

Asahi Kasei Europe GmbH
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Asahi Kasei Honorary Fellow Akira Yoshino receives the European Inventor Award 2019

Düsseldorf, June 21, 2019 – Asahi Kasei Honorary Fellow Dr. Akira Yoshino has received the European Inventor Award 2019 by the European Patent Office (EPO) in the category of Non-EPO countries for his invention and refinement of the lithium-ion battery. The award ceremony was held on June 20, 2019, in Vienna, Austria, at the Wiener Stadthalle and was attended by some 600 guests from the fields of intellectual property, politics, business, science and academia.

"Yoshino created the foundation of today's lithium-ion technology and industry. His inventions can be found in the smartphones that connect people around the world and are enabling the emergence of electric vehicles too," said EPO President António Campinos. "His technology has transformed our society, in part because the licenses granted to other companies for the use of his patented inventions helped to decisively speed up its commercialization."

"I am greatly honored to receive this year's European Inventor Award. It was gratifying that the EPO President said my invention significantly impacted society," commented Dr. Akira Yoshino. "I hope that my accomplishment will help make the name of Asahi Kasei well known throughout Europe. The series of events associated with this award reminded me of how concerned European people are about environmental issues. I am humbled that my invention is contributing to solutions."

The Award is presented annually by the EPO to distinguish outstanding inventors from Europe and around the world who have made an exceptional contribution to technological progress, society and economic growth. The finalists and winners in five categories (Industry, Research, SMEs, Non-EPO countries and Lifetime achievement) were selected by an independent international jury from a pool of hundreds of inventors and teams of inventors put forward for this year's Award.

Yoshino's development of a small, lightweight, rechargeable battery with a sufficient storage capacity has helped to unlock a mass market in portable electronic devices, ranging from camcorders to laptop computers. His rechargeable batteries are used in nearly five billion mobile phones worldwide today and have enabled the emergence of electric vehicles. Prior to his invention of the lithium-ion battery (LIB), users had to discard batteries when the energy contained in their materials ran out, which posed a challenge to manufacturers developing portable electronic products.

The origins of Yoshino's invention can be found in his early research into electrically conductive polymers, carried out after joining Japanese chemical company Asahi Kasei in the early 1970s. His breakthrough came when he realized the value of the properties of polyacetylene and lithium cobalt oxide discovered at that time. In 1977 Japanese chemist Hideki Shirakawa demonstrated that the first is conductive, and two years later in 1979, US physicist John Goodenough discovered that the latter is stable in air. Yoshino understood that using a polyacetylene anode and a lithium cobalt oxide cathode

could make his invention more stable than other rechargeable batteries in development at the time.

He also introduced a thin polyethylene-based porous membrane to act as a separator between materials, serving as a safety mechanism: when the battery overheated, the membrane melted. This halted the operation of the batteries before they caught fire. The membrane, which serves as the chemical equivalent of a safety fuse, is still used today to lessen the risk of LIBs catching fire.

Yoshino's first rechargeable LIB was produced in 1983. In 1985, Asahi Kasei filed the original Japanese patent application for the battery, beginning its road to commercialization. Yoshino has continued to work on his innovation, boosting battery performance and refining its safety features throughout his extensive career. Further patents helped to protect these solutions, and today Yoshino is named as inventor on 56 Japanese patents and six European patents.

Asahi Kasei licensed Yoshino's basic LIB patent to other manufacturers including Sony, which introduced the technology into the market in 1991. "My inventions have led to many patents for my company," said Yoshino. "The patents are not used to keep people out, rather we license our patents to encourage many other manufacturers to use our technology. Some of my latest innovations are for batteries for electric vehicles - and these, I hope, will change the world again."

Yoshino studied petrochemistry at Kyoto University. After completing his master's degree in 1972 he joined the research division of Asahi Kasei, where he continues to serve as an advisor and honorary fellow to this day. He also holds a PhD in engineering from Osaka University, which he completed in 2005.

Dr. Yoshino is the third Japanese winner of the European Inventor Award, following Dr. Sumio Iijima et al. in 2015 for the discovery and development of carbon nanotubes (Non-EPO countries), and a team led by Masahiro Hara in 2014 for the development of the QR code (Popular Prize).

Developed by Dr. Yoshino in 1983, the lithium-ion battery has been widely adopted in various electronic devices as a safe lightweight rechargeable battery, enhancing portability as the digital age began in the 1990s, ushering in the IT revolution and our current society of mobile connectivity.

Furthermore, the lithium-ion battery is playing a growing role in measures to counter global warming, by powering electric vehicles and by enabling the effective storage and use of electricity from unstable sources of renewable energy. As such, the lithium-ion battery will thus continue to be increasingly important for the sustainability of our society.

Please refer to the European Inventor Award website for more information:

<https://www.epo.org/learning-events/european-inventor.html>

About Asahi Kasei

Asahi Kasei Corporation is a globally active diversified technology company with operations in the Material, Homes, and Health Care business. The Material division encompasses fibers & textiles, petrochemicals, performance polymers, performance materials, consumables, battery separators, and electronic devices. The Homes division provides housing and construction materials to the Japanese market. The Health Care division includes pharmaceuticals, medical devices, and acute critical care devices and systems. With approximately 39,283 employees around the world, the Asahi Kasei Group serves customers in more than 100 countries and achieved sales of 17.6 billion euros (2,170.4 billion yen) in the fiscal year 2018 (April 1, 2018 – March 31, 2019).

Asahi Kasei is “Creating for Tomorrow” with all operations sharing a common mission of contributing to life and living for people around the world. For more information, visit www.asahi-kasei.co.jp/asahi/en/ and <https://automotive-asahi-kasei.eu/>.

About the European Inventor Award

The European Inventor Award is one of Europe's most prestigious innovation prizes. Launched by the EPO in 2006, it honours individual inventors and teams of inventors whose pioneering inventions provide answers to some of the biggest challenges of our times. To qualify for the Award, all proposals have to meet specific criteria, including the requirement that the inventor had to have been granted at least one European patent for their invention by the EPO. The finalists and winners in five categories are selected by an independent jury of international authorities in the fields of business, politics, science, academia and research who examine the proposals in terms of their contribution towards scientific and technological progress, society, economic prosperity and job creation in Europe. The winner of the Popular Prize is chosen by the general public from among the 15 finalists by online voting in the run-up to the ceremony. This year's 15 finalists were selected from hundreds of proposals put forward by members of the public, national patent offices around Europe, and EPO staff.

About the EPO

With nearly 7 000 staff, the European Patent Office (EPO) is one of the largest public service institutions in Europe. Headquartered in Munich with offices in Berlin, Brussels, The Hague and Vienna, the EPO was founded with the aim of strengthening co-operation on patents in Europe. Through the EPO's centralised patent granting procedure, inventors are able to obtain high-quality patent protection in up to 44 countries, covering a market of some 700 million people. The EPO is also the world's leading authority in patent information and patent searching.

Company Contact Europe:

Asahi Kasei Europe GmbH
Sebastian Schmidt
Am Seestern 4, 40547 Düsseldorf
Tel: +49 (0) 211-2806-8139
Mail: sebastian.schmidt@asahi-kasei.eu

Press Contact:

financial relations GmbH
Henning Küll
Tel: +49 (0) 6172/ 27159 – 12
Mail: h.kuell@financial-relations.de