

Novel material paves the way for next-generation information technology

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(PhysOrg.com) -- University of Queensland researchers have successfully demonstrated a futuristic semiconductor technology that will pave the way for the next generation of electrical and information technology systems.

Professor Jin Zou and Dr Yong Wang from the Faculty of Engineering, Architecture and Information Technology have collaborated with the University of California, Los Angeles (UCLA) and [Intel](#) Corporation to create advanced ‘magnetic quantum dots’.

Magnetic quantum dot technology is expected to underpin future communications and resolve [power consumption](#) and variability issues in today’s microelectronics industry by providing computers and other devices with extraordinary electrical and magnetic properties.

Professor Zou said the team’s breakthrough had enabled their magnetic quantum dots to simultaneously utilise both ‘charge’ and ‘spin’ - two types of outputs generated by electrons.

“Developing [quantum dots](#) which are able to harness both outputs may help to significantly reduce the size of electrical devices and reduce power dissipation inherent in electrical systems, because the collective spins in spintronics devices are expected to consume less energy than current charge-based technology,” Professor Zou said.

Significantly the team was able to prove the novel technology in

experiments at relatively high temperature, which was not previously thought possible.

ARC Australian Postdoctoral Fellow Dr Yong Wang said the successful operation of the technology in sustainable and manageable conditions would enable it to be more easily integrated into existing silicon-based microelectronic technology, which is the current platform used by industry.

“This research will lead to greater efficiency and stability for electrical systems and information technology which provide essential infrastructure for every sector.

“We hope our work will help to improve the performance of microelectronics in applications used in health care to defence to communications,” Dr Wang said.

The breakthrough research was published this week in prestigious scientific journal Nature Materials.

Executive Dean of the Faculty of Engineering, Architecture and Information Technology Professor Graham Schaffer congratulated Professor Zou, Dr Wang and their colleagues on their achievement.

“This exciting advance is the result of collaboration between researchers from across the globe,” Professor Schaffer said.

“In particular I would like to highlight the work done by Dr Wang of UQ and Dr Xiu of UCLA, who are young up-and-coming researchers in their fields,” Professor Schaffer said.

Dr Wang and Dr Xiu worked to progress the technology with Professor Jin Zou of UQ and Raytheon Professor Kang L Wang of UCLA who have collaborated for more than 10 years on the development of various

semiconductor materials.

More information: Read the full article on the *Nature Materials* website: www.nature.com/nmat/journal/va...nt/abs/nmat2716.html

Provided by University of Queensland

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