

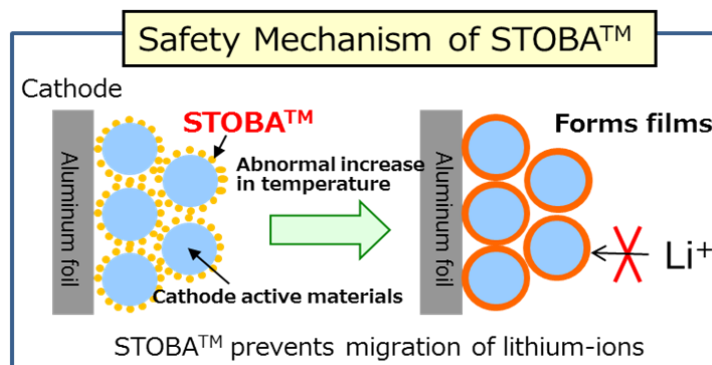
**ITRI<sup>※</sup> Grants Taiwan Mitsui Chemicals Exclusive License to Manufacture and Sell STOBA<sup>TM</sup>**

-- STOBA<sup>TM</sup> Curbs Thermal Runaway to Prevent Lithium-ion Battery Fires --

※ITRI: Industrial Technology Research Institute

On September 16<sup>th</sup>, the Industrial Technology Research Institute of Taiwan (“ITRI”; President: Jyuo-Min Shyu) signed an exclusive license agreement with Taiwan Mitsui Chemicals, Inc. (President: Takeshi Hiraiwa), a wholly-owned subsidiary of Mitsui Chemicals, Inc. (President & CEO: Tsutomu Tannawa), allowing it to manufacture and distribute ITRI’s STOBA<sup>TM</sup>, the world’s only technology<sup>\*1</sup> to prevent hazardous lithium-ion battery (LIB) thermal runaway which can lead to explosions and fires.

\*1: Studies by ITRI and Mitsui Chemicals



ITRI, Taiwan’s largest and leading R&D institution, developed this groundbreaking technology, with support from the Taiwan government, using nonconventional mechanisms and innovative materials to prevent thermal runaway of LIBs. In 2009, ITRI’s technology to enhance the safety of LIBs, STOBA<sup>TM</sup> (self-terminated oligomers with hyper-branched architecture) was recognized by R&D Magazine and awarded the “2009 R&D 100 Award in Energy Devices”.

From 2012, ITRI in collaboration with Mitsui Chemicals undertook joint development and feasibility studies.

STOBA<sup>TM</sup> is a functional polymer with dendritic (hyper branch) nano-sized structures which forms films when internal temperatures of LIBs increase abnormally, thereby preventing migration of lithium ions and inhibiting further temperature increase, allowing safe termination of the battery. This technology is already used in Taiwan in electronic instruments such as smartphones and personal mobility vehicles (PMV) which require high safety standards.

With the increase of larger-scale, high energy (higher output and high capacity) applications, such as electric vehicles, safety of LIBs is a top priority, pressing issue. In addition, with market growth of high-risk, high-energy-based cathode active materials, the need for safe batteries will grow significantly. “STOBA<sup>TM</sup> inside” will significantly contribute to safety and reliability of LIBs and bolster market expansion.

By fiscal 2016, Mitsui Chemicals will establish a manufacturing base for STOBA™ in Taiwan. The Company targets fusion of its proprietary polymer and composite technologies to further enhance STOBA™ by improving manageability and usability. Mitsui Chemicals also plans to develop proprietary LIB materials using STOBA™ technology.

### **Official Comments:**

#### **Fuh, Wea-shyang, Deputy Director General, Department of Industrial Technology (DoIT), Ministry of Economic Affairs (MOEA)**

“High-safety STOBA™ batteries have attracted considerable interest among lithium-ion battery producers around the world since 2009. Four local lithium-ion battery makers – E-One Moli Energy Corp., Amita Technologies Inc., SYnergy ScienTech Corp., and Lion-tech Corp. – produce batteries using this technology and have received orders from Japan for battery cells used in uninterruptible power systems and mobile power sources. They have also cooperated with foreign automakers in the development of batteries for electric vehicles. I hope that the licensing of this technology to Mitsui Chemicals Group will boost the international visibility of Taiwan's battery cell makers and the STOBA™ inside batteries, helping to strengthen international competitiveness and establish a high-safety, high-quality lithium-ion battery industry in Taiwan.”

#### **Jyuo-Min Shyu, President, ITRI**

“Mitsui Chemicals is one of Japan's leading chemical companies, having engaged in the development of chemical materials and products along with extensive experiences in mass production. Mitsui Chemicals also maintains a close relationship with a number of international automakers. I expect the licensing STOBA™ technology to Mitsui Chemicals Group will help promote the image of STOBA™ inside batteries around the world through the relationship between Mitsui Chemicals Group and automotive industry. This will enable the STOBA™ technology to be used in an international brand name and throughout the supply chain, underpinning the development of the battery industry in Taiwan.”

#### **Mr. Yoshio Nishi (2014 Charles Stark Draper Prize Recipient )**

“As LIBs use an organic electrolyte solution, the risk of fire from thermal runaway by battery misuse is high. STOBA™, developed by ITRI, is an outstanding material in suppression of hazardous thermal runaway. The first time I encountered STOBA™, I remembered the words of the American science fiction writer Arthur C. Clark, “Highly developed scientific technology cannot be distinguished from magic”. I congratulate Mitsui Chemicals Group for having been granted this license and I am confident that the Company has the ability to quickly turn it into a great business chance.”

#### **Shigeru Isayama, Managing Executive Officer, Mitsui Chemicals**

“Mitsui Chemicals has targeted the three business domains of mobility, healthcare, and food and packaging as high growth areas. ITRI's STOBA™ will bolster Mitsui Chemicals' strength in the mobility



domain through its characteristic mechanisms and their potential to respond to wide market demands for safety. Through this exclusive license for STOBA™ technology, we target bolstering performance through our state-of-the-art polymer science technology and the creation of a new global safety standard for lithium-ion batteries. I look forward to greatly contributing to the development of cell-related industries in Taiwan.”

#### **About [ITRI](#)**

ITRI is one of the world's leading technology R&D institutions aiming to innovate a better future for society. Based on its long-term partnership with various industry sectors, ITRI offers a wide range of services, from technical to business consultation, to the international community— such as contract research, product and process development, and pilot runs for technological upgrades; IP strategy and licensing, industrial analysis, and talent training for hi-tech business; and the open lab and incubation for new ventures and emerging industries. The Institute has also incubated more than 240 innovative companies since 1973, including well-known names such as UMC and TSMC. Headquartered in Taiwan, ITRI has five branch offices in Silicon Valley, Tokyo, Berlin, Moscow, and Eindhoven to extend its R&D innovation across the globe.

#### **About [Mitsui Chemicals](#) (Tokyo: 4183, ISIN: JP3888300005)**

Mitsui Chemicals' roots can be traced back to 1912 when it began producing raw material for chemical fertilizers from coal gas byproducts, the first company in Japan to do so. This undertaking significantly contributed to increasing agricultural productivity, a major social issue at the time. Later, the company evolved its technology from coal chemicals to gas chemicals, and in 1958 it built Japan's first petrochemical complex and so provided impetus to Japan's industrial sector. Today, the company boasts many world-class products with sales standing at 1.5 trillion yen and with over 135 companies in 27 countries. Its business portfolio includes environment-friendly materials for next-generation vehicles, healthcare services to realize health and happiness in an ageing society, packaging that ensures the reliability and safety of food products, agrochemicals that contribute to increased production of food, electronic materials, and environment-friendly materials for the energy sector.

Mitsui Chemicals will continue to contribute to solving social challenges with its state-of-the-art technology and by "Creating New Customer Value through Innovation".

More information can be found at <http://www.mitsuichem.com/index.htm>

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