Environmental Monitoring

1- Advances in Biosensing and Environmental Monitoring Based on Electrospun Nanofibers

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Abstract

Electrospun nanofibers (NFs) are directly produced by electrospinning technology. They are useful in a series of applications such as excellent performance in biosensing and environmental monitoring, due to their large specific surface area and high porosity. The wide range of materials used provide a solid foundation and core guarantee for electrospun NFs to sense, which are used in a variety of polymers, small molecules, colloidal particles, and composites. Biosensing primarily aims at small biomolecules, biomacromolecules, wearable human motion monitoring, and food safety testing. Environmental monitoring encompasses the detection of gases, humidity, volatile organic compounds, and monitoring the degradation of heavy metal ions. We aim to sort out some recent research for electrospun NFs in the sensing area, which may inspire emerging smart sensing devices and bring a novel approach for biomedical development and environmental remediation. We highlight the powerful applications of electrospun NFs in the rapidly growing field of wearable electronic devices, which may spur the industry's novel perspectives on the development of wearables. Finally, we point out some unresolved difficulties in the sensing field for electrospun NFs and propose possible and novel ideas for this development.

Keywords
Author Keywords

BiosensingEnvironmental monitoringSensorsWearablesElectrospun nanofibers

Keywords Plus

GOLD NANOPARTICLESAIR-POLLUTIONPOLYIMIDE NANOFIBERSCARBON NANOTUBESGLUCOSE-OXIDASEGRAPHENE OXIDEDRUG-DELIVERYLABEL-FREETURN-ONSENSORS

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2- IoT enabled environmental toxicology for air pollution monitoring using AI techniques

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Abstract

In past decades, the industrial and technological developments have increased exponentially and accompanied by non-judicial and un-sustainable utilization of non-renewable resources. At the same time, the environmental branch of toxicology has gained significant attention in understanding the effect of toxic chemicals on human health. Environmental toxic agents cause several diseases, particularly high risk among children, pregnant women, geriatrics and clinical patients. Since air pollution affects human health and results in increased morbidity and mortality increased the toxicological studies focusing on industrial air pollution absorbed by the common people. Therefore, it is needed to design an automated Environmental Toxicology based Air Pollution Monitoring System. To resolve the limitations of traditional monitoring system and to reduce the overall cost, this paper designs an IoT enabled Environmental Toxicology for Air Pollution Monitoring using Artificial Intelligence technique (ETAPM-AIT) to improve human health. The proposed ETAPM-AIT model includes a set of IoT based sensor array to sense eight pollutants namely NH3, CO, NO2, CH4, CO2, PM2.5, temperature and humidity. The sensor array measures the pollutant level and transmits it to the cloud server via gateways for analytic process. The proposed model aims to report the status of air quality in real time by using cloud server and sends an alarm in the presence of hazardous pollutants level in the air. For the classification of air pollutants and determining air quality, Artificial Algae Algorithm (AAA) based Elman Neural Network (ENN) model is used as a classifier, which predicts the air quality in the forthcoming time stamps. The AAA is applied as a parameter tuning technique to optimally determine the parameter values of the ENN model. In-order to

examine the air quality monitoring performance of the proposed ETAPM-AIT model, an extensive set of simulation analysis is performed and the results are inspected in 5, 15, 30 and 60 min of duration respectively. The experimental outcome highlights the optimal performance of the proposed ETAPM-AIT model over the recent techniques.

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Air qualityHuman healthEnvironmental toxicologyArtificial intelligencePollution monitoringInternet of things

Environmental Monitoring

3- A Low-Cost Platform for Environmental Smart Farming Monitoring System Based on IoT and UAVs

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Abstract

When integrating the Internet of Things (IoT) with Unmanned Aerial Vehicles (UAVs) occurred, tens of applications including smart agriculture have emerged to offer innovative solutions to modernize the farming sector. This paper aims to present a low-cost platform for comprehensive environmental parameter monitoring using flying IoT. This platform is deployed and tested in a real scenario on a farm in Medenine, Tunisia, in the period of March 2020 to March 2021. The experimental work fulfills the requirements of automated and real-time monitoring of the environmental parameters using both under- and aboveground sensors. These IoT sensors are on a farm collecting vast amounts of environmental data, where it is sent to ground gateways every 1 h, after which the obtained data is collected and transmitted by a drone to the cloud for storage and analysis every 12 h. This low-cost platform can help farmers, governmental, or manufacturers to predict environmental data over the geographically large farm field, which leads to enhancement in crop productivity and farm management in a cost-effective, and timely manner. Obtained experimental results infer that automated and human-made sets of actions can be applied and/or suggested, due to the innovative integration between IoT sensors with the drone. These smart actions help in precision agriculture, which, in turn, intensely boost crop productivity, saving natural resources.

Keywords
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