

# NTU tech can prevent battery fire in PMDs, other devices

It gives added defence against short circuits - the main cause of fires in lithium-ion batts

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A new battery technology could soon prevent personal mobility devices (PMDs) and mobile phones from catching fire while charging.

Nanyang Technological University (NTU) scientists have invented a battery component that provides an added layer of protection to prevent short circuits, the main cause of fires in lithium-ion (Li-ion) batteries. These batteries are widely used in smartphones, laptops, electric vehicles and even aircraft.

The "anti-short layer" invented by Professor Xu Zhichuan and his team from NTU's School of Materials Science and Engineering can be easily added inside Li-ion batteries to prevent short circuits during charging.

Most Li-ion battery fires are caused by a build-up of lithium deposits, or dendrites, that cross the separator from the negative electrode (anode) to the positive electrode (cathode) of the battery when it is being charged. This causes a short circuit, which leads to a chemical fire, said Prof Xu.

The positive and negative electrodes can be thought of as bread slices, with the anti-short layer as a cheese slice added to prevent dendrites from reaching the cathode, he said.

For a Li-ion battery to work, Li-ions must be able to travel between the positive and negative sides during charge and discharge cycles, said Prof Xu, who is director of the Energy Storage and Renewables & Low Carbon Generation: Solar cluster at the Energy Research Institute @ NTU.

But for current commercial Li-ion batteries, the transfer of Li-ions means the formation of dendrites is inevitable, said the professor. As it is not possible to prevent the formation of dendrites, Prof Xu's team made use of the dendrites' properties - they coated an added layer of conductive material on the separator for the dendrites to connect with.

Once the dendrites connect with the layer, they will not be able to grow further and this prevents them from reaching the other side, said Prof Xu.

He said the technology is the first of its kind globally, and can be rapidly adopted in battery manufacturing. Made of a common material used in battery manufacturing, the anti-short layer can be easily integrated without changing the manufacturing process.

The technology will cost around 5 per cent of the existing production cost of a Li-ion battery, said Prof Xu. It is now awaiting a patent and is being commercialised by NTUitive, NTU's innovation and enterprise company.

Mr Kelvin Lim, chief executive of battery technology company Durapower Group, said: "This technology breakthrough is of significant interest to our business in electrifying e-mobility and stationary energy storage applications that are presently heavily dependent on Li-ion batteries."

The invention will help boost the safety and extend the lifespan of Li-ion batteries, which will translate to longer driving ranges for electric vehicles and longer operational hours for battery energy storage solutions, Mr Lim added.

Dr Avishek Kumar, CEO and co-founder of energy storage technology firm V-Flow Tech, said: "This invention, which solves the most critical puzzle of the thermal runaway issue in Li-ion energy storage solutions, will prove to be one of the biggest enablers for mass adoption of Li-ion energy storage tech."