Researchers have developed a stretchable conductive material that could facilitate advances in wearable electronics and durable biomedical implants.

Electronic systems today are based on standard printed circuit board processes. Rigid and unyielding, they directly serve the needs of traditional product fields like automotive, computing or industrial electronics. However, in light of new demands to commercialize technologies, standard circuits have become outdated. ‘Stretchable electronics’ have since taken its place, and gained widespread attention as the new, emerging class of electronics.

Now, researchers at the National Centre for Nanoscience and Technology have created a printable, stretchable and biocompatible metal-polymer conductor that is part elastic polymer and part liquid metal. It was produced through screen printing and microfluidic patterning, such that liquid metal ‘islands’ are suspended in seas of polymer. This hybrid material attempts biomimicry of human flesh by being highly compliant, whilst retaining full functionality. Stretchable circuits also permit “convenient fabrication across size scales with micro-feature precision”, says senior author Xingyu Jiang.

The versatility of stretchable circuits has ground-breaking implications for wearable technology. We have previously seen electronic functions applied to textile design with Ying Gao’s ‘Possible Tomorrows’; a collection of interactive, robotized clothing. Another example is the Graphene Dress
by smart apparel company Cute Circuit. The haute couture carbon-based garment is adorned with LED lights which change colour in response to the wearer’s breathing rate.

The health sector could also benefit from stretchable circuits. Self-healing, recyclable ‘e-skins’ can be embedded with flexible sensors to create seamless prostheses that communicate temperature and pressure. Soft robots may conduct minimal invasive surgeries with maximal precision in hospitals or ambulances. Health-monitoring implants can also track poor posture or aid early diagnosis and treatment of diseases without compromising quality of life.

Biomimetics is still in its infancy but the potential it holds already has disrupted traditional understandings of ‘natural’ and ‘artificial’, ‘human’ and ‘machine’. How else can stretchable circuits be implemented in novel and sustainable ways?

26th July 2018
Email: webmaster@nanoctr.cn
Website: www.english.nanoctr.cas.cn
Contact: webmaster@nanoctr.cn