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Multilayer Piezoelectric/resistive Hybrid Composite Systems for Structural Health Monitoring and Energy Harvesting

A flexible, self-powered, and reusable polymer-based sensor, manufacturable with a simple roll-to-roll process, offers a cost-effective solution for monitoring the structural health of civil infrastructure and large equipment.

Researchers at Purdue University have developed new structural health monitoring (SHM) sensors for civil structures including buildings, bridges, dams, pipelines, aircraft, ships, and large machine equipment. Environmental changes are often wearing on the materials of these structures, and undetected can cause irreparable damage. Current technologies include eddy-current thermography-based sensors that are discrete but are also typically expensive and require extensive wiring setups. The solution created by Purdue researchers includes a small flexible, self-powered, reusable sensor which is attachable to most surfaces. The device operates by recording changes in resistivity when static disturbances occur. In addition, the highly efficient sensor features piezoelectric and piezoresistive polymer-based layers that are readily manufacturable through a simple roll-to-roll process.

Advantages:

-Self-powering

-Roll-to-roll

-Flexible

-Reusable

-Attaches to any surface

Potential Applications:

-Materials engineering

-Civil engineering

Technology ID

2019-CAKM-68503

Category

Buildings, Infrastructure, & Construction/Structural Health Monitoring

Chemicals & Advanced Materials/Polymer Science & Smart Materials

Materials Science & Nanotechnology/Advanced Functional Materials

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-Construction management

TRL: 3

Intellectual Property:

CIP-Patent, 2019-09-16, United States

Keywords: structural health monitoring sensor, SHM sensor, flexible sensor, self-powered sensor, reusable sensor, piezoelectric sensor, piezoresistive sensor, polymer-based sensor, roll-to-roll manufacturing, civil structures monitoring, Civil Engineering, Detection, Energy Harvesting, Materials and Manufacturing, Materials Science, Monitor, Piezoelectric, Piezoresistor, Roll-to-Roll, Sensing, Sensors, Structural Detection, Thin Films