Air Pollutants

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

By:
Asha, P (Asha, P.) [1] ; Natrayan, L (Natrayan, L.) [2] ; Geetha, BT (Geetha, B. T.) [3] ; Beulah, JR (Beulah, J. Rene) [4] ; Sumathy, R (Sumathy, R.) [5] ; Varalakshmi, G (Varalakshmi, G.) [6] ; Neelakandan, S (Neelakandan, S.) [7]
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(provided by Clarivate)

ENVIRONMENTAL RESEARCH
Volume
205
Article Number
112574
DOI
10.1016/j.envres.2021.112574
Published
APR 1 2022
Early Access
DEC 2021
Indexed
2022-01-13
Document Type
Article

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.

Keywords
Author Keywords
Air qualityHuman healthEnvironmental toxicologyArtificial intelligencePollution monitoringInternet of things

Air Pollutants

2- Electrochemical detection of nitrate with carbon nanofibers and copper co-modified carbon fiber electrodes

By:
Li, GZ (Li, Guangzhen) [1] ; Yuan, H (Yuan, Hua) [1] ; Mou, JJ (Mou, Jinjin) [2] ; Dai, EH (Dai, Enhao) [1] ; Zhang, HY (Zhang, Huayu) [1] ; Li, ZD (Li, Zhende) [1] ; Zhao, YK (Zhao, Yankun) [1] ; Dai, YF (Dai, Yifeng) [1] ; Zhang, XY (Zhang, Xiaoyan) [1]

COMPOSITES COMMUNICATIONS
Volume
29
Article Number
101043
DOI
10.1016/j.coco.2021.101043
Published
JAN 2022
Early Access
DEC 2021
Indexed
2022-02-02
Document Type
Article

Abstract

Obvious air pollutants are both environmental and health hazards, which is likely to cause respiratory problems in infants and the elderly. Airborne nitrates are a significant part of water-soluble ions in air pollutants. The detection of these nitrate ions would go a long way to help manage and control such ions in air pollutants and their disastrous effects. A critical challenge in the detection of nitrate is the uncontrollable concentration and signal overlapping with other ions. This study aimed at detection of nitrate ion using carbon fibers microelectrodes. A novel copper/carbon nanofibers/carbon fiber microelectrode (Cu/CNFs/CFE) was designed and used to detect nitrates in a simple, inexpensive and facile approach. The prepared Cu/CNFs/CFE has shown an increased sensitivity and a lower limit of detection for nitrate compared to bare CFE. This increase in sensitivity is due to the increased electrode surface area with a Cu/CNFs coating and more mass transport channels with superior electrocatalytic abilities. Under optimal experimental conditions, the Cu/CNFs/CFE demonstrated the detection limit of nitrate was 0.8 mu M (S/N = 3) and linear range was 5 mu M-8000 mu M. Finally, it's pointed out the nitrate content that four air pollutant samples obtained from the cities of Yuci and Taiyuan in Shanxi province of China.

Keywords
Author Keywords

Air Pollutants

Carbon fiber electrodeCarbon nanofiberCopperNitrate

Keywords Plus

PM2.5IONS

Air Pollutants

3- Effect of lockdown amid COVID-19 pandemic on air quality of the megacity Delhi, India

By:
Mahato, S (Mahato, Susanta) ; Pal, S (Pal, Swades) ; Ghosh, KG (Ghosh, Krishna Gopal) [1]
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(provided by Clarivate)

SCIENCE OF THE TOTAL ENVIRONMENT
Volume
730
Article Number
139086
DOI
10.1016/j.scitotenv.2020.139086
Published
AUG 15 2020
Indexed
2020-06-12
Document Type
Article

Abstract

Amid the COVID-19 pandemic, a nationwide lockdown is imposed in India initially for three weeks from 24th March to 14th April 2020 and extended up to 3rd May 2020. Due to the forced restrictions, pollution level in cities across the country drastically slowed down just within few days which magnetize discussions regarding lockdown to be the effectual alternativemeasures to be implemented for controlling air pollution. The present article eventually worked on this direction to look upon the air quality scenario amidst the lockdown period scientifically with special reference to the megacity Delhi. With the aid of air quality data of seven pollutant parameters (PM10, PM2.5, SO2, NO2, CO, O-3 and NH3) for 34 monitoring stations spread over themegacity we have employed National Air Quality Index (NAQI) to show the spatial pattern of air quality in pre and during-lockdown phases. The results demonstrated that during lockdown air quality is significantly improved. Among the selected pollutants, concentrations of PM10 and PM2.5 have witnessed maximum reduction (>50%) in compare to the prelockdown phase. In compare to the last year (i.e. 2019) during the said time period the reduction of PM10 and PM(2.)5 is as high as about 60% and 39% respectively. Among other pollutants, NO2 (-52.68%) and CO (-30.35%) level have also reduced during-lockdown phase. About 40% to 50% improvement in air quality is identified just after four days of commencing lockdown. About 54%, 49%, 43%, 37% and 31% reduction in NAQI have been observed in Central, Eastern, Southern, Western and Northern parts of the megacity. Overall, the study is thought to be a useful supplement to the regulatory bodies since it showed the pollution source control can attenuate the air quality. Temporary such source control in a suitable time interval may heal the environment. (C) 2020 Elsevier B.V. All rights reserved.

Keywords

Air Pollutants

Author Keywords
Covid-19LockdownMegacity DelhiNational Air quality IndexChange of air quality
Keywords Plus
POLLUTION INDEXQUANTITATIVE-EVALUATIONAMMONIA EMISSIONSURBAN AREAIMPACTPARTICLESBURDENSTATES

Air Pollutants

4- Marine microplastics as vectors of major ocean pollutants and its hazards to the marine ecosystem and humans

By:
Amelia, TSM (Amelia, Tan Suet May) [1] ; Khalik, WMAWM (Khalik, Wan Mohd Afiq Wan Mohd) [1] , [2] ; Ong, MC (Ong, Meng Chuan) [1] , [3] ; Shao, YT (Shao, Yi Ta) [4] , [5] ; Pan, HJ (Pan, Hui-Juan) [6] , [7] ; Bhubalan, K (Bhubalan, Kesaven) [1] , [2] , [3] , [8] , [9]
View Web of Science ResearcherID and ORCID
(provided by Clarivate)

PROGRESS IN EARTH AND PLANETARY SCIENCE
Volume
8
Issue
1
Article Number
12
DOI
10.1186/s40645-020-00405-4
Published
JAN 22 2021
Indexed
2021-02-23
Document Type
Review

Abstract

Microplastic pollutes water, land, air, and groundwater environments not only visually but also ecologically for plants, animals, and humans. Microplastic has been reported to act as vectors by sorbing pollutants and contributing to the bioaccumulation of pollutants, particularly in marine ecosystems, organisms, and subsequently food webs. The inevitable exposure of microplastic to humans emphasises the need to review the potential effects, exposure pathways, and toxicity of microplastic toward human health. Therefore, this review was aimed to reveal the risks of pollutant sorption and bioaccumulation by microplastic toward humans, as well as the dominant types of pollutants sorbed by microplastic, and the types of pollutants that are bioaccumulated by microplastic in the living organisms of the marine ecosystem. The possible factors influencing the sorption and bioaccumulation of pollutants by microplastic in marine ecosystems were also reviewed. The review also revealed the prevailing types of microplastic, abundance of microplastic, and geographical distribution of microplastic in the aquatic environment globally. The literature review revealed that microplastic characteristics, chemical interactions, and water properties played a role in the sorption of pollutants by microplastic. The evidence of microplastic posing a direct medical threat to humans is still lacking albeit substantial literature has reported the health hazards of microplastic-associated monomers, additives, and pollutants. This review recommends future research on the existing knowledge gaps in microplastic

research, which include the toxicity of microplastic, particularly to humans, as well as the factors influencing the sorption and bioaccumulation of pollutants by microplastic.

Keywords
Author Keywords
AdsorptionBioaccumulationContaminantMicroplasticPollutantVector

Air Pollutants

5- Association between short-term exposure to air pollution and COVID-19 infection: Evidence from China

By:
Zhu, YJ (Zhu, Yongjian) [1] ; Xie, JG (Xie, Jingui) [2] , [3] ; Huang, FM (Huang, Fengming) [2] ; Cao, LQ (Cao, Liqing) [2]
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(provided by Clarivate)

SCIENCE OF THE TOTAL ENVIRONMENT
Volume
727
Article Number
138704
DOI
10.1016/j.scitotenv.2020.138704
Published
JUL 20 2020
Indexed
2020-07-20
Document Type
Article

Abstract

The novel coronavirus pneumonia, namely COVID-19, has become a global public health problem. Previous studies have found that air pollution is a risk factor for respiratory infection by carrying microorganisms and affecting body's immunity. This study aimed to explore the relationship between ambient air pollutants and the infection caused by the novel coronavirus. Daily confirmed cases, air pollution concentration and meteorological variables in 120 cities were obtained from January 23, 2020 to February 29, 2020 in China. We applied a generalized additive model to investigate the associations of six air pollutants (PM2.5, PM10, SO2, CO, NO2 and O-3) with COVID-19 confirmed cases. We observed significantly positive associations of PM2.5, PM10, NO2 and O-3 in the last two weeks with newly COVID-19 confirmed cases. A 10-mu g/m(3) increase (lag0-14) in PM2.5, PM10, NO2, and O-3 was associated with a 2.24% (95% CI: 1.02 to 3.46), 1.76% (95% CI: 0.89 to 2.63), 6.94% (95% CI: 2.38 to 11.51), and 4.76% (95% CI: 1.99 to 7.52) increase in the daily counts of confirmed cases, respectively. However, a 10-mu g/m(3) increase (lag0-14) in SO2 was associated with a 7.79% decrease (95% CI: -14.57 to -1.01) in COVID-19 confirmed cases. Our results indicate that there is a significant relationship between air pollution and COVID-19 infection, which could partially explain the effect of national lockdown and provide implications for the control and prevention of this novel disease.

Keywords
Author Keywords

Air Pollutants

Air pollutionNovel coronavirus pneumoniaCOVID-19Generalized additive model

Keywords Plus

DAILY HOSPITAL ADMISSIONSCARDIOVASCULAR-DISEASESVIRUCIDAL PROPERTIESTIME-SERIESLIGHTSO2

Air Pollutants

6- COVID-19 lockdowns cause global air pollution declines

By:
Venter, ZS (Venter, Zander S.) [1] ; Aunan, K (Aunan, Kristin) [2] ; Chowdhury, S (Chowdhury, Sourangsu) [3] ; Lelieveld, J (Lelieveld, Jos) [3] , [4]
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PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA
Volume
117
Issue
32
Page
18984-18990
DOI
10.1073/pnas.2006853117
Published
AUG 11 2020
Indexed
2020-09-01
Document Type
Article

Abstract

The lockdown response to coronavirus disease 2019 (COVID-19) has caused an unprecedented reduction in global economic and transport activity. We test the hypothesis that this has reduced tropospheric and ground-level air pollution concentrations, using satellite data and a network of >10,000 air quality stations. After accounting for the effects of meteorological variability, we find declines in the population-weighted concentration of ground-level nitrogen dioxide (NO2: 60% with 95% CI 48 to 72%), and fine particulate matter (PM2.5: 31%; 95% CI: 17 to 45%), with marginal increases in ozone (O-3: 4%; 95% CI: -2 to 10%) in 34 countries during lockdown dates up until 15 May. Except for ozone, satellite measurements of the troposphere indicate much smaller reductions, highlighting the spatial variability of pollutant anomalies attributable to complex NOx chemistry and long-distance transport of fine particulate matter with a diameter less than 2.5 mu m (PM2.5). By leveraging Google and Apple mobility data, we find empirical evidence for a link between global vehicle transportation declines and the reduction of ambient NO2 exposure. While the state of global lockdown is not sustainable, these findings allude to the potential for mitigating public health risk by reducing "business as usual" air pollutant emissions from economic activities. Explore trends here: https://nina.earthengine.app/view/lockdown-pollution.

Keywords
Author Keywords

Air Pollutants

air qualityCOVID-19 confinementemissionsnitrogen dioxideparticulate matter
Keywords Plus
EMISSIONSQUALITYTROPOMICLIMATEREGIONOZONE

Air Pollutants

7- A review on heterogeneous photocatalysis for environmental remediation: From semiconductors to modification strategies

By:
Wang, HJ (Wang, Huijie) [1] ; Li, X (Li, Xin) [1] ; Zhao, XX (Zhao, Xiaoxue) [1] ; Li, CY (Li, Chunyan) [2] ; Song, XH (Song, Xianghai) [1] ; Zhang, P (Zhang, Peng) [3] ; Huo, PW (Huo, Pengwei) [1] ; Li, X (Li, Xin) [4]
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(provided by Clarivate)

CHINESE JOURNAL OF CATALYSIS
Volume
43
Issue
2
Page
178-214
DOI
10.1016/S1872-2067(21)63910-4
Published
FEB 2022
Indexed
2022-02-02
Document Type
Article; Proceedings Paper
Conference
Meeting
3rd Chinese Symposium on Photocatalytic Materials (CSPM)
Location
Wuhan Univ Technol, Wuhan, PEOPLES R CHINA
Date
DEC 11-14, 2020
Sponsors
Guangdong Univ Petrochem Technol; Changsha Univ; Huaibei Normal Univ

Abstract

Heterogeneous photocatalysis, an advanced oxidation process, has garnered extensive attention in the field of environmental remediation because it involves the direct utilization of solar energy for the removal of numerous pollutants. However, the application of heterogeneous photocatalysis in environmental remediation has not achieved the expected consequences due to enormous challenges such as low photocatalytic efficiencies and high costs of heterogeneous photocatalysts in large-scale practical applications. Furthermore, pollutants in the natural environment, including water, air, and solid phases, are diverse and complex. Therefore, extensive efforts should be made to better understand and

apply heterogeneous photocatalysis for environmental remediation. Herein, the fundamentals of heterogeneous photocatalysis for environmental remediation are introduced. Then, potential semiconductors and their modification strategies for environmental photocatalysis are systematically presented. Finally, conclusions and prospects are briefly summarized, and the direction for the future development of environmental photocatalysis is explored. This review may provide reference directions toward understanding, researching, and designing photocatalytic re mediation systems for various environmental pollutants.

Keywords
Author Keywords
PollutantHeterogeneous photocatalysisEnvironmental remediationSemiconductorModification strategy
Keywords Plus
GRAPHITIC CARBON NITRIDES-SCHEME HETEROJUNCTIONLAYERED DOUBLE HYDROXIDESVISIBLE-LIGHTORGANIC POLLUTANTSQUANTUM DOTSSURFACE HETEROJUNCTIONDEEP DESULFURIZATIONEFFICIENT ADSORPTIONHYDROGEN-PRODUCTION

8- Links between air pollution and COVID-19 in England

By:
Travaglio, M (Travaglio, Marco) [1] ; Yu, YZ (Yu, Yizhou) [1] ; Popovic, R (Popovic, Rebeka) [1] ; Selley, L (Selley, Liza) [1] ; Leal, NS (Leal, Nuno Santos) [1] ; Martins, LM (Martins, Luis Miguel) [1]
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(provided by Clarivate)

ENVIRONMENTAL POLLUTION
Volume
268
Part
A
Article Number
115859
DOI
10.1016/j.envpol.2020.115859
Published
JAN 1 2021
Indexed
2021-09-17
Document Type
Article

Abstract

In December 2019, a novel disease, coronavirus disease 19 (COVID-19), emerged in Wuhan, People's Republic of China. COVID-19 is caused by a novel coronavirus (SARS-CoV-2) presumed to have jumped species from another mammal to humans. This virus has caused a rapidly spreading global pandemic. To date, over 300,000 cases of COVID-19 have been reported in England and over 40,000 patients have died. While progress has been achieved in managing this disease, the factors in addition to age that affect the severity and mortality of COVID-19 have not been clearly identified. Recent studies of COVID-19 in several countries identified links between air pollution and death rates. Here, we explored potential links between major fossil fuel-related air pollutants and SARS-CoV-2 mortality in England. We compared current SARS-CoV-2 cases and deaths from public databases to both regional and subregional air pollution data monitored at multiple sites across England. After controlling for population density, age and median income, we show positive relationships between air pollutant concentrations, particularly nitrogen oxides, and COVID-19 mortality and infectivity. Using detailed UK Biobank data, we further show that PM2.5 was a major contributor to COVID-19 cases in England, as an increase of 1 m(3) in the long-term average of PM2.5 was associated with a 12% increase in COVID-19 cases. The relationship between air pollution and COVID-19 withstands variations in the temporal scale of assessments (single-year vs 5-year average) and remains significant after adjusting for socioeconomic, demographic and health-related variables. We conclude that a small increase in air pollution leads to a large increase in the

Air Pollutants

COVID-19 infectivity and mortality rate in England. This study provides a framework to guide both health and emissions policies in countries affected by this pandemic. (C) 2020 The Author(s). Published by Elsevier Ltd.

Keywords
Author Keywords
SARS-CoV-2COVID-19Air pollutionNitrogen oxidesOzonePM2.5PM10Mortality
Keywords Plus
LONG-TERM EXPOSUREPARTICULATE MATTERDIOXIDE EXPOSURENITROGEN-DIOXIDEPHAGOCYTOSISINFLAMMATIONULTRAFINEOZONEFINENO2

9- Lockdown for CoViD-2019 in Milan: What are the effects on air quality?

By:
Collivignarelli, MC (Collivignarelli, Maria Cristina) [1] , [2] ; Abba, A (Abba, Alessandro) [3] ; Bertanza, G (Bertanza, Giorgio) [3] ; Pedrazzani, R (Pedrazzani, Roberta) [4] ; Ricciardi, P (Ricciardi, Paola) [1] ; Miino, MC (Miino, Marco Carnevale) [1]
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(provided by Clarivate)

SCIENCE OF THE TOTAL ENVIRONMENT
Volume
732
Article Number
139280
DOI
10.1016/j.scitotenv.2020.139280
Published
AUG 25 2020
Indexed
2020-06-29
Document Type
Article

Abstract

Based on the rapid spread of the CoViD-2019, a lockdown was declared in the whole Northern Italy by the Government. The application of increasingly rigorous containment measures allowed to reduce the impact of the CoViD-2019 pandemic on the Italian National Health System but at the same time these restriction measures gave also the opportunity to assess the effect of anthropogenic activities on air pollutants in an unprecedented way. This paper aims to study the impact of the partial and total lockdown (PL and TL, respectively) on air quality in the Metropolitan City of Milan. As results, the severe limitation of people movements following the PL and the subsequent TL determined a significant reduction of pollutants concentration mainly due to vehicular traffic (PM10, PM2.5, BC, benzene, CO, and NOx). The lockdown led to an appreciable drop in SO2 only in the city of Milan while it remained unchanged in the adjacent areas. Despite the significant decrease in NO2 in the TL, the O-3 exhibited a significant increase, probably, due to the minor NO concentration. In Milan and SaA the increase was more accentuated, probably, due to the higher average concentrations of benzene in Milan than the adjacent areas that might have promoted the formation of O-3 in a more significant way.

Keywords
Author Keywords

Air Pollutants

Air monitoringPM10OzoneCoViDSARS-CoV 2Coronavirus

Keywords Plus

O-3WEATHERIMPACTBASINPM2.5PM10

10- Oxidative degradation of phenols and substituted phenols in the water and atmosphere: a review

By:
Sun, JF (Sun, Jianfei) [1] ; Mu, Q (Mu, Qin) [1] ; Kimura, H (Kimura, Hideo) [1] ; Murugadoss, V (Murugadoss, Vignesh) [2] ; He, MX (He, Maoxia) [3] ; Du, W (Du, Wei) [1] ; Hou, CX (Hou, Chuanxin) [1]
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(provided by Clarivate)

ADVANCED COMPOSITES AND HYBRID MATERIALS
Volume
5
Issue
2
Page
627-640
DOI
10.1007/s42114-022-00435-0
Published
JUN 2022
Early Access
MAR 2022
Indexed
2022-03-19
Document Type
Review

Abstract

As a class of toxic compounds, phenols are difficult to biodegrade and will exist in the environment for a long time, posing potential risks to the environment and human beings. To avoid threatening the water environment and air quality, phenolic pollutants need to be treated effectively. This paper reviews the data concerning the environmental degradation of phenols and substituted phenols, both in the water and in the air. The values are respectively obtained from the experimental and theoretical researches. In wastewater, several advanced oxidation processes (AOPs) based on powerful transitory species which can efficiently degrade phenolic compounds were summarized. In terms of the atmospheric oxidative degradation, the reaction of phenols and substituted phenols with oxidants such as hydroxyl radical (center dot OH), nitrate radical (center dot NO3), Cl atoms, and ozone is probably a major degradation mechanism. The atmospheric degradation regular patterns of phenolic compounds initiated by different oxidants were also concluded. Graphic abstract

Keywords
Author Keywords

Air Pollutants

Phenolic pollutantsOxidative degradationAdvanced oxidation process

Keywords Plus

GAS-PHASE REACTIONSREACTION-RATE CONSTANTSRATE COEFFICIENTSNO3 RADICALSHYDROXYL RADICALSCHLORINE ATOMSBROWN CARBONOH RADICALSHYDROGEN-PEROXIDELIGHT-ABSORPTION

Air Pollutants

11- Nexus between air pollution and NCOV-2019 in China: Application of negative binomial regression analysis

By:
Iqbal, W (Iqbal, Wasim) [1] ; Tang, YM (Tang, Yuk Ming) [2] , [3] ; Chau, KY (Chau, Ka Yin) [3] ; Irfan, M (Irfan, Muhammad) [4] , [5] ; Mohsin, M (Mohsin, Muhammad) [6]
View Web of Science ResearcherID and ORCID
(provided by Clarivate)

PROCESS SAFETY AND ENVIRONMENTAL PROTECTION
Volume
150
Page
557-565
DOI
10.1016/j.psep.2021.04.039
Published
JUN 2021
Early Access
MAY 2021
Indexed
2021-06-11
Document Type
Article

Abstract

On a global scale, the epidemic of the novel coronavirus (NCOV-2019) has become a major issue that is seriously harming human health and impairing the environment's quality. The current study examines the association between air pollution and NCOV-2019 in China, where cases of NCOV-2019 are correlated with deaths in public databases with data on air pollution tracked at multiple locations in different provinces of China. A negative binomial regression (NBR) model was applied to examine the difference between the number of people infected with NCOV-2019 and the number of deaths in China. The findings show that, after population density regulation, there is a positive connection between air pollutants concentration (particularly nitrogen dioxide) and the number of NCOV-2019 cases and deaths. Furthermore, PM2.5 is the key cause of NCOV-2019 cases and deaths in China. The results indicate that a 1% increase in the average of PM2.5 was correlated with an increase of 11.67 % in NCOV-2019 cases and a rise of 18 % in NCOV-2019 deaths. We concluded that a slight rise in air pollution has caused the number of NCOV-2019 cases and deaths to increase dramatically. This research provides a basis for future policies affected by this pandemic in terms of health and pollution.

Keywords

Air Pollutants

Author Keywords

COVID-19Air pollutionPM25SO2PM10NO2O3Negative binomial regression

Keywords Plus

TERM EXPOSURECOVID-19POISSONDESIGN

12- Aging mechanism of microplastics with UV irradiation and its effects on the adsorption of heavy metals

By:
Mao, RF (Mao, Ruofan) [1] ; Lang, MF (Lang, Mengfan) [1] ; Yu, XQ (Yu, Xiaoqin) [1] ; Wu, RR (Wu, Renren) [2] ; Yang, XM (Yang, Xiaomei) [1] , [3] ; Guo, XT (Guo, Xuetao) [1] , [3]

JOURNAL OF HAZARDOUS MATERIALS
Volume
393
Article Number
122515
DOI
10.1016/j.jhazmat.2020.122515
Published
JUL 5 2020
Indexed
2020-05-29
Document Type
Article

Abstract

Microplastics are formed by the degradation of plastic wastes under the action of physicochemical mechanisms in environment, and they are becoming a new type of pollutant that is attractings global attention. However, research on the aging characteristics and mechanism of microplastics is limited. The aging mechanism of Polystyrene (PS) with UV irradiation under different conditions (air, pure water and seawater) and the effect of aging on heavy metal adsorption were studied. The results show that PS have different characteristics with UV irradiation under different conditions, and the aging of PS is the most obvious in air. Based on the 2D-COS analysis, different aging mechanisms were identified under different aging conditions, aging sequence of aged PS functional groups in air and water were clearly definited. An isothermal adsorption model shows that aging can significantly increase the adsorption of heavy metals by PS. The adsorption of heavy metals is also affected by different aging methods. Over all, a 2D-COS analysis was an effective method for understanding the aging process of PS. These results further clarify the aging mechanism of PS, and provides a theoretical basis for the assessment of environmental behavior and ecological risk when microplastics and heavy metals coexist.

Keywords
Author Keywords
MicroplasticsUV irradiation2D-COSAdsorptionHeavy metal
Keywords Plus

Air Pollutants

CORRELATION SPECTROSCOPIC ANALYSISPLASTIC PRODUCTION PELLETSPHOTOCATALYTIC DEGRADATIONMARINE-ENVIRONMENTTRACE-METALSHUMIC ACIDSPOLYSTYRENESORPTIONIMPACTTIO2

Air Pollutants

13- Changes in China's anthropogenic emissions and air quality during the COVID-19 pandemic in 2020

By:
Zheng, B (Zheng, Bo) [1] ; Zhang, Q (Zhang, Qiang) [2] ; Geng, GN (Geng, Guannan) [3] ; Chen, CH (Chen, Cuihong) [2] , [4] ; Shi, QR (Shi, Qinren) [3] ; Cui, MS (Cui, Mengshi) [2] ; Lei, Y (Lei, Yu) [5] ; He, KB (He, Kebin) [3]
View Web of Science ResearcherID and ORCID
(provided by Clarivate)

EARTH SYSTEM SCIENCE DATA
Volume
13
Issue
6
Page
2895-2907
DOI
10.5194/essd-13-2895-2021
Published
JUN 17 2021
Indexed
2021-07-10
Document Type
Article

Abstract

The COVID-19 pandemic lockdowns led to a sharp drop in socio-economic activities in China in 2020, including reductions in fossil fuel use, industry productions, and traffic volumes. The short-term impacts of lockdowns on China's air quality have been measured and reported, however, the changes in anthropogenic emissions have not yet been assessed quantitatively, which hinders our understanding of the causes of the air quality changes during COVID-19. Here, for the first time, we report the anthropogenic air pollutant emissions from mainland China by using a bottom-up approach based on the near-real-time data in 2020 and use the estimated emissions to simulate air quality changes with a chemical transport model. The COVID-19 lockdown was estimated to have reduced China's anthropogenic emissions substantially between January and March in 2020, with the largest reductions in February. Emissions of SO2, NOx, CO, non-methane volatile organic compounds (NMVOCs), and primary PM2.5 were estimated to have decreased by 27 %, 36 %, 28 %, 31 %, and 24 %, respectively, in February 2020 compared to the same month in 2019. The reductions in anthropogenic emissions were dominated by the industry sector for SO2 and PM2.5 and were contributed to approximately equally by the industry and transportation sectors for NOx, CO, and NMVOCs. With the spread of coronavirus controlled, China's anthropogenic emissions rebounded in April and since then returned to the comparable levels of 2019 in the second half of 2020. The provinces in China have presented nearly synchronous decline and rebound

in anthropogenic emissions, while Hubei and the provinces surrounding Beijing recovered more slowly due to the extension of lockdown measures. The ambient air pollution presented much lower concentrations during the first 3 months in 2020 than in 2019 while rapidly returning to comparable levels afterward, which have been reproduced by the air quality model simulation driven by our estimated emissions. China's monthly anthropogenic emissions in 2020 can be accessed from https://doi.org/10.6084/m9.figshare.c.5214920.v2 (Zheng et al., 2021) by species, month, sector, and province.

Keywords
Keywords Plus
INVENTORYHEBEICOAL

Air Pollutants

14- Enhanced secondary pollution offset reduction of primary emissions during COVID-19 lockdown in China

By:
Huang, X (Huang, Xin) [1] ; Ding, AJ (Ding, Aijun) [1] ; Gao, J (Gao, Jian) [2] ; Zheng, B (Zheng, Bo) [3] , [4] ; Zhou, DR (Zhou, Derong) [1] ; Qi, XM (Qi, Ximeng) [1] ; Tang, R (Tang, Rong) [1] ; Wang, JP (Wang, Jiaping) [1] ; Ren, CH (Ren, Chuanhua) [1] ; Nie, W (Nie, Wei) [1] ; ...More
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NATIONAL SCIENCE REVIEW
Volume
8
Issue
2
Article Number
nwaa137
DOI
10.1093/nsr/nwaa137
Published
FEB 2021
Indexed
2021-04-16
Document Type
Article

Abstract

To control the spread of the 2019 novel coronavirus (COVID-19), China imposed nationwide restrictions on the movement of its population (lockdown) after the Chinese New Year of 2020, leading to large reductions in economic activities and associated emissions. Despite such large decreases in primary pollution, there were nonetheless several periods of heavy haze pollution in eastern China, raising questions about the well-established relationship between human activities and air quality. Here, using comprehensive measurements and modeling, we show that the haze during the COVID lockdown was driven by enhancements of secondary pollution. In particular, large decreases in NOx emissions from transportation increased ozone and nighttime NO3 radical formation, and these increases in atmospheric oxidizing capacity in turn facilitated the formation of secondary particulate matter. Our results, afforded by the tragic natural experiment of the COVID-19 pandemic, indicate that haze mitigation depends upon a coordinated and balanced strategy for controlling multiple pollutants.

Keywords
Author Keywords

Air Pollutants

COVID-19haze pollutionozoneemission reductionsecondary pollution

Keywords Plus

URBAN OZONE POLLUTIONAIR-QUALITYORGANIC AEROSOLNITROGEN-DIOXIDENOX EMISSIONSRIVER DELTAIMPACTPRECURSORSCHEMISTRYAIRCRAFT

Air Pollutants

15- Molecular mechanisms of oxidative stress in asthma

By:
Michaeloudes, C (Michaeloudes, Charalambos) [1] , [2] ; Abubakar-Waziri, H (Abubakar-Waziri, Hisham) [1] , [2] ; Lakhdar, R (Lakhdar, Ramzi) [1] ; Raby, K (Raby, Katie) [1] ; Dixey, P (Dixey, Piers) [1] , [2] ; Adcock, IM (Adcock, Ian M.) [1] , [2] ; Mumby, S (Mumby, Sharon) [1] , [2] ; Bhavsar, PK (Bhavsar, Pankaj K.) [1] , [2] ; Chung, KF (Chung, Kian Fan) [1] , [2] , [3]
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MOLECULAR ASPECTS OF MEDICINE
Volume
85
Article Number
101026
DOI
10.1016/j.mam.2021.101026
Published
JUN 2022
Indexed
2022-07-12
Document Type
Review

Abstract

The lungs are exposed to reactive oxygen species oxygen (ROS) produced as a result of inhalation of oxygen, as well as smoke and other air pollutants. Cell metabolism and the NADPH oxidases (Nox) generate low levels of intracellular ROS that act as signal transduction mediators by inducing oxidative modifications of histones, enzymes and transcription factors. Redox signalling is also regulated by localised production and sensing of ROS in mitochondria, the endoplasmic reticulum (ER) and inside the nucleus. Intracellular ROS are maintained at low levels through the action of a battery of enzymatic and non-enzymatic antioxidants. Asthma is a heterogeneous airway inflammatory disease with different immune endotypes; these include atopic or non-atopic Th2 type immune response associated with eosinophilia, or a non-Th2 response associated with neutrophilia. Airway remodelling and hyper-responsiveness accompany the inflammatory response in asthma. Over-production of ROS resulting from infiltrating immune cells, particularly eosinophils and neutrophils, and a concomitant impairment of antioxidant responses lead to development of oxidative stress in asthma. Oxidative stress is augmented in severe asthma and during exacerbations, as well as by air pollution and obesity, and causes oxidative damage of tissues promoting airway inflammation and hyper-responsiveness. Furthermore, deregulated Nox activity, mitochondrial dysfunction, ER stress and/or oxidative DNA damage, resulting from exposure to irritants, inflammatory mediators or obesity, may lead to redox-dependent changes in cell signalling. ROS play a central role in airway epithelium-mediated sensing, development of innate and adaptive immune responses, and airway remodelling and hyperresponsiveness. Nonetheless, antioxidant

compounds have proven clinically ineffective as therapeutic agents for asthma, partly due to issues with stability and in vivo metabolism of these compounds. The compartmentalised nature of ROS production and sensing, and the role of ROS in homeostatic responses and in the action of corticosteroids and beta 2-adrenergic receptor agonists, adds another layer of complexity to antioxidant therapy development. Nox inhibitors and mitochondrial-targeted antioxidants are in clinical development for a number of diseases but they have not yet been investigated in asthma. A better understanding of the complex role of ROS in the pathogenesis of asthma will highlight new opportunities for more targeted and effective redox therapies.

Keywords
Author Keywords
AsthmaOxidative stressRedox signallingNADPH oxidaseMitochondriaAir pollution
Keywords Plus
EXHALED BREATH CONDENSATEGROWTH-FACTOR-BETAENDOPLASMIC-RETICULUM STRESSNF-KAPPA-BEXTRACELLULAR-SUPEROXIDE DISMUTASEINDUCED AIRWAY HYPERRESPONSIVENESSOBSTRUCTIVE PULMONARY-DISEASEARYL-HYDROCARBON RECEPTORMUC5AC MUCIN EXPRESSIONSERUM URIC-ACID

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