Biocompatible Strain Sensing Polymer Fiber

VTIP 20-062: “Thermal Drawing of Strain Sensing Polymer Fiber”

THE CHALLENGE

Strain sensing has large implications in biomedical applications to monitor wearer’s physiological conditions. Current metal or silicon based strain sensors cannot sense small deformations (less than 5%) & are not biocompatible, thus are not suitable for human health monitoring. These strain sensors are usually not very flexible and cannot be woven onto fabrics for wearable devices. These strain sensors also have low strain sensing range unless you opt for expensive ones.

OUR SOLUTION

Jia and her team present a novel, stretchable polymer fiber that can measure strain, is biocompatible, can be woven into fabrics and can also be configured into a mesh to map the strain distribution across an area. By innovatively using the process of thermal drawing and doping, the inventors have created a polymer fiber that has multiple modes of operation to measure strain. It remarkably provides a strain sensing range of 400% and stability of a 1000 cycles.

The biocompatibility was tested by mounting the fiber mesh on a pig bladder to observe the physiological reactions, with success. The strain sensor can be potentially used for a wide variety of applications across biomedical devices and wearable devices. The fiber can also be attached to robotics and prosthetics for feedback control of its movement and interaction.

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