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Printing electronics with a t-shirt printer

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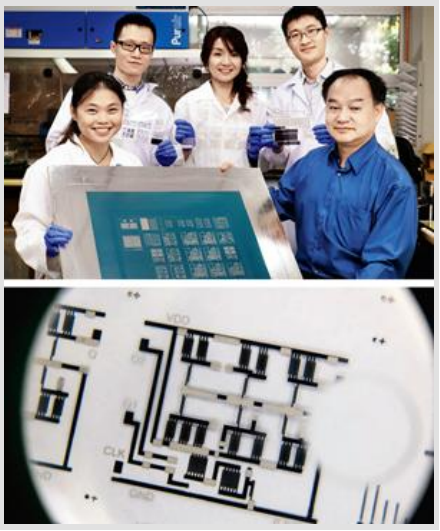

Top: Joseph Chang (extreme right) with his team and the screen used to print flexible circuits; Above: A close-up of the circuit

Mumbai Mirror Bureau

Researchers have created an eco-friendly way to make flexible but complex circuits using a t-shirt printer. The breakthrough may allow us to print low-cost disposable electronics.

Nanyang Technological University, Singapore, has successfully printed complex electronic circuits using a common t-shirt printer. The electronic circuits are printed using unique materials in layers on top of everyday flexible materials such as plastic, aluminum foil and even paper.

Resistors, transistors and capacitors, the key components of a complex electronic circuit, are printed using non-toxic organic materials like silver nanoparticles, carbon and plastics.

Joseph Chang, leader of the group said their unique printing tech has made mass production of cheap disposable electronic circuits possible.

"This means we can have smarter products, such as a carton that tells you exactly when the milk expires, a bandage that prompts you when it is time for a redressing, and smart patches that can monitor life signals like your heart rate," said the electronics expert from NTU's School of Electrical and Electronic Engineering.

"We are not competing with highend processors like those found in smartphones and electronic devices. Instead we complement them with cheaply printed circuits that cost mere cents instead of a few dollars, making disposable electronics a reality."

The types of complex circuits the team has successfully printed include a 4-bit digital-to-analog converter - a component commonly used in turning digital signals into sound for speakers and headphones; and radiofrequency identification (RFID) tags, commonly used for tracking of goods.

The key difference between this method and the other printed electronics is that it is fully additive, which makes it very eco-friendly. The circuits are printed entirely without the use of any toxic chemicals.

"Our innovative process is green, using non-corrosive chemicals. It can be printed on demand when needed within minutes. It is also scalable, as you can print large circuits on many types of materials and it is low cost, as print tech has been available for decades," Chang added.

A new start-up company is being established to commercialise the invention. A multinational biomedical company has also expressed interest to adopt the application of printed electronics for biomedical devices.

The innovation has also attracted international interest with Chang delivering several keynote addresses at major conferences. He has also been recognised by the Institute of Electrical and Electronics Engineers (IEEE), the world's largest profession for engineers in the field, as a Distinguished Lecturer for the Printed Electronics.

Moving forward, the four-person multi-disciplinary team - two engineers, a material scientist and a chemist - will be looking to develop both digital and analog printable circuits for other biomedical applications in sensing and processing, where lowcost smart circuits are required and for smart lighting systems.