Highly Sensitive, Printable, Piezoresistive Composite Materials for Strain Sensor Applications

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Interest in personalized health-monitoring, human motion detection, human/machine interfaces, and soft robotics has led to an wearable, stretchable, and highly sensitive strain sensor materials. Additionally, direct-printable sensor materials are needed, instead of usual complicated patterning process. Here, we develop a direct-printable and piezo-resistive strain sensor materials composed of carbon filler and elastomer. We blend carbon composite materials, triblock copolymer elastomer and organic solvents to manufacture a viscoelastic paste. We control the fundamental properties and structure design of carbon filler and interfacial properties between carbon filler and elastomer in order to endow highly sensitive sensor characteristics and enable direct-printing process. The optimized strain sensor materials through printing process have wide sensing range from 1% to 70% strain and show high sensitivity with a gauge factor 70.
키워드: Strain sensor, Composites, 3D printable