
Stretchable Sensors for Wearable Electronics and Healthcare Monitoring

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Stretchable electronics that provide morphological adaptability and mechanical properties that match those of human skin and organs can be conformally attached and mounted to the human body to monitor physiological activities and communicate with external electronics, thereby playing an important role in personalized medicine and healthcare. Stretchable sensor-integrated systems with various sensors into new platforms have the ability to monitor, track, and record physiological activities (such as muscle movement, movement disorders, emotion, cognitive states, and malignancy), vital signs (such as pulse rate, blood pressure and respiration), and failure (such as heart failure) in the human body to provide insight into the user's state of health. For those applications, various sensing devices including physical, optical, and chemical sensors with new functionalities need to be developed and integrated in various platforms.

In this presentation, some examples of stretchable physical, optical, and chemical sensors which can be integrated into new platforms including wearable band or skin-attachable patch will be presented. In particular, stretchable physical (strain, pressure, and temperature), optical sensor, humidity sensor, and glucose sensor based on low-dimensional nanoscale materials (1D and 2D), nanocomposites and their hierarchical nanohybrids in FETs and resistors are discussed. A few examples of patchable integrated platforms with multiple sensors are also presented for monitoring of physiological parameters, emotional expressions, bodily motions, and daily activities of human.

Keywords: Stretchable sensor; Nanomaterials; Wearable electronics; Sensor-integrated system

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