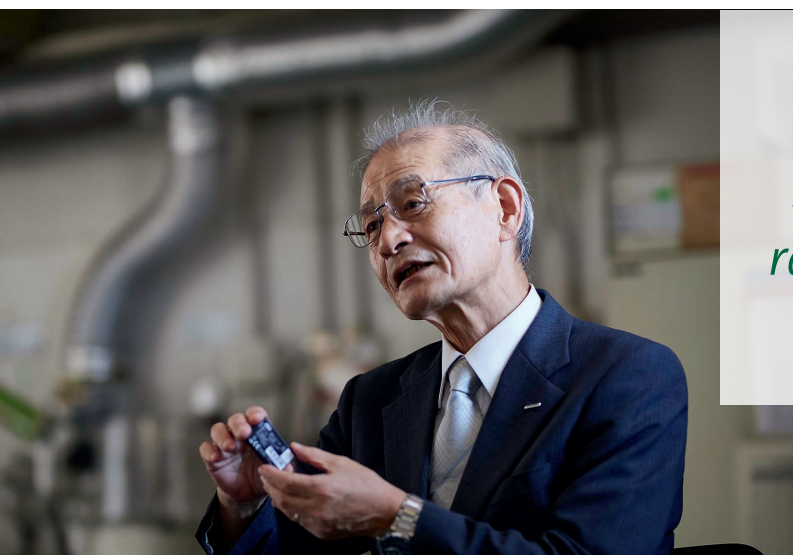


“Plastics Play a Key Role in Lithium-Ion Batteries”

*Interview with One of this Year's Winners of the Nobel Prize in Chemistry,
Dr Akira Yoshino*

Lithium-ion batteries are the basis of most mobile devices. Auto manufacturers also rely on them in their electric vehicles. The importance they have now acquired for our society is clearly shown by the award of the Nobel Prize for Chemistry 2019 to Dr Akira Yoshino, Dr Michael S. Whittingham, and Dr John B. Goodenough for their contributions to the development of lithium-ion batteries. **Kunststoffe** interviewed Dr Yoshino about the key role plastics play in these batteries and how the range problems of electric vehicles are being solved.



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*With fully autonomous,
smart vehicles, limited driving
range will no longer be an issue*”

Dr Akira Yoshino

About the Interviewee

For nearly 40 years now, the Japanese chemist, **Dr Akira Yoshino**, has been working on lithium-ion batteries. In 1981 he started development of rechargeable batteries, initially with polyacetylene as the anode material. Two years later, he had developed a functioning battery. In 1985, there followed the prototype of the lithium-ion battery in its present form. Since then, Dr Yoshino had been working continually on the further development of these batteries, improving, for example, their safety and charging methods. For his invention, he was awarded the 2019 Nobel Prize in Chemistry. Since gaining his Master's degree in 1972 at the University of Kyoto, Japan, Dr Yoshino has been employed by the Japanese company Asahi Kasei. He is also currently President of the Japanese research consortium for batteries, Libtec. He completed his doctorate at the University of Osaka, Japan, in 2005. Since 2017, he has been a Professor at Meijo University in Nagoya, Japan.

Electromobility is on the advance. Practically all auto manufacturers are investing in both electric vehicles and the charging infrastructure. The brainchild at the heart of electric cars but at the same time their greatest problem child is the lithium-ion battery. It is still too heavy and its capacity too small, so limiting the driving range of these vehicles. **Kunststoffe** interviewed the “father of the lithium-ion battery”, Japanese chemist Dr Akira Yoshino, about the current difficulties and future of his creation.

Kunststoffe: *What role do plastics play in lithium-ion batteries?*

Dr Akira Yoshino: A key role – particularly in relation to light-weight design. Take pouch cells, for example. Their outer casing generally consists of an aluminum-plastic laminated film. Before this development was introduced in 1995, batteries used metallic cylinders. The new cell type made batteries lighter and slimmer. In the automotive sector, too, a decision will have to be made in future as to whether the batteries use metallic cylinders or pouch cells.

Kunststoffe: *What improvements in lithium-ion batteries are you working on at present?*

Yoshino: Lithium-ion batteries are already a mature technology for small electronic devices. In the automotive sector, on the

other hand, I still see very great potential for improvement. I am particularly keen to research the fundamentals of lithium ions again. The movements of lithium ions differ significantly – depending on whether they are in a liquid or solid electrolyte. When it comes to optimizing the batteries, it will play a major role as to how we can increase the speed of the lithium ions. Further development of the electrolytes – liquid and solid – is the key here and is already forging ahead.

Kunststoffe: *You once said you hoped that your invention would change the whole world in the automotive sector. What changes do you hope and expect to see?*

Yoshino: The abbreviation CASE, for Connected, Autonomous, Shared und Electric, perfectly describes the direction in which the world is heading. Autonomous vehicles will be connected worldwide and shared with other users. I believe that a new mobile society is emerging. Not only with the increasing popularity of electric vehicles but also with the aid of other technologies such as AI, IoT and 5G.

Kunststoffe: *But there are still some problems with electromobility, for example the limited driving range of the vehicles. The battery is often blamed for this. How can this problem be solved?*

Yoshino: I firmly believe in a “shared automotive society” from 2025. Private vehicles will gradually be replaced by fully autonomous, smart vehicles moving through the streets with the best

possible efficiency and always recharging in good time. Limited range will then no longer be an issue.

Kunststoffe: *You are called the “father of the lithium-ion battery”. This year you were awarded the Nobel Prize in Chemistry. Which means more to you?*

Yoshino: Both are an incredible honor for me and make me very happy. The two accolades are also directly connected with each other. After all, the development of the lithium-ion battery played no small part in my being awarded the Nobel Prize in Chemistry. (smiles) ■

The interview was conducted by Florian Streifinger, Editor

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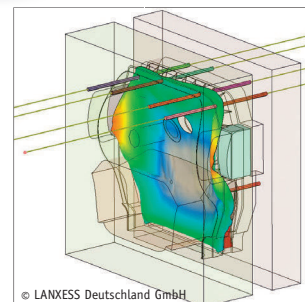
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