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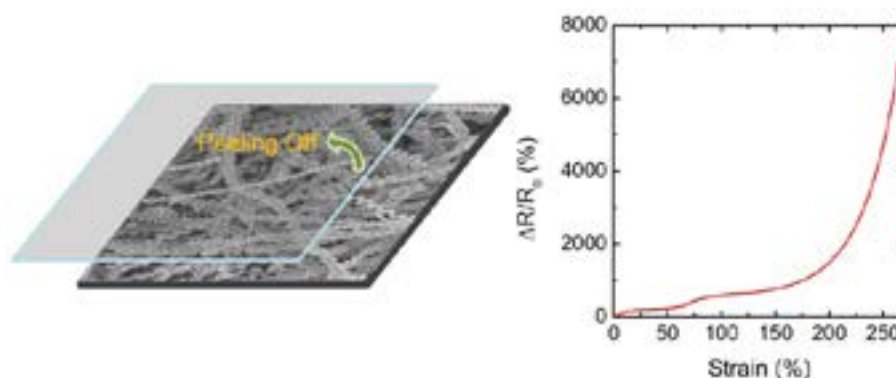
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A wearable strain sensor based on carbon nanocoils

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In recent decade, wearable electronic device and sensor attracted intense attention with the development of smart systems, owing to their effective interactions with human and machine motions. Despite the tremendous progress, it is still a challenge to develop a highly sensitive, stretchable and low cost sensor. Herein, a super stretchable and sensitive strain sensor fabricated by a simple peeling off approach is reported. The strain sensor is prepared by peeling off a thin as-grown carbon nanocoil (CNC) film from substrate using a stretchable polydimethylsiloxane (PDMS) film or a flexible adhesive tape. Here we take advantages of the spring-like morphology, and the original network of CNCs. The spring-like morphology of CNCs determines the point contact among single CNCs and the super stretchability of CNCs. The original networks of CNCs on substrates make it much simpler and cheaper for sensor preparation. The sensor is used to detect pressure, tension and bend. The strain range and maximum real-time gauge factor reach 260 % and 190 respectively, with a rapid response (less than 12 ms). The contrary resistance responses under tension and bend make it possible to distinguish the direction and type of strain. The sensor is used to monitor a strain in wide range, from human pulse to the impact of a 0.9 kg weight. The high sensitivity and stretchability, easy and cheap fabrication, effective interaction with human motions suggest the great potential applications of the sensor in wearable strain sensor and smart system.



Biography

Chenghao Deng is a P.h.D. student focused on the research of physical properties and applications of carbon nanomaterials. He has succeeded in characterizing the mechanical, thermal, electrical and structural properties of single carbon nanocoils. He developed some simple and economic methods to fabricate stretchable or flexible sensors based on carbon nanomaterials, towards wearable or micro/nano scale applications.

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