Highly Stretchable & Flexible Electronic Sensors

Tech ID: 27609 / UC Case 2017-470-0

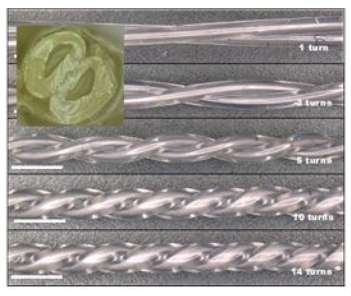
BACKGROUND

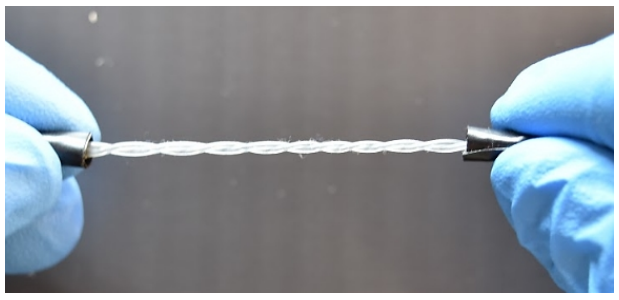
Stretchable and flexible multifunctional electronic components, including sensors and actuators, have received increasing attention in robotics, electronics, wearable, and healthcare applications. Electrical and mechanical stability are required for soft and stretchable devices, and despite advances it has remained challenging to design analogs of many electronic components to be highly stretchable, efficient to fabricate, and to provide control over electronic performance. There is a need for efficient fabrication methods and design techniques that lead to durable devices whose performance can be tuned to meet application requirements.

DESCRIPTION

Researchers at the University of California, Santa Barbara have developed a cost-effective method to create highly stretchable and flexible and durable electronic devices using twisted conductive microtubules composed of a liquid metal alloy, eutectic gallium indium, eGaIn, injected into hollow elastomer filaments fabricated via a simple roller coating process. The unique twisted helical structure allows for tuning of mechanical and electronic properties, enabling strain, pressure, rotation, and tactile sensing with stretchability exceeding 400%. These sensors offer fast response, high durability over 1000 loading cycles, and easy integration into varied applications including robotics, wearables, soft electronics, and healthcare devices.

Publication: https://www.nature.com/articles/s41598-017-01898-8





ADVANTAGES

- Highly stretchable (>400%) and flexible electronic interconnects and sensors
- Simple, scalable, and low-cost fabrication method using common tools
- Adjustable mechanical and electronic sensitivity via twisting and pre-tensioning
- Compact, multifunctional, and reliable with fast response and long durability
- Can detect strain, pressure, rotation, and tactile stimuli simultaneously

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OTHER INFORMATION

KEYWORDS

Sensors, microtubules, stetchable sensors, tactile sensing, indansens

CATEGORIZED AS

- **Environment**
  - Sensing
- **Engineering**
  - Other

RELATED CASES

2017-470-0

APPLICATIONS

- Robotics: motion sensing for cable-driven systems, tendon position feedback, soft robotic sensors
- Healthcare: real-time monitoring of human joint motion for rehabilitation, surgical tool haptics
- Wearables: flexible smart clothing, fitness trackers, and human motion and force detection
- Soft Electronics: stretchable wiring, tactile sensor arrays, haptic feedback devices
- Industrial and Military: durable stretchable sensors for harsh environments and human-machine interfaces

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,908,038	02/02/2021	2017-470

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Photonic Devices For Converting Light Energy Into Mechanical Energy, Forces, and Displacements
- Integrated Soft Optoelectronics for Wearable Health Monitoring

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