

NTU start-up could lead next big leap in lithium ion batteries

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A MATERIALS science start-up from the Nanyang Technological University (NTU) has developed ultra-fast charging lithium ion batteries, potentially affecting a global market of rechargeable batteries tipped to be worth some US\$23.4 billion in 2016.

The new batteries, invented by Chen Xiaodong, an associate professor at NTU's School of Materials Science and Engineering, can be recharged up to 70 per cent in just two minutes, and last over 20 years.

This makes them far superior to current batteries, which take about 40 minutes to get up to 80 per cent of charge, and have a lifespan of only 2-3 years, Prof Chen told *The Business Times*.

The breakthrough, he said, will have an impact on a wide range of industries that utilise lithium ion rechargeable batteries, among them mobile phones, laptops, tablets, watches, and in particular, electric vehicles.

These vehicles, whose mass adoption the Land Transport Authority is trying to promote here, is not highly popular because of their long recharge times, limited battery lives and the unavailability of charging infrastructure.

With the new technology, drivers of electric vehicles are able to save "tens of thousands" by cutting down on the number of times they need to replace their vehicle batteries, and charge their vehicles in just "a matter of minutes", said Prof Chen.

The technology, however, will not significantly affect general battery costs and capacity, BT learns.

Like before, electric car drivers will continue to pay about US\$5,000 for each battery replacement, and can travel 60-160 km on average on a single charge.

"But with a longer lifespan, our batteries can now outlive cars and mobile phones – which typically last 10 and five years respectively – by much longer," said Prof Chen.

And this, he added, can open up new, even eco-friendly prospects in product development.

For instance, mobile phone makers can create a standardised battery type such that it can be recycled for use across different phone models, rather than be trashed together with an old phone only because it cannot be used elsewhere.

"We can drastically cut down on the toxic waste generated by disposed batteries, since our batteries last 10 times longer," said Prof Chen.

Already, the patented technology has attracted industry interest; it is now being licensed by a multi-national corporation (MNC) for mass production.

When asked, NTU declined to dis-

close the name of the MNC and its dealings, suggesting that these details would be announced soon.

The project team, led by Prof Chen and comprising research fellows Tang Yuxin and Zhang Yanyan as well as PhD student Deng Jiyang, is now applying for a proof-of-concept grant to build a large-scale battery prototype.

With support from NTUitive, a wholly-owned subsidiary of NTU set up to support NTU start-ups, it has received over S\$200,000 in funding from the National Research Foundation and NTU over the last three years.

This invention marks the next big leap in battery technology, said Ra-



Prof Chen with the new batteries that can be recharged up to 70 per cent in just two minutes, and can last over 20 years

chid Yazami, an NTU professor who 30 years ago co-developed the lithium-graphite anode that is used in today's lithium ion batteries.

"While the cost of lithium ion batteries has been significantly reduced and its performance improved since Sony commercialised it in 1991, the market is fast expanding towards new applications in electric mobility and energy storage," said Prof Yazami.

The scientist, who is now developing new battery types for electric vehicle applications at NTU's Energy Research Institute and is not involved in Prof Chen's project, added: "Ideally, the charge time for batteries in electric vehicles should be less than 15 minutes, which Prof Chen's nanostructured anode has proven to do."

The latter's new batteries – made possible through nanotechnology where the typical anode of a lithium ion battery (made from graphite) is replaced with a gel made of titanium dioxide nanotubes – are expected to hit the market in the next two years.