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All Printed Wireless Radiation Sensor

Disposable PEDOT-based RF tag that measures sterilization radiation exposure in real-time.

Researchers at Purdue University have developed a printable, wireless device (dosimeter) for detecting radiation. Sterilization via radiation is the preferred technique for sterilization of health instruments like masks, gloves, and syringes, medical devices, and pharmaceutical packaging. There is demand for measurement of radiation dosage due to the deleterious effects of both under- and over-exposure of materials to gamma radiation. The Purdue researchers' device is made of PEDOT : PSS/PU polymer composite. This is a low-cost material; the device need not be recovered after use. The composite deforms when exposed to gamma radiation, which is interpreted as an increase in impedance. A vector network analyzer (VNA) emits a signal toward a sensor adhered to the composite; the backscattered signal is detected as impedance by an antenna connected to the VNA. The impedance value can then be transferred to any Wi-Fi connected device and used to evaluate the sterilization process.

Technology Validation: The researchers' device responded to radiation exposure of 40 kGy with an impedance increase of 375%.

Advantages:

- Wireless, radiofrequency signal transmission

- Printable reference and sensing tags

- Real-time

- Detection of radiation exposure up to 40 kGy

- Low-cost

Applications:

- Evaluation of radiation sterilization used to disinfect health instruments, medical devices, and pharmaceutical packaging

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