SELF-POWERED WEARABLES

Slimmed down for sensitivity

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Wearable sensors that can detect vital signs could be used to continuously monitor a person's health. The devices should be flexible and offer high sensitivity. They also typically require a constant power supply, which can restrict their broader application. Lead zirconate titanate (PZT) — a perovskite ceramic that is able to translate mechanical strain into electrical signals — is a promising material for self-powered applications. However, its low sensitivity has limited its use in wearable sensors. Bin Yang and colleagues at Shanghai Jiao Tong University have now developed a self-powered PZT force sensor that can detect artery pulse signals in real time and recognize hand gestures.

The researchers first bonded a PZT layer to a beryllium copper foil in order to help create a uniform strain distribution in the device. Next, the PZT layer was thinned down to a thickness of 50 μm to reduce the mechanical stress on the metal layer. Finally, the PZT layer was bonded to a flexible plastic substrate. The resulting sensor exhibited a high sensitivity of up to 10 V N^{-1} and could be attached to curved surfaces. To further assess its performance, the sensor was placed on a person's wrist, arm and neck, and pulse measurements were recorded. The sensor can also be connected to a computer via a wireless signal transmission system.

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