

Pressure-Sensitive Electrode Material, Means and Methods of Use

Stanford researchers have developed an ultra-sensitive resistive pressure sensor based on an elastic, microstructured conducting polymer (EMCP) thin film. This low cost device enables the detection of a large range of pressure values (~ 1 Pa to 100 kPa) and exhibits a short response time, good reproducibility, excellent cycling stability and temperature-stable sensing. These pressure sensors can be applied to a wide range of fields, including human-computer user interfaces, robotics, and industrial monitoring. Moreover, EMCP materials will be highly useful in the design of next generation electronic systems due to their advantageous traits, including a 3D hierarchical morphology, high conductivity, and good elasticity.

Figure

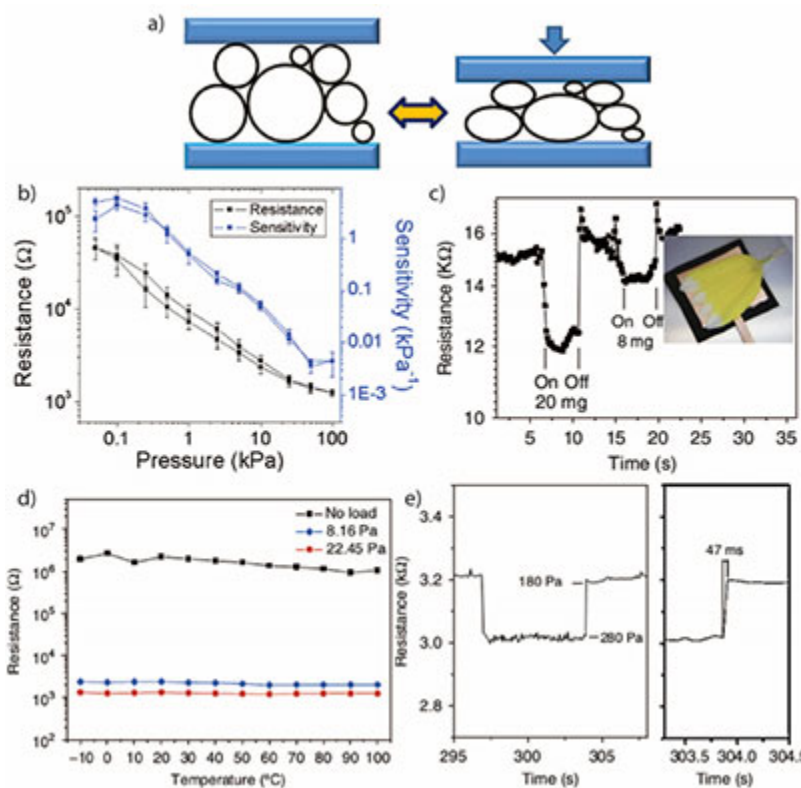


Figure description - Summary of EMCP pressure sensor characteristics. (a)

Mechanism of action. With increasing pressure, the contact area between the EMCP and the electrode increases, causing a reduction in the contact resistance. (b) High pressure characteristics of the device. The device functions in the range of ~ 1 Pa to at least 100 kPa. (c) Demonstration of the ability to sense small weights such as an 8 mg flower petal. (d) Resistance of the sensor at different pressures. The pressure sensing characteristics are consistent in the range from -10 to 100 °C. (e) Time response of 50 ms.

Stage of Research

- Prototype tested and exhibited unprecedented performance with ultra-high sensitivity
- Sensitivity of this pressure sensor can be ultimately improved to $\sim 56.0\text{--}133.1 \text{ kPa}^{-1}$ in the low-pressure regime (30 Pa), the highest among any reported flexible pressure sensors

NPR "All Tech Considered" Feature

["Just Like Human Skin, This Plastic Sheet Can Sense And Heal"](#), April 11, 2016

Applications

- Current application can be for **low cost, disposable sensors for temporary sensing requirements**
- Pressure sensor materials can be used in a wide range of industries such as medical, industrial, electronics, robotics, displays, and toys and games.

Advantages

- Low cost, simple design
- Pressure response is insensitive to temperature
- Ultra -high sensitivity at low and medium pressures
- Wide dynamic range
- Rapid response time

Publications

- Pan, A. Chortos, G. Yu, Y. Wang, S. Isaacson, R. Allen, Y. Shi, R. Dauskardt, Z. Bao, "[An ultra-sensitive resistive pressure sensor based on hollow-sphere microstructure induced elasticity in conducting polymer film](#)", Nature Comm., 5, Article number: 3002, 2014.

Patents

- Published Application: [20150168236](#)
- Published Application: [WO2015095379](#)

Innovators

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