

A strain sensor based on a stretchable CNTs/PDMS fiber

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Abstract

Flexible electronics have attracted enormous attention in an emerging field of flexible conductor and strain sensor due to the excellent flexibility and good electrical conductivity [1]. The increasing demand for wearable electronic devices based on flexible electronics in personal health monitoring, human-machine interaction, and motion capture for games or communication with deaf-mute people has brought great interest in the research field of wearable flexible electronics [2]. In this work, we fabricated stretchable carbon nanotubes/polydimethylsiloxane (CNTs/PDMS) fibers by a simple and low-cost method of extrusion moulding. The CNTs/PDMS fibers is capable of strain sensing, as elucidated by the linear resistance change with a function of strain. It also shows excellent repeatability of mechanical and electrical properties for strain sensor. And the electrical property is relatively stable after 20,000 cycles of 50% tension. This strain sensor is potential to be used as a wearable device in human motion monitoring through combination with fabric, such as gloves and sport suits.

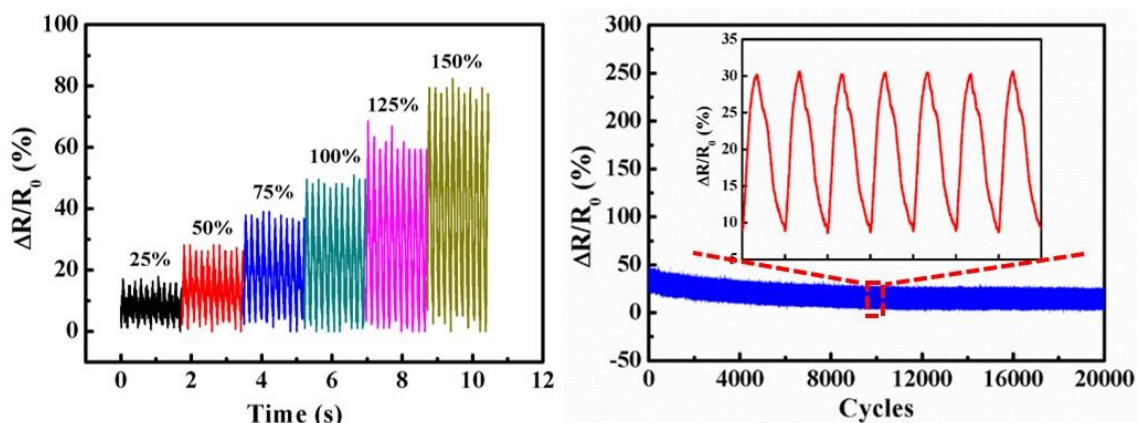


Figure 1: Repeatability and dynamic stability of the strain sensors based on CNTs/PDMS fibers for different magnitudes of cyclic stretch.

References

- [1] Huang, S.Y.; Liu, Y.; Zhao, Y.; Ren, Z.F.; Guo, C.F.: Flexible Electronics: Stretchable Electrodes and Their Future, *Advanced Functional Materials*, Vol. 29, No. 1805924, pp. 1-15, 2019
- [2] Amjadi, M.; Pichitpajongkit, A.; Lee, S.; Ryu, S.; Park, I.: Highly Stretchable and Sensitive Strain Sensor Based on Silver Nanowire-Elastomer Nanocomposite, *ACS Nano*, Vol. 8, No. 5, pp. 5154-5163, 2014.