PURDUE INNOVATES | Office of Technology Commercialization

Battery Free Vial Printed Temperature Sensors

Battery-free, vial-printed temperature sensors are integrated into a low-power wireless system for noninvasive, real-time process monitoring in sensitive industrial production batches like pharmaceutical freeze drying.

High sensitivity industrial production batches, such as pharmaceutical freeze drying, need accurate monitoring abilities so that producers can ensure the batches are at the optimum production value. To monitor the temperature of a batch, thermocouples are placed in the packaging or attached to a single product. Current technology requires either a web of wires threaded through the packaging to power the thermocouples or bulky batteries within the packaging. This method is invasive and obtrusive to the product and needs to be updated.

Researchers from Purdue University have developed battery free, vial printed temperature sensors/thermocouples, which can be printed on an adhesive substrate and placed on a vial and other surfaces. The temperature sensors can be integrated into a 2.4 GHz, low-power, wireless system, which is powered using a wireless energy harvester, ensuring battery free operation and real time data. This solution provides an almost noninvasive solution to process monitoring.

Advantages:

-Comprehensive data collection

-Noninvasive

Potential Applications:

-Printed circuits

-Pharmaceutical freeze drying

-Industrial batch monitoring

TRL: 5

Technology ID
2016-RAGH-67408

Category
Pharmaceuticals/Pharmaceutical Packaging & Delivery Systems
Robotics & Automation/Perception & Sensing

Authors
Dimitrios Peroulis
Nithin Raghunathan

Further information
Parag Vasekar
psvasekar@prf.org

View online

Intellectual Property:

Provisional-Patent, 2015-06-09, United States | Provisional-Patent, 2015-12-15, United States | PCT-Patent, 2016-01-27, WO | NATL-Patent, 2017-07-19, United States | NATL-Patent, 2017-07-25, European Patent | NATL-Patent, 2017-07-26, India | NATL-Patent, 2017-07-27, Brazil | NATL-Patent, 2017-07-28, Japan | NATL-Patent, 2017-07-28, China | Provisional-Patent, N/A, United States

Keywords: battery free temperature sensor, vial printed thermocouple, wireless energy harvester, noninvasive process monitoring, pharmaceutical freeze drying sensor, industrial batch monitoring, low power wireless system, printed circuits, adhesive temperature sensor, real time data monitoring