Wearable Human Motion Detectable Sensors based on Graphene and 2D Material Composites

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Wearable strain-pressure sensors with high sensitivity and flexibility have attracted a great deal of attention for their broad range of applications such as healthcare monitoring and human motion detection. Sensing with continuous measurement of physiological parameters is an effective way to monitor personal health. For human friendly comfortable health monitoring systems, sensor integrated or mounted wearable systems are required. In addition, wearable and flexible sensors which are able to be integrated into clothes should be comfortable and do not affect people's everyday life and activities. In order to be applicable in real life, a wearable strain-pressure sensor should be able to accurately detect subtle body signals from external stimuli in an extensive sensing range from pulse signals to knee joint bending.

In this talk, a wearable and flexible physical sensor (pressure and strain) based on rGO (Reduced Graphene Oxide)-SWCNT composite coated fabrics for the motion glove is introduced. Sensing performance and reliability at different points such as fingertip, finger joint and wrist, are presented. The signal has good reproducibility in response to pressing, bending and stretching. Water tolerance of fabric-based sensors are also evaluated. This sensor can be applicable for personalized physiological monitoring and prosthetic hand.
In addition, a MoS2/graphene porous network (GPN) infiltrated Ecoflex hybrid nanostructure as a flexible strain-pressure sensor is also introduced. Drowsiness detection in response to motion signals such as eye blinking and neck bending is presented. This sensor will be used to calibrate any posture during exercise or to prevent fatal accidents caused by driving while drowsy.

References

[1] S.J. Kim, C.-G. Choi et al., ACS Appl. Mater. Interfaces 10, 3921−3928 (2018)

Figures

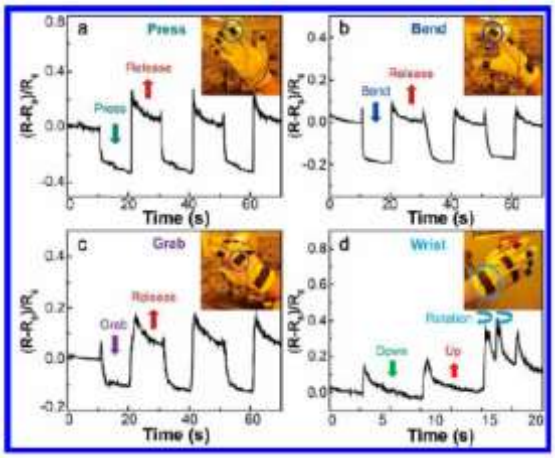

Figure 1. Relative resistance changes with various movements of the motion glove containing the rGO-SWCNT fabric-based sensors, such as (a) pressing, (b) bending, (c) grabbing, and (d) up, down, and rotation of the wrist.

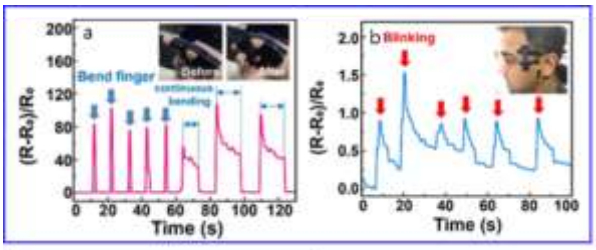

Figure 2. Relative resistance response of the MoS2/GPN/Ecoflex sensors corresponding to various motion signals such as (a) finger bending and (b) eye blinking.

Acknowledgments

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