers; there are between them four laureates of Russian Government's award in the field of science and engineering. Vladipor is leading RTD organization in NIS being a largest manufacturer of pressure driven membranes and membrane MF, UF, NF and RO modules. Between the applications of technique developed at Vladipor, there are new types of composite polymeric membranes for recovery of heavy fraction of hydrocarbons from natural gas, casing-head gases and effluent gases of oil refineries; tubular filtering elements for purification of fruit and vegetable juices; composite membranes based on fluoroplast and filtering elements for purifying oils and fuels from trace mechanical contaminants, water and suspended sludges.

Contact person: Dr Vladimir P. DUBYAGA

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24. Voronezh State University (Russia)

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25. Warsaw University, Faculty of Chemical and Process Engineering (Poland)

The Faculty of Chemical and Process Engineering of the Warsaw University of Technology was established in the beginning of 70-ties. In spite of didactic duties, the faculty staff is involved in research activities focused on following topics:

Environmental protection, New technologies for the industry, High purity chemicals technology, Biomedical engineering and nanotechnologies, Engineering of new apparatuses and industrial processes and Energy from high energetic substances.

Good scientific level of the research work benefits in cooperation with leading industrial institutions like BASF, Merck (Germany), Bayer GmbH (Germany), Membrana GmbH, Fairey Industrial Ceramics and many others. Wide scientific exchange program is conducted with such universities and Scientific centres as TU Delft (Holland), ETH Zurich Institute of Experimental Physics - University of Vienna, School of Pharmacy - University of Bradford (UK), Kanazawa University (Japan), Hiroshima University (Japan), University of Delaware (USA), University of Chicago (USA), Mississippi State University (USA), University of Minnesota (USA) and many others.

Membrane technologies (theory, application as well as membrane processes and plants design) are the ones intensively developing among others projects. In particular such topics are in scope of our interest: a process of membrane formation, membrane manufacturing processes, filters design and manufacturing, cross flow filters, submerge filters, pervaporation, and gas separation.

Contact person: Prof Wojciech PIATKIEWICZ
