Dr. Subrata Biswas, B.Tech, M.Tech, Ph.D

Assistant Professor
Indian Institute of Technology (IIT) ROORKEE
Email: subrata.biswas@pt.iitr.ac.in
b4subrata@gmail.com

Education

2015-2021 Doctor of Philosophy (Ph.D)	**Curtin University Australia and IIT Kharagpur India** **Major Subject:** Chemical engineering **Specialization:** Environmental pollution control **Thesis title:** Design and development of a three phase semifluidized bed reactor for wastewater treatment with reference to steel plant effluent
2013-2015 Master of Technology (M.Tech)	**National Institute of Technology (NIT) Durgapur** **Major Subject:** Chemical engineering **Specialization:** Environmental pollution control **Thesis title:** Computer aided performance analysis of three phase biofilm bioreactors for industrial wastewater treatment
2009-2013 Bachelor of Technology (B.Tech)	**West Bengal University of Technology** **Specialization:** Chemical engineering **Major Subjects:** Heat transfer, mass transfer, fluid mechanics, chemical reaction engineering, thermodynamics, chemical process technology

Employment

3/2024 – present Assistant Professor	**Indian Institute of Technology (IIT) ROORKEE, India** Department of Paper Technology
6/2022 -11/2023 Research Associate	**University of Wisconsin –Milwaukee, USA** **Major projects**: (i) synthesis and application of green antibacterial coating for flow devices and other water handling equipment (ii) hydrophobic dual layer coating on ceramic surface (iii) fabrication of a portable biosensor for rapid detection of pathogenic bacteria in wastewater (iv) feasible technology for removal of PFAS from aqueous solution at low concentration
9/2021 -4/2022 Industry project fellow	**IIT Kharagpur, India** **Major projects:** i) Industry visit for verification of various pollution control equipment (ii) Provide technical support for the industry (iii) Chemical industry visits for verification of hazardous chemical managementsystem (iv) Technical report preparation for various chemical industry
4/2021-9/2021 Research Associate	**HKUST Hong Kong** **Major projects:** La loaded anion exchange resin for recovery of Phosphate in continuous flow column
9/2020- 3/2021 Project assistant	**IIT Madras** **Major projects:** Creation of management structure for Lead (Pb) in paint in India

Funded project

Title: Development of portable biosensor for rapidly detection of water borne bacteria

Amount: 50000$

Agency : WEP (Water Equipment policy, Milwaukee, Wisconsin, USA)

Role: Co PI with Professor Junjie Niu (https://sites.uwm.edu/niu/people/)

Research expertise

Water and wastewater treatment technology, environment contaminant remediation, environmental assessment, Sustainable technology development, impact studies and analysis with possible solution, reactor design, green technology, biomass pyrolysis, hazardous waste management, biosensor, PFAS removal,

Industrial Project involvement

- Decarbonization program and total carbon foot print of Chaliyama steel plant Jharkhand India
- Capacity adequacy evaluation of bag filters of coke oven plant of m/s neelachal ispat nigam limited, India
- Environmental assessment of air pollution control equipment installed at B S sponge pvt. Limited
- Environmental assessment of air pollution control equipment installed at reshmi metaliks pvt. Limited
- Creation of management structure for Lead (Pb) in paint in India (project undertaken by IIT Madras from Govt of India)

Key responsibilities

- Personal investigation on various pollution control equipment installed in the industry
- Investigating and documenting of client's requirement on environmental risk assessment
- Providing technical support to the client to improve their pollution control equipment installed
- Providing risk and safety training and guidance to the clients
- Undertaken research on hazardous waste management methodology including environmental impact and risk assessment
- Writing technical reports and proposals relating to various pollution control equipment specially air and water pollution control system along with management structure creation for hazardous waste

Key Contribution

- Visit the industries in person to investigate the performance of their various pollution control equipment like bag filters, electrostatic precipitator
- Provide technical support if the equipment are not working upto satisfactory level
- Collection of market data on Lead concentration in paint manufactured by both local companies and international manufacturer in India
- Provide a management structure to control excess Lead concentration in paints to Govt of India

Selected Scientific Publications

[1] **S. Biswas**, R. K Diwakar, I. D. Behera, B. C. Meikap, T. K. Sen and M. Khiadani "Aqueous phase phenol removal from synthetic and real steel plant effluents through a batch and Semifluidized bed column operation: Experimental and model analysis," *J. Environ. Chem. Eng.*, vol 8,p 104441, 2020.

https://doi.org/10.1016/j.jece.2020.104441

[2] **S. Biswas**, S. Sharma, S. Mukherjee, B. C. Meikap, and T. K. Sen, "Process modelling and optimization of a novel Semifluidized bed adsorption column operation for aqueous phase divalent heavy metal ions removal," *J. Water Process Eng.*, vol. 37, p. 101406, Oct. 2020. https://doi.org/10.1016/j.jwpe.2020.101406.

[3] **S. Biswas**, S. S. Mohapatra, U. Kumari, B. C. Meikap, and T. K. Sen, "Batch and continuous closed circuit semi-fluidized bed operation: Removal of MB dye using sugarcane bagasse biochar and alginate composite adsorbents," *J. Environ. Chem. Eng.*, vol. 8, no. 1, p. 103637, 2020. https://doi.org/10.1016/j.jece.2019.103637.

[4] **S. Biswas**, H. Siddiqi, B. C. Meikap, T. K. Sen, and M. Khiadani, "Preparation and Characterization of Raw and Inorganic Acid-Activated Pine Cone Biochar and Its Application in the Removal of Aqueous-Phase Pb2+ Metal Ions by Adsorption," *Water, Air, Soil Pollut.*, vol. 231, no. 1, p. 3, Jan. 2020. https://doi.org/10.1007/s11270-019-4375-7

[5] **S. Biswas**, T. K. Sen, A. M. Yeneneh, and B. C. Meikap, "Synthesis and characterization of a novel Ca-alginate-biochar composite as efficient zinc (Zn 2+) adsorbent: Thermodynamics, process design, mass transfer and isotherm modeling," *Sep. Sci. Technol.*, vol. 54, no. 7, pp. 1106–1124, May 2019, https://doi.org/10.1080/01496395.2018.1527353

[6] **S. Biswas**, T. K. Sen, and B. C. Meikap, "Experimental hydrodynamic and bed characteristics of co-current gas-liquid-solid three phase semifluidization with liquid as the continuous phase," *Part. Sci. Technol.*, vol. 38, pp. 999-1011, Aug. 2019. https://doi.org/10.1080/02726351.2019.1651586.

[7] **S. Biswas**, B. C. Meikap, and T. K. Sen, "Adsorptive Removal of Aqueous Phase Copper (Cu2+) and Nickel (Ni2+) Metal Ions by Synthesized Biochar–Biopolymeric Hybrid Adsorbents and Process Optimization by Response Surface Methodology (RSM)," *Water, Air, Soil Pollut.*, vol. 230, no. 8, p. 197, Aug. 2019. https://doi.org/10.1007/s11270-019-4258-y.

[8] **S. Biswas**, S. Sharma, H. Siddiqi, B. C. Meikap, T. K. Sen, and M. Khiadani, "Semifluidized Bed Adsorption Column Studies for Simultaneous Removal of Aqueous Phase Pb^{2+} and Cd^{2+} by Composite Adsorbents: an Experimental and Mass Transfer Dynamic Model–Based Approach," *Water, Air, Soil Pollut.*, vol. 232, no. 8, 2021, https://doi.org/10.1007/s11270-020-04951-x

[9] M. Bal, **S. Biswas**, S. K. Behera, and B. C. Meikap, "Modeling and optimization of process variables for HCl gas removal by response surface methodology," *J. Environ. Sci. Heal. Part A*, vol. 54, no. 4, pp. 359–366, Mar. 2019, doi: 10.1080/10934529.2018.1551650.

[10] U. Kumari, **S. Biswas**, and B. C. Meikap, "Defluoridation characteristics of a novel adsorbent developed from ferroalloy electric arc furnace slag: Batch, column study and treatment of industrial wastewater," *Environ. Technol. Innov.*, vol. 18, p. 100782, May 2020, doi: 10.1016/j.eti.2020.100782.

[11] H. Siddiqi, U. Kumari, **S. Biswas**, A. Mishra, and B. C. Meikap, "A synergistic study of reaction kinetics and heat transfer with multi-component modelling approach for the pyrolysis of biomass waste," *Energy*, vol. 204, p. 117933, 2020, doi: 10.1016/j.energy.2020.117933.

[12] M.Bal, I.D. Behera, U. Kumari, **S.Biswas**, B.C. Meikap, "Hydrodynamic study and particulate matter removal in a self priming venturi scrubber, " *Environ. Technol. Innov.*, vol. 20, p. 101167, September 2020, doi:10.1016/j.eti.2020.101167.

[13] S. Mukherjee, A. Verma, **S. Biswas**, M. Bal, B.C. Meikap, Removal of Cement Dust Particulates via Fully Submerged Self-Primed Venturi Scrubber, CLEAN – Soil, Air, Water. 49 (2021) 2000241. https://doi.org/10.1002/clen.202000241.

[14] H. Siddiqi, **S. Biswas**, U. Kumari, H. Bindu VNV, S. Mukherjee, B.C. Meikap, A comprehensive insight into devolatilization thermo-kinetics for an agricultural residue: Towards a cleaner and sustainable energy, J. Clean. Prod. 310 (2021) 127365. https://doi.org/10.1016/j.jclepro.2021.127365.

[15] I. Dipamitra, M. Nayak, **S. Biswas**, B. C Meikap, R. Sen, Enhanced biodegradation of total petroleum hydrocarbons by implementing a novel two-step bioaugmentation strategy using indigenous bacterial consortium, J. Environ. Manage. 292 (2021) 112746. https://doi.org/10.1016/j.jenvman.2021.112746.

[16] M. Shang, S Biswas, MS Samuel, J Niu, Dual-Layered SiO2 Nanoparticles and Epoxy Polymers for Self-

Cleaning Coatings on Ceramic Glaze. ACS Appl. Nano Mater. 2022, 5, 10, 15934–1594. 10.1021/acsanm.2c04218.

Conference Presentation

[1]**Golden Jubilee International Conference on Recent Developments In Chemical And Biochemical Engineering**, NIT Durgapur, India, 2015.

[2]. **Subrata Biswas, T. K Sen, B. C Meikap** "***Biochar-Alginate novel composite adsorbent: synthesis characterization and application in water and wastewater treatment*"** 18 AiCHE Annual meeting, Pittsburgh, USA, October 28 to November 2, 2018.

[3] **Subrata Biswas, T. K Sen, B. C Meikap** "***Bioremediation of Phenol by mixed microbial consortium: kinetic, efficiency and pathway study***" Fifth International Symposium on Green Chemistry, Sustainable Development and Circular Economy, Greece, September 30 to October 3, 2018, Page 26, ISBN: 978-618-5271-61-9.

[4] **Subrata Biswas, T. K Sen, B. C Meikap,** "***Recent advances in column based adsorption studies in wastewater treatment",*** International Symposium on Environment and Chemical Engineering 2021 November 2021 (ISECE2021), Malyasia (As Invited Speaker)

Professional body membership

Life Associate member of IIChE (LAM-647)

Member of AIChE (membership no 9902923281)

Award and scholarships

GATE scholarship from MHRD Govt of India for PhD (2015-2020)

Curtin International Postgraduate Research Scholarship (2017-2018) for study at Curtin University Australia.

Professional network link

Google scholar Link https://scholar.google.co.in/citations?hl=en&user=Wq1QR0gAAAAJ

Research gate link https://www.researchgate.net/profile/Subrata_Biswas9

Orcid id https://orcid.org/0000-0003-4398-5236

Official webpage: https://iitr.ac.in/Departments/Paper%20Technology%20Department/People/Faculty/400169.html