

# SHOUMICK MITRA



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## PROFILE

I am an ardent Environmental Engineer, about to complete my Joint Ph.D. from the Civil Engineering Department at the Indian Institute of Technology Madras (IIT-M), India, and the School of Chemistry, Chemical Engineering, and Biotechnology (CCEB) at Nanyang Technological University (NTU), Singapore. My research interests mainly include air quality monitoring & modelling, Airborne particulate matter (PM) measurements & analysis, Personal exposure monitoring, Environmental geochemistry, Sustainable energy solutions, and ecological and human health risk assessments of pollutants.

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## EDUCATION

**Doctor of Philosophy in Environmental Engineering (Joint Degree Programme)**  
*IIT Madras, India – Nanyang Technological University, Singapore - (2020-2025)*  
CGPA - 10 (out of 10)

**Master of Technology in Environmental Biotechnology**  
*Jadavpur University (JU) - (2018-2020)*  
CGPA - 9.17 (out of 10)

**Bachelor of Technology in Civil Engineering**  
*Maulana Abul Kalam Azad University of Technology, West Bengal - (2014-2018)*  
CGPA - 8.61 (out of 10)

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## EXAMINATION QUALIFIED

**Graduate Aptitude Test in Engineering (GATE) 2021**

Qualified in Environmental Science and Engineering (ES) with a Gate score of 359.

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## RESEARCH INTERESTS

- Ambient and Indoor Air Quality: Measurements & Modelling
  - Personal Exposure Monitoring
  - Environmental Geochemistry & Toxicology Analysis
  - Ecological and Health Risk Assessments
  - Bio-monitoring of Environmental Pollutants
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## **RESEARCH EXPERIENCE**

### **Real-world Emission Measurements of Internal Transfer Vehicles (ITVs)**

**at Chennai Container Terminal, Chennai Port**

***IIT Madras, India & Ministry of Ports, Shipping & Waterways, Government of India***

***(March 2024 - May 2024)***

- Developed a comprehensive action plan for achieving targeted outcomes in terms of quantified reduction in carbon emission through focused implementation and close monitoring of Green Initiatives to achieve Sustainable Developmental Goals (SDG).

### **Clean Energy for Healthy Environment & Lives (CE4HEAL)**

***IIT Madras, India & Australian National University (ANU), Australia***

***(September 2021 - September 2022)***

- The objective was to: (1) collect, synthesise, and communicate examples of good practice in clean energy projects in rural and remote communities; (2) identify barriers and enablers for increased adoption of clean domestic energy solutions; (3) communicate their health, environmental, and economic benefits in rural/remote South India and Central Australia; and (4) enhance bilateral collaboration on clean energy solutions.

### **Development of Mobile EV based- Real Time Air Quality Monitoring and Modelling for NLC India Limited**

***Department of Civil Engineering, IIT Madras - (September 2020 – July 2022)***

- Carried out regular ambient air sampling at 10 locations using air quality samplers to determine trends in PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, NO<sub>x</sub>, and Ozone.
- Developed the pollutant spatial and temporal graphs for the 10 monitoring locations.
- Studied and reported the effects of meteorology on the dispersion of air pollutants at the locations.
- Retrofitted an electric vehicle with low-cost sensors for real-time air quality mobile monitoring.
- Installed 10 low-cost sensor setups (PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>x</sub>, NO<sub>x</sub>, Temp, R.H) at the monitoring stations.

### **Health Risk Assessment of Construction Workers from Trace Metals in PM<sub>2.5</sub> from Kolkata, India**

***School of Environmental Studies, Jadavpur University – (June 2019 - July 2020)***

- Carried out air sampling at construction sites using deployable portable sampler to collect PM<sub>2.5</sub> particles.
- Carried out SEM-EDS analysis to determine the physical nature of the particles captured.
- Carried out sequential leaching procedure for the PM<sub>2.5</sub> associated trace metals using ICP-MS.
- Estimated the health risk (both carcinogenic and non-carcinogenic) associated with the trace metals obtained.

### **Study of Coconut Fibre Reinforced Concrete: A Sustainability Approach**

***Department of Civil Engineering, Maulana Abul Kalam Azad University of Technology, West Bengal - (June 2017 - July 2018)***

- Procured and pre-treated coconut fibre for use in design mix process of fibre reinforced concrete.
  - Conducted batch studies with varying proportion of W:C ratio as well as fibre content to identify the most efficient proportion.
  - Carried out tensile and compressive strength tests on the concrete cubes developed to validate and conclude the findings.
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## **PUBLICATIONS**

### ***Journal Article***

- **Mitra, S.,** Das, S., Nagendra, S.M.S., Webster, R.D., 2025 Impact of Ambient PM<sub>2.5</sub> on Regional Lung Deposition and Chronic Obstructive Pulmonary Disease (COPD) Hospitalisations: A Study from a Mining and Thermal Powerplant Township in Southern India ([currently under review at Air Quality, Atmosphere & Health \(ID: AIRO-D-25-01054\)](#))
- Das, S., Verma, N., **Mitra, S.,** Nagendra, S.M.S., Vardoulakis, S., 2025. Air Quality Degradation from Open Waste Burning: A Case Study of Brahmapuram, Kochi. ([currently under review at Aerosol Science and Engineering \(ID: ASEN-D-25-00090\)](#))
- Ray, I., **Mitra, S.,** Kayee, J., Yuan, S., Nagendra, S.M.S., Wang, X., Das, R., 2024. Dominance of open burning signatures in PM<sub>2.5</sub> near coal plant should redefine pollutant priorities of India. *npj Clim Atmos Sci* 7, 1–17. <https://doi.org/10.1038/s41612-024-00836-6>
- **Mitra, S.,** Das, R., 2022. Health risk assessment of construction workers from trace metals in PM<sub>2.5</sub> from Kolkata, India. *Archives of Environmental & Occupational Health* 77, 125–140. <https://doi.org/10.1080/19338244.2020.1860877>

### ***Conference Proceedings***

- Ray, I., Das, R., **Mitra, S.,** Kayee, J. and Wang, X., 2024. Lead (Pb) Isotopes and Elemental Concentrations for Identification of Multiple Sources of Particulate Matter in Coal-Fired Power Plants. *AGU23 Annual Meeting*. <https://agu.confex.com/agu/fm23/meetingapp.cgi/Paper/1453643>
- Vardoulakis, S., Nagendra, S., Ford, L.P., Matthews, V., Mathew, S., Joyce, C., Vasudevan, K., Zander, K., Joshy, A., **Mitra, S.,** Indu, G., Shekar, S., Sharma, P., Mukherjee, B., Borah, P., Chawla, P., Vine, K., 2023. Clean Energy for Healthy Environments and Lives: Rural and Remote Community Leadership in Clean Energy Solutions for Australia and India. *ISEE Conference Abstracts 2023*. <https://doi.org/10.1289/isee.2023.OP-005>
- **Mitra, S.,** Nagendra, S.M., S., 2022. Fine particulate matter exposure and its associated COPD health risk from conventional lignite-fired thermal power plant in South India. Presented at the Desert Song Festival 2022, Climate and Land: DSF 2022 Symposium, Country and Climate Yarning Circle, Araluen Arts Centre, Alice Springs, Australia.
- **Mitra, S.,** Nagendra, S.M., S., 2022. Personal Exposure to Air Pollution in Industrial Area, in: *Conference Proceedings of CEPHA 2022 International Symposium*. Presented at the CEPHA 2022 International Symposium, Mahidol University, Thailand, p. 44.
- **Mitra, S.,** Nagendra, S.M., S., 2021. PM<sub>2.5</sub> attributable COPD hospital admissions and its monetary burden from a mining & thermal power plant based industrial town in Tamil Nadu, India. Presented at the 6th Indian International Conference on Air Quality Management (IICAQM-2021), Indian Institute of Technology Madras (IIT-M), p. 95.

### ***Poster Presentations***

- **Mitra, S.,** Nagendra, S., 2025. Assessing PM<sub>2.5</sub> Exposure and Health Risks in a Mining and Thermal Powerplant Township in Southern India: Impacts on Air Quality and Public Health (No. EGU25-21565). Presented at the EGU25, Copernicus Meetings. <https://doi.org/10.5194/egusphere-egu25-21565>
- **Mitra, S.,** Giri, J. A., Webster, D., R., Nagendra, S.M., S., 2024. Impact Assessment of In-Car Ventilation Modes on PM<sub>2.5</sub> Exposure and Elemental Composition in an Electric Vehicle (EV): A Case Study from a Mining and Thermal Powerplant Township in Southern India. *AGU24 Annual Meeting*. <https://doi.org/10.22541/essoar.173557535.56059033/v1>
- **Mitra, S.,** Giri, J. A., Webster, D., R., Nagendra, S.M., S., 2024. In-car Exposure to Fine PM bound Trace Elements under different Operating Conditions from a Mining & Thermal Powerplant based Industrial Town in Southern India, in: *Open House 2024*, Department of Civil Engineering, IIT Madras, India.

- Vardoulakis, S., Nagendra, S.M., S., Mathew, S., Vasudevan, K., Matthews, V., Ford, L P., Joshy, A., **Mitra, S.**, Joyce, C., Mukherjee, B., Zander, K., Thalavoor, G., Vine, K., Chawla, P., Sharma, P., Borah, P., 2022. Clean Energy for Healthy Environment & Lives (CE4HEAL), in Healthy Environments and Lives (HEAL) Conference 2022, Australian National University (ANU), Canberra, Australia.

### *Newsletter*

- **Mitra, S.**, 2024. Airborne Microplastics and their Impact on Human Health and Environmental Sustainability. CEPHA Prakriti Quarterly Newsletter, January-March 2024, Vol 4, Issue 1, p. 24. <http://cepha.in/prakriti-vol-4-issue-1/>
- **Mitra, S.**, Dutta, A., 2021. Sanitary Landfill in Ecosystem Restoration. Green Book e-magazine, School of Environmental Studies, Jadavpur University.

## **SCHOLARSHIP & AWARDS**

- Received the **Office of Global Engagement (OGE) Travel Grant (4<sup>th</sup> cycle), Indian Institute of Technology Madras (IIT-M)** for attending and presenting at the **AGU 2024 Annual Meeting – May 2025** (<https://ge.iitm.ac.in/oge-travel-grant/recipients>)
- Received a **scholarship from the ARISTEiA Institute for the Advancement of Research & Education in Arts, Sciences & Technology** for participating in the “**Interdisciplinary School for Environmental Crisis (ISEC) - Science, Health, Economy, and Social Sustainability**” at **Negroponte Resort Hotel in Eretria, Euboea, Greece– November 2024**
- Received the **Anusandhan National Research Foundation (ANRF), formerly Science and Engineering Research Board (SERB), International Travel Support (ITS)** grant for attending and presenting at the **AGU 2024 Annual Meeting – November 2024**
- Awarded a **partial fee waiver** for manuscript publication support **funded by the Laura Bassi Scholarship** based on Ph.D. research. – **August 2024.**
- Received a **scholarship from the Indo-German Centre for Sustainability (IGCS)** funded by **DAAD** and sponsored by **BMBF** for participating in the **Summer School 2024 on “Regenerative Urban Futures- Circular Economies and Societies”** at **RWTH Aachen University, Germany – April 2024.**
- Awarded the prestigious **IIT-M Alumni Funded- Kris Gopalakrishnan scholarship** for pursuing **Joint Doctoral Degree Programme** at **Nanyang Technological University, Singapore, and Indian Institute of Technology Madras, India – September 2022.**
- Received the **Honor Award for Conference Oral Presentation** at **CEPHA 2022 International Symposium, Bangkok, Thailand** organised by the **Clean Environment & Planetary Health in Asia (CEPHA) – March 2022**
- Awarded **Best Technical Paper (First Prize)** for presenting my work titled “**PM<sub>2.5</sub> attributable COPD hospital admissions and its monetary burden from a mining & thermal power plant based industrial town in Tamil Nadu, India**” at the **6<sup>th</sup> Indian International Conference on Air Quality Management (IICAQM 2021), Indian Institute of Technology Madras (IIT-M) – December 2021.**

- Received **Rashtriya Uchchatar Shiksha Abhiyan (RUSA 2.0)** travel grant from the **Ministry of Human Resource Development (MHRD), Government of India**, for carrying out high precision trace metal analysis along with SEM-EDS study on 47mm PTFE PM<sub>2.5</sub> filter paper at the **Earth Observatory of Singapore, Nanyang Technological University – June 2019**.
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## **TRAINING & WORKSHOPS**

**“Interdisciplinary School for Environmental Crisis (ISEC) - Science, Health, Economy, and Social Sustainability”, organized by the ARISTEiA Institute for the Advancement of Research & Education in Arts, Sciences & Technology**

***Negroponte Resort Hotel in Eretria, Euboea, Greece– March 2025***

- Got selected to participate and contribute to the group project on *“Increase security against extreme events in Euboea and scaling up of Community-Led Initiatives”*.

**Indo-German Centre for Sustainability (IGCS) Summer School 2024 on “Regenerative Urban Futures – Circular Economies and Societies”**

***RWTH Aachen University, Germany – July & August 2024***

- Participated in the discourse on creating more resilient and equitable cities for the future. Learned about the different socio-economical challenges that prevent the circular economy and regenerative urbanism. Completed and presented a group project on the *“Circular Economy in Leather Industry Waste Management”*.

**Training Course on “Agilent 7700 ICP-MS Techniques and Operation with Mass Hunter”**

***Agilent University, Agilent CrossLab - February 2023***

- Learnt the different techniques for the operation and maintenance of Agilent 7700 Series ICP-MS with Mass Hunter integrated software.

**Short-term Course on “Recent Advances in Environmental Biotechnology”**

***School of Environmental Science and Engineering & Department of Civil Engineering, IIT Kharagpur - October 2020***

- Recent advances in biotechnology for promoting sustainable development and ecological resilience, and tackling complex global environmental issues.

**Dissemination Workshop of “Three Special Reports (SR 1.5, SRCCL, and SROCC)”**

***Intergovernmental Panel on Climate Change (IPCC) and West Bengal State Pollution Control Board, Kolkata - October 2020***

- Presentation followed by discussion and debate on the three IPCC special reports (SR1.5, SRCCL, and SROCC).

**Workshop on “High Precision Trace Metal Analysis using ICP-MS”**

***Earth Observatory of Singapore, Nanyang Technological University (NTU) - October 2019***

- Sequential leaching of trace metal and metalloid fraction deposited on PM<sub>2.5</sub> filters and their chemical analysis using Inductively Coupled Plasma -Mass Spectrometer (ICP-MS).
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## **TECHNICAL SKILLS**

- **Laboratory Instruments acquainted with:** Inductively Coupled Plasma Mass Spectrometry, Inductively Coupled Optical Emission Spectrometry, Atomic Absorption Spectrophotometer, Ion Chromatography, Elemental Carbon-Organic Carbon Analyser, X-Ray Diffractometer, Scanning Electron Microscope, UV-vis Spectrophotometer.
  - **Research scoping skills:** Screening of research papers and literature review.
  - **Software Knowledge:** SPSS, RStudio, MATLAB, Origin, ArcGIS, MPPD, AirQ+, PMF, HYSPLIT
  - Word, Excel, Powerpoint Presentations & Report Preparation, Graphics Designing via Canva.
  - **Languages:** English (proficient), Bengali (native), Hindi (fluent).
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## **INDUSTRIAL VISITS**

### **Field visit to the ‘:metabolon’ Circular Economy in Solid Waste Management project at the Leppe landfill in Lindlar, Germany**

*IGCS Summer School 2024, RWTH Aachen University, Germany – July 2024*

### **Field monitoring campaign at Chennai Container Terminal, Chennai Port, Tamil Nadu**

*Chennai Port, Ministry of Ports, Shipping & Waterways, Government of India – March 2024 & April 2024*

### **Project work at NLC India Limited, Cuddalore District, Tamil Nadu**

*NLC India Limited (formerly Neyveli Lignite Corporation Limited) - January 2022 & June 2022*

### **Industrial visit of PepsiCo India, Howrah, West Bengal**

*PepsiCo India Holdings Pvt. Ltd., Howrah & School of Environmental Studies, Jadavpur University - January 2019*

### **Industrial visit of a (G+4) building construction site, Kolkata, West Bengal**

*Kolkata Metropolitan Development Authority - July 2016*

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## **CONFERENCE & SEMINARS ATTENDED**

### **10<sup>th</sup> Indian International Conference on Air Quality Management (IICAQM 2025)**

*Indian Institute of Technology Delhi (IIT-D), Delhi, India-December 2025*

### **Conference on “Weaving Diverse Knowledges into Climate Action for Better Health”**

*Healthy Environments and Lives (HEAL)-National Research Network, Australia- November 2025*

### **EGU General Assembly, 2025**

*European Geosciences Union, Vienna, Austria-April 2025*

### **9<sup>th</sup> Indian International Conference on Air Quality Management (IICAQM 2024)**

*Indian Institute of Technology Madras (IIT-M), Chennai, India-December 2024*

### **AGU Annual Meeting, 2024**

*American Geophysical Union, Washington D.C.-December 2024*

### **Conference on “Healing with Country for a Sustainable Future for Everyone”**

*Healthy Environments and Lives (HEAL)-National Research Network, Australia- November 2024*

### **AGU Annual Meeting, 2023**

*American Geophysical Union, Online-January 2024*

### **8<sup>th</sup> Indian International Conference on Air Quality Management (IICAQM 2023)**

*Indian Institute of Science (IISc), Bangalore, India-December 2023*

**Conference on “Collective Action for Health, Environment and Climate”**

*Healthy Environments and Lives (HEAL)-National Research Network, Australia- November 2023*

**7<sup>th</sup> Indian International Conference on Air Quality Management (IICAQM 2022)**

*Indian Institute of Technology Madras (IIT-M), India-December 2022*

**Conference on “Transformational Change for Environmental, Planetary, and Human Health”**

*Healthy Environments and Lives (HEAL)-National Research Network, Australia- November 2022*

**Desert Song Festival 2022, Climate and Land- DSF 2022 Symposium**

*Country and Climate Yarning Circle, Araluen Arts Centre, Alice Springs, Australia- September 2022*

**Clean Environment and Planetary Health in Asia (CEPHA) Symposium on “Environmental Epidemiology & Health Risk”**

*Clean Environment and Planetary Health in Asia (CEPHA), Universiti Kebangsaan, Malaysia- March 2022*

**Clean Environment and Planetary Health in Asia (CEPHA) International Symposium**

*Clean Environment and Planetary Health in Asia (CEPHA), Mahidol University, Thailand- March 2022*

**6<sup>th</sup> Indian International Conference on Air Quality Management (IICAQM 2021)**

*Indian Institute of Technology Guwahati (IIT-G), India-December 2021*

**Conference on “Healthy Environments & Lives”**

*Healthy Environments and Lives (HEAL)-National Research Network, Australia- November 2021*

**Seminar on “Application of Statistics and Software Models to Ascertain Pollution Impact”**

*CSIR-Indian Institute of Toxicology Research, Lucknow, India- November 2021*

**Part IX of E-Talk Series on “INDIUM SELENIDE: A promising 2D material for future nanotechnology”**

*Maharaja Agrasen Institute of Technology, Himachal, India- September 2021*

**Seminar on “Aerosol transmission and deposition in the lung: Understanding the propagation of COVID-19 and other airborne diseases”**

*Indian Institute of Technology Madras, India- August 2021*

**International E-Seminar on “Neurobiology of Pain & Itch”**

*Maharaja Agrasen Institute of Technology, Himachal, India - August 2021*

**Part- VIII of E-Talk Series on “Nanotechnology versus nanowaste and their interaction with environment: Global framework and sustainable development”**

*Indian Institute of Technology-Banaras Hindu University (IIT-BHU), India - July 2021*

**Part- VII of E-Talk Series on “Advanced Functional Nanomaterials for Air Pollution Control”**

*Maharaja Agrasen Institute of Technology, Himachal, India - July 2021*

**Online course on “Challenges and Development in Ambient Air Quality Monitoring”**

*Envitran Smart Systems, IIT Madras, India - June 2021*

## **National E-Seminar on “Key Challenges and Options in Environmental Management”**

*National Institute of Technology Karnataka (NIT-K), India - March 2021*

## **5<sup>th</sup> Indian International Conference of Air Quality Management (IICAQM 2020)**

*Indian Institute of Technology Madras (IIT-M), India-December 2020*

## **National Seminar on Advancements of Biotechnology in Human Welfare**

*SHRM Biotechnologies, India - February 2020*

## **13<sup>th</sup> Environment Partnership Summit & Environment Excellence Awards 2019**

*Indian Chamber of Commerce, Kolkata Chapter, India - December 2019*

## **International Seminar on Sustainable 2-G Biorefinery Platforms**

*Department of Chemical Engineering, Jadavpur University, India - December 2019*

## **National Seminar on Climate Change and Water Crisis**

*Department of Civil Engineering, IEST Shibpur, Howrah, India - June 2019*

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## **MEMBERSHIP ORGANISATIONS**

### **Air & Waste Management Association (A&WMA)**

*Student Member (Membership ID: 1264849)*

### **European Geosciences Union (EGU)**

*Student Member (Membership ID: 783480)*

### **American Geophysical Union (AGU)**

*Student Member (Membership ID: 1613105)*

### **Air Quality Management Association (AQMA), IIT Madras**

*Lifetime Association Member (Membership ID: AQMA-22E-0009)*

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## **REFERENCES**

### **Dr. S.M. Shiva Nagendra**

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