

# Significant Breakthrough in Battery Technology

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Economic and Commercial



## CHALLENGE

There is an ever-increasing demand for portable electronic devices, and improved technology for battery life and stability is a vital factor in device performance. The typical lithium-ion battery on the market today is based on graphite and has a relatively low capacity which limits the amount of energy that can be stored. There is a need for smaller and lighter batteries that can hold more charge for longer and maintain this performance over the lifetime of the product so that your phone doesn't die in the middle of a critical call.

## RESPONSE

Dr. Ryan and his research team in the Materials and Surface Science Institute (MSSI) at the University of Limerick (UL) have developed a technology that more than doubles the capacity of lithium-ion battery anodes and retain this high capacity even after being charged and discharged over 1,000 times. This work was published in the journal Nano Letters and describes the use of germanium, an alternative element to carbon, which has a higher capacity. The team restructured germanium nanowires into a stable porous material using nanotechnology. The new germanium nanowire-based anode has the ability to greatly increase the capacity and lifetime of lithium-ion batteries. This is an ideal battery material as it remains stable over very long time scales during continued operation.



## ENGAGEMENT

This project is part of GREENLION, a large scale collaborative project within the EU FP7 framework, with a goal of manufacturing greener and cheaper lithium-ion batteries for electric vehicle applications. GREENLION is a consortium of 14 partners including large car manufacturers such as SEAT and Volkswagen.

## IMPACT

The combined value of the market for rechargeable battery technology is set to grow from \$11.8 billion in 2010 to \$53.7 billion in 2020. This breakthrough is important for mobile computing and telecoms but also for the emerging electric vehicle market allowing for smaller and lighter batteries that can hold more charge for longer and maintain this performance over the lifetime of the product. The nanotechnology solution developed by Dr. Ryan and his team is scalable, low-cost and low-energy making the technology greener and cheaper and a real commercial possibility!



## NEXT STEPS

Dr. Ryan has received an Enterprise Ireland Commercialisation Fund Technology Development grant with the aim of commercialising this technology. The basic research for this grant originated from an SFI Principal Investigator award (2006), which led to the GREENLION EU grant and subsequently to the EI grant.



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