

Industrial Consultancy & Sponsored Research (IC&SR)

PRESSURE SENSITIVE ADHESIVE TAPE BASED FLEXIBLE STRAIN SENSOR

IITM Technology Available for Licensing

Problem Statement

- A strain gauge is a sensor which converts mechanical deformation of the substrate to the change in electrical resistance, the **resilience** and **gauge factor** are existing limitation of current strain sensor.
- In sensor installation phase, **using of inappropriate adhesives** from the market, **long curing time** for certain kinds of adhesives and no control over the manual adhesive coating, which causes **uneven thickness profile** which **affects sensor performance**.
- **Hindrance of Flexible Sensors to Reach Market:** Most design often ignores the **packaging feasibility** and **non-compatibility** with existing **industrial manufacturing process**.

Technology Category/ Market

Electronics-Strain / Tactile Sensor.

Mechanical Engineering: Mechanical Sensor.

Industry- Health-care, Biomedical Engineering,

Applications-Structural Health Monitoring device, wearable electronics, robotics rehabilitation and bio-functional prosthetics.

Market - The Global Strain Sensor Market is projected to grow from USD 1.02 billion in 2017 to **USD 2.06 billion** by **2030**, at a CAGR of **7.5%**, from 2017 to 2030.

Technology

- **Nanomaterial Functionalization:** Carbon nanotube is polymer functionalized to achieve consistent sensing performance through out the sensor tape.
- **Polymer Nanocomposite:** flexible strain sensor film is a homogenized mixture of the **carbon nanotube** and **polyvinylidene chloride (PVDC)**.
- **Design Framework:** Flexible strain sensor tape comprises of one polymer nanocomposite flexible stain sensor film; one acrylic based pressure sensitive adhesive layer in bottom; and one copper electrode layer on top.
- **Problem Addressed:** This strain sensor tape design **solves laborious and time consumed installation process** and provides **viable sensor packaging** and easily **adaptable industrial manufacturing process**.

TRL (Technology Readiness Level)

TRL- 3/4 Proof of concept ready Stage

Intellectual Property

IDF Ref: 2310; IN 202241015602.

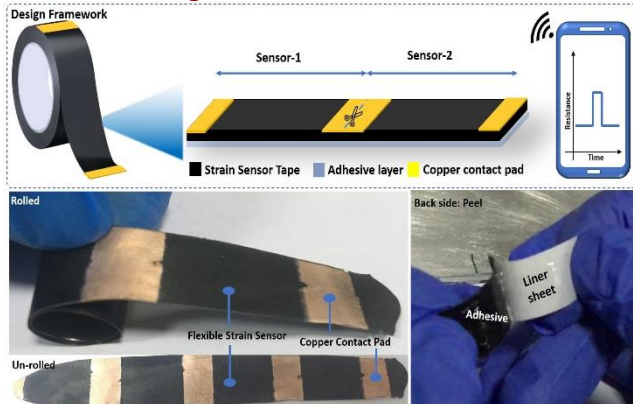


Figure shows the schematic and developed PSA tape based strain sensor in different view points.

Key Features / Value Proposition

❖ User Perspective:

- The strain sensor tape allows to **peel sensor flexibly from the big roll** based on the required length.
- Smart peel and stick model enables **effortless installation process** to the user.
- Using of PSA avoids long curing time and enables **quick fabrication process** to the user.

❖ Industrial Perspective:

- This design framework ensures **viable packaging** to the flexible strain sensor.
- **Easily adaptable** in the industrial manufacturing process.
- **Sensor, adhesive and contact pad** are designed in a single entity make the product smart and competitive.

❖ Technical Perspective:

- **Effective Strain Transmission:** The **uniform thin coating** of PSA layer with **controlled thickness** helps in effective transfer of the strain experienced by the substrate to the sensor.
- **High sensitivity:** The PSA tape based flexible strain sensor shows **the gauge factor of 25** which is **12 times higher than the commercial metallic strain gauge**.

Research Lab

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