ADDING ZAP TO ZINC-AIR BATTERIES

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Lightweight, powerful, rechargeable batteries are the Holy Grail for many energy researchers: batteries that can propel electric cars hundreds of kilometres on a single charge or store large quantities of electricity for local power grids.

The answer could lie in zinc-air batteries. Instead of packaging all the essential chemicals inside the battery casing, zinc-air batteries use oxygen in the surrounding air to drive a key chemical reaction. As a result, they're much lighter than conventional batteries. And at least in theory, they have the potential to deliver much more specific energy than any other kind of battery technology.

But rechargeable zinc-air batteries also suffer from several key drawbacks. They require expensive metals or alloys, they don't charge and discharge quickly, and they're not durable.

A new, nanoengineered solution could change all that. University of Waterloo chemical engineering professor Zhongwei Chen and his colleagues recently developed something they call a core corona bifunctional catalyst (CCBC).

The outer layer of the CCBC consists of carbon nanotubes studded with nitrogen. When zinc in the battery meets oxygen from the air, these nanotubes catalyze a reaction that generates electricity. Meanwhile, the core of CCBC is made of lanthanum nickelate, which catalyzes the opposite reaction. By regenerating oxygen and zinc, it recharges the battery.

Thanks to these low-cost ingredients, CCBC batteries won't break the bank. And unlike current state-of-the-art metal-air batteries, they continue to hold charge even after a thousand recharging cycles. Thanks to funding from NSERC Idea to Innovation and the C4 Network, the WISE researchers are now developing prototypes that can be used to market this highly promising technology to investors and partners.

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