PS10.11
IOT WEREABLE MONITOR (PM 2,5 – PM 10)

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This work presents a low-cost wearable monitor for measuring PM2.5 and PM10 particulate matter concentrations. The monitor employs a laser particle counter interfaced with an Arduino platform, incorporating an Internet of Things (IoT) approach. Data are sampled at a regular rate, stored on a smartphone or in the cloud for post-acquisition processing and graphical visualization, and can eventually notify the user when predetermined values are reached.
The wearable design enables monitoring of human exposure to particulate pollution across various locations and times. The system supports the integration of location data from a GPS sensor into a GIS database for spatial analysis. The devices are battery-powered and can be worn or utilized as fixed probes, with the potential for power supply via solar panels and/or wind generators.
Machine Learning techniques are employed to improve accuracy by comparing data from proximal sensors. The collected data can also be utilized for training predictive models leveraging Deep Learning techniques. During monitoring, concentration values are wirelessly transmitted to the cloud, supporting the use of the MQTT IoT protocol. The monitor can sample other environmental parameters, enabling full monitoring of air quality and exposure levels in both outdoor and indoor environments.
The construction of the dust sensors and data collected from this research enhance the current research by describing an open-source concept and providing initial measurements. In principle, sensors can be massively multiplexed and used to generate real-time maps of particulate matter around a given location.
Keywords: Arduino; IoT; air quality; crowd-sensing; crowd-sourced sensing; dust sensor; environmental analysis; human exposure; particulate matter; pollution; wireless networks.

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PS10.12
EVOLUTION OF FRICKE GEL DOSIMETRY FOR ENHANCED RADIOTHERAPY QUALITY ASSURANCE

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Introduction: The Fricke Xylenol Gel (FXG) is a radiochromic dosimeter of great interest in the medical field due to its properties that resemble those of human tissue. Its response is based on the radio-induced conversion of ferrous ions to ferric ions. Despite its potential, the use of this dosimeter still faces significant challenges, particularly regarding the control of auto-oxidation. This work aims to review the advancements and techniques used to enable the effective application of this dosimeter in quality control for radiotherapy treatments.
Materials & Methods: The results were obtained through a literature review that investigated the main advancements and methodologies employed, resulting in the enhancement of the Fricke Xylenol Gel dosimeter for applications in radiotherapy dosimetry
Results: The findings unveiled noteworthy progress in utilizing Fricke Xylenol Gel dosimetry for radiotherapy applications. These advancements arise from proposed modifications regarding the dosimeter's primary reagents, coupled with techniques enabling precise control over natural oxidation and ferrous ion diffusion.
Summary: In summary, the advancements in Fricke Xylenol Gel dosimetry demonstrate its increasing suitability for radiotherapy applications. The proposed modifications and refined techniques for controlling oxidation and ion diffusion signify significant progress in enhancing dosimeter efficacy. These findings underscore the importance of ongoing research to optimize dosimeter performance, ensuring improved quality assurance in radiotherapy treatments.
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PS10.13
ASSESSMENT OF DOSIMETRY IN ONCOLOGICAL TREATMENT USING RADIOACTIVE NANOPARTICLES: A COMPREHENSIVE LITERATURE REVIEW

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Introduction: With technological advances in medicine, various treatments and diagnoses have emerged, contributing to extended survival for cancer patients. In the ever-evolving landscape of nanotechnology and medicine, radioactive nanoparticles emerge as promising agents at the interface of diagnosis and therapy, offering innovative applications in the field of theranostic medicine capable of integrating both diagnosis and therapy in a single device. With this purpose, this study aims to conduct a literature review on the dosimetry of radioactive nanoparticles, intending to evaluate their feasibility for oncological treatment.
Materials & Methods: The bibliographic study exclusively focuses on works related to the dosimetry of radioactive nanoparticles. The selection involved relevant topics on the Scopus platform (Elsevier), such as dosimetry, in vivo tests, and preclinical studies involving radioactive nanoparticles.
Results: Out of 113 selected works, 51, 24, and 38 address dosimetry, in vivo tests, and preclinical studies of radioactive nanoparticles, respectively. Due to the scarcity of research, all articles were analyzed, excluding those less cited and less relevant to the objective. Most studies suggest viability as a treatment, although some do not detail the dose calculation in the target region.
Summary: This work provides studies on the dosimetry of radioactive nanoparticles, highlighting a broad distribution of research. While the treatment shows promising viability, gaps persist, especially in describing the precise calculation of the dose in the target region, pointing to opportunities for future research to address this issue.