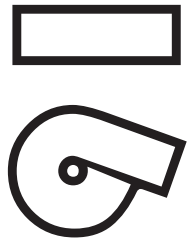
台灣氣膠研究學會

Taiwan Association for Aerosol Research

2023 Oct.



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TAAR Newsletter is a quarterly publication by the Taiwan Association for Aerosol Research

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Date October 27 2023

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Announcement

- 第十六屆第二次會員大會已於 2023 年 9 月 22 日在國立陽明交通大學博愛校區賢齊館順利舉辦， 感謝會員參與。
- 第十六屆第五次理監事聯席會議已於 2023 年 9 月 22 日召開。

Calendar of Events

Date
March 21 – 22, 2024

Conferences
2024 Theory and Technique Taiwan Forum on Sustainable Environment

Location
National Yang Ming Chiao Tung University (Yangming Campus)
Taipei, Taiwan

Date
Sep , 2024

Conferences
The 31st International Conference on Aerosol Science and Technology

Location
Yilan, Taiwan

THE 30th ICAST

Former and current presidents

Keynote speech I

Feng Tay Lecture

Moderator :
Professor Wen-Jhy Lee

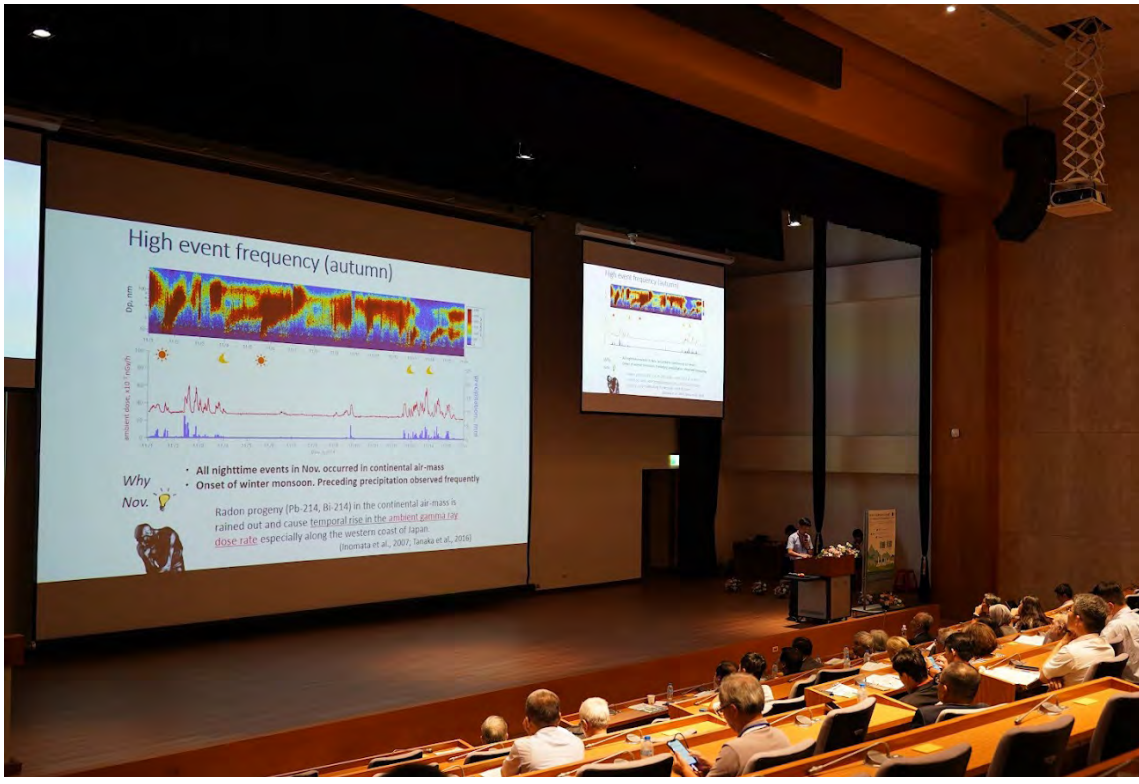
Keynote speech I

Feng Tay Lecture

Speaker :
Professor Matsuki Atsushi

Title :

Long-term measurements of atmospheric aerosols in the Noto peninsula, Japan



Keynote speech II

Moderator :
Professor Neng-Huei Lin

Keynote speech II

Speaker :
Professor Daniel Averill Jaffe

Title :

Indoor Air and Sources of Pollution Indoors

Keynote speech III

Speaker :
Professor Otto Klemm

Title :

Trends in Fog Research

Keynote speech IV

Moderator :
Professor Chih-Chieh Chen

Keynote speech IV

Speaker :
Professor Noor Zaitun Yahaya

Title :

Myatmos : Novel Method to Analyse an Air Pollution Big Data with Artificial Intelligent Approach

Current Status and Prospects of Air Pollution Control Forum I

Issues in North and East regions

Speaker :
環境部大氣環境司 張根穆 副司長

Title :

空氣污染防制成果與展望

Current Status and Prospects of Air Pollution Control Forum II

Issues in Central and South regions

Moderator :
國立中央大學太空及遙測研究中心 林唐煌 教授

Speaker :
臺中市環保局 陳宏益 局長

Title : 臺中市空污科技治理成效

Current Status and Prospects of Air Pollution Control Forum II

Issues in Central and South regions

Speaker :
雲林縣環保局 吳孟禹 技士

Title : 雲林縣空氣品質進展與願景

Speaker :
嘉義縣環保局 張輝川 局長

Title : 底嘉深呼吸

Keynote speech VI

Moderator :
Professor Ta-Chih Hsiao

Speaker :
Professor Puji Lestari

Title :

Characteristic and source of $PM_{2.5}$ in Jakarta

Keynote speech VII

Speaker :
Professor Chuen-Jinn Tsai

Title :

Innovative monitoring and control technologies for $PM_{2.5}$ and nanoparticles

Monitoring and Control of Fine Particulate Pollutants Forum

Speaker :

Graduate Institute of Environmental Engineering,
National Taiwan University

Professor Ta-Chih Hsiao

Title :

$PM_{1.0}$ and Ultrafine Particles in the Taiwan Urban Areas

Monitoring and Control of Fine Particulate Pollutants Forum

Speaker :

Department of Occupational Safety and Health,
China Medical University

Professor Li-Hao Young

Title :

台中 $PM_{2.5}$ 化學組成、粒徑分布與 3D 構形之高時間解析度量測與應用

Speaker :

Department of Chemistry,
National Sun Yat-sen University

Professor Chia-Chen Wang

Title :

利用氣膠光電子光譜及質譜方法探測 VOC 臭氧化導致次級有機氣膠之物化特性、生成機制及影響因子

Air Quality and Net Zero Emissions Forum

Moderator :

Department of Chemical and Materials Engineering,
Tunghai University

Professor Kuan-Ting Lee

Speaker :

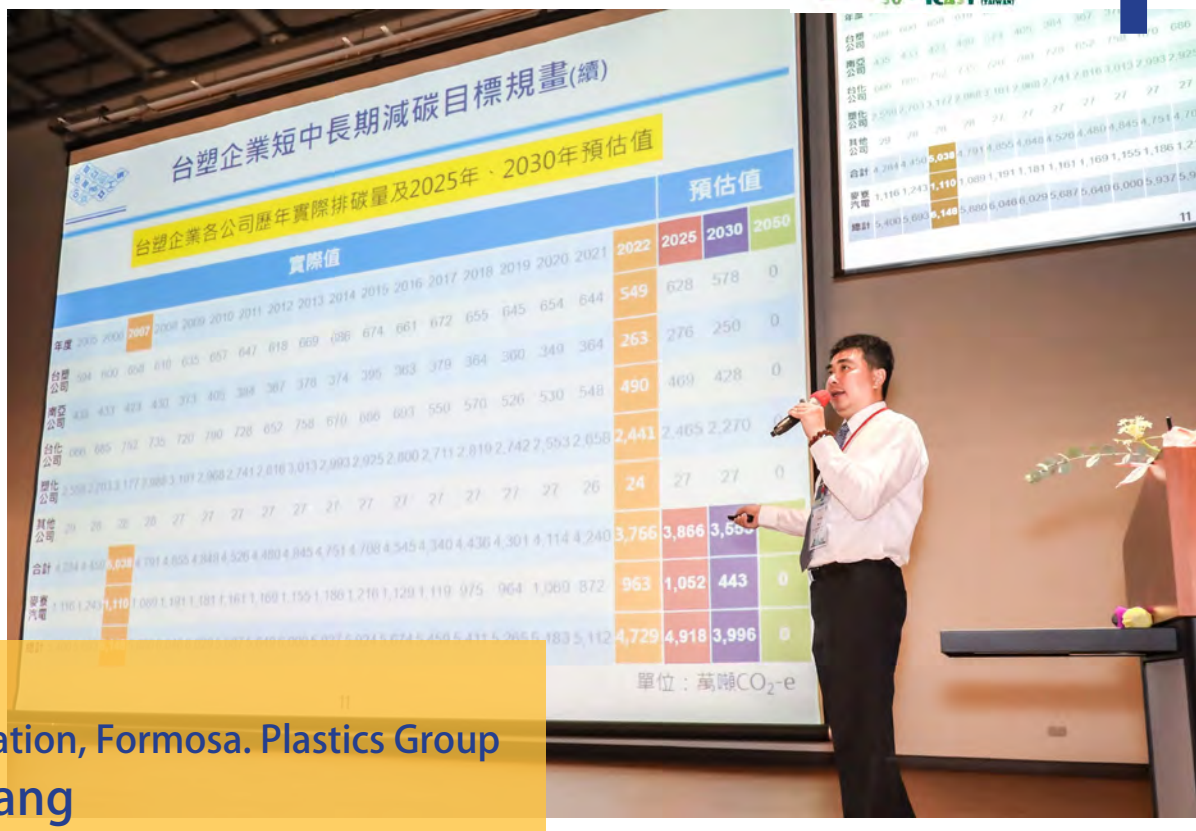
Institute of Environmental Engineering,
National Sun Yat-sen University

Professor Yuan-Chung Lin

Title :

生質能減碳再利用

Air Quality and Net Zero Emissions Forum



Speaker :

General Administration, Formosa. Plastics Group

Dr. Hsin-Kai Wang

Title : 台塑企業達到碳中和之因應策略

Speaker :

Graduate Institute of Environmental Engineering, National Central University

Professor Chang, Moo-Been

Title :

Plasma catalysis via alumina-based catalyst for C_4F_8 conversion: Assessment based on CO_2e

Southeast Asia Forum

Moderator :

Department of Environmental Engineering,
National Cheng Kung University

Professor Sheng-Lun Lin

Speaker :

Chulalongkorn University, Thailand

Professor Tawatchai Charinpanitkul

Title :

Application of Jet Fan Technology for Air Ventilation in Medium-to-Large Scale Confined Space

Southeast Asia Forum

Speaker :

National University of Singapore, Singapore

Dr. Phuong Thi Minh Tran

Title :

Nature-Based Solution for Mitigation of Personal Exposure to Airborne

Speaker :

Mahidol University, Thailand

Professor Weerawut Chaiwat

Title :

Utilization of petroleum wastes and agricultural residues for production of carbon materials towards net zero emission

THE 30th ICAST

THE 30th ICAST

Group Photo

THE 30th ICAST

Group Photo

THE 30th ICAST

Poster session

THE 30th ICAST

THE 30th ICAST

Awards

TAAR Fellow

Professor Ya-Fen Wang

Prof. Ya-Fen Wang was former TAAR president and former Deputy Director of Environmental Protection Administration. She was also an accredited Professional Engineer and joined the Department of Environmental Engineering of Chung Yuan Christian University (CYCU) at 2004. Prof. Wang's research focused on air pollution control, hazardous waste treatment and transform waste into energy. Her publication "Hydrogen and Methane Production from Styrofoam Waste Using an Atmospheric-pressure Microwave Plasma Reactor" was selected as the best engineering paper in AAQR at 2021 (Aerosol and Air Quality Research). She is not only focused on academic research, but also devoted to environmental education, especially for foreign students who come to Taiwan to study. She has organized Theory and Technique Taiwan Forum on Sustainable Environment for ASEAN students job matching and cooperate with Ministry of Education to cultivate Green STEM female students. Prof. Wang is also conducting a local green life program for industry and community, to get new mindsets for behavior change to achieve a net zero future.

Awards

TAAR Fellow

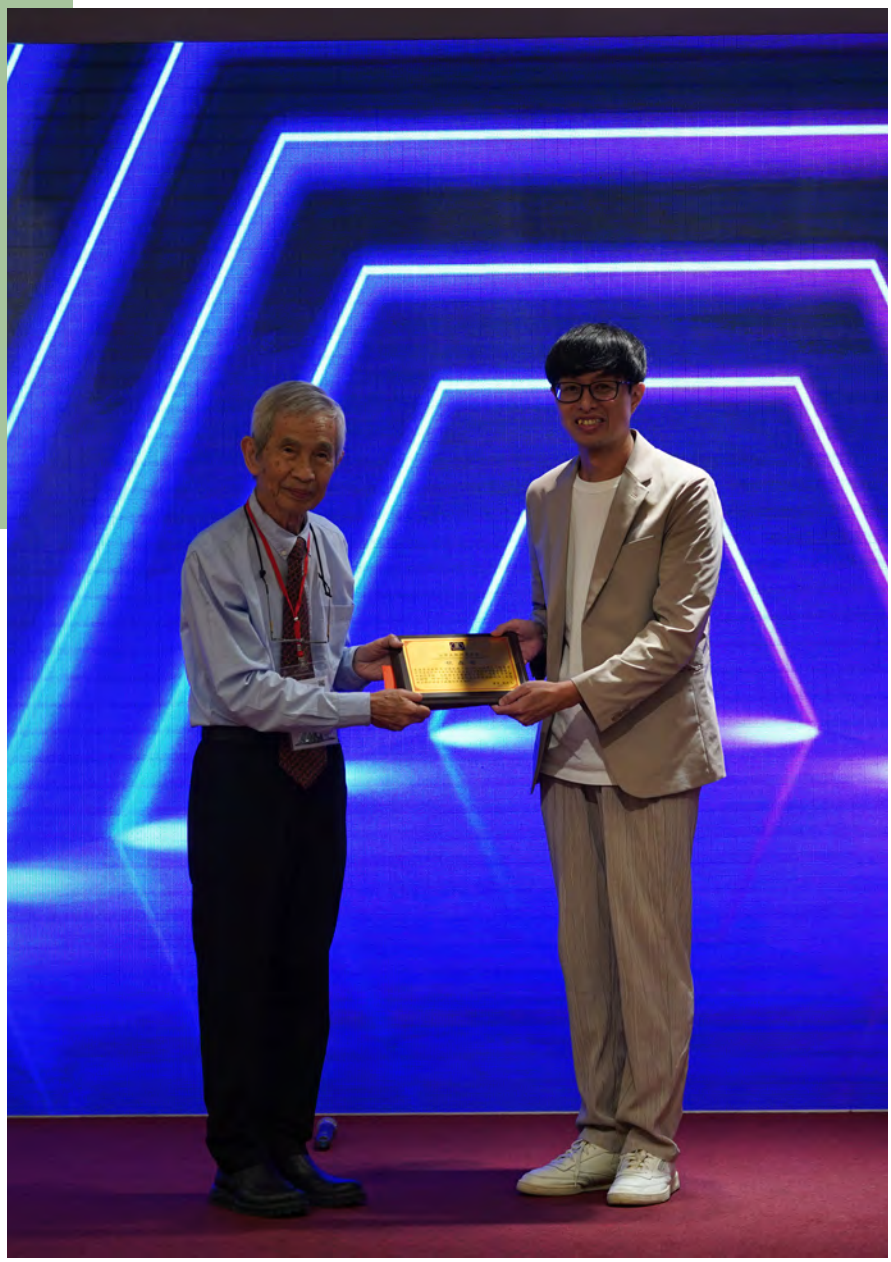
Professor Dan Jaffe

Prof. Daniel Jaffe is editor-in-chief of AAQR. He is an expert on global transport of pollutants, especially from Asia to the United States. He has published several papers on the influence of background sources on regional and urban air quality. He recently participated on the panel for the National Academy of Science’ s study on The Significance of Intercontinental Transport of Air Pollutants and was chosen as the Fulbright Distinguished Chair in Environmental Sciences. His research has been funded by the National Science Foundation, NOAA, NASA, EPA and industry partners. Recently,Dan has funded several projects via crowdfunding. His current projects include studying ozone and particulate matter from global and regional air pollution sources at the Mt. Bachelor Observatory, studying the impacts of wildfires on air quality in the Western U.S. and the impacts from diesel powered and coal trains.

Awards

Chiu-Sen Award

Professor Chih-Da Wu

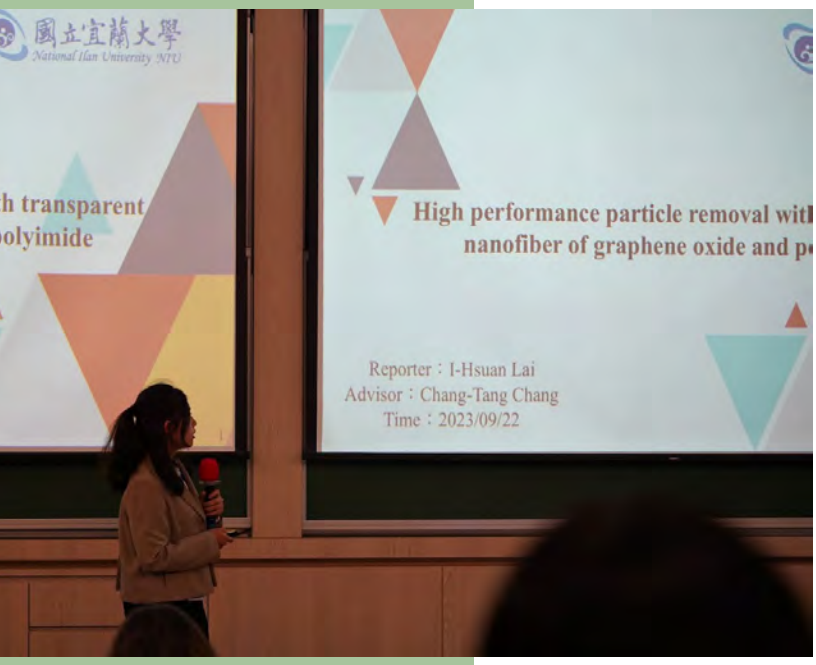


This award is presented to recognize the contributions of Professor Chi-Da Wu for his outstanding research regarding to the use of geographic artificial intelligence and spatial information technology to explore the impact of air pollution on health in Taiwan within a novel field. Professor Wu shows great potential for future development and serves as a role model for young scholars. This award is generously donated by Professor Chiu-Sen Wang, and the TAAR expresses heartfelt gratitude to Professor Wang for his ongoing support and encouragement to the next generation.

Awards

Student Oral Presentation Competition

High Distinction Award



Presenter : I-Hsuan Lai

Topic：
High performance particle removal with transparent nanofiber of graphene oxide and polyimide .

Creator：I-Hsuan Lai, Chang-Tang Chan

Substitute : Yu-Chen Cheng

Awards

Student Oral Presentation Competition

Excellence Award

Presenter : Yueh-Chen Wang

Topic：

Investigating the relationship between $PM_{2.5}$ concentration and planetary boundary layer height by using Taiwan Micro Pulse Lidar Network .

Creator：Yueh-Chen Wang, Sheng-Hsiang Wang

Awards

Student Oral Presentation Competition

Honorable Mention Award

Presenter : Yi-Ju Lee

Topic：

Development of the innovative $PM_{2.5}$ forecasting models in Taiwan through CMAQ and CNN algorithms .

Creator：Yi-Ju Lee, Fang-Yi Cheng, Chih-Yung Feng, Zhih-Ming Yang

Awards

Student Oral Presentation Competition

Honorable Mention Award

Presenter : Zih-Jhe Ciou

Topic：

Characteristics, sources and health risks of VOCs considering photochemical loss during ozone episode in an urban area of central Taiwan .

Creator：

Zih-Jhe Ciou, Chuan-Hsiu Huang, Zih-Wun Chen,

Ruei-Hao Shie, Yu-Hsiang Cheng, Yu-Chieh Ting

THE 30th ICAST

Acknowledgment to Sponsors

THE 30th ICAST

30th Anniversary Banquet

2023 Tour for Aerosol Young Scientists

Visits to Science Park Exploration Museum

2023 Tour for Aerosol Young Scientists

Visits to Science Park Exploration Museum

2023 Tour for Aerosol Young Scientists

Visits to Science Park Exploration Museum

2023 Tour for Aerosol Young Scientists

Visits to National Health Research Institutes

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Visits to National Health Research Institutes

2023 Tour for Aerosol Young Scientists

Visits to Tongxiao Power Plant

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Visits to Tongxiao Power Plant

2023 Tour for Aerosol Young Scientists

Activities at the Boai Campus, National Yang Ming Chaio Tung University

New Book on Aerosol

Publisher : Elsevier; 1st edition
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Language : English
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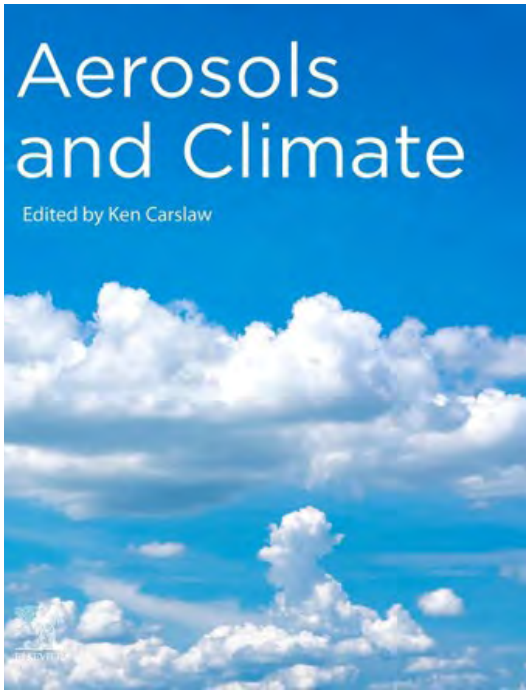
ISBN-13 : 978-0128197660
Print length : 854 pages

by Ken S. Carslaw (Editor)



The ever-diversifying field of aerosol effects on climate is comprehensively presented here, describing the strong connection between fundamental research and model applications in a way that will allow both experienced researchers and those new to the field to gain an understanding of a wide range of topics. The material is consistently presented at three levels for each topic: (i) an accessible "quick read" of the essentials, (ii) a more detailed description, and (iii) a section dedicated to how the processes are handled in models. The modelling section in each chapter summarizes the current level of knowledge and what the gaps in this understanding mean for the effects of aerosols on climate, enabling readers to quickly understand how new research fits into established knowledge. Definitions, case studies, reference data, and examples are included throughout.

Aerosols and Climate is a vital resource for graduate students, postdoctoral researchers, senior researchers, and lecturers in departments of atmospheric science, meteorology, engineering, and environment. It will also be of interest to those working in operational centers and policy-facing organizations, providing strong reference material on the current state of knowledge.

- Includes a section in each chapter that focuses on the treatment of relevant aerosol processes in climate models
- Provides clear exposition of the challenges in understanding and reducing persistent gaps in knowledge and uncertainties in the field of aerosol-climate interaction, going beyond the fundamentals and existing knowledge
- Authored by experts in modeling and aerosol processes, analysis or observations to ensure accessibility and balance

Position
Assistant Professor, China Medical University
Education
Ph.D., National Cheng-Kung University
E-MAIL
ccjung@mail.cmu.edu.tw

Dr. Chien-Cheng Jung

Dr. Chien-Cheng Jung currently serves as an Assistant Professor in the Department of Public Health at China Medical University. Dr. Jung's research is centered around the collection and monitoring of indoor/outdoor air pollutants, combining building characteristics, human activities, physical-chemical analyses of pollutants, and health data to investigate the following topics: (1) applications of isotopes in indoor air pollution source apportionment, (2) abundance, physical-chemical characteristics, and influencing factors of airborne microplastic particles, and (3) assessing the impact of adaptation behaviors under global warming on indoor air quality and its associated health risks. The major contributions of his research are in the assessment of sources of air pollution, exposure assessment, causes, influencing factors, and health risks in people's living environments through real samples, which are crucial references for the making of air quality management policies. Over the past 5 years, Dr. Jung has published 17 first or corresponding author papers in important SCI journals in environmental sciences, such as "Science of the Total Environment," "Environmental Pollution," "Atmospheric Environment," and "Indoor Air." Dr. Jung has also held various roles, including guest editor and reviewer in SCI journals in the environmental sciences.

Recent Research Topics

1 Applications of isotopes in indoor air pollution source apportionment

With the changing lifestyles of people, people spend over 90% of their time, making the association between indoor air quality and health effects more significant. In order to systematically investigate the sources of indoor $PM_{2.5}$ to support the control of key pollution sources, Dr. Jung's team established research bases in areas with severe $PM_{2.5}$ pollution and complex sources to analyze indoor $PM_{2.5}$ pollution sources and their seasonal variations using statistical methods. Dr. Jung's team also estimated the contribution of indoor and outdoor air to indoor $PM_{2.5}$ and its carcinogenic and probably carcinogenic heavy metals to humans. Additionally, Dr. Jung's team also analyzed the impact of specific outdoor human activities on the indoor air quality of surrounding buildings. These findings help us to reduce the bias of $PM_{2.5}$ and heavy metal exposure assessments in environmental epidemiological research. Furthermore, considering that past methods of identifying indoor $PM_{2.5}$ sources lack specific and stable indicators, Dr. Jung's team (collaborating with Dr. Charles C.-K. Chou from the Academia Sinica) assessed whether isotopes can be applied to identify indoor $PM_{2.5}$ sources. Dr. Jung's team established isotopic signatures for major indoor $PM_{2.5}$ sources (including incense, cigarettes, e-cigarettes, cooking-generated oil fumes, and paint) and found that these isotopes can distinguish the original $PM_{2.5}$ by different brands, nicotine contents, and cooking methods.

Dr. Jung's team further analyzed the isotope signatures in indoor and outdoor $PM_{2.5}$ in residences and schools and demonstrated that these isotopes can be used to identify indoor $PM_{2.5}$ sources and how ventilation conditions affect the results. However, the seasonal variations of isotopes in indoor and outdoor air are different compared to atmospheric trends, implying a bias in assessing people's $PM_{2.5}$ exposure source solely based on atmospheric data. Currently, Dr. Jung's team estimates indoor, outdoor, atmospheric, and personal $PM_{2.5}$ sampling and isotope analysis systems in schools and residences for accurately calculating the exposure sources of $PM_{2.5}$ to reduce the bias in exposure assessment in particle epidemiological studies.

2 Abundance, physical-chemical characteristics, and influencing factors of airborne microplastic particles

The mature manufacturing technologies, low-cost, and durability of plastics have made them become the most widely used materials globally. However, plastic materials or products emit plastic particles due to biotic degradation, photo, thermal, or mechanical processes, which become an emergency environmental issue. Currently, research focuses on microplastic particles in marine and soil environments, with a limited understanding of the characteristics, causes, and influencing factors of microplastic particles in the air.

Dr. Jung's team has established the sampling and analyzing methods for microplastic particles in the air and set up sampling sites in indoor and outdoor air in urban, suburban, agricultural, and coastal areas. Dr. Jung's team found that there was severe microplastic particle pollution in nail salons. The polymer composition of these microplastic particles reflected their association with artificial nails or gels used in the nail process. The level of microplastic particles in the air also increases with reduced ventilation rate and increase in the use of nail material with phthalates. Moreover, the plastic flooring and ceiling materials in nail salons are also important contributors to microplastic particles. These study results provide directions for improving indoor air quality in nail salons.

Dr. Jung's team also found that microplastic particle concentrations in outdoor air are associated with population density, and temperature, which shows a significant positive correlation with the concentration of microplastic particles. In other words, high concentrations of microplastic particles mainly appear in the warmer seasons, indicating a different pollution trend for microplastic particles in the air compared to $PM_{2.5}$ or PM_{10}. This reflects differences in the sources, causes, and influencing factors of these two types of particulate pollutants. In typical indoor environments, the concentration and polymer composition of microplastic particles do not exhibit significant changes with season, weekdays, or weekends, and temperature is not the primary influencing factor. However, ventilation conditions and the number of people are important influencing factors, illustrating different causes for indoor and outdoor microplastic particles. The related research results also indicate that when investigating microplastic particles in the air, the research design and approach differ significantly from traditional particulate pollutants and show distinctions between indoor and outdoor air.

3 Assessing the impact of adaptation behaviors under global warming on indoor air quality and its associated health risks

The Global Warming Assessment Reports released by the IPCC in 2021-2022 have again highlighted that people cannot ignore the influence of global warming, as well as adaptation and mitigation strategies. Currently, research on adaptation to global warming focuses on outdoor environments and recommendations for adaptation methods. Data collection and analysis in indoor environments remain limited.

Dr. Jung's team assessed the impact of global warming on indoor environmental quality and the associated health risks. Firstly, Dr. Jung's team analyzed the cumulative hours of occupants for adapting to extremely high or low temperatures to reduce the impact of extreme temperatures on health. These analyses are based on indoor environments, reducing potential errors that might have arisen from studies based on outdoor data, as these errors could impact health risk assessments and the formulation of adaptation methods.

Additionally, Dr. Jung's team also focused on the changes in indoor environmental quality that may occur when occupants take some adaptation behaviors for heat. These study results demonstrated that adaptation behaviors changed the distribution of gases and particulate pollutant concentrations, and the type of heat adaptation also affects the changes in their concentration. This highlights that adaptation behaviors may change the amount of exposure to pollutants for occupants.

Currently, Dr. Jung's team is evaluating the impact of the type and timing of adaptation behaviors by occupants on emerging indoor pollutants using short-term real samples and recorded data. They aim to establish a comprehensive relationship between adaptation, indoor emerging pollutants, exposure assessment, and health hazard risks. This will enhance our understanding of emergency pollutants in indoor air and associated health risks resulting from global warming, serving as a planning guideline for future adaptation strategies.

Glossary

Isotope

Isotopes refer to chemical elements with the same atomic number but different neutron numbers, and they have been widely applied in earth science, chemistry, and environmental forensics. In the field of environmental forensics, isotopic signatures of environmental pollutants are different in different sources or production processes, thus, these signatures are applied in analyzing the source of environmental pollutants, including in water, soil, air, and waste.

Microplastic particle

Microplastic particles are plastic particles in size from 1 μm to 5 mm. These particles can be emitted from plastic materials or products through various degradation processes (such as UV or heat). Current research has indicated the presence of microplastic particles in oceans, freshwater, soil, and air. These microplastic particles also have been found in human blood. Toxicological and some occupational epidemiological studies have shown the association between exposure to microplastic particles and health hazards.

Adaptation

People take some actions to enhance resilience and reduce the risks of global warming, which is termed adaptation. This may involve changes in architectural design, the use of ventilation systems, or the development of water resource management systems.

Emergency pollutant

Emerging pollutants are environmental contaminants that limited attention or are newly generated. The characteristics, formation mechanisms, influencing factors, and potential health effects of these pollutants are not yet fully understood by humans. Moreover, these pollutants can be emitted from industrial, agricultural, or energy generation processes.