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# Electroactive Polymer Thermoplastic Polyurethane Sensor

**A customizable, low-cost screen-printable conductive ink made of thermoplastic polyurethane and carbon nanofibers enables the creation of flexible, stretchable strain sensors superior for applications like wearable monitoring and soft robotics.**

Researchers at Purdue University have developed a novel screen-printable conductive ink composed of thermoplastic polyurethane (TPU) and carbon nanofibers (CNFs) for use in flexible, stretchable strain sensors. The screen-printed TPU-CNF sensors demonstrated lower stiffness, better strain sensitivity, and more stable electrical behavior under cyclic loading compared to sensors made using commercially available conductive TPU filament (Filaflex). Additionally, the screen-printed sensors showed better mechanical compliance, reduced delamination, and consistent resistance response under uniaxial strain. This innovation is ideal for applications in wearable health monitoring, soft robotics, active vibration damping, and flexible human-machine interfaces.

**Technology Validation:**

Compared to 3D-printed conductive Filaflex, the screen-printed TPU-CNF composites exhibited consistent, monotonic resistance changes and higher gauge factors, enabled by the compliant structure and uniform conductive network formed during solvent evaporation.

**Advantages**:

-Tunable conductivity

-Customizable conductive ink

-Low-cost manufacturing

**Applications**:

-Wearable health monitoring device

**Technology ID**

2025-NEWE-71211

**Category**

Chemicals & Advanced Materials/Polymer Science & Smart Materials

Materials Science & Nanotechnology/Nanomaterials & Nanostructures

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**View online**

-Smart fabric

-Sport performance tracking

**TRL:** 3

**Intellectual Property:**

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**Keywords:** Screen-printable conductive ink, thermoplastic polyurethane, carbon nanofibers, flexible strain sensors, stretchable strain sensors, wearable health monitoring, soft robotics, active vibration damping, flexible human-machine interfaces, smart fabric