

# Madhumita Manna, Ph.D

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## Profile

I have completed **Ph.D** in **Chemical Engineering** from NIT Rourkela with the skill and experience in nanomaterial research, waste-to-value-added material synthesis, and water treatment. I successfully led a collaborative project under the IMPRINT 2 initiative funded by SERB-DST India, which culminated in 5 peer-reviewed SCI journal publications, where I served as the leading author, 2 patent grants, and several book chapters. I am committed to advancing smart and sustainable technologies to promote a circular economy by addressing critical global challenges in water, energy, infrastructure, and the environment. I am currently seeking academic professional positions and research and development roles to further contribute to these areas.

## Education

### National Institute of Technology Rourkela

CGPA: 9.81

#### Ph.D. in Chemical Engineering

May 2019 - Jan 2024

- Thesis title: Aluminosilicate Waste Derived Novel Zeolite A based Nanocomposite for Treating Waste water
- Worked as a Project scholar
- Courses:** Nanomaterials in Energy and Environmental Applications, Interfacial Science and Engineering, Principles of Analytical and Characterization Instruments, Advanced Environmental Biotechnology, Environmental Management System, Seminar and Technical Writing

### University of Calcutta

CGPA: 9.75

#### M.Tech in Chemical Technology

May 2017 - May 2019

- Graduated with Distinction
- Specialized in Petrochemicals and Petroleum Refinery Engineering

### University of Calcutta

CGPA: 9.0

#### Post B.Sc-B.Tech in Chemical Technology

Apr 2014 - Apr 2017

- Awarded with gold medal
- Relevant courses:** Reaction engineering, Chemical engineering, Material Science and Technology

### Bethune College, University of Calcutta

Percentage: 61.12

#### B.Sc in Chemistry(Hons.)

June 2011 - Apr 2014

- Passed with first class
- Courses:** Organic, Inorganic, and Physical Chemistry

## Work Experience

### Indian Oil Corporation Limited

Haldia, India

#### Engineering Intern

May 2016 - June 2016

- Accomplished with refinery operations like crude oil distillation, vacuum distillation, fluid catalytic cracking, sulfur recovery, and effluent treatment.
- Completed short-term project on energy and cost analysis of a fractionation column.
- Analysis of pros and cons existing effluent treatment plant.
- Soft Skills:** Teamwork, Time Management, Communication, Presentation skills.

## Research Projects

### Zeolite based low-cost hybrid membrane photoreactor for treating and recycling of high strength industrial wastewater

Odisha, India

#### National Institute of Technology Rourkela

May 2019 - Mar 2023

- Catalyst preparation and coating of nanocomposite photocatalyst on a tubular ceramic membrane.
- Development of cross-flow membrane setup for refractory organics from industrial wastewater.
- Hybrid process organization by integrating micro-nanobubble with membrane photoreactor that enhances the efficacy.

### Zeolite synthesis from industrial solid wastes

Odisha, India

#### National Institute of Technology Rourkela

May 2019 - Jul 2023

- Zeolite A synthesis from fly ash and red mud.
- Detailed characterization and optimizing process parameters by mathematical model (RSM, CCD).
- Comparative study on efficacy between synthesized and commercial zeolite A.

- Simple technical approach is explored to synthesize a novel core-shell assembled nanocomposite named ZA@ZnO1-x.
- Detailed characterization with high-end instruments like XPS, XRD, FESEM, TEM etc.
- Synthesized nanocomposite efficiently removes multiple poly aromatic hydrocarbons that are carcinogenic PAHs.

## Skills

### Technical

Hands on experience in high-end analytical instruments like HPLC, GC-MS, FTIR, SEM, UV-Vis, and Multimeter. Knowledge about XRD, XPS, DLS, TGA-DTA, BET, and HRMS.

### Miscellaneous

LaTeX(Overleaf), Microsoft Office.

### Soft Skills

Report writing, Critical thinking, Problem-solving, Documentation, Engaging Presentation.

## Achievements

2017-2019 **SVCM**, Swami Vivekananda merit-cum-means scholarship

India

2015-2016 **Emami**, Scholarship

India

2011-2014 **INSPIRE**, Scholarship

India

## Publications

### JOURNAL ARTICLES

A mechanistic evaluation for total removal of toxic hexavalent and trivalent chromium from water by oxygen vacancy-engineered nanocomposite

Madhumita Manna, Sujit Sen

*Journal of Environmental Chemical Engineering* p. 111755. Elsevier, 2024

A hybrid ZA@ ZnO1- X nanocomposite-based tubular membrane process for enhanced degradation of organics: A bench scale study for Bismarck brown R effluent

Madhumita Manna, Binay Kanti Dutta, Sujit Sen

*Journal of Environmental Chemical Engineering* p. 110321. Elsevier, 2023

A novel oxygen-deficient core-shell ZA@ ZnO1-X nanocomposite for enhanced degradation of multiple polyaromatic hydrocarbons

Madhumita Manna, Sujit Sen

*Applied Surface Science* p. 157523. Elsevier, 2023

Advanced oxidation process: a sustainable technology for treating refractory organic compounds present in industrial wastewater

Madhumita Manna, Sujit Sen

*Environmental Science and Pollution Research* pp. 25477–25505. Springer, 2023

Tuning crystallization for controlled morphology of Zeolite A by an eco-friendly sonochemical precursor-less method

Madhumita Manna, Sujit Sen

*Materials Chemistry and Physics* p. 128378. Elsevier, 2023

### BOOK CHAPTERS

Heavy metal removal by low-cost adsorbents

Manisha Maharana, Madhumita Manna, Moumita Sardar, Sujit Sen

*Green Adsorbents to Remove Metals, Dyes and Boron from Polluted Water* pp. 245–272. Springer, 2021

Sustainable Management of Waste: Present Challenges and Future Planning

Madhumita Manna, Sujit Sen

*Waste Management: Strategies, Challenges and Future Directions* pp. 1–23. Nova Science, 2021

Remediation of dyes from industrial wastewater using low-cost adsorbents

Moumita Sardar, Madhumita Manna, Manisha Maharana, Sujit Sen

*Green adsorbents to remove metals, dyes, and boron from polluted water* pp. 377–403. Springer, 2021

2D Zeolites

Moumita Sardar, Manisha Maharana, Madhumita Manna, Sujit Sen

*Layered 2D Advanced Materials and Their Allied Applications* pp. 193–210. Wiley Online Library, 2020

### PATENTS

Madhumita Manna, Sujit Sen. “Process for Development of Zeolite A from Mixed Industrial Solid Wastes”. Patent No. 545784 Awarded 24.07.2024.

– “ZA@ZnO1-X Nanocomposite Photocatalyst-Coated Ceramic Membrane-Based Hybrid Process for Industrial Wastewater Treatment”. Patent No. 542891 Awarded on 25.06.2024.

## Conference Presentation

- **Advanced Oxidation Process- A Sustainable Technology for Treating Refractory Organic Compounds Present in Industrial Wastewater** International Conference on Advances in Sustainable Research for Energy and Environmental Management (ASREEM-2021) on 6th - 8th August 2021
- **Emerging and Sustainable Technologies for Wastewater Treatment–A Current Perspective and Future Direction** The Hybrid 9th Jordan International Chemical Engineering Conference (JChEC 09) on 12th – 14th October 2021

## References

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- **Dr. Sujit Sen**, Associate Professor, Department of Chemical Engineering, National Institute of Technology Rourkela, Email: sensujit@nitrkl.ac.in
- **Dr. Suverna Trivedi**, Assistant Professor, Department of Chemical Engineering, Indian Institute of Technology Kharagpur, Email: strivedi@che.iitkgp.ac.in
- **Dr. Sanjib Barma**, Assistant Professor, Department of Chemical Technology, University College of Science, Technology and Agriculture, University of Calcutta, Email: sanjib.burma@gmail.com