

Flexible pressure sensor array based on highly elastic porous film

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A flexible pressure sensor array having high sensitivity in a low pressure region has attracted great interest owing to its potential for a variety of applications ranging from flexible displays to electronic skins and health care systems [1]. For realizing the flexible pressure sensor array, the sensitivity and the flexibility are considered as two major issues. In order to improve the sensitivity of a flexible pressure sensor, a number of techniques capable of processing at low-temperatures for flexible substrates, employing an air gap [2,3], utilizing a highly elastic material as a dielectric layer [4,5] and introducing micro-structures on the surface of a thin dielectric layer [1] have been suggested. However, they still suffer from the poor sensitivity in a low pressure region [2-4] or the complicated and expensive fabrication processes [1-3,5]. Therefore, a new approach, which is simple and cost-effective, to the improvement of the sensitivity in a rather wide range of the pressure needs to be explored.

In this work, we demonstrate a flexible pressure sensor array using a highly elastic film of a dielectric layer where the pore structure is formed. The porous dielectric layer fabricated using polydimethylsiloxane (PDMS) was placed between two flexible substrates with patterned electrodes as shown in Fig. 1. The sensitivity was significantly improved, especially, in the subtle pressure region due to the increase in the mechanical deformation of the porous film upon the compressive pressure, and was able to be easily controlled without complicated processes [1]. Furthermore, by the introduction of an additional thin PDMS layer, serving as an adhesive layer, between the porous elastomer film and the flexible substrate facilitates the fabrication process. Our flexible pressure sensor array will lead to various applications such as the electronic skin detecting a subtle pressure change and advanced touch panels with more human-friendly interfaces.

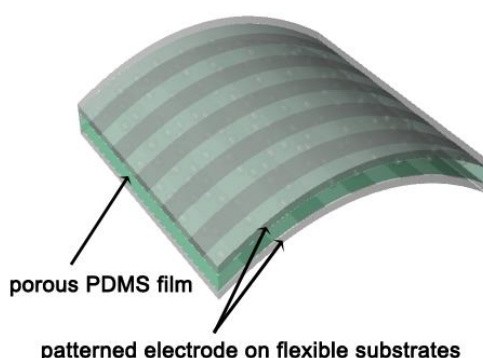


Fig. 1. A schematic diagram of pressure sensor array based on porous PDMS film placed between two flexible substrates with patterned electrodes.

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References

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