

CURRICULUM VITAE

I. PROFESSIONAL AFFILIATION AND CONTACT INFORMATION

Dr. RABIRANJAN MURMU
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Research Profile

Orcid ID: <https://orcid.org/0000-0002-7878-3143> Scopus Author ID: **57202404579**

Researcher ID: **AEU-3871-2022**

About me

I am currently working as an Assistant Professor at the Department of Chemical Engineering. My research focusses on the fabrication of proton exchange membrane for fuel cell application, preparation and characterization of polymer composites for advanced applications, water treatment via adsorption and membrane filtration process, and biofuel production and optimization. My Ph.D. thesis from Jadavpur University focused on fuel cell membranes for direct methanol fuel cell applications, and during this time, I published six papers in SCI journals.

To date, I have contributed to a total of 31 publications and presented my findings at various prestigious conferences. My work reflects a strong commitment to advancing knowledge in fuel cells, polymer composites, surface coating, water treatment, and biofuel production.

In addition to my research, I am passionate about teaching and mentoring the next generation of scholars. I actively participate in online courses through the AICTE SWAYAM-NPTEL platform, having completed ten courses. My commitment to lifelong learning has been recognized with several awards, including the NPTEL Superstar Award, Discipline Star Award, and Motivated Learners Award.

I look forward to continuing my research and inspiring students in the ever-evolving field of chemical engineering.

Teaching Interests and Specialties

Chemical Reaction Engineering, Heat Transfer, Chemical Engineering Thermodynamics, Chemical Process Technology, Numerical Methods and MATLAB, Polymer Technology, Membrane Science & Technology.

II. EDUCATION

2024: Ph.D. (Engineering), Jadavpur University, Kolkata, West Bengal, India.

Thesis Title: Experimental Studies and Modelling of Chitosan based Proton Exchange Membrane Fuel Cell (PEMFC).

Supervisor: Prof. (Dr.) Debashis Roy, Chemical Engineering Department, Jadavpur University, Kolkata-700032, West Bengal.

(Six Number of SCI Publications from PhD Thesis)

2011-2013: M.Tech (Chemical Engineering), Indian Institute of Technology (IIT), Madras, Tamil Nadu, India.

Thesis Title: Preparation & Characterization of SPEEK membrane for proton conducting fuel cell.

Supervisor: Prof. (Dr.) Abhijit P. Deshpande, Chemical Engineering Department, Indian Institute of Technology Madras, Chennai-600036, Tamil Nadu.

2007-2011: B.Tech (Chemical Engineering), Indira Gandhi Institute of Technology, Sarang, Odisha, India.

2005-2007: +2 Science, Ravenshaw Junior College, Cuttack, Odisha, India.

2005: Matriculation, Govt. High School, K.C. Pur, Mayurbhanj, Odisha, India.

III. PROFESSIONAL EXPERIENCE

✓ **August 6, 2019 to Present: Assistant Professor (Grade-I, Senior Grade)**

✓ **August 6, 2014 to August 5, 2019: Assistant Professor (Grade-II)**

Chemical Engineering Department, Indira Gandhi Institute of Technology, Sarang
(An Autonomous Institution of Govt. of Odisha).

Responsibilities include:

- Taught undergraduate & P.G courses
- Supervise UG, PG & Doctoral Thesis
- Organizing workshops and seminars
- Member of Board of Studies
- Departmental Course Coordinator
- Deputy Center Superintendent (UG/PG), Examination Section
- Assistant Superintendent, Surya Bhawan Hostel
- Purchase Committee Member (Laboratory Equipment, Chemicals)

IV. Academic Achievements & Awards

- i. **Promoted to Assistant Professor (Senior Grade) on 6th August 2019.**
- ii. **Received the prestigious NPTEL Superstar Award** for being the topper of three NPTEL courses during JAN–APR 2024.
- iii. Successfully Completed the Mandatory Teacher Training Course (**Eight Module**) of the **National Initiatives for Technical Teachers Training (NITTT)**, approved by **AICTE** during JAN-APR 2023.
- iv. **Qualified GATE 2011 & 2014 (Two times)**
- v. **Guided 4 Post Graduation Projects and 10 Under Graduation Projects.**
- vi. **Received NPTEL Motivated Learners Award** during JAN-APR 2024.
- vii. **Received NPTEL DISCIPLINE STAR Award** during JUL-DEC 2023.
- viii. **Received MHRD Scholarship (P.G) at IIT Madras** during 2011-2013.

V. RESEARCH AND CREATIVE ACTIVITY

A. Research Interests and Specialties

Electrochemistry: Fuel Cell, Proton Exchange Membrane Fuel Cell (PEMFC), Modeling and Simulation of fuel cell stack, **Surface and Coating Technologies, Polymer Composites:** Synthesis, Characterization & Application, **Water treatment:** Preparation of low cost bio char for heavy metal adsorption, Preparation and characterization of ceramic based membrane for water treatment, **Energy & Fuels:** Biofuels (Production, optimization & Up gradation), Biodiesel Production.

B. Software skills

MATLAB, Aspen plus, Origin lab, MS Office, MINI TAB, Z-view.

C. Doctoral Student Guidance: NIL

D. PG Student Guidance: 4

Sl. No.	Name & Regd. No.	Thesis Title	Year
1	Abhijeet Nanda (2207105048)	Experimental and thermo-gravimetric analysis of fast pyrolytic oil obtained from fish scale and banana peel.	2024
2	Sibangi Rath (2007105001)	A Review on the Enhancement of Microbial Activity (Aspergillus) for Polyethylene Degradation.	2022
3	Subhasmita Jena (1907105005)	Development of Ionic Liquid modified composite membrane for direct methanol fuel cell.	2021
4	Lipi Lekha Sahu (1807105044)	Development of SPEEK-PVA-silica hybrid membranes for low to medium temperature direct methanol fuel cell.	2020

E. Research Project Handled: 03 (Completed)

Sl. No.	Title of Project	Sanctioning Authority	Amount (Rs.), (Lakhs)	Status	Role
1.	Experimental studies of the chitosan based Proton exchange membrane for DMFC application.	TEQIP-III	2.11	completed	PI
2.	Preparation and characterization of SPEEK-PVA-Zeolite composite membrane for Proton exchange membrane fuel cell operating at medium temperature.	TEQIP-III	1.18	completed	PI
3.	Effect of Zeolite concentration in Graphene Oxide (GO)/PVA composite membrane for waste water purification.	TEQIP-III	3	completed	PI

VI. PUBLICATIONS AND CREATIVE WORK

(1) List of Patents and Copyright

1. An equipment for production of Wear-Resistant Superhard Carbon Compound. (**Granted for Canadian Copyright, Registration No. 1224919**)

(2) Technical Paper Published

A. List of Paper Published in SCI Journals: 15 Nos.

1. L. Karthick, VJ Priyadharshini, N Mallireddy, SS Kadam, **R. Murmu**, S. Nishanth, Effects on mechanical, wear, thermal and flammability of vinyl ester based composite reinforced with biopolymer made from grape stalk and microfiber from celosia cristata, **Biomass Conversion and Biorefinery**, 2024. <https://doi.org/10.1007/s13399-024-06129-5> (**Impact Factor: 3.5**)
2. R. Dharai, H. Sutar, **R. Murmu**, D. Roy “Micrographite (μG) and Polypropylene (PP) composites: Preparation and influence of filler content on property modifications”, **Journal of Composites Science**, 8(8), 298, 2024. <https://doi.org/10.3390/jcs8080298> (**Impact Factor: 3.3**)
3. **R. Murmu**, S. George, Yuvarani P, P Bhatnagar, Amudha K & Karuna MS “Sustainable Solutions for Heavy Metal Contamination: Characterization and Regeneration of Water Hyacinth Biosorbent in Wastewater Treatment”, **Global NEST Journal**, 26(6), 05910, 2024. <https://doi.org/10.30955/gnj.05910> (**Impact Factor: 1.4**)
4. **R. Murmu**, D. Roy, H. Sutar “Mathematical Modelling and Simulation of Active Direct Methanol Fuel Cell”, **Journal of Polymer Materials**”, 40 (3-4), 125-139, 2024. <https://doi.org/10.32381/JPM.2023.40.3-4.1>
5. SC Patra, S. Swain, P. Senapati, H. Sahu, **R. Murmu**, H. Sutar “Polypropylene and Graphene Nanocomposites: Effects of Selected 2D-Nanofiller’s Plate Sizes on Fundamental Physicochemical Properties”, **Inventions**, 8(1), 8, 2023.

- <https://doi.org/10.3390/inventions8010008> (**Impact Factor: 3.4**)
6. **R. Murmu**, D. Roy, S.C. Patra, H. Sutar, B. Choudhary “Preparation and characterization of Red Mud modified chitosan-PVA composite membrane for direct methanol fuel cell”, **Journal of Electrochemical Energy Conversion and Storage**, 20(3), 031008, 2023. <https://doi.org/10.1115/1.4055693> (**Impact Factor: 2.5**)
 7. **R. Murmu**, D. Roy, H. Sutar, P. Senapati, S.C. Patra “Development of the highly performed chitosan based thin film towards the sustainability of direct methanol fuel cell”, **Polymer-Plastics Technology and Materials**, 62(6), 732-755, 2022. <https://doi.org/10.1080/25740881.2022.2133616> (**Impact Factor: 2.7**)
 8. **R. Murmu**, D. Roy, H. Sutar, P. Senapati, S.A. Mohapatra “Effect of Sulfuric Acid on the physiochemical properties of Chitosan-PVA blend for direct methanol fuel cell”, **Journal of Polymer Materials**, 39(1-2), 89-109, 2022. <https://doi.org/10.32381/JPM.2022.39.1-2.6> (**Impact Factor: 0.53**)
 9. **R. Murmu**, D. Roy, S. Jena, H. Sutar “Development of chitosan based hybrid membrane modified with Ionic Liquid and Carbon Nanotubes for direct methanol fuel cell operating at moderate temperature”, **Polymer Bulletin**, 80, 3949-3980, 2022. <https://doi.org/10.1007/s00289-022-04246-7> (**Impact Factor: 3.2**)
 10. D. Sahu, H. Sutar, P. Senapati, **R. Murmu**, D. Roy “Graphene, Graphene-Derivatives and Composites: Fundamentals, Synthesis Approaches, Applications”, **Journal of Composites Science (MDPI)**, 5, 181, 2021. <https://doi.org/10.3390/jcs507018> (**Impact Factor: 3.3**)
 11. P. Senapati, H. Sutar, **R. Murmu**, S. Bajpai, “Experimental design of solid particle wear behavior of Ni-based composite coatings”, **Journal of Composites Science (MDPI)**, 5(5), 133, 2021. <https://doi.org/10.3390/jcs5050133> (**Impact Factor: 3.3**)
 12. H. Sutar, B. Mishra, P. Senapati, **R. Murmu**, D. Sahu, “Mechanical, thermal and morphological properties of Graphene nanoplatelets reinforced polypropylene nanocomposites: Effects of nanofiller thickness”, **Journal of Composites Science (MDPI)**, 2021, 5, 24. <https://doi.org/10.3390/jcs5010024> (**Impact Factor: 3.3**)
 13. **R. Murmu**, D. Roy, S.C. Patra, H. Sutar, P. Senapati, “Preparation and characterization of the SPEEK/PVA/Silica hybrid membrane for direct methanol fuel cell (DMFC)”, **Polymer Bulletin**, 79, 2061-2087, 2022. <https://doi.org/10.1007/s00289-021-03602-3> (**Impact Factor: 3.2**)
 14. **R. Murmu**, H. Sutar, “A Novel SPEEK-PVA-TiO₂ Proton Conducting Composite Membrane for PEMFC Operations at Elevated Temperature”, **Journal of Polymer Materials**, 35 (4), 409-431, 2018. <https://doi.org/10.32381/JPM.2018.35.04.2>
 15. **R. Murmu**, H. Sutar, “Steady State Analysis of Water Transport through Sulfonated Polyether Ether Ketone (SPEEK) Membrane for Fuel Cell Application”, **Journal of Polymer Materials**, 35 (1), 103-118, 2018. <https://doi.org/10.32381/JPM.2018.35.01.8>

B. List of Paper Published in Scopus/Peer Reviewed Journals: 14 Nos.

1. D.K. Kanungo, **R. Murmu** & H. Sutar “A Unique Modelling Strategy to Dynamically Simulate the Performance of a Lobe Pump for Industrial Applications” *Advances in Chemical Engineering and Science*, 14(2), 57-73, 2024. <https://doi.org/10.4236/aces.2024.142004>
2. D.K. Kanungo, N. Mocherla, **R. Murmu**, B. Sahoo, H. Sutar “An Appropriate Numerical Model to Capture Pseudocritical Property Change of Steam Flowing Inside Straight Tube” *European Chemical Bulletin*, 12(10), 11437-11446, 2023. <https://doi.org/10.48047/ecb/2023.12.10.807>
3. D.C. Sau, P. Senapati, **R. Murmu**, H. Sutar, “Thermal decomposition behavior and kinetics study of Jamadoba coal and its density separated macerals: A non-isothermal approach”, *Advances in Chemical Engineering and Science*, 11(3), 203-227, 2021, <https://doi.org/10.4236/aces.2021.113013>
4. D. Sau, **R. Murmu**, P. Senapati, H. Sutar, “Optimization of raceway parameters in iron making blast furnace for maximizing the pulverized coal injection (PCI) rate, *ACES*, 2021, 11(2), 141-153. <https://doi.org/10.4236/aces.2021.112009>
5. D.R. Rout, P. Senapati, H. Sutar, D.C. Sau, **R. Murmu**, “Graphene Oxide (GO) Supported Palladium (Pd) Nanocomposites for Enhanced Hydrogenation”, *Graphene*, 8, 33-51, 2019. <https://doi.org/10.4236/graphene.2019.83003>
6. H. Sutar, B. Mishra, **R. Murmu**, S. Patra, S.C. Patra, S.C. Mishra, D. Roy, “Wettability, Thermal and Sliding Behavior of Thermally Sprayed Fly Ash Premixed Red Mud Coatings on Mild Steel”, *Materials Sciences and Applications*, 11, 12-26, 2020. <https://doi.org/10.4236/msa.2020.111002>
7. H. Sutar, H.S. Maharana, C. Dutta, **R. Murmu**, S. Patra, “Strain Rate Effects on Tensile Properties of HDPE-PP Composite Prepared by Extrusion and Injection Moulding Method”, *Material Sciences and Applications*, Vol. 10 (1), 205-215, 2019. <https://doi.org/10.4236/msa.2019.103017>
8. P.C. Sahoo, **R. Murmu**, S. Patra, C. Dutta, H. Sutar, “Electrical Behaviour and Spherulites Morphology of HDPE/PP Polyblends with HDPE as Base Material”, *Materials Sciences and Applications*, Vol. 09 (10), 837-843, 2018. <https://doi.org/10.4236/msa.2018.910060>
9. H. Sutar, P.C Sahoo, P.S Sahu, S. Sahoo, **R. Murmu**, S. Swain, S.C. Mishra, “Mechanical, Thermal and Crystallization Properties of Polypropylene (PP) Reinforced Composites with High Density Polyethylene (HDPE) as Matrix”, *Materials Sciences and Applications*, Vol. (9), 502-515, 2018. <https://doi.org/10.4236/msa.2018.95035>
10. H. Sutar, D. Roy, S.C. Mishra, S. Patra, **R. Murmu**, “Thermal and dry sliding wear behavior of plasma sprayed Red Mud-Fly Ash coatings on mild steel”, *Tribology in Industry*, Vol. 40 (1), 117-128, 2018. <https://doi.org/10.24874/ti.2018.40.01.11>
11. **R. Murmu**, H. Sutar, S. Patra, “Experimental Investigation and Process Optimization of Biodiesel Production from kusum oil using Taguchi Method” *Advances in Chemical Engineering and science*, Vol. 7 (4), 464-476, 2017. <https://doi.org/10.4236/aces.2017.74033>

12. H. Sutar, **R. Murmu**, D. Roy, S.C. Mishra, A. Mishra, "Effect of Red Mud (RM) Reinforcement on Physio-Chemical Characteristics of Ordinary Portland Slag Cement (OPSC) Mortar", *Advances in Materials Physics and Chemistry*, Vol. 6(8); 231-238, 2016. <https://doi.org/10.4236/ampc.2016.68023>
13. H. Sutar, D. Roy, S.C. Mishra, **R. Murmu**, "Sliding Wear Performance Evaluation of Red Mud (RM), RM+Fly Ash (FA) and RM+FA+Al Coatings on Mild Steel", *Materials Sciences and Applications*, Vol. 7, 171-179, 2016. <https://doi.org/10.4236/msa.2016.73017>
14. H Sutar, K.N. Barik, A.K. Bairagi, **R. Murmu**, "Hydrodynamic Behavior of Common Salt Water (Nacl Solution) in a glass beads packed cylindrical fluidized Bed", *American Chemical Science Journal*, 9(2), 1-6, 2015. <https://doi.o10.9734/ACSJ/2015/20086>

(3) Articles in National and International Conference Proceedings:

1. N.R. Dash, **R Murmu***, H Sutar, "Effect of zinc oxide on the mechanical, thermal and physiochemical properties of chitosan-based hybrid membrane for DMFC application, **Materials Today: Proceeding**, 2023. [10.1016/j.matpr.2023.06.082](https://doi.org/10.1016/j.matpr.2023.06.082)
2. S. Rautaray, H. Sutar, P. Senapati, **R. Murmu**, "The mechanical and thermal behavior of unsaturated polyester matrix (UPM) composite filled with pistachio shell particles (PSP), **Materials Today: Proceedings**, 2022. <https://doi.org/10.1016/j.matpr.2022.09.460>
3. **R. Murmu**, Abhijit P. Deshpande, "Preparation and Characterization of Sulfonated Polyether Ether Ketone (SPEEK) Membrane for Fuel Cell by using different technique", presented at **International Conference on Innovative Applications of Chemistry in Pharmacology & Technology**, Berhampur University, India from February: 06-08, 2015.

(4) Book Chapter/Book Published

1. H. Sutar, **R. Murmu**, D. Roy, S.C. Mishra, "Plasma Sprayed Red Mud-Fly Ash Composite Coatings on Mild Steel: A Comprehensive Outline", *Advances and Trends in Physical Science Research*, Vol. 2, Chapter-3, P: 154-177, 2019 (Book Chapter). DOI: <https://doi.org/10.9734/bpi/atpsr/v2>, ISBN print: 978-93-89246-00-1, ebook ISBN: 978-93-89246-44-5
2. H. Sutar, **R. Murmu**, "High Density Polyethylene (HDPE) and polypropylene (PP) blend: An Experimental Approach", *New Advances in Materials Science and Engineering*, Vol. 1 P: 40-65, 2019 (Book Chapter). Print ISBN: 978-93-89246-08-7, eBook ISBN: 978-93-89246-26-1, DOI: <https://doi.org/10.9734/bpi/namse/v1>
3. H. Sutar, D. Roy, S.C. Mishra and **R. Murmu** "Study of Sliding Wear Behavior of Plasma Sprayed Red Mud Composite Coatings on Mild Steel", Book Publisher international, India, United Kingdom, first edition, 2019 (Book). ISBN 978-93-89816-04-4 (Print) ISBN 978-93-89816-05-1 (**eBook**). DOI: <https://doi.org/10.9734/bpi/mono/978-93-89816-04-4>
4. P Senapati, H Sutar, **R Murmu**, S Gupta, "Slurry Erosion Behaviour of HVOF-Sprayed NiAl Composite Coating, 2022, *Recent Advances in Mechanical Engineering*, 623-629. DOI: https://doi.org/10.1007/978-981-16-9057-0_68

VII. Advance Training Organized

1. TEQIP-III Sponsored National Workshop in “**Applications of Chemical Engineering in Natural Resources (AChENRI)**” at Chemical Engineering Department, IGIT Sarang from 17-21 July 2018.
2. TEQIP-III Sponsored one week online Faculty Development Program on “**Recent Advances in Chemical Engineering (RACE-2020)**” at Chemical Engineering Department, IGIT Sarang from 14th December to 18th December 2020.

VIII. NPTEL SWAYAM (AICTE) Courses Completed

1. Participated and Successfully Completed AICTE Approved Twelve Week NPTEL Online FDP Course on “**Characterization of Polymers, Elastomers and Composites**” during JAN-APR 2024. (**Silver Medal**)
2. Participated and Successfully Completed AICTE Approved Twelve Week NPTEL Online FDP Course on “**Renewable Energy Engineering: Solar, Wind and Biomass Energy Systems**” during JAN-APR 2024. (**Topper**)
3. Participated and Successfully Completed AICTE Approved Eight Week NPTEL Online FDP Course on “**Waste to Energy Conversion**” with a consolidated score of 85% during JAN-MAR 2024. (**Topper, Silver Medal**)
4. Participated and Successfully Completed AICTE Approved Eight Week NPTEL Online FDP Course on “**Biological Process Design for Wastewater Treatment**” with a consolidated score of 95% during JAN-MAR 2024. (**Topper, Gold Medal**)
5. Participated and Successfully Completed AICTE Approved Twelve Week NPTEL online FDP course on “**Advanced Reaction Engineering**” during JUL-OCT 2023. (**ELITE**)
6. Participated and Successfully Completed AICTE Approved Twelve Week NPTEL online FDP Course on “**Hydrogen Energy: Production, Storage, Transportation and Safety**” during JUL-OCT 2023. (**ELITE**)
7. Participated and Successfully Completed AICTE Approved Twelve Week NPTEL online FDP Course on “**Biomass Conversion and Bio refinery**” during JAN-APR 2023. (**ELITE**)
8. Participated and Successfully Completed AICTE Approved Eight week NPTEL online FDP Course on “**Technologies for Clean and Renewable Energy Production**” during JUL-SEP 2022. (**Silver Medal**)
9. Participated and Successfully Completed AICTE Approved Twelve Week NPTEL online FDP Course on “**Membrane Technology**” during JAN-APR 2022. (**ELITE**)
10. Participated and Successfully Completed AICTE Approved Twelve Week NPTEL online FDP Course on “**Chemical Reaction Engineering**” during JUL-OCT 2019. (**ELITE**)