

Stay Connected with NEWRI – Your Global Research & Technology Partner

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## A word from the Prof...

Dear Colleagues and Friends of NEWRI,

Since the last update, there have been several events marking exciting developments for us at NEWRI and Singapore's water and environment industry.

On 2 June 2016, NEWRI had the honour of hosting the Minister for the Environment and Water Resources (MEWR), Mr Masagos Zulkifli, at our facilities. On the same day, Minister Masagos also graced the launch of the Separation Technologies Applied Research and Translation (ST-ART). ST-ART is a national facility set up to bridge innovations from the laboratory to industry application. It is also the first such facility in the Asia-Pacific.

In this issue I would also like to congratulate Prof Anthony Gordon Fane, NEWRI-SMTC's Director-Mentor. Prof AG Fane has recently been recognised by the Water & Wastewater International Magazine as one of the top 25 leaders in the water & wastewater industry. We also had our first IGS-NEWRI PhD graduates: Ms Zhang Yanmei, Ms Jaslyn Lee, and Mr Goh Kunli.

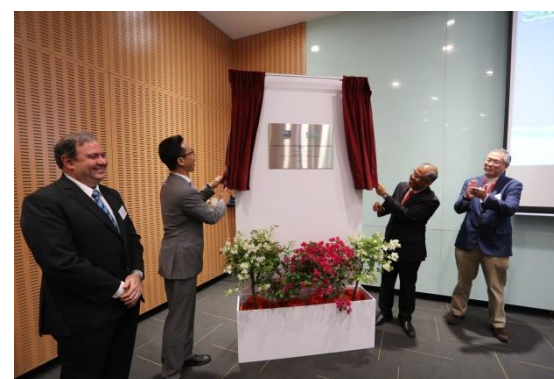
Last but not least, the NEWRI family cordially invites you to visit us at the Singapore International Water Week, 11-14 July 2016, Sands Expo & Convention Centre Marina Bay Sands. Our theme this year is "Road to Innovation and Enterprise". Do come to ask us how our technology can support and improve your water, wastewater and waste enterprise.

We look forward to seeing you at our booth, B2-D02.

**Prof Ng Wun Jern**  
Executive Director, NEWRI  
NEWRIUpdate



NEWRI hosts the Minister for the Environment and Water Resources Mr Masagos Zulkifli (Pg 2)



The Separation Technologies Applied Research and Translation (ST-ART) was officially launched on 2 June 2016 by the Minister for Environment and Water Resources, Masagos Zulkifli. (Pg 3)



Meet us at the upcoming Singapore International Water Week (SIWW), from 10 to 14 of July 2016, at the Sands Expo & Convention Centre Booth B2-D02, Marina Bay Sands, Singapore!



Nanyang Environment & Water Research Institute

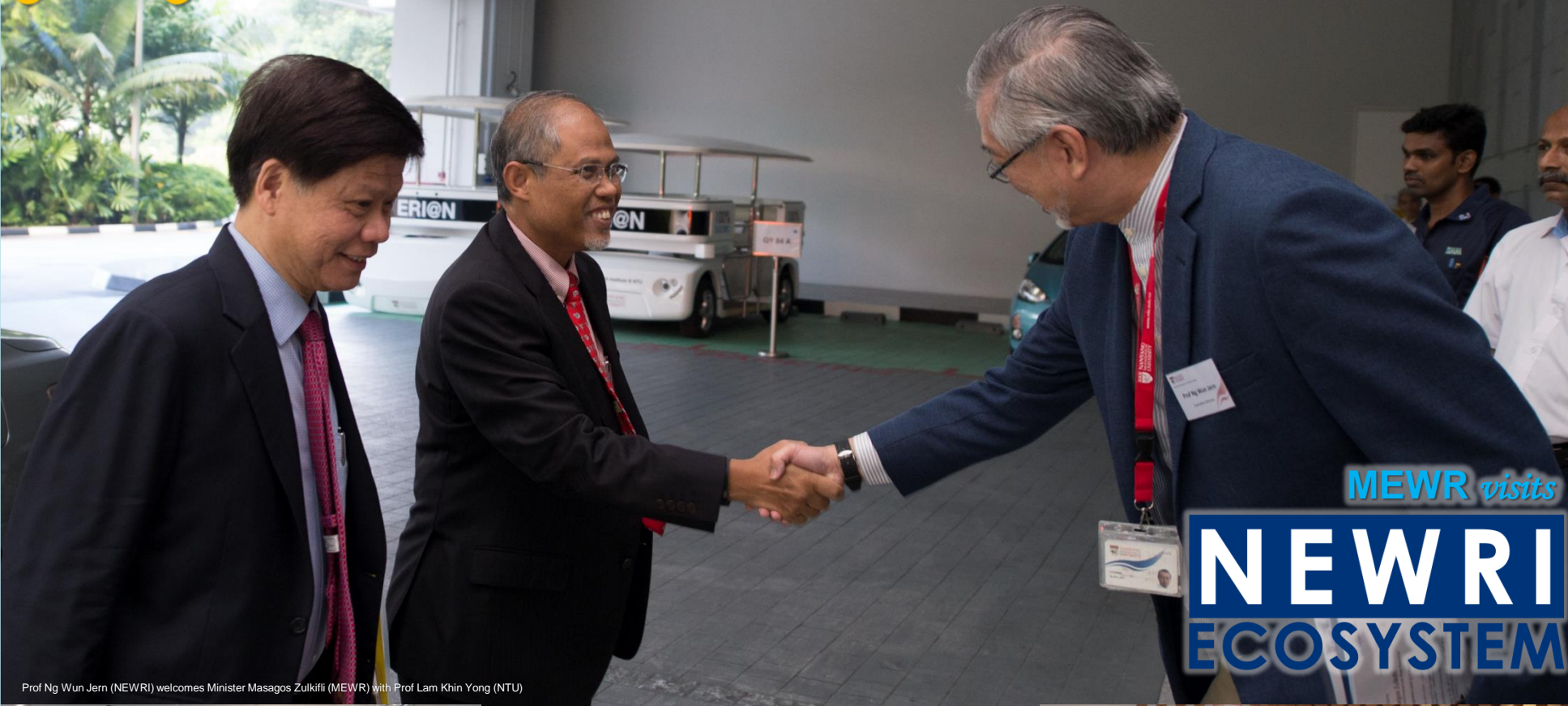




Main Feature!

2 June 2016; NEWRI hosts the Minister for the Environment and Water Resources Mr Masagos Zulkifli as he visits NEWRI to have a better understanding of the R&D activities and progress at the NEWRI Ecosystem which is leading to value for the national economy.

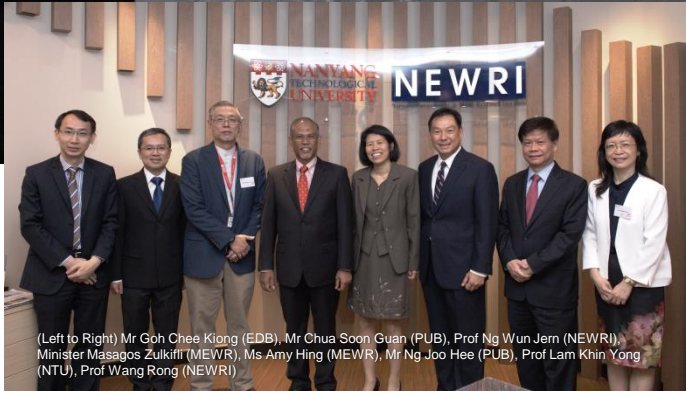
After meeting NEWRI's leadership, Minister Masagos was taken on a tour of NEWRI's laboratories and given an overview of the facilities and our research goes into.



Prof Ng Wun Jern (NEWRI) welcomes Minister Masagos Zulkifli (MEWR) with Prof Lam Khin Yong (NTU)



Minister Masagos presented with a token from SMTC. (Left to Right) Ms Amy Hing (MEWR), Prof Lam Khin Yong (NTU), Prof Wang Rong (NEWRI), Minister Masagos Zulkifli (MEWR), Prof Ng Wun Jern (NEWRI), Mr Ng Joo Hee (PUB)



(Left to Right) Mr Goh Chee Kiong (EDB), Mr Chua Soon Guan (PUB), Prof Ng Wun Jern (NEWRI), Minister Masagos Zulkifli (MEWR), Ms Amy Hing (MEWR), Mr Ng Joo Hee (PUB), Prof Lam Khin Yong (NTU), Prof Wang Rong (NEWRI)



(Left to Right) Prof Ng Wun Jern (NEWRI), Mr Bernard Tan (PUB), Mr Chua Soon Guan (PUB), Mr Goh Chee Kiong (EDB), Prof Wang Rong (NEWRI)



Prof Ng Wun Jern (NEWRI) presents NEWRI's progress to the meeting



NEWRI's centres of excellence had the opportunity to show their recent works in water & environment R&D to the Minister for Environment and Water Resources, Minister Masagos Zulkifli.



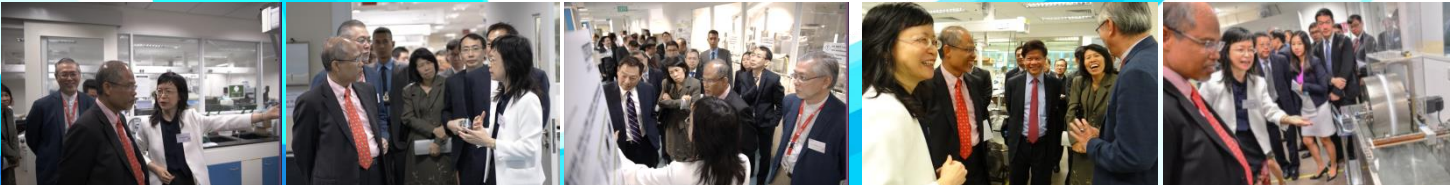
AEBC's Prof Liu Yu and Asst Prof Zhou Yan informs Minister on the IPs in enhanced biosludge digestion which has nearly doubled the capacity compared to conventional systems in volatile solids reduction, as well as the collaboration with YHS (Singapore) Pte Ltd in water & energy savings for the beverage industry.



R3C's Prof Victor Chang describing the development of Singapore's guideline for use of Incinerator Bottom Ash (IBA) in land reclamation, a collaboration with Singapore's MEWR and NEA, with industry collaborators, as well as the upcoming NEA-NTU Waste-to-Energy research facility.



Prof Ng Wun Jern (NEWRI) leads Minister Masagos and delegation to the NEWRI labs



SMTC's Prof Wang Rong informs Minister on low-pressure nanofiltration membrane for water softening, which retains high flux without compromising on salt rejection, and the aquaporin-based biomimetic membranes, which are potentially capable of reducing energy requirement in desalination and water reclamation processes by up to 30%.



Main Feature!

Start  
Separation Technologies Applied Research and Translation  
has started



The Separation Technologies Applied Research and Translation (ST-ART) centre was officially launched on 2 June 2016 by the Minister for Environment and Water Resources, Masagos Zulkifli. Dr Lim Jui (NTUitive) and Minister Masagos, accompanied by Dr Adil Dhalla (ST-ART) and Prof Ng Wun Jern (NEWRI), unveil the ST-ART plaque signifying the launch.

ST-ART has been set up to test and analyse scaled-up "separation technologies", such as membranes. The centre will be equipped with facilities enabling fabrication and system assembly of large-scale advanced membranes. In effect, the national initiative will bridge innovations from laboratory-scale to application level. To illustrate, in NEWRI labs, our researchers are able to test membranes up to 2-inch modules. ST-ART will be able to fabricate and test a full-sized 12-inch module.

ST-ART is supported by the Nanyang Technological University (NTU) and Singapore's Economic Development Board (EDB), Public Utilities Board (PUB), and National Research Foundation (NRF). NTU's innovation arm, NTUitive, spearheads the initiative.



Dr Lim Jui (CEO of NTUitive) being interviewed by the media



MD Adil Dhalla of ST-ART being interviewed by the media



The media getting a quote from Mr Tan Cheng Guan, Head of Group Business Development, Sembcorp







WORLD  
CITIES  
SUMMIT

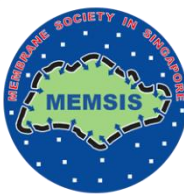
2016  
10 – 14 JULY

## Sands Expo & Convention Centre, Marina Bay Sands, Singapore

Meet us at the upcoming **Singapore International Water Week (SIWW)**, from **10 to 14 of July 2016**, at the **Sands Expo & Convention Centre Booth B2-D02**, Marina Bay Sands, Singapore!

The SIWW is a biennial event organised to provide a global platform for sharing and co-creating innovative water solutions. It gathers stakeholders from the global water industry to share best practices, showcase the latest technologies, and taps business opportunities. These events are organised by Singapore International Water Week Pte Ltd, a company set up by Singapore's Ministry of the Environment & Water Resources and PUB, Singapore's national water agency.

Our theme this year is the "Road to Innovation and Enterprise". Hop on-- we will show you our latest technologies and solutions for the water & environment industry.



Professor Wang Rong  
President, MEMSIS

The **'Membrane Society in Singapore (MEMSIS)'** has officially been formed. MEMSIS is a non-profit organization registered with the Registry of Societies, Government of Singapore and is governed by a Board of Directors. Its purpose is to promote the interaction and exchange of ideas between researchers and practitioners in academia, government agencies or laboratories, and industry in Singapore.

MEMSIS will be organizing its **Inaugural Symposium** entitled **"Membrane Innovations in Water Desalination and Reuse: Material Science, Process Engineering, Energetics and Environmental Impact"** on 9 July 2016 at PUB Water Hub. The registration fee (inclusive of lunch and tea breaks) is \$100 for Public and \$25 for MEMSIS members.

For more information, visit MEMSIS website [www.memsis.org](http://www.memsis.org)



NEWRI-EPMC's Director, Prof Adrian Law, has been invited as a guest speaker at the upcoming IDA Desalination Master Class in Singapore.

Prof Adrian will be talking on the Design of Coastal Intakes and Brine Outfalls for Seawater Reverse Osmosis (SWRO) Desalination Plants.

The workshop is organised by the Singapore Water Academy and the IDA Academy, in conjunction with SIWW 2016.

Read the full PDF [here](#).

## PARTNERSHIPS / NEW RESEARCH

**"To be consistently innovative is what we have to do in order to meet the demands of the industry."**  
Prof Ng Wun Jern

NEWRI's continues to push into valued-added solutions, defining our journey towards enterprise and contributing to global sustainable economic values, in our on-going effort to bridge innovation and enterprise.

Our trans-disciplinary research deliver cutting-edge innovations, and these together with partnerships with community and industry make a difference in the water and environment industry.

## New, Higher Resolutions imaging equipment arrives at NEWRI labs. (article by Valencia Evelyn, Dr Han Yuan, Dr Ronn Goei)

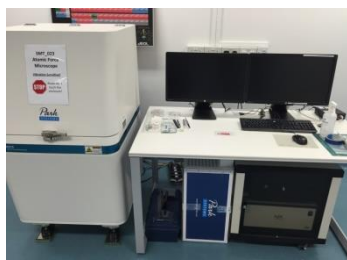
As industries and cities deal with increasingly complex waste and stringent discharge requirements, new perspectives on issues and innovation are needed. NEWRI's advanced research efforts are committed to meet these challenges. Close understanding of materials is important to carefully design and assess their behaviour for application in water/wastewater treatment and other niche areas. While these details are of microscopic scale, control and adjustments at such level can make magnified differences in the field, culminating in improved performance of waste management facilities and lower operations and maintenance cost.

NEWRI laboratories have recently acquired four high-resolution, sophisticated optical and analytical devices which will enable NEWRI researchers to better characterise waste materials, assess their solutions, and subsequently improve on NEWRI technologies. Some of the things NEWRI researchers investigate daily include novel chemicals, biomolecules, biofilms, and membrane behaviour. Targeted applications include membrane fouling studies (SMTc), graphene oxide and polymer thin film surface assessment (ECMC), and characterisation of emerging micro-pollutants (AEBC).

The X-Ray Photoelectron Spectroscopy (XPS) is able to provide quantitative elemental and chemical state information of sample materials which can be membrane, thin film, or catalysts.



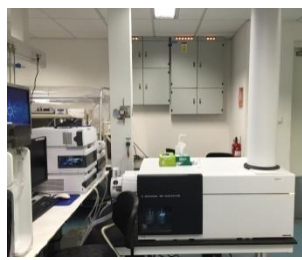
The Atomic Force Microscope (AFM), a type of scanning probe microscope, has a resolution in the order of fractions of a nanometer. The probe enables views not only of the topographical and mechanical properties of a sample surface (e.g. roughness, adhesion force, etc.), but also its chemical and biological properties.



The Field Emission Scanning Electron Microscope (FESEM) is a tool for characterizing surface and cross section of materials at magnifications of 10x to 300,000x, with virtually unlimited depth of field. Compared with conventional SEMs, FESEM produces less electrostatically distorted images.



The Liquid Chromatography- Quadrupole Time-of-Flight (LC-QTOF) is a powerful and accurate tool for identification of unknown compounds in water and wastewater, even at concentrations as low as parts per trillion (e.g. pharmaceuticals and their metabolites) which would have been difficult to distinguish otherwise.









**The Straits Times (Science) B12: “Turning soya bean waste into medium for yeast to grow on”**

22 April 2016

A litre of NEWRI's medium, made from Soya bean waste, costs just \$3, 25-90% cheaper than commercial media prices. This invention can potentially drive down the production cost of many biotech product (e.g. vaccines) while repurposing food waste.



Dr Jaslyn Lee (left) and Prof William Chen featured in ST article

Read the full article [here](#).

*Click image for article*

**CNA: “Severe oil spill incidents in 2016 so far nearly 50% of those in 2015: LTA”**

Oil spills can endanger road users.  
“The road surface is made of porous medium and if the oil gets trapped inside, it's very difficult to clean up on a hot afternoon. Then you have the hot surface and oil becomes more liquefied, then you have the rainwater, which comes in and everything will come to the surface and make a very slippery film on the road surface.”

- Assistant Professor Victor Chang, deputy director of NEWRI's R3C.



Asst Prof Victor Chang (R3C) was recently interviewed by ChannelNewsAsia for his expert opinion regarding a recent oil spill incident in Singapore, 2016.

Read the full article [here](#).

**OFFICIAL VISITS**

The NEWRI welcomed of visitors from numerous organisations. Many come to determine opportunities for collaboration.



NEWRI recently played host to various representatives from Bhutan, Botswana, Cambodia, Mauritius, Seychelles, Sri Lanka, Timor Leste, Tuvalu, South Africa, Philippines, Barbados, Nauru, Laos, Thailand and Ghana. These are representatives from the water and environment industries (April 2016)



PT. PEU Management dropped by NEWRI to discuss potential application of NEWRI's technology at their plantations. (March 2016)





Visit to NTU-NEWRI by Prof Ye Daiqi, Dean of School of Environment and Energy, South China University of Technology, China, and Delegation: Prof Hu Yun, Dr Wei Chaohai and Dr Lin Zhang (June 2016)



The Danish Ministry of Environment and Food paid NEWRI a visit in April 2016. Provost Freddy Boey and Prof Ng Wun Jern were present to receive Minister Esben Lunde Larsen (Ministry of Environment and Food) and entourage, in their efforts to learn more about NTU's efforts in areas of water resources and food. (April 2016)



NEWRI's visit to Aurangabad (India) held promise as representatives from NEWRI met with the Hon. District Collector of Chamber of Marathwada Industries and Agriculture (CMIA), and was featured in their local news. (April 2016)



NEWRI's R3C recently played host to University of Tuebingen (Germany) for the Organic Pollutants in the Water Cycle Workshop (Feb 2016)

The workshop was to provide a communication platform for leading research groups from Singapore and Germany to look at the issue of occurrence and minimization of organic trace pollutants in the aquatic environment and in water treatment.

In attendance  
NEWRI  
Prof Hu Xiao, Assoc Prof Lim Teik Thye Asst Prof Victor Chang, Asst Prof Chong Tzyy Haur, Ziggy, Dr Zhang Dongqing, Dr Maszenan bin Abdul Majid

University of Tuebingen  
Prof Christian Zwiener, Dr Sylvain Merel, Mr Sascha Lege, Dr Jorge Yanez Heras



Learning journey to Nanyang Environment & Water Research Institute – Visit by the Nanyang Girls' High School (March 2016)

A group of Secondary Three students from **Nanyang Girls' High School** from the 'extended classroom programme' which focuses on science, technology, engineering & mathematics paid NEWRI a visit. Working on projects related to the wide field of STEM, the visit allowed them to be exposed to strong/cutting edge research related to STEM as a learning journey.



1. ZeeLung: A new membrane-aerated biofilm reactor for low energy wastewater treatment
2. Microbial functional diversity predicts groundwater contamination and ecosystem functioning
3. Microbial Feedbacks Mediates Vulnerability of Permafrost Carbon to Climate Warming
4. DEWATS- Rising technical challenges & Bridging the gap from Lab to field studies
5. Conjugated Oligoelectrolytes for Biochemical applications
6. Antibiotic Resistant Genes as an Emerging Environmental Contaminant
7. Biofilm Sloughing in Integrated Fixed-Film Activated Sludge (IFAS) Systems
8. Organic Pollutants in the Water Cycle Workshop
9. Some Recent Advances in Research of Dense Jets
10. Strategies for biosynthesis of polyhydroxyalkanoates (PHAs) using excess activated sludge
11. Art of Grantsmanship – Prof Wang Kuan (Taipei Medical University)
12. Microstructure Optical Fibers, 3D Scaffold and Biofilm Engineering
13. Stochastic Processes in microbial community assembly and Succession
14. Removal of Intermediate Aromatic Halogenated DBPs by Activated Carbon Adsorption: A New Approach to Controlling Regulated Trihalomethanes and Haloacetic Acids in Chlorinated Drinking Water

### NEWRI Ecosystem

#### ZeeLung: A New Membrane-Aerated Biofilm Reactor for Low Energy Wastewater Treatment

**Seminar Profile**  
13 May 2016  
3:30pm to 4:30pm  
CleanTech One  
1 CleanTech Loop  
#06-08, Meeting Room 1  
Dress code: Smart Casual

**Registration**  
There is no admission fee, however, attendance is strictly by RSVP.  
Please register HERE by 12 May 2016

**Speaker Profile**  
Dr. ZeeLung (Zee) was born on December 22, 1964 in Bremen, The Netherlands, and raised in the province of Overijssel. He attended the University of Twente in Enschede and graduated with a Master's degree in Chemical Engineering in 1988. He continued his M.Sc. at the same university in the Interdisciplinary Technology Group and obtained his Ph.D. degree in 1992. His thesis was titled "Optimization of Acidic Gas Absorption: Kinetic and Mass Transfer Aspects".

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### NEWRI AECB

#### Microbial functional diversity predicts groundwater contamination and ecosystem functioning

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### NEWRI AECB

#### Microbial Feedbacks Mediates Vulnerability of Permafrost Carbon to Climate Warming

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### NEWRI ECMG

#### Microstructure Optical Fibers, 3D Scaffold and Biofilm Engineering

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### NEWRI AECB

#### Antibiotic Resistant Genes as an Emerging Environmental Contaminant

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### NEWRI R3C

#### Organic Pollutants in the Water Cycle Workshop

**Workshop Profile**  
17-18 Feb 2016  
9am to 5pm  
CleanTech One  
1 CleanTech Loop  
#06-08, Meeting Room 1  
Dress code: Smart Casual

**Registration**  
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Please register HERE by 15 Feb 2016

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### NEWRI DHI-NTU

#### SOME RECENT ADVANCES IN RESEARCH OF DENSE JETS

**Seminar Profile**  
2 February 2016, Tuesday  
3pm to 4pm  
CleanTech One  
1 CleanTech Loop  
#06-08, Meeting Room 1  
Dress code: Smart Casual

**Registration**  
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Prof Anthony Gordon Fane, NEWRI-SMTC's Director-Mentor, has recently been recognised by the Water & Wastewater International Magazine as one of the top 25 leaders in the water & wastewater industry.

Once a year the global water/wastewater industry votes on the Top 25 Industry Leaders. Nominations are done by an advisory committee of experts. WWi readers then vote on the nominated candidates. Prof Fane's recognition was featured in the January issue of the WWi.



Lee-Jian Yuan, one of our graduating IGS-NEWRI PhD candidates was interviewed in the Research in Germany newsletter.

Jian-Yuan is one of the 25 young researchers who won the Green Talents 2014 -- International Forum for High Potentials in Sustainable Development competition run by Germany's Federal Ministry of Education and Research (BMBF).

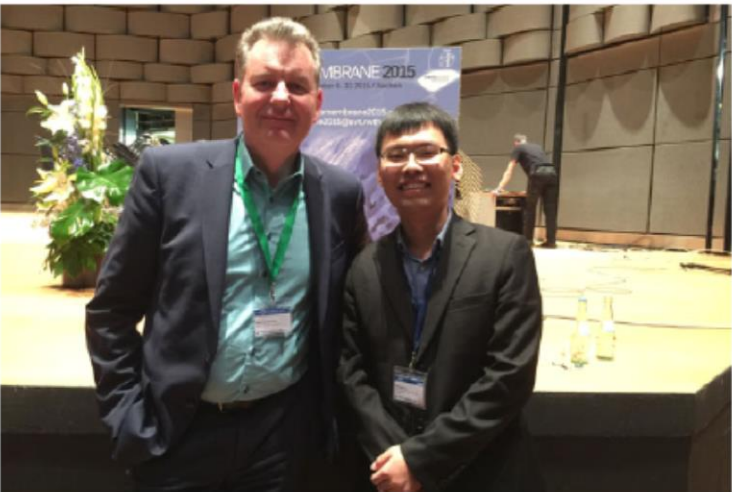
“Germany is one of the most attractive research locations”

This article was published in our newsletter. Sign up here.

It sounds so easy: we cannot survive without water, so access to clean drinking water is a basic human right. Nonetheless, there is not enough water for everyone in the world. Jian-Yuan Lee from Malaysia, a PhD candidate in chemistry, materials science and engineering, has developed a new **desalination process** capable of significantly reducing the costs of producing clean water.

Jian-Yuan Lee is one of 25 young researchers who won the Green Talents 2014 – International Forum for High Potentials in Sustainable Development competition run by Germany's Federal Ministry of Education and Research (BMBF). In our interview, Jian-Yuan Lee explains why he could well imagine spending longer pursuing his research in Germany.

Mr Lee, your research is focused on the production of clean water. You have developed a special desalination process. How does it work? What potential does this technology have and why is it so important?



© private  
Professor Matthias Wessling (left) and Jian-Yuan Lee (right)

My current research concerns the development of sustainable desalination technology. This is multidisciplinary work spanning different fields such as sustainable chemistry, materials science and clean water technology. More specifically, sustainable desalination technology is known as engineered osmosis or forward osmosis (FO), which is the current state of the art in osmotically-driven membrane technology. FO utilizes the natural phenomenon of osmosis and can potentially be used as a sustainable way to address both the global water shortage and the energy crisis.

24/02/16 “Germany is one of the most attractive research locations” – Research in Germany

In 2010, FO technology was highlighted by National Geographic as one of the three most promising sustainable technologies for desalination and as the one closest to commercialization. Compared to conventional pressure-driven membrane processes such as reverse osmosis and nanofiltration, FO can significantly lower energy consumption by up to thirty percent and thus reduce the costs of producing clean water.

You were one of the winners of the Green Talents Competition 2014, and visited Germany in 2014. What exactly did you see and what is your impression of the German research landscape?

In 2014, I visited RWTH Aachen University during one of the individual meetings of the Green Talents Science Forum. I met Professor Matthias Wessling and talked to him about new ideas for sustainable research at RWTH Aachen University. To give one example, we discussed potential research opportunities in 3D-printed membranes/spacers for the forward osmosis application. In spite of its current limitations in terms of resolution, membrane researchers have begun in recent years to adopt 3D printing technology for producing membranes/spacers.

Professor Wessling and his co-workers are **pioneers in this research area**, as well as one of the leading groups in developing 3D-printed membranes/spacers for a variety of applications. This gave me a good and lasting impression of the **high quality of Germany's interdisciplinary research in sustainable development**. This experience stood me in very good stead during my subsequent three-month research period with Professor Wessling's group that was made possible by the Green Talents Award I received.

Would you like to continue researching in Germany?

Yes, very much so. I am currently writing a research proposal to apply for the Humboldt Research Fellowship for Postdoctoral Researchers and Professor Wessling has been proposed to host my postdoctoral training at RWTH Aachen University.

In your opinion, why is the German research landscape in the field of sustainability research a good place for young scientists?

First of all, Germany is one of the most attractive research locations not only for me but also for young scientists around the world in sustainable research. Research in the area of sustainable science and technology in Germany is well-known around the world because of its advanced infrastructure, broad range of disciplines, well-established research facilities and highly competent staff. Moreover, the research environment is conducive in Germany, offering various types of research locations such as universities, universities of applied sciences, non-university institutes, industrial research and federal institutions.

Secondly, the German government, large organizations such as the German Research Foundation (DFG) and the German Academic Exchange Service (DAAD), as well as numerous prominent foundations such as the Alexander von Humboldt Foundation and the Volkswagen (VW) Foundation, provide a **variety of funding options that allow foreign scientists** to conduct sustainable research in Germany.

In addition, Germany is an excellent research location for carrying out research projects and getting in touch with the German and international scientific community. Recently, the German government has invested heavily in sustainable research and sustainable development. Consequently, the scientific sustainable research conducted here achieves the highest international standards, and **Germany occupies a leading position in sustainable science and technology**.

Jian-Yuan Lee, thank you for the interview and good luck with your research proposal. We hope to welcome you soon in Germany.

Last update: 12 Jan 2016

Read the full article [here](#).



NEWRI recently was presented a NJC Partner Award from National Junior College when NJC celebrated their 47<sup>th</sup> College Day on 7 May 2016. The award celebrates commendable service contributing to the holistic development of NJC students.

College Day is commemorated every year and is of special significance to the entire NJC community. The celebration each year is a reminder of their founding philosophy to serve the nation with honour.





## Spotlight on **FIRE SAFETY** in the Laboratory



While research is important to NEWRI, emphasis is also placed on the safety procedures. In a recent fire drill in April 2016, safety practices in the laboratory were reiterated and NEWRI's appointed safety officers were reintroduced to procedures, keeping everyone abreast of knowledge on extinguishers usage and spill response training.

**Fire drill:** The emergency response procedure drill was tested on the 8 April 2016 and organized by CTO. This was participated by NEWRI staff and students in the post evacuation exercise, NEWRI's designated fire wardens and fire fighters practiced the use of fire extinguishers to hone their fire fighting skills.

**Spill Response training:** spill response training was conducted in NEWRI by TECS Fire and Safety Training Pte Ltd on 18 Apr 2016, where 15 members from the Spill Response Team attended. With theory and practical sessions involved, Spill Response Team members learnt how to respond to chemical spills and use of spill kits.

## NEWRICOMM New Project

## New Project at NEWRIComm

In March 2016, NEWRIComm officially welcomed a new Lien Environmental Fellow: Dr Sudarshana Fernando from the International Water Research Institute (IWMI), Sri Lanka.



**LEF Fellow/ Project Coordinator:**

*Dr Sudarshana Fernando*

Resource Recovery Expert  
International Water Management Institute

The Lien Environmental Fellowship (LEF) enables local partner institutions and NEWRI to co-develop and implement solutions to improve water & sanitation management in developing communities in Asia. The Fellowship is funded by the Lien Foundation and is administered by NEWRIComm.

Dr Fernando coordinates the LEF Project "Turning Fecal Sludge into a high-value Asset" in Negombo, Sri Lanka. The project looks to demonstrate viable septage treatment for the Sri Lanka context, using anaerobic digestion. With proper processing, septage can be safely disposed and can be valuable to the agricultural sector as a soil conditioner and fertiliser.

The project team is currently preparing to carry out septage characterisation in the Negombo Municipality.

**NEWRI and IWMI** team assessing field conditions



The Sri Lankan Ministry of Agriculture, one of the project stakeholders, showed us their Agronomic Trial Site at Makandura, where the field-scale trials on organic soil conditioner/ fertiliser can be done.

Most of Sri Lanka depend on on-site systems (septic tanks). Almost all municipalities in Sri Lanka manage septage using suction trucks for offsite treatment or land disposal. Local authorities often have limited resources to upkeep the expensive operations.



Septage discharged to a transfer tank, located at an abandoned treatment plant, before transport by gully bowlers to another wastewater treatment facility at a neighbouring municipality.

Many of the offsite septage treatment facilities have also failed due to poor design, variability in the incoming septage, lack of skilled operator, and inadequate institutional support.

In absence of appropriate treatment technology, municipalities and private operators have to resort to land disposal. Finding a disposal site has become difficult, with increasing urban density. Most dumpsites in Sri Lanka are close to densely-populated, lower-income neighborhoods, which depend on groundwater for drinking water.

Waterborne disease is currently the sixth leading cause of hospitalisation in Sri Lanka, and the leading cause of death for children under five years old.



At NEWRI we do not forget our technical foundation which is good science . NEWRI's researchers publish frequently in journals . You can log on to the following website for more information on the articles.

Please click on link:

<http://newri.ntu.edu.sg/Publications/Pages/Home.aspx>.

NEWRI's new brochure is out now!

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*Till the next update - best wishes,*

