

Curriculum Vitae



Dr. Satyabrata Sahoo

(Assistant Professor)

Department of Mechanical Engineering
Indian Institute of Technology (ISM), Dhanbad
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Research Interests

Refrigeration and air conditioning, Solid Sorption Systems, Carbon Capture, Energy Storage, Heat and mass Transfer, Thermal Management, Thermodynamic Modeling

Education

Ph.D. (Specialization: Mechanical Engineering)

Indian Institute of Technology Kharagpur, India (Dec 2010-April 2016)

Thesis Title: Heat and Mass Transfer Studies on Adsorbed Natural Gas Storage Systems

Supervisors: Prof. M. Ramgopal

(Thesis submitted: Sep 2015; PhD. Awarded: Apr 2016)

M. Tech. (Specialization: Thermal Engineering) **CGPA-8.43**

Indian Institute of Technology Kharagpur, India (2007-2009)

Thesis Title: Studies on Solid Sorption Systems Based on Ammonia-Salts

Supervisor: Prof. M. Ramgopal

B. E. (Mechanical Engineering)-**70.5%**

Bijupatanaik University of Technology, Odisha, India (2002-2006)

Employment

Employer	Position held	Duration
IIT (ISM) Dhanbad	Assistant Professor	July 2017-Present
Bits Pilani, Pilani Campus	Assistant Professor	Aug 2016- Jul 2017
NIT Jamshedpur	Ad hoc Faculty	Jan 2016- May 2016
C V Raman College of Engineering Bhubaneswar	Assistant Professor	Jul 2009- Dec 2010

Awards / Recognitions

- ❖ G.E. Scholarship during M. Tech at IIT Kharagpur 2007-2009
- ❖ AIR-233 GATE (Mechanical Engineering) in 2007
- ❖ MHRD fellowship for PhD
- ❖ National Rural Talent Scholarship in 7th standard
- ❖ Got Scholarship in 3rd and 5th standards
- ❖ Stood 1st in the district and was among the top 100 of the state in state board

Courses Developed

- ❖ I am one of the co-developers of the Pedagogical Course for **Thermodynamics**.

List of Publications

Book Chapters:

1. Gorai, B, **Sahoo, S.**; Energetic and exergetic analysis of an ejector based green refrigeration system employing evaporative cooling in the gas cooler, Book Chapter: Advances in Thermofluids and Renewable Energy (Chapter 8) (ISBN: 978-981-16-3496-3) Springer Singapore (2021)
2. Gautam, **Sahoo, S.**; Heat and Mass Transfer Analysis of Cylindrical and Spherical Reactors for CO₂-based Adsorption systems. In Fluid Mechanics and Fluid Power (Vol. 1) Select Proceedings of FMFP 2021 2023 Mar 30 (pp. 385-390). Singapore: Springer Nature Singapore.
3. Shakya G, Chaudhuri S, **Sahoo S.** Numerical and Analytical investigation on pressure and shear driven flow of Sisko fluid. In Fluid Mechanics and Fluid Power (Vol. 3) Select Proceedings of FMFP 2021 2023 Apr 18 (pp. 7-12). Singapore: Springer Nature Singapore.

Journals Papers:

2024

4. Gautam, Chaudhary, A., Singh, A., Singh, P K., and **Sahoo S.**, Experimental Investigation and Thermodynamic Analysis of Coconut-Shell-Derived Activated Carbon for CO₂-Based Advanced Adsorption Cooling Systems. **Industrial Engineering and Chemistry Research** 63(5) (2024) 2395–2415 (I.F.- 4.2)

5. Chaudhary, A., and **Sahoo S.**, On thermodynamics and heat and mass transfer aspects of CH₄ adsorption onto coconut shell-based carbonaceous material **International Journal of Heat and Mass Transfer** 225 (2024) 125410 (I.F.- 5.2) (SCIE)

2023

6. Gautam, Serafin, J, Vikram S, Dziejarski, B, **Sahoo, S.**; An environmentally friendly synthesis method of activated carbons based on subabul (*Leucaena leucocephala*) sawdust waste for CO₂ adsorption. **Journal of Cleaner Production** 422 (2023) 137406 (I.F.- 11.1).
7. Gautam, Chaudhary, A, **Sahoo, S.**; Exploring the feasibility of next-generation CO₂-based adsorption cooling systems using different adsorbent reactor configurations. **Energy Conversion and Management** 288 (2023) (I.F.- 10.4).
8. Gautam, Chaudhary, A, **Sahoo, S.**; Experimental investigation on adsorbent composites for CO₂ capture application: An attempt to improve the dynamic performance of the parent adsorbent, **International Journal of Heat and Mass Transfer** 203 (2023) 123796. (I.F.- 5.2).
9. Gautam, Chaudhary, A, **Sahoo, S.**; Comparative studies on thermal-hydraulic performance of adsorption vessels for CO₂ storage, **Heat Transfer Engineering** 46 (2023)1-19 (I.F.-2.431)
10. Kumar, G, **Sahoo, S.**; Thermodynamic Analysis of a Compression-Driven Adsorption-Based Cooling System Using CO₂ as the Refrigerant. **Journal of The Institution of Engineers (India): Series C.** 2023.
11. Chaudhary, A Gautam, **Sahoo, S**; Thermal management and optimization of the reactor geometry for adsorbed natural gas storage systems subjected to free convection and radiative environment, **Journal of Natural Gas Science and Engineering** 109 (2023) 10485. (I.F.- 5.285)
12. Gautam, **Sahoo, S**, Sah, R P; A review on adsorption isotherms and kinetics of CO₂ and various adsorbent pairs suitable for carbon capture and green refrigeration applications, **Sadhana** 48 (27) (2023) (I.F.- 1.6)

2022

13. Gautam, **Sahoo, S.**; A Comprehensive Thermodynamic Analysis and Performance Evaluation of A Transcritical Ejector Expansion CO₂ Adsorption Refrigeration System Integrated With Thermoelectric Sub-cooler, **Journal of Supercritical Fluids** 182 (2022) 105517. (I.F.- 4.514)
14. Gautam, **Sahoo, S** Experimental investigation on different activated carbons as adsorbents for CO₂ capture, **Thermal Science and Engineering Progress** 33 (2022) 101339. (I.F.- 4.56)

15. Biswajit Gorai, **Sahoo, S**, Gautam; Comparative Exergy Analysis and Environmental Impact of a Dairy Plant Integrated with a Transcritical Heat Pump System: A Feasibility of Throttle Valve, Expander, and an Ejector as Expansion Devices, **Arabian Journal for Science and Engineering** 48 (2022) 3503–3521 (I.F.- 2.807)

2021

16. Gautam, **Sahoo, S.**; Thermal management and optimization of adsorption vessels for CO₂-based green refrigeration systems: A heat and mass transfer approach, **Sadhana**, 46 (246) (2021). (I.F.- 1.347)
17. Kinage, A., **Sahoo, S.**, Chaudhuri S.; Effects of different electrical arrangements, and Thomson effect on the system performance as well as the optimum allocation of thermocouples in a self-driven two-stage TEC & TEC; **Journal of Thermal Science and Engineering Progress**, 25 (2021) 101035. (I.F.- 4.56)

2020

18. Gautam, Kumar, G., **Sahoo, S.**; Performance improvement and comparisons of CO₂ based adsorption cooling system using modified cycles employing various adsorbents: A comprehensive study of subcritical and transcritical cycles; **International Journal of Refrigeration**, 112 (2020) 136-154. (I.F.- 4.14)
19. Gupta A., Gautam, **Sahoo, S.** Mohanty A. Performance evaluation of porous fin with prescribed tip temperature: An analytical and numerical approach, **International Journal of Heat and Mass Transfer**, 156 (2020) 119736. (I.F.- 5.431)
20. Gautam, **Sahoo, S.** Effects of geometric and heat transfer parameters on adsorption-desorption characteristics of CO₂-activated carbon pair, **Clean Technology and Environmental Policy**, 23 (2020) 1065-1085 (I.F.- 4.700)
21. Chaudhuri S., **Sahoo, S.** Characterization of Fully Developed Pressure-Driven, Shear-Driven and Combined Pressure and Shear Driven Flow of Sisko Fluids Through Rectangular Channels, **Arabian Journal of Science and Engineering**, 45 (2020) 5925–5947. (I.F.- 2.807)

2018

22. Patil, K., **Sahoo, S.**; Charge characteristics of adsorbed natural gas storage systems based on MAXSORB III; **Journal of Natural Gas Science and Engineering** 52, (2018) 267-282. (I.F.- 5.285)

23. Inampudi, S. T., Marhi, Baji, **Sahoo, S.**; Entropy Generation in Water- Based Natural Circulation Loop; **ASME Journal of Heat Transfer** (ASME) 140, (2018) DOI: 10.1115/1.403976. (I.F.- 1.855)
24. Chaudhuri, S., **Sahoo, S.**; Effects of aspect ratio on the flow characteristics of magneto hydrodynamic (MHD)third grade fluid flow through a rectangular channel; **Sadhana** 43, (2018) 2-10. (I.F.- 1.347)

2017

25. **Sahoo, S.**, Ram Gopal, M., , A new tank configuration for large scale storage of natural gas in adsorbed form; **International Journal of Petrochemical Science and Engineering** 2 (7) (2017) 208-217

2016

26. **Sahoo, S.**, Ramgopal, M.; Experimental studies on an indigenous coconut shell based activated carbon suitable for natural gas storage; **Sadhana** 41(4) (2016) 459-468. (I.F.- 1.347)
27. **Sahoo, S.**, Ram Gopal, M.; Theoretical performance of adsorbed natural gas storage systems subjected to variable charge-discharge conditions; **International Journal of Ambient Energy** 37 (2016) 372–386.
28. **Sahoo, S.**, Ram Gopal, M., Simulation of an adsorbed natural gas storage system for large scale storage; **Journal of Energy Heat and Mass Transfer** 38 (2016) 11-30

2015 and before

29. **Sahoo, S.**, Ram Gopal M., Regression equation for predicting discharge performance of adsorbed natural gas storage systems; **Applied Thermal Engineering** 86 (2015) 127–134. (I.F.- 6.465)
30. **Sahoo, S.**, Ram Gopal, M., A simple regression equation for predicting charge characteristics of adsorbed natural gas storage systems; **Applied Thermal Engineering** 73 (1) (2014) 1093–1100. (I.F.- 6.465)
31. **Sahoo, S.**, Ram Gopal, M.; Charge-discharge characteristics of an adsorbed natural gas storage system under ambient conditions; **Applied Mechanics and Materials** 592 (2014) 1448–1455.
32. **Sahoo, S.**, Ram Gopal, M.; Comparative study on charge-discharge characteristics of different activated carbon based adsorbed natural gas storage systems; **Journal of Energy Heat and Mass Transfer** 36 (2014) 63–80.

Publication in Peer reviewed Conferences:

1. **Sahoo S.**, Ram Gopal M., Charge-discharge characteristics of an adsorbed natural gas storage system under ambient conditions; International Mechanical Engineering Congress 2014, June 13-15, NIT Tiruchirapalli, India.
2. **Sahoo S.**, Ram Gopal M., Performance of Adsorbed natural gas storage system subjected to different boundary conditions; International symposiums on aspects of mechanical engineering and technology for industry (AMATI 2014), December 6-8, NERIST Itanagar, India.
3. **Sahoo S.**, Ram Gopal M., Simulation of an adsorbed natural gas storage system for large scale storage; 23rd National Heat and Mass transfer conference and 1st international ISHMT-ASTFE heat and mass transfer conference IHMTTC-2015. December 17-20, Thiruvananthapuram, India.
4. **Sahoo S.**, Modi A, Chaudhuri S., Pressure driven flow of a third-grade fluid through a narrow channel with viscous dissipation; Proceedings of the 6th International and 43rd National Conference on Fluid Mechanics and Fluid Power. December 15-17, 2016 MNNITA, Allahabad, U.P., India.
5. **Sahoo S.**, Ram Gopal M., Chaudhuri S., **Heat** and mass transfer studies on adsorbed natural gas storage system; Proceedings of the 24th National and 2nd International ISHMT-ASTFE Heat and Mass Transfer Conference (IHMTTC-2017), December 27-30, 2017, BITS Pilani, Hyderabad, India
6. Gautam, **Sahoo S.**, Water as Energy Storage Medium for CO₂ Adsorption. In Proceedings of the 25th National and 3rd International ISHMT-ASTFE Heat and Mass Transfer Conference (IHMTTC-2019). Begel House Inc. DOI: 10.1615/IHMTTC-2019.340
7. Gautam, **Sahoo S.**, Effects of Geometric as well as Heat Transfer Parameters on Adsorption Characteristics of CO₂ and Activated Carbon Pair; 12th International Conference on Thermal Engineering: Theory and Application, February 23-26, 2019, PDPU, Gandhinagar, India [ICTEA-2019]
8. Gautam, **Sahoo S.**, Basic characterization and carbon capture study of an indigenous activated carbon, Proceedings of Advances in Thermal-Fluids Engineering (ATFE 2021), 25-26 March 2021, PDPU Gandhinagar, and Gujarat, India. IOP Conference Series: Materials Science and Engineering (Vol. 1146, No. 1, p. 012004). **(Scopus indexed)** IOP Publishing. doi:10.1088/1757-899X/1146/1/012004. **Won Best Paper award under the theme: "Energy and Sustainability."**
9. Gorai B, **Sahoo S.** Energetic and exergetic analysis of an ejector based green refrigeration system employing evaporative cooling in the gas cooler, recent trends in developments of Thermo-

- fluids and Renewable Energy (TFRE-2020). 26-28 November 2020, NIT Arunachal Pradesh, India. **Won Best Paper award of Track-1** “Bio Heat Transfer, Computational Fluid Dynamics, Refrigeration and Air Conditioning”
10. Gautam, **Sahoo S.**, Heat and Mass Transfer Analysis of Cylindrical and Spherical Reactors for CO₂-based Adsorption systems, Proceedings of 48th National Conference on Fluid Mechanics and Fluid Power [FMFP 2021], BITS Pilani, Pilani Campus, Rajasthan, India, 27 -29 December 2021. **Won Best Paper of the session award.**
 11. Shakya G., Chaudhuri S., **Sahoo S.**, Numerical and Analytical investigation on pressure and shear driven flow of Sisko fluid, Proceedings of 48th National Conference on Fluid Mechanics and Fluid Power [FMFP 2021], BITS Pilani, Pilani Campus, Rajasthan, India, 27 -29 December 2021.
 12. Gautam, Chaudhary A., Singh A., and **Sahoo S.**, Modeling and Simulation of Cylindrical and Spherical Adsorbent Reactors for Maxsorb III-CO₂ pair-based Adsorption Heat Pumps, In Proceeding of 9th International and 49th National Conference of FMFP (FMFP-2022), Dec 14-16, 2022, IIT Roorkee, India.
 13. Chaudhary A., Gautam, and **Sahoo S.**, Performance Enhancement of an Adsorbed Natural Gas Storage System Using Various Nanofluids: A Heat and Mass Transfer Approach, In Proceeding of 4th International Conference on Recent Advances in Mechanical Infrastructure (ICRAM-2022), Dec 16-18, 2022, IITRAM Ahmedabad, India.
 14. Kumar G, **Sahoo S.**, Thermodynamic analysis of a compression-driven adsorption based cooling system using CO₂ as the refrigerant. In 7th National and 1st International Conference on Refrigeration and Air Conditioning (NCRAC 2022). 24th -26th February 2022 IIT Guwahati, India.
 15. Chaudhary A., and **Sahoo S.**, Performance Analysis of a Helical Reactor Configuration for Adsorbed Natural Gas Storage. International Conference on Futuristic Advancements in Material, Manufacturing and Thermal Sciences (ICFAMMT 2024), Jan 19-21 2024, IITRAM Ahmedabad, India.
 16. Singh A., and **Sahoo S.**, Computational Study on Heat Transfer and Fluid Flow Aspects of Adsorption Based CO₂ Capture, International Conference on Futuristic Advancements in Material, Manufacturing and Thermal Sciences (ICFAMMT 2024), Jan 19-21 2024, IITRAM Ahmedabad, India.
 17. Chaudhary A., Gautam, Singh A., **Sahoo S.**, On performance enhancement of adsorbed natural gas storage systems employing phase change material as an energy storage medium, 8th National

and 2nd International conference on Refrigeration and Air Conditioning. (NCRAC 2024) 13th -15th

March 2024, IIT Madras, Chennai, India. **Own Outstanding Presentation Award**

R & D Projects

Sl. No.	Project Title	Amount in Rs. (Lakh)	Role	Funding Agency	Duration	Status
1.	Investigation into the dynamics of the adsorption system based on waste source derived indigenously developed adsorbents for carbon capture application	52.522	PI	DST (SERB) CRG	2024-25	Approved
2.	Design and development of novel adsorption systems for green refrigeration and CO ₂ capture	41.92	PI	DST (SERB) ECR Grant	2019-2022 36 months (36 Months) Sanction Date: 07/03/2019	Completed
3.	Rheological characterization of Sisko and power-law fluids	10	PI	Institute FRS Scheme	2018-2021 (36 Months) Sanction date:	Completed
4.	Preparation and characterization of activated carbon-based composite bead suitable for CO ₂ adsorption	2.0	PI	TEQIP-III	2018-2020 (24 Months)-	Completed

Workshop/EDP/FDP/Seminar Conducted

Sl. No.	Workshop Title	Amount in Rs. (Lakh)	Role	Funding Agency	Duration	Status
1.	Adsorption for CO ₂ capture, Green Refrigeration and Energy Storage	1.158	CI	Participants (Industry personnel, Faculty members, Research scholars, U.G. and P.G. students)	13 th and 14 th April 2024	Completed

Ph.D. Supervision

Sl. No.	Name of Student	Thesis Title	Current Status
1.	Gautam	Experimental and Numerical Studies on CO ₂ -Based Adsorption Systems Suitable for Green Refrigeration and Carbon Capture	Awarded in 2023
2.	Anupam Chaudhary	Thermal Management and Optimization of Adsorption-Based Gas Storage Systems	Ongoing
3.	Aditya Singh	Development and Performance Evaluation of High Uptake Activated Carbons for CO ₂ Capture	Ongoing

M. Tech. Supervision:

Sl. No.	Name of Student	Admission No.	Title of Dissertation
4.	Gyanesh Kumar	17MT001636	Thermodynamic Analysis of Thermal Driven and Compressor Driven Adsorption Based CO ₂ Refrigeration Systems
5.	Ajay Gupta	17MT001703	Analysis of Porous Fins with Simultaneous Convection & Radiation
6.	Utsav Swarnkar	17MT001714	Design and Analysis of Capillary Tube for Refrigeration Systems
7.	Arpit Sanjay Kinage	17MT001702	Analysis of Thermoelectric Cooler Driven By Thermoelectric Generator
8.	Biswajit Gorai	17KT000180	Thermodynamic Analysis of Refrigeration Unit of a Dairy Plant and its Modifications
9.	Sanjeev Verma	18MT0095	Design and Optimization of Heat Exchangers for Supercritical Fluids using Entropy generation minimization
10	Gaurav Shakya	18MT001084	Experimental and Theoretical Studies on Flow Characteristics of Various Non-Newtonian Fluids
11	Nikhil Sharma	22MT0226	Thermodynamic and Economic Analysis of Solar Assisted Transcritical CO ₂ -Based Trigenation Systems

Courses taught:

IIT (ISM) Dhanbad (Aug 2017 – present)

- ❖ Advanced Thermodynamics (PG)
- ❖ Refrigeration & Air Conditioning(UG)
- ❖ Heat and Mass Transfer(UG)
- ❖ Advanced Heat Transfer(PG)
- ❖ Mechanical Engineering-II (UG)

Bits Pilani, Pilani Campus (August 2016-July 2017)

- ❖ Refrigeration and Air conditioning (UG)
- ❖ Advanced Heat Transfer (PG)

NIT Jamshedpur (Jan 2016-May 2017)

- ❖ Refrigeration & Air Conditioning (UG)

C V Raman College of Engineering Bhubaneswar (Jul 2009- Dec 2010)

- ❖ Thermodynamics (UG)
- ❖ Heat &Mass Transfer (UG)
- ❖ Refrigeration & Air Conditioning (UG)

Lab Developed:

Developed: Non-Conventional Refrigeration & Energy Storage Lab.

Renovation of Refrigeration and Air conditioning lab

Membership of Professional Bodies

Member of Institutions of Engineers (India) (M1585716)

Administrative Responsibility:

Sl. No.	Name of position hold	Duration	
		From	To
1.	Faculty in charge, Non-Conventional Refrigeration and Energy Storage Lab	2019	Till Date
2.	Faculty in-charge, Refrigeration & Air Conditioning Lab	2019	Till Date
3.	DAC Secretary	2018	2023
4.	Member of the Department Stock Verification Committee	2019	2021
5.	Tabulator for examination result	2018	2019
6.	Member of the DUGC	2023	Till date

References

- **Dr. Maddali Ramgopal**
Professor Mechanical Engineering
Indian Institute of Technology Kharagpur, India.
e-mail : ramg@mech.iitkgp.ernet.in ,
- **Dr. Sandipan Ghosh Moulic**
Professor Mechanical Engineering
Indian Institute of Technology Kharagpur, India.
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- **Dr. Sukanta Kumar Dash**
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Indian Institute of Technology Kharagpur, India.
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