Graphene Sensors for Wearable Applications

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Abstract

Physiological signals and motion activities monitoring has exhibited a huge market in the past few decades, reaching the number of $5 billion in 2015. Owning plenty of excellent properties, graphene has been an ideal material for flexible and wearable devices, which can be used to monitor life signals. Inspired by the microstructure of human epidermis tissue, we demonstrated a pressure sensor with random distributed spinosum, achieving both large linear range and high sensitivity. [1] Furthermore, a full and simple process to fabricate epidermal sensor based on laser scribed graphene has been developed.[2] After a few minutes' of fabrication and preparation, the programmable graphene pattern can be transferred and attached to any object easily and stably, showing prosperous future potential in health care and intelligent systems. Besides electronic epidermis mentioned above, graphene can also be applied in textile to make strain sensors. Without any polymer encapsulation, this device are much more close-fitting.[3] All of this mechanical sensors show excellent performance in sensitivity, range, durability and stability, which are essential to health monitoring. Beyond that, these devices possess flexible peculiarity and then make it possible for the fabrication of wearable electronics, with a prosperous future in detection of physiological activities.

References

[1] Pang, Yu , et al. "Epidermis Microstructure Inspired Graphene Pressure Sensor with Random Distributed Spinosum for High Sensitivity and Large Linearity." ACS Nano (2018):acsnano.7b07613.

[2] Yancong, Qiao , et al. "Multilayer Graphene Epidermal Electronic Skin." ACS Nano (2018):acsnano.8b02162-.

[3] Zhen, Yang , et al. "Graphene Textile Strain Sensor with Negative Resistance Variation for Human Motion Detection." ACS Nano (2018):acsnano.8b03391-.

Figures

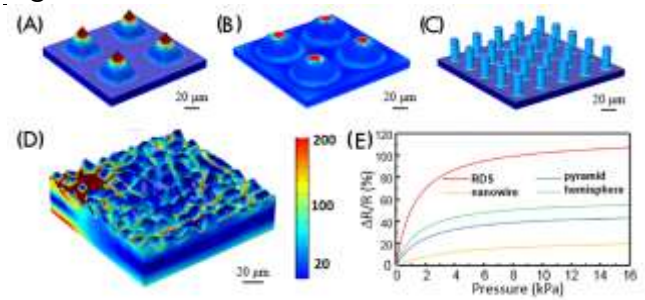

Figure 1: The simulation results of resistance variation versus applied pressure for different surface microstructures.

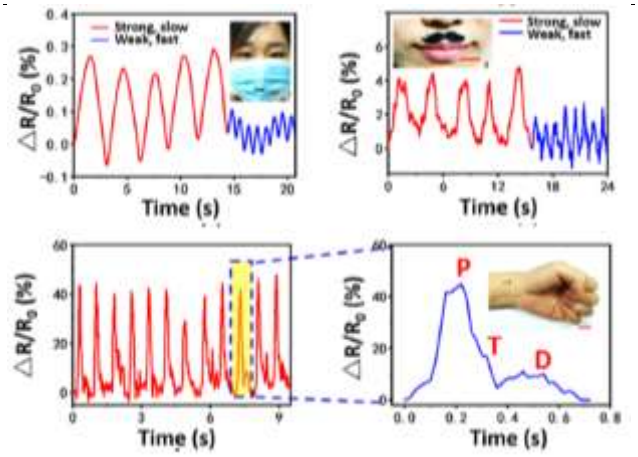

Figure 2: Detection of subtle and violent human motions by graphene epidermal electronic Skin.

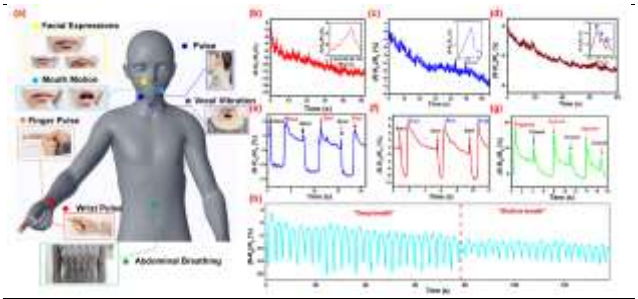

Figure 3: Detection of various human motions using the wearable graphene textile strain sensor.