

June 29, 2010  
Toray Industries, Inc.

## **Inauguration of Toray Singapore Water Research Center - Toray's Water Treatment R&D Base in Singapore**

Toray Industries, Inc. (headquarters: Chuo-ku, Tokyo, Japan; President and Chief Operating Officer: Akihiro Nikkaku; hereinafter referred to as "Toray") today announced that it held the opening ceremony for Toray Singapore Water Research Center (TSWRC), its water treatment technology research and development base in Singapore, today at its booth at the Singapore International Water Week 2010 site.

The ceremony was graced with the presence of the Minister for Environment and Water Resources Dr Yaacob Ibrahim, Chief Executive Khoo Teng Chye from the Public Utilities Board (PUB), Assistant Managing Director Yeoh Keat Chuan from the Economic Development Board (EDB) from the Singapore side, while former Prime Minister and Asia-Pacific Water Forum Chairman Yoshiro Mori, Vice Minister Taizo Mikaduki from the Ministry of Land, Infrastructure, Transport and Tourism, and Ambassador Makoto Yamanaka from the Embassy of Japan in Singapore attended from the Japanese side. From Toray, Chairman & CEO Sadayuki Sakakibara, Senior Vice President Koichi Abe, who also serves as General Manager of Water Treatment & Environment Division, and Vice President and General Manager of Research & Development Division Yuukichi Deguchi among other officials attended the ceremony.

TSWRC was established in August 2009 at the Nanyang Environment & Water Research Institute (hereinafter referred to as "NEWRI") of Nanyang Technological University (hereinafter referred to as "NTU") with the aim of conducting research and development of water treatment technology based on Toray's water treatment membranes. Prior to the establishment, Toray and NTU signed a memorandum of understanding in June 2009 and Toray has been carrying out research centered on membrane-based water treatment technology jointly with Prof. Ng Wun Jern, an international authority on wastewater treatment technology. Furthermore, based on a memorandum of understanding signed in December 2007, Toray has been conducting pilot tests jointly with PUB on recycling of wastewater using polyvinylidene fluoride (PVDF) hollow fiber ultrafiltration (UF) membranes modules and 16-inch large-sized reverse osmosis (RO) membrane module.

At the TSWRC, Toray will further enhance the ongoing joint research test-bedding projects with PUB and plans to start a pilot test for recycling wastewater combining membrane bioreactors and RO membrane. Toray also plans to utilize NTU's internship program to enhance its collaboration with the university. It plans to increase the number of the research staff at the center to about 30 people in 2015 and develop TSWRC into the core water treatment research and development base after the research centers in Japan and China.

Toray began research on RO membrane in 1968, and during the course of these 40 years it has been making continuous efforts to study and develop water treatment membranes. Toray has developed and currently offers all of the four types of water treatment membranes of RO, nanofiltration (NF), UF and microfiltration (MF) membranes. Toray is the world's only membrane manufacturer that produces and supplies all the different types of membranes. Toray's water treatment membranes, which are advanced materials developed using its comprehensive and unique technological capability based on synthetic organic chemistry, polymer chemistry, biotechnology and nanotechnology, has been internationally acclaimed. Toray's proven track record in supplying high-performance membranes employing nanostructure control technology to major plants in Singapore include the high boron rejection RO membrane elements for the Tuas Seawater Desalination Plant with the capacity to produce 136,000 cubic meters of

water per day and the low fouling RO membrane elements for the Changi NEWater plant with a capacity to produce 228,000 cubic meters of water per day.

Toray's international R&D network spreads over Japan, South Korea, China, the U.S. and Singapore and it currently conducts water treatment technology-related research and development in Japan, China and Singapore. With TSWRC operations moving into full swing, Toray aims to step up global water treatment research and development efforts to further reinforce its presence in the water treatment business made possible by the world's best water treatment membranes and application technologies.

### **[Profile of Toray Singapore Water Research Center]**

Name: Toray Singapore Water Research Center (Abbr.: TSWRC)

Representative: Dr. Tadahiro Uemura, Director, Toray Industries, Inc.

Location: Nanyang Environment & Water Research Institute (NEWRI),  
Nanyang Technological University

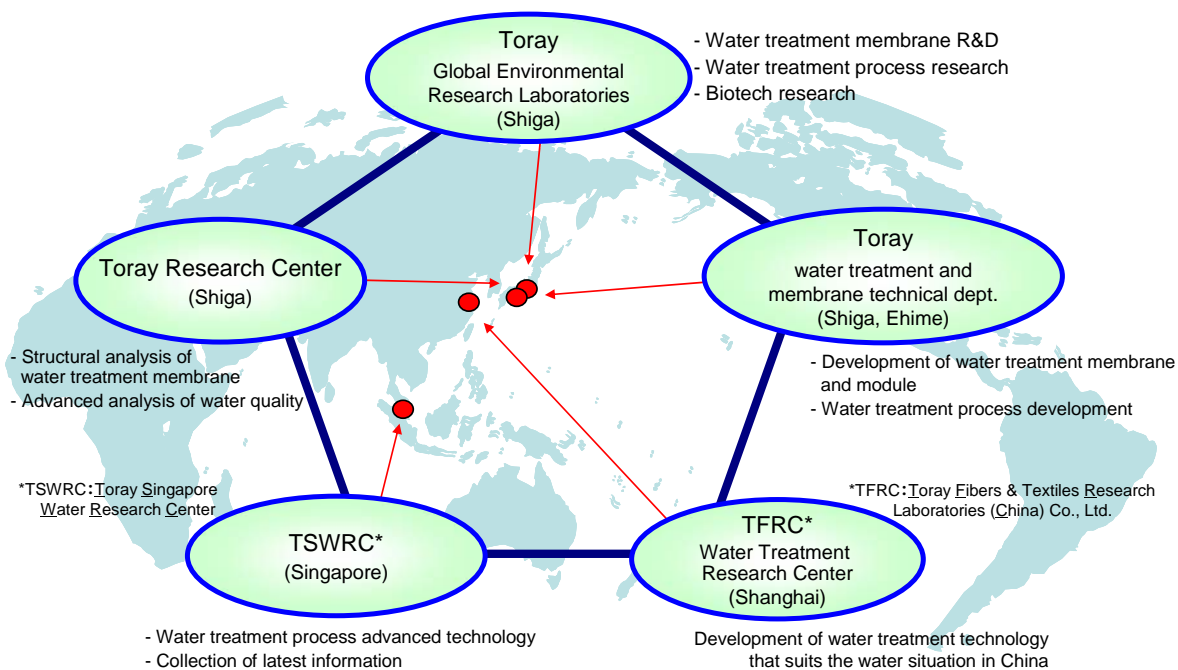
Established: August 2009

Research themes: Applied research and development of technology related to Toray's water treatment membranes and associated technologies. Essentially the research will be carried out jointly with Prof. Ng, Executive Director of NEWRI, who is an international authority on sewage treatment technology.

Objective of TSWRC and expected outcome:

Aim		Expected outcome
1	Develop innovative water treatment technologies and nurture human resources	<ul style="list-style-type: none"> <li>- Acquire advanced element technologies and latest information in joint research with NTU</li> <li>- Nurture global human resources by dispatching Toray engineers (joint researchers) to Singapore</li> <li>- Nurture human resources by enhancing technical capabilities of locally hired technicians</li> </ul>
2	Improve efficiency in development and business promotion (taking advantage of human resources and accumulation of market information through overseas collaboration)	<ul style="list-style-type: none"> <li>- Improve the efficiency of Toray's technological development by utilizing outstanding talents from partner universities</li> <li>- Develop effective technologies through acquisition of customers and grasping of market trends and information</li> <li>- Bolster Toray's collaboration with TAS leveraging the presence of Toray technicians</li> </ul>
3	Build relationship of trust with PUB, researchers and water treatment-related companies	<ul style="list-style-type: none"> <li>- Build favorable business relationships with influential and key figures in the industry</li> <li>- Carry out pilot tests to reinforce the track record of Toray's water treatment technology</li> <li>- Enhance Toray's presence through collaboration with PUB and researchers</li> <li>- Ensure appropriate and close communication through collaboration between Toray technicians and TAS and enhance the relationship of trust</li> </ul>

**[Toray Group's water treatment research and development structure]**



Promote efficient and effective technological development, information gathering and dissemination through mutual collaboration

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## ■Toray's Water Treatment Business

Toray is the only integrated membrane manufacturer in the world that supplies all of the four types of water treatment membranes (RO, NF, UF and MF) developed using its own technologies. It started research on RO membranes in 1968 and has supplied the membranes to a number of plants including the Magtaa Seawater Desalination Plant in Algeria, which will be the world's largest membrane-based desalination plant with a production capacity of 500,000 cubic meters of water per day when it starts operation in 2011. As of the end of December 2009, the RO membranes Toray has supplied so far altogether produced 16 million cubic meters of water per day, which is equivalent to the daily life water of 65 million people.

The RO membrane market has been expanding at an annual rate of 10%, fueled by worsening water shortage around the world and the need for conserving water resources in response to environmental considerations. The demand is expected to maintain the current momentum, growing steadily primarily in regions including the U.S., Europe, Middle East, North Africa and China. In recent years, further growth in RO membrane demand is anticipated as new markets such as urban sewage and wastewater reuse plants are expanding, in addition to the growth in demand for seawater and brine desalination applications and industrial applications such as production of water for use in boilers.

To address this growing demand, Toray has increased the production capacity of RO membrane elements at its existing facilities – Ehime Plant in Japan and Toray Membrane USA, Inc. (TMUS) in the U.S. Ehime Plant also has started operation of a new line of membrane production facilities. Moreover, Toray together with China National BlueStar (Group) Co., Ltd. established a joint venture company Toray BlueStar Membrane Co., Ltd. (TBMC) in Beijing, China in July 2009, which has the production facilities of RO membrane and RO membrane elements. With these expansions and the new facility, Toray's RO membrane element production capacity will expand 1.5 times the level in 2008, ensuring a potent global supply structure with bases in Japan, the U.S. and China.

At the same time, Toray has been actively working on the enhancement and expansion of global research and development as well as marketing structures for its water treatment business. Making use of its high-performance water treatment membranes based on its distinctive technologies, Toray continues to aim to be the world's leading company in water treatment membranes by winning orders in growing markets such as Middle East, Mediterranean Sea, China and Oceania.

### \* Positioning of the water treatment business at Toray Group

Toray formulated its long-term management vision AP-Innovation TORAY 21 in April 2006 with the aim of becoming a global top business group in advanced materials through the pursuit of innovative technologies in chemistry. Under this long-term vision, Toray has been allocating its resources to the foundation businesses of Fibers and Textiles, Plastics and Chemicals, which are stable profit bases as well as to the strategically expanding businesses of IT-related products, Carbon Fiber Composite Materials, etc., which drive the medium to long-term growth in profits. And, the water treatment business, because it addresses one of the major environmental issues dragging down economic growth on a global scale, is positioned as a strategically developing business.

Moreover, Toray has identified safety, disaster prevention and preservation of environment as the

top management priority and strives to improve the global environment as part of its CSR activities.

Under its corporate slogan, Innovation by Chemistry, Toray intends to contribute to the creation of a sustainable society and the further development of water treatment industry leveraging its world-class membrane and associated technologies.

### ■Toray's track record in Singapore in membrane sales

Toray supplied its low-fouling RO membrane element in June 2003 to the water recycling plant in Seletar region (production capacity of 24,000 cubic meters of water per day). The desalination plant (production capacity: 136,000 cubic meters per day) in the Tuas region of Singapore, the largest reverse osmosis membrane-based desalination plant in Asia, which started operations in 2005, also uses Toray's desalination RO membrane element. The Changi wastewater recycling plant (228,000 cubic meters per day), the biggest in Singapore, which became fully operational this time has also adopted the low-fouling RO membrane element, which gives Toray products a 60% share of the RO membrane elements used in Singapore.