

In this issue...

- **BioNexGen ID** 1
- **BioNexGen Partners** 1
- Objectives & solutions 2
- In Short...WssTP 2
- Interview: PhD Student Exchange Programme 3
- Events 4

Editorial

Dear Readers,

It is our pleasure to present the first issue of our BioNexGen newsletter. This will be the first of several upcoming publications in order to keep you updated about the BioNexGen progress.

The purpose of the first issue is to make you familiar with the general objectives and activities of the BioNexGen project. You will also find a description of the consortium presenting the individual partners.

Besides, we interviewed a PhD student involved in the project within the frame of an exchange programme between two universities, as we found it interesting to focus on his experience in this context at professional and personnel levels.

We hope you will enjoy this issue and we are looking forward to sharing more interesting news with you in the coming issues.

Moreover we kindly invite you to consult our website www.bionexgen.eu which is also intended to keep you updated about all project activities.

Yours sincerely,

BioNexGen consortium

BioNexGen Partners

The project is carried out by **7 European, 1 Turkish and 3 MENA partners**, namely two partners from North Africa and one from the Middle East.

The consortium has been carefully selected to ensure a multidisciplinary approach which is necessary to realise this innovative concept.



It consists of academic and industrial partners and of technology transfer institutions. They ally their competences and play different roles towards the project's successful realisation.

BioNexGen ID

Title

Development of the Next Generation membrane Bio reactor system

Programme

Seventh Framework Programme, Collaborative Project

Duration

01/09/2010-28/02/2014

Main objective

BioNexGen is developing a new class of functional low fouling membranes for membrane bioreactor technology with high water flux and high rejection of organic matter with low molecular weight

Partner countries

Egypt, Germany, Greece, Italy, Syria, Tunisia, Turkey, UK



Technology transfer: Coordinator, Karlsruhe University of Applied Sciences (Germany), Steinbeis-Europa-Zentrum (Germany)

Membrane's development: Institute for Membrane Technology at Italian National Research council (Italy), Foundation for Research and Technology, Hellas (Greece), Izmir Institute of Technology (Turkey), Swansea University (UK), as well as Microdyn Nadir (Germany) and Nanothinx (Greece), as European leaders in innovative MBR membrane technology and carbon nanotubes' manufacturing

Demonstration and field test activities: Centre de Biotechnologie de Sfax (Tunisia), Central Metallurgical Research and Development Institute (Egypt) and Al Baath University (Syria)

To obtain further information about the individual partners contact the one that is geographically closer to you, please do not hesitate to [click on the map](#) on their logos. You will be re-directed to their respective web-sites.

Objectives & Solutions

The Mediterranean and MENA (Middle East and North Africa) countries are facing severe water scarcity, especially during the summer period. This problem will be tightened by climate change since this area is one of the most vulnerable regions to climate change with negative implications towards current and future sustainability of water management. Therefore novel innovative solutions for water treatment and water reuse are vitally needed.

Membrane technologies can contribute significantly to sustainable water treatment and reuse solutions. Particularly a combined process of biological wastewater treatment and membrane filtration so called membrane bioreactor (MBR) technology can be regarded as being very beneficial since it offers the advantage of having low footprint and producing water of high quality. However, the current MBR membranes (micro- and ultrafiltration) are susceptible to fouling resulting in significantly reduced water flow and their ability to retain low molecular weight micro-pollutants is rather low.

Therefore, the major objective of BioNexGen is to develop a novel single step nanofiltration MBR with low fouling membranes, small footprint and possessing high rejection of low molecular weight molecules consequently improving water flow performance as well as water quality.

BioNexGen membranes are functionalised at the nano-scale to lower fouling and improved rejection of low-molecular micro-pollutants. This means to provide high flux and high rejection for low molecular weight micro-pollutants through developing tailor-made “loose” nanofiltration membranes. Optimisation of the mem-

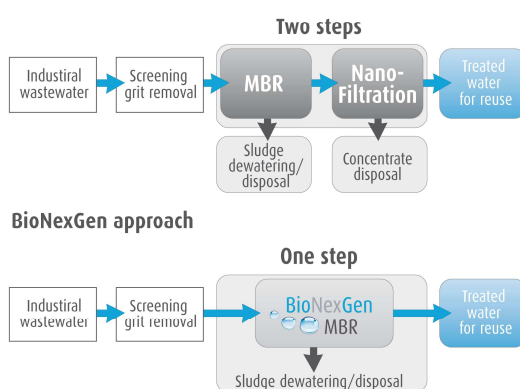
branes will extend the operation efficiency from high biodegradable organic compounds to waste waters containing stress-inducing substances and waste waters with high colourity and low biodegradable organic compounds. Thus, from view point of operating efficiency BioNexGen MBRs will result in 1-for-3- solution as it can treat (i) high biodegradable organic pollutants, (ii) stress-inducing substances, and (iii) low biodegradable organic compounds like dyes.

Within BioNexGen an international consortium consisting of 11 partners from 8 different countries aims at developing a new class of high efficiency membranes for MBRs to improve wastewater treatment and reuse in municipal, agricultural and a variety of industrial sectors in Europe and MENA countries (see article “BioNexGen Partners”).

BioNexGen partners will perform field tests with these newly developed membranes. The tests will be conducted with wastewater from 3 different industries such as cosmetics, textiles and olive oil industry which play an important role in the Mediterranean and MENA countries.

In summary the BioNexGen technology will have important impacts on the implementation of water reclamation and purification plants through achieving breakthroughs by:

Membrane bioreactor process combined with nanofiltration



- Increasing the efficiency and the operational time due to less membrane fouling which allows operation at constant high flux
- Decreasing the operational and maintenance costs
- Improving quality of reclaimed water by retaining micro-pollutants
- Increasing the performance of biodegradation process through high salt permeability for salts and reducing the generation of toxic sludge

In short... WssTP

WssTp is the European Water Platform. It aims to develop an effective collaboration between the different communities working in the water sector: industrialists, Research Groups, Policy Makers, Financiers, Water Consumers. Each community is involved in raising awareness on water issues, defining the main drivers for R&D at European level, contributing to the water Millennium Development goals. This initiative involves all stakeholders who are engaged in European water supply and

sanitation and major end-user groups. The mission and related goals of WssTP are to strengthen the competitiveness and the potential for **Technological leadership** by the European Water Industry, **Solving** European water issues, **Addressing** the challenges of an integrated and sustainable management of water resources:

- Increased water stress and costs
- Increasing urbanisation
- Rapid climate change
- Under-resourced rural areas

More information: www.wsstp.eu



Student Exchanges:

A way to foster students' advancement and cooperation between universities

Shamim Ahmed Deowan comes from Bangladesh where he studied at the Islamic University of Technology of Bangladesh, in Gazipur, and obtained his Bachelor of Science in Mechanical Engineering in 2001. He now works as a research assistant at Karlsruhe University of Applied Sciences (HSKA) where he supports



Prof. Hoinkis, the coordinator of BioNexGen. As he conducts his doctorate within the frame of an exchange programme between two partner organisations of the project, we wanted him to tell us about his experience in this context.

How did you come to Germany? How did you end up working with Prof. Hoinkis?

After graduating in Bangladesh, it was important for me to get higher education from abroad. I decided to come to Germany where I could study without having to pay for any tuition fees. This was a decisive factor for me as I did not get any financial support from my country of origin. So I started studying at HSKA, and got a Master in "Sensor Systems Technology" in 2005.

I got to know Prof. Jan Hoinkis by attending his lectures in environmental process technology. I submitted him some research ideas in the field of water technology, which he luckily appreciated very much. Two years later, I was employed in a German engineering company, and Prof. Hoinkis told me about a new project that was to be initiated and in which I would have the opportunity to do my doctorate. So I left my job in the industry and started with my PhD studies within the scope of BioNexGen project. I am employed by HSKA where my doctoral study is internally integrated and I work as a research assistant for Prof. Hoinkis.

Can you describe the context of the exchange you are involved in?

I do my doctorate within the scope of a PhD programme, result of an agreement between University of Calabria (ITM-CNR) and HSKA. I am registered as an "external student" at the Italian University. Hence, HSKA is rather considered as a guest university. Currently, it has 23 PhD students registered with Karlsruhe Institute of Technology (KIT) and some other universities.

To be selected as a PhD Student for this programme, I had to overcome a quite selective application procedure with written and oral examination. 8 students per year from each school of the university are accepted to join the pro-

gramme, which lasts three years. I do not get any financial support, although the possibility exists to apply for a grant previous to the beginning of the programme. Since my research activities within my doctorate contribute to the progress of BioNexGen, I am financed by the funds received for the project implementation.

Can you say a few words about the context of cooperation between HSKA and CNR?

It is of pure scientific nature and has existed since 2005, with the launching of the EU project INNOWA that was funded by EU Commission in the Asia Pro Eco Programme. Its objective was to contribute significantly to reduce water-borne diseases and illnesses in Bangladesh and China, particularly among poor families.

Both organisations are now involved in the BioNexGen project. ITM-CNR is an active partner for membrane development and characterization, while HSKA is in charge of verifying findings being prepared as well as of some parts of the membrane characterization. As for the PhD programme, it actually started last year, in December 2010.

What topic are you working on for your doctorate?

I am developing a hybrid membrane bioreactor process applying low-fouling membrane. Hence, the outcomes of my research activities definitely contribute to BioNexGen, as my findings can be useful for the further progress of the project.

What "added value" does it give to your research to work as a Ph.D. student at two Universities and in two countries?

Some activities can exclusively be conducted in Germany and other exclusively in Italy, depending on some technical requirements. The PhD programme is divided into two branches, the development of membrane on the one hand, and the development of process on the other hand. Concerning the first activity, Karlsruhe suffers some technical limitations, while ITM-CNR is one of the best organisations in this field worldwide. Therefore, working there has given me the opportunity to learn much about the latest developments and to become acquainted with cutting-edge research. Moreover, it is exciting to get an insight on two different research environments. I got to explore new ideas for innovative research.

Besides, I have the opportunity to observe two different cultures and work approaches, e.g. at the level of time management.

What have you learnt in Italy which you couldn't have learnt at HSKA?

I have learnt much about the latest membrane development techniques. I would have never had this opportunity in Germany where there is no similar institute of such renown. I have got access to more knowledge. Indeed, I spend some months there every year. Much shorter visits are also possible, but they are not so frequent. Conversely, a PhD student from the Italian University is planned to stay in Karlsruhe for a few weeks in the coming months.

What advice would you give to other students willing to conduct their doctorate in two countries in parallel?

It is better to explore the possibility to have more time flexibility, e.g. it could be very useful to be able to attend some seminars or workshops in the parent university within short notice. Likewise, it might be more enriching to set on an equal time distribution between both Universities to be able to follow the work at both institutions in parallel. Of course, this implies higher travel and subsistence costs, but it is also possible to resort to e.g. EU exchange programmes and get some costs covered on this way.

Above all, I would recommend trying to be fully dedicated to your PhD, without having to deliver any results or conduct any research activities for other purposes that the topic of doctorate. If this should not be possible, I would at least try to be at two Universities in the same country.

Personally, even though I am exposed to more pressure when I am in Italy, as I have to be more productive than ever due, I am fine and satisfied with my activities!

Interesting event

First International Conference on Desalination and Environment: A Water Summit

From 29 October to 1 November 2011, Abu Dhabi will host the first international conference on desalination and environment, about recent Developments in Non-Reverse Osmosis Desalination and Related Technologies.

This conference represents a unique opportunity for academics and members of the desalination industry to meet with distinguished scientists from around the world and to discuss advances in the fields of desalination and water treatment.

It is hoped that the conference will foster new opportunities for scientific cooperation amongst national, regional and international institutes actively involved in desalination and water sciences research.



Topic List

Thermal processes including:

- ◊ Multistage flash desalination (MSF)
- ◊ Multi-effect desalination (MED)
- ◊ Vapour compression (VC)
- ◊ Freezing

Hybrid processes including:

- ◊ Membrane distillation (MD)
- ◊ Pervaporation (PV)
- ◊ Multistage flash-reverse osmosis (MSF-RO)
- ◊ Reverse osmosis-electrodialysis (RO-ED)
- ◊ Nanofiltration-reverse osmosis (NF-RO)
- ◊ Membrane distillation-forward osmosis (MD-FO)

Related technologies including:

- ◊ Renewable energy for desalination
- ◊ Nuclear desalination
- ◊ Resource recovery and water reuse and brine concentration and disposal
- ◊ Scale and corrosion inhibition and operational problem solving
- ◊ Pre-treatment
- ◊ Bio-fouling control and removal of suspended matter in feed water
- ◊ Process economics
- ◊ Low pressure membranes
- ◊ Residuals management and environmental impact

REGISTRATION DEADLINE IS 1st SEPTEMBER. DO NOT HESITATE TO REGISTER NOW BY CLICKING [HERE](#).

Project events

6 months partner meeting in March 2011 in Patras

The 6 months partner meeting took place on **10th and 11th March 2011** in Patras, Greece and was organised by partner



FORTH (Foundation for Research and Technology, Hellas).

The partners presented their progresses in their respective tasks. New goals for the next six months were set up. Fruitful and enthusiastic discussions emerged from this two-day meeting.

Moreover, the partners had the opportunity to visit the facilities of FORTH and Nanothinx and to share their experiences.

In addition to this very interesting technical visit, the partners also enjoyed a visit of the city of Patras and of the warmth of the Greek culture.

Upcoming partner meeting in Swansea (UK)

The next partner meeting will also be the first review meeting of the project. It will take place on **5th and 6th October 2011** in Swansea, United Kingdom and will be organised by Swansea University.

The partners will have the opportunity to discuss the technical progresses obtained since the beginning of the project in September 2010.

