

Highly stretchable and sensitive strain sensors based on single-walled carbon nanotube-coated nylon textile

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Carbon nanotube (CNT) shows promise on strain sensor applications because of its high piezoresistivity. With increasing demand for wearable electronic devices, developing strain sensors with a high stretchability becomes quite critical. To develop a high performance stretchable strain sensor, we used nylon textile obtained from commercial thigh-highs as substrate for coating single-walled CNT (SWNT). Using vacuum-assisted spray-layer-by-layer technique, SWNTs were uniformly coated on the surface and filled between the yarns. Our SWNT/nylon textile sensor exhibited high sensitivity of 100 gauge factor at 100% strain, fast response, and excellent durability. In addition, the sensors were used for human motion detection by attaching to glove and sewing with leggings. We have a great expectation that high stretchability, sensitivity, and durability of this SWNT/nylon textile strain sensor, with its simple integration to clothes, open up new opportunities for fabrication of high performance wearable strain sensor.