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Yissum Introduces a Novel Method to Develop Next-Generation Batteries

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Yissum Introduces a Novel Method to Develop Next-Generation Batteries

Novel sodium-ion battery is an environmentally friendly, economic and efficient solution for a variety of applications including electric vehicles and stationary storage for renewable energies

Study was published in the prestigious Nature Communications Journal

One of the most pressing problems of modern society is how to convert and store energy. Lithium ion batteries have been the main energy storage medium for mobile applications for the past 20 years. But there are significant drawbacks for using lithium ion batteries, in particular the low availability and high cost of lithium, coupled with the environmental impact of extracting and disposing of this highly reactive ion.

Therefore, there has been growing focus on sodium-ion batteries (NIBs), in particular as an energy storage solution for larger applications, such as electric vehicle and for stationary storage for renewable energies. NIBs are attractive due to their lower cost and larger abundance of sodium (Na). Still, one of the main obstacles to the commercialization of NIBs is the limited choice of anode materials that can provide high capacity, good stability and high-rate performance to the battery.

Now Yissum, the Research and Development Company of the Hebrew University of Jerusalem, introduces a novel anode for NIBs, which enables the production of a battery with high capacity, excellent rate capability and good cycle performance. The novel anode, which was invented by Professor Ovadia Lev, from the Center for Nanoscience and Nanotechnology at the Casali Institute of Applied Chemistry at the Hebrew University, together with colleagues from Singapore's Nanyang Technological University (NTU) and The Russian Academy of Science, Moscow, is based on coating graphene with antimony sulphide (stibnite) nanoparticles.

The research is sponsored by Singapore's National Research Foundation, under its Campus for Research Excellence and Technological Enterprise (CREATE) programs in Electromobility and Nanomaterials for energy and water management, in addition to the Israel-Strategic Alternative Energy Foundation. The findings have been recently published in the prestigious publication [Nature Communications](#).

The novel anode is based on a new coating technology, also invented by Prof. Lev together with Dr. Petr Prikhodchenko, which enables coating of graphenes with a thin film of nanoparticles at low cost. Prof. Lev and Dr. Denis Y.W. Yu, along with [Dr. Sudip K Batabyal](#) from the Energy Research Institute @ Nanyang Technological University (ERI@N) and their teams optimized and tested the battery's performance. Tests conducted at NTU showed that the novel composite material performs extremely well as an anode for the new sodium-ion batteries.

The material provides more than two times the capacity of hard carbon, retains its charge

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capacity even at high current rates, and exhibits a charge and discharge time of 10 minutes. This would allow fast charging of NIBs in the future, which will enable utilization in applications such as electric vehicles. In addition to the excellent rate capability, the material also shows stable cycle performance, with capacity retention of more than 95% after 50 cycles.

"Researchers at the Hebrew University are committed to developing novel, innovative and efficient solutions that will help deal with the energy requirements of the modern world. The novel sodium ion anode invented by Prof. Ovadia and his colleagues is one such important step toward developing an environmentally friendly, economic and efficient NIB that will replace the current lithium battery for many applications," said Yaacov Michlin, CEO of Yisum. "The battery market in the US alone is estimated at \$14 billion, and is projected to grow to \$17 billion by 2017. The novel anode will no doubt help propel the integration of NIBs into this market, and Yisum is now looking for potential partners for further development and commercialization of this invention."

About Yisum

Yisum Research Development Company of the Hebrew University of Jerusalem Ltd. was founded in 1964 to protect and commercialize the Hebrew University's intellectual property. Products based on Hebrew University technologies that have been commercialized by Yisum currently generate \$2 Billion in annual sales. Ranked among the top technology transfer companies in the world, Yisum has registered over 8,100 patents covering 2,300 inventions; has licensed out 700 technologies and has spun out 80 companies. Yisum's business partners span the globe and include companies such as Syngenta, Monsanto, Roche, Novartis, Microsoft, Johnson & Johnson, Merck, Intel, Teva and many more. For further information please visit www.yisum.co.il

About Nanyang Technological University

A research-intensive public university, Nanyang Technological University (NTU) has 33,500 undergraduate and postgraduate students in the colleges of Engineering, Business, Science, and Humanities, Arts, & Social Sciences, and its interdisciplinary Graduate School. It has a new medical school, the Lee Kong Chian School of Medicine, set up jointly with Imperial College London. A fast-growing university with an international outlook, NTU is putting its global stamp on Five Peaks of Excellence: Sustainable Earth, Future Healthcare, New Media, New Silk Road, and Innovation Asia. Besides the main Yunnan Garden campus, NTU also has a satellite campus in Singapore's science and tech hub, one-north, and a third campus in Novena, Singapore's medical district. For more information, visit www.ntu.edu.sg

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