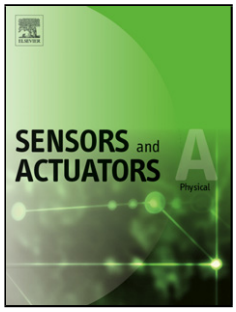

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Authors: Hairong Kou, Lei Zhang, Qiulin Tan, Guanyu Liu, Wen Lv, Fengxiang Lu, Helei Dong, Jijun Xiong

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Wireless flexible pressure sensor based on micro-patterned Graphene/PDMS composite

Hairong Kou, Lei Zhang, Qiulin Tan*, Guanyu Liu, Wen Lv, Fengxiang Lu, Helei Dong, Jijun Xiong

Science and Technology on Electronic Test and Measurement Laboratory, North University of China, Tai Yuan 030051, China;

* Correspondence: tanqiulin@nuc.edu.cn;

Highlights:

- Doping the graphenen into the PDMS can improve the sensitivity of capacitance sensor.
- The wrinkled Au electrodes and the micro-patterned Gr/PDMS dielectric layer can increase the contact area and distance between the electrodes when pressure is applied.
- A wireless LC pressure sensor was fabricated by using the micro-patterned Gr/PDMS as the dielectric layer and the wrinkled Au electrodes as the antenna and electrode. The sensors can wirelessly detect the hand bending and facial muscle movements.

Abstract:

High-performance flexible pressure sensors have attracted more attention because of their high-sensitivity, strong-flexibility, implantable and wearable characteristics. Here, we propose a flexible high-performance pressure sensor using a micro-patterned graphene/polydimethylsiloxane (Gr/PDMS) composite as the dielectric layer, which is sandwiched by folding the PDMS substrate with the cavity and the wrinkled continuous Au pattern as the antenna and electrode. By investigating graphene with different concentration, the composite with a thickness of 200 μm and a concentration of 2% as the dielectric layer exhibits the highest sensitivity. The sensors are tested under cyclic pressure, exhibiting outstanding stability and durability, low detection limit, and rapid response time, and they can be utilized to detect subtle pressure. In addition, the sensors can be sensitive to hand bending and facial muscle movements, and thus they have the potential to be used for highly sensitive wireless detection in the wide range of wearable electronic devices, bionic-electronic skins and intelligent robot.

Keywords: pressure sensor, flexible sensor, micro-patterned Gr/PDMS, wireless.

1. Introduction

Flexible pressure sensors because of their high-sensitivity, strong-flexibility, as well as their implantable and wearable characteristics, are gradually replacing the traditional sensors and becoming a research hotspot at home and abroad in recent years. They have been widely used in wearable electronic