Dr. Sachin Jadhao

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Research Interest

- Industrial Ecology & Circular Economy
- Life Cycle Assessment (LCA)
- Techno-Economic Analysis (TEA)
- Process Sustainability Assessment
- De-carbonization Strategies
- Sustainable Product Design
- Exergy Analysis
- Waste-to-Value Technologies
- Resource Utilization Optimization
- Process Simulation (ASPEN Plus)
- Environmental Impact Modeling
- Industrial Process Development
- Material Flow Analysis

Education

Aug 2009 - Oct 2015	Ph.D. (Chemical Engineering) at Institute of Chemical Technology (ICT), Mumbai, India
Aug 2007 - June 2009	M.Chem Engg (Chemical Engineering) at Institute of Chemical Technology (ICT), Mumbai, India
July 2000 - June 2005	B. Tech (Chemical Engineering) at Anuradha Engineering College, Chikhli, Maharashtra, India.

Academic Research

Assistant Research Scientist — July 2025 – Till Date

School of Sustainability, Arizona State University, Tempe, U.S.A

- Employed the Life Cycle Assessment (LCA) and Techno-economic Assessment (TEA) to evaluate the alternative pathways of meeting Net Zero Emissions for the Global Chemical and Metal Manufacturing Sector.
- Also focused on the role of Small Modular Reactors and Frontier Energy Technologies in meeting the goal of Net Zero Emissions and developing a roadmap to meet the Net Zero Emissions.

Research Scholar — Aug 2024 – June 2025

Systems Engineering, Cornell University, Ithaca, U.S.A

- Research project funded by United States Department of Agriculture (USDA)
- Employed the Life Cycle Assessment (LCA) methodology to evaluate the environmental performance of lettuce production and supply chains serving the New York City metropolitan area.
- Compared the environmental performance of lettuce sourcing: Conventional field-grown lettuce from California & Locally grown lettuce produced in Controlled Environment Agriculture (CEA) facilities near New York City
- Study identifies environmental hotspots and proposes strategies to enhance the sustainability of urban lettuce production and distribution systems

Senior Project Research Scientist — Feb 2024 – May 2024

Indian Institute of Technology (IIT) Bombay, Mumbai, India

- Perform Preliminary techno-economic assessment (TEA) for the selected Sustainable Aviation Fuel.

- Conducted research on evaluation of alternative pathways of Sustainable Aviation Fuel (SAF) in India, focusing on Fischer-Tropsch Synthesis using captured CO2 and green hydrogen.
- Used Life Cycle Assessment (LCA) and Techno-Economic Assessment (TEA) for evaluation of alternative pathways of SAF production technologies aligned with ASTM International standards.
- Developed analytical frameworks to evaluate environmental and economic feasibility of SAF implementation at national scale.
- Identified and analyzed critical hotspots across the SAF production lifecycle, from feedstock acquisition to final fuel production.

Post Doctoral Fellow — Jul 2017 – Jun 2020

Indian Institute of Technology (IIT) Bombay, Mumbai, India

- Co-pyrolysis studies on the interaction of mixed plastics waste using spent FCC.
- Developed a continuous process for plastic pyrolysis of mixture of waste plastics (HDPE, LDPE, PP, and PS).
- Experimentally investigated the effect of the interaction plastic components on the yields and quality of Oil.
- Scaled up the Process from a laboratory scale to a process that can handle 10 kg/h of feed.
- Tata Research Center funded this project; it is part of integrated waste management for the IITB campus using various technologies such as plastic pyrolysis, biomass gasification, composting, etc.

Graduate Research Assistant — Aug 2009– 2015

Chemical Engineering, Institute of Chemical Technology (ICT), Mumbai, India

- Dissertation Research:Thermodynamic Assessment of Resource Utilization and Destruction in India in Past Four Decades: Insights from Exergy Analysis
- Employed the exergy Analysis methodology to evaluate the efficiency of resource utilization in various sectors of Indian Economy. For the resource assessment of Indian economy, the sectors considered are Industry Sector, Utility Sector (Electricity Generation), Agriculture Sector, Transport Sector, Residential & Commercial Sector
- Evaluated the Environmental performance of various Sectors of Indian Economy.
- Evaluated the thermodynamic efficiency, environmental performance and teno-ecomin analysis of alternative Municipal Solid Waste Treatment technologies in the Indian context
- Carried out an comprehensive temporal and spatial analysis study that take in to account the change in the composition of the waste and assessed thermodynamic conversion efficiency of Municipal solid waste treatment technologies for various geographical location in India
- Evaluated the Environmental and economic performance pf Incineration, Plasma Gasification and Landfilling (Open dumping)

Publications

Peer-Reviewed Articles

Google Scholar link

- D'Sa, S.M., Patnaik, D., Acham, V., **Jadhao S.** Correspondence between Technology Options Available for Chemical Industries and the Levels of the Waste Management Hierarchy: A Case Study Approach. Nature Environment and Pollution Technology, 2021, 20(4), pp. 1733–1740. https://www.researchgate.net/publication/356857259

- **Jadhao, S.B.**, Pandit, A.B., Bakshi, B.R. Resource Utilization and Destruction in Indian Industrial Sectors: An Exergy Analysis, Industrial and Engineering Chemistry, 2019, 58, 26, 11566-11575. https://pubs.acs.org/doi/10.1021/acs.iecr.8b06131
- **Jadhao, S.B**., Pandit, A.B., Bakshi, B.R. Gasify, Burn, or Bury: Assessing Municipal Solid Waste Management Options in Indian Megacities by Exergy Analysis. Clean Technologies and Environmental Policy. July 2017, Volume 19, Issue 5, pp 1403-1412. http://www.sciencedirect.com/science/article/pii/S0306261917312308
- **Jadhao, S.B.**, Pandit, A.B., Bakshi, B.R. The evolving metabolism of a developing economy: India's exergy flows over four decades. Applied Energy, Volume 206, 15 November 2017, Pages 851–857. http://www.sciencedirect.com/science/article/pii/S0306261917312308
- Patwardhan, A.W., Mali, R.G., **Jadhao, S.B.**, Bhor, K.D., Padmakumar, G., Vaidyanathan, G. Argon entrainment into liquid sodium in a fast breeder reactor. Nuclear Engineering and Design, Vol. 249, August 2012, Pages 204-211. https://www.sciencedirect.com/science/article/pii/S0029549311006224

Conference Publications

- **Jadhao, S.B.**, Seethamraju, S. Pyrolysis of mixed plastic waste. IOP Conference Series: Materials Science and Engineering, Volume 736, 042036, 2020. https://iopscience.iop.org/article/10.1088/1757-899X/736/4/042036
- **Jadhao, S.B.**, Pandit, S., Shinghade, Bakshi, B.R. Municipal Solid Waste to Useful Energy Conversion Options in India: Insights From Exergy Analysis. 3rd International Congress on Sustainability Science and Engineering, ICOSSE 2013, pp. 476–492, Cincinnati, OH, USA. http://icosse.org/2013/proceeding/paper/municipal-solid-waste-useful-energy-conversion-options
- **Jadhao, S.B.**, Pandit, A.B., Bakshi, B.R. Challenges and opportunities for enhancing exergy efficiency of industrial sectors in developing economies - Insight from India's growth. 2012 AIChE Annual Meeting, Conference Proceeding, Pittsburgh, PA, USA. https://www.aiche.org/conferences/aiche-annual-meeting/2012/proceeding
- **Jadhao, S.B.**, Bakshi, B.R., Pandit, A.B. The evolving metabolism of a developing economy - Insight from India's growth. IEEE International Symposium on Sustainable Systems and Technology, 2012, Boston, Massachusetts, USA. http://ieeexplore.ieee.org/abstract/document/6228004/

Conferences & Presentations

- **Jadhao S. B.**, Srinivas S., Feedstock Recycling of mixed plastics waste. International Symposium on Sustainable Systems and Technology Pittsburgh, PA, USA, 2019. On 25-27 June 2019, in Portland, USA. https://iopscience.iop.org/article/10.1088/1757-899X/736/4/042036
- **Jadhao, S.B.**, Pandit, S. Shinghade, Bakshi, Municipal Solid Waste to Useful Energy Conversion Options in India: Insights From Exergy Analysis. BR International Congress on Sustainability Science Engineering. ICOSSE, 2013. Cincinnati, USA. http://icosse.org/2013/proceeding/paper/municipal-solid-waste-useful-energy-conversion-options-indiainsights-exergy-analysis-0-
- **Jadhao, S.B.**, Pandit, A.B., Bakshi, B.R. Challenges and opportunities for enhancing exergy efficiency of industrial sectors in developing economies Insight from India's 2012 AIChE Annual Meeting, Conference Proceeding, 2012. Pittsburgh, USA. https://www.aiche.org/conferences/aiche-annual-meeting/2012/proceeding/paper/630g-challenges-andopportunities enhancing-exergy-efficiency-industrial-sectors-developing
- **Jadhao, S.B.**, Bakshi, B.R., Pandit, A.B., The evolving metabolism of a developing economy - Insight from India's growth, IEEE International Symposium on Sustainable Systems and Technology, 2012. Boston, Massachusetts, USA. http://ieeexplore.ieee.org/abstract/document/6228004/

- **Jadhao, S.B.**, National Level Paper Presentation at MS University Baroda (Gujarat).

Teaching Experience

- Teaching Assistant at Indian Institute of Technology Bombay, Mumbai, India,
  Subject: CL 665 (Sustainable Engineering Principles)
  Subject: CL433 Chemical Engineering Lab 4

Industrial Research & Experience

Lab Head — Apr 2022 – Jan 2024

Shreeji Aqua Treatment Pvt. Ltd., Pune, India

- Head operations of the National Accreditation Board for Testing and Calibration Laboratories (NABL) & The Ministry of Environment, Forest and Climate Change (MoEFCC) accredited analytical laboratory.
- Provided consultancy services for all environment-related work, like environmental monitoring, environmental site assessment, environmental audits for industries, and meeting environmental compliance requirements.

Senior Project Engineer — Jul 2020 – Dec 2023

Chemengg Research Pvt. Ltd., Pune, India

- Led multiple R&D projects from conceptualization, laboratory-scale product and process development, process finalization, process optimization to pilot-scale implementation, focusing on sustainable chemical process development and waste valorization.
- Innovative chemical processes designed and optimized including continuous flow reactions and selective separation technologies.
- Developed scalable processes for industrial waste recovery and value-added product manufacturing.
- Managed end-to-end project lifecycle including feasibility studies, process design, and economic evaluations.
- Successfully developed processes for:
  * Recovery and purification of hydrochloric acid from industrial waste streams
  * Manufacturing of Sodium permanganate (NaMnO4)
  * Continuous flow synthesis of 3-nitro-benzaldehyde with enhanced efficiency
  * Eco-friendly concrete admixtures from Kraft lignin
  * Economic recovery of sodium sulfate from industrial effluents

Engineering & Operations:

- Executed comprehensive process engineering calculations, including mass/energy balances and equipment sizing
- Developed detailed process flow diagrams (PFD) and P&IDs for pilot plant operations
- Supervised laboratory and pilot plant experiments, ensuring data accuracy and reproducibility
- Conducted technical and economic feasibility studies, including CAPEX/OPEX analysis
- Managed research facilities and laboratory resources, optimizing operational efficiency

Senior Technology Architect **Feb 2015 – Jun 2017**

Geist Research Pvt. Ltd., Goa, India

- Developed a continuous process for high-strength, stable bleaching powder.
- Developed a Process for the recovery of valuable chemicals from Industrial effluents.
- Pilot plant trials for recovery of calcium hypochlorite from mother water
- Developed process for recovery of sodium sulphate from industriel effluents.

Chemical Engineer **Sept 2006 – Jun 2007**

Gujarat Organics Pvt. Ltd., Ankleshwar, Gujarat, India

- Handling the production & technology transfer activities.
- Manufacturing of para hydroxyl benzoic acid.

PROFESSIONAL MEMBERSHIPS

- American Institute of Chemical Engineers.
- The International Society for Industrial Ecology (ISIE)

ACADEMIC SERVICE

- Organizing committee member for the International Symposium on Sustainable Systems and Technology, USA.
- Organizing committee member for Young Researchers Conference-09 UICT Mumbai.

Skills

Simulation Skills Aspen Plus, OPENLCA

Languages

English, Hindi, Marathi

References

- Prof. Aniruddha B. Pandit (Ph.D. supervisor)
  Vice Chancellor, Institute of Chemical Technology, Nathalal Parekh Marg, Matunga
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  Email: ab.pandit@ictmumbai.edu.in
  Faculty webpage link

- Prof. Bhavik R Bakshi
  Arizona State University, Tempe, AZ 85287, USA
  Telephone: +1-614-664-3656
  Email: Bhavik.Bakshi@asu.edu
  Faculty webpage link

- Prof. Seethamraju Srinivas
  Department of Energy Science and Engineering, IIT Bombay

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