"RUNNING" INTO THE FUTURE WITH PRINTABLE BATTERIES

Printable electronics is an exciting field of research with varied and extensive applications – and now thanks to the development of a new breed of printed batteries, its applications are making their way into our daily lives.

Imagine being able to wrap a special bandage around an injured limb, have it send real-time updates to your doctor or having a smartphone that's so thin you can roll it up and put it in your pocket, while also charging it on the go via your solar-power-generating clothes.

While the application of flexible electronics is limited only by our imaginations, these devices must be powered by batteries, which in most cases are heavy, cannot be bent and need to be connected by wires. In addition, most batteries contain toxic chemicals and cannot be easily recycled, which poses an environmental problem.

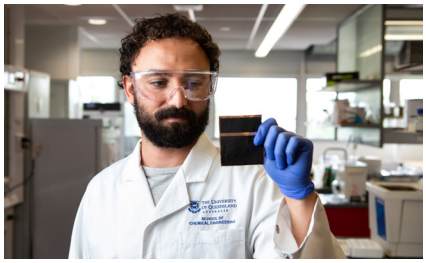
These challenges are being tackled by researchers at UQ, who are supporting Printed Energy specialising in printed batteries and photovoltaics, to develop paper-thin, flexible, rechargeable batteries in partnership with the University of New South Wales (UNSW). The collaboration has been made possible by an Australian Government Cooperative Research Centres Project (CRC-P) grant, and led by Professor Chris Greig, Professor Vicki Chen and Professor Lianzhou Wang.

One impressive example of the progress of this technology, is the trial of "smart" marathon bibs, used in December 2019 for capturing runners' times. These paper-thin batteries were printed via a screen-printing technology, not unlike a paper printing one, integrated with radio-frequency identification (RFID) sensor.

The printed battery can provide power for the RFID sensor for recording and sending the data from the race runner.

"These batteries are made of zinc and manganese oxide, which are both cheap and easily recycled, making them far more sustainable than current alternatives," says Dr Miaoqiang Lyu, an Advance Queensland Research Fellow .

Dr Lyu says flexible printed batteries are much safer than alternatives such as lithium-ion batteries. "This makes them more suitable for use in medical devices, wearable healthcare electronics and therapeutics," he says.



PhD researcher Benoit Clement, holding printed flexible electrodes for printed batteries

UQ Infrastructure	Capabilities
Australian National Fabrication Facility–Queensland	Metal oxide thin-film deposition using the magnetron sputtering system.
Centre for Microscopy and Microanalysis	Fundamental studies: printed battery ink materials, electrodes and additives, including chemical valence states, morphologies of materials and phases of electrode materials at different electrochemical stages – SEM, XRD and XPS
School of Chemical Engineering	Battery assembly and testing
Australian Institute for Bioengineering and Nanotechnology	Surface area analysis for the porous electrode materials using BET
UQ Glassblowing Services	Home-designed glassware and testing kits for electrochemical experiment

Further information
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