Curriculum Vitae

Personal information

Name **Madhumita Patel**
https://scholar.google.ca/citations?user=OdbmqBQAAAAJ&hl=en

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Nationality Indian

Research interest:

- Renewable Energy from Wastes (Pyrolysis and Hydrothermal Liquefaction)
- Development of Chemical Process Modelling for Scale-up
- Low-cost Catalyst from Mining Waste
- Life Cycle and Techno-Economic Assessment
- Environmental Impact Assessment and Circular Economy
- Remote Sensing and GIS (landfill siting)
- Solid Waste Management

Teaching Interest:

- Life Cycle Assessment Methods and Tools
- Waste to Wealth Concepts and Methods
- Carbon Capture, Sequestration and Conversion Technologies
- Introduction to Sustainable Development Goals
- Solid Waste Management
- Pollution Control and Management

Education and training:

Dates: September 2012 –November 2018
Name of organization: **University of Alberta,** Canada
Title of qualification: **Ph.D. in Engineering Management (Sustainable Energy Research Lab),** Department of Mechanical Engineering with a cumulative grade point average (**CGPA) of 3.83/4**
Received **Best Ph.D. Thesis Award** in the field of **Bioenergy Research at Canadian Society of Bioengineering Conference (CSBE), Vancouver, 2019**

Dates: July 2009 - May 2011
Name of organization: **Indian Institute of Technology Delhi**, India
Title of qualification awarded: '**ostgraduate, MTech in Chemical Engineering** with cumulative grade point average (**CGPA) 9.22/10 (consistently topped the class all semester)**

Dates: July 2003 – May 2007
Name of organization: **IGIT Sarang (Govt. Engineering College), Odisha India**
Title of qualification awarded: **Bachelor of Technology in chemical engineering** with a cumulative grade point average (CGPA) **of 8.23/10**

Publications:

Journal Publications:

1. Dhibar N, Reddy R and **Patel M*.** Investigation of kinetics, reaction mechanisms, thermodynamics, and synergetic effects in co-pyrolysis of wood sawdust and linear low-density polyethylene using the thermogravimetric approach, Environmental Science and Pollution Research, 2024, 31: 56113 **(Impact Factor 5.8)**
2. Agarwal K, Bardia M, Bhar R, Das A, Yadav B, Mahata S, **Patel M***, Kumari A and Dubey B Biofuel Production from Organic Fraction of Municipal Solid Waste and their Environmental Implications via Life Cycle Assessment Approach: Turning Trash into Treasure **(Under Review in Journal of Environmental Chemical Engineering)**

3. Rahman W, **Patel M,** Kurian V, Kumar A. A comparative techno-economic assessment of fast pyrolysis, hydrothermal liquefaction, and intermediate pyrolysis of municipal solid waste for liquid transportation fuels production, Energy Conversion and Management, 2022, 267: 115877. (Impact factor 11.53)
4. **Patel M,** Oyedun AO, Kumar A, Gupta R. What is the production cost of renewable diesel from woody biomass and agricultural residue-based on experimentation? A comparative assessment, Fuel Processing Technology, 2019, 191: 79-92. (Impact factor: 8.129)
5. **Patel M,** Oyedun AO, Kumar A, Doucette J. The development of a cost model for two supply chain networks of the decentralized pyrolysis system to produce bio-oil, Biomass, and Bioenergy, 2019, 128: 105287. (Impact factor: 5.774)
6. **Patel M,** Oyedun AO, Kumar A, Gupta R. Predicting the biomass conversion performance in a fluidized bed reactor using an isoconversional model-free method, The Canadian Journal of Chemical Engineering, 2018, 9999:1-11. (Impact factor: 2.500)
7. **Patel M**, Oyedun A, Kumar A, Gupta R. A techno-economic assessment of renewable diesel and gasoline production from aspen hardwood, Waste and Biomass Valorization, June 2018, 1-16 (Impact factor: 3.703)
8. **Patel M,** Kumar A. Production of renewable diesel through the hydroprocessing of lignocellulosic biomass-derived bio oil: a review, Renewable and Sustainable Energy Reviews, 2016, 58:1293-1307. (Impact factor: 16.8)
9. **Patel M,** Zhang X, Kumar A. Techno-economic and life cycle assessment of lignocellulosic biomass-based thermochemical conversion technologies: a review, Renewable and Sustainable Energy Reviews, 2015, 53: 1486-1499. (Impact factor: 16.8)
10. **Madhumita Patel**, Tarun K. Jindal, and Kamal K. Pant. 'Kinetic Study of Steam Reforming of Ethanol on Ni-Based Ceria–Zirconia Catalyst. Ind. Eng. Chem. Res., 2013, 52 (45),15763–15771. (Impact factor: 4.326)
11. Pravakar Mohanty, **Madhumita Patel** and Kamal K Pant. 'Hydrogen production from steam reforming of acetic acid over Cu–Zn supported calcium aluminate' Bioresource Technology, 2012 123, 558-565. (Impact factor: 11.88)
12. Singh R, Joshi A, Kundu T, Gupta M and **Patel M*.** Enhancing Cellulose Extraction Efficiency from Lignocellulosic Biomass: A Review of Current Techniques and Microstructural Dynamics. (**Review proposal submitted to ACS Chemical Review Journal**)
13. Susheen A, Bisai A and **Patel M***. Integrating GIS and FAHP for landfill site selection in Ranchi, India and sensitivity analysis of identified parameters. (to be Submitted to Waste Management)
14. Dhibar N, **Patel M*** and Dewangan N. Hydrothermal Co- Liquefaction of Wood sawdust for the production of Bio-oil: Effect of Temperature, Solvent, catalyst and overall Reaction Mechanism. (To be submitted)

Book Chapters:

1. Oyedun A, **Patel M,** Kumar M, Kumar A, The upgrading of bio-oil via hydrodeoxygenation. **Book Chapter** submitted to Chemical Catalysts for Biomass Upgrading for Wiley, Mark Crocker and Eduardo Santillan-Jimenez ISBN: 978-3-527-34466-6 (accepted).
2. **Madhumita Patel**, K K Pant, Pravakar Mohanty 'Renewable hydrogen generation by steam reforming of acetic acid over Cu-Zn-Ni supported calcium aluminate catalysts' **Book Chapter** for American

Chemical Society (ACS) Books, Nanocatalysis for Fuels and Chemicals, 2011

3. Asish Bisai and **Madhumita Patel,** Recent advances in pretreatment of waste biomass" Elsevier book entitled "PROCESSING OF BIOMASS WASTE: TECHNOLOGICAL UPGRADATION AND ADVANCEMENT

Technical Reports:

1. Adetoyese Oyedun, Mahdi Vaezi, Abayomi Oni, Eskinder Gemechu, **Madhumita Patel**, Mayank Kumar, Matthew Davis, Giovanni Di Lullo, Mustafizur Rahman, M.I.H.S Soiket, Amit Kumar. Data to Support Lifecycle Carbon Intensity Reductions in Canadian. Submitted to Environment and Climate Change Canada, April 2018.
2. R. Keivani, F.H. Abanda, M. Archibald, D.P. de Leon Barido, H. Rahmat, **M. Patel**, L.F. Cabeza, V. Vilarino, Smart Cities and their Promise for Addressing Climate Change in Cities. Submitted to Intergovernmental Panel on Climate Change (IPCC), April 2018.
3. Oyedun A, Akbari M, **Patel M,** Kumar M, Biswas D, Kumar A. Techno-economic assessment of biomass conversion technologies. Final report submitted to Natural Resources Canada (NRCan), 500 Booth Street, Ottawa, Ontario, Canada K1A 0E4, January 2019

Conference Presentations:

1. Aanchal Susheen, Madhurupa Sahoo and **Madhumita Patel**. "A Review on Synthesis of Zeolite from Industrial Mining Mineral Waste" presented at IC4M-2025, 22-24th January 2025 at CSIR-IMMT, Bhubaneswar.
2. Asish Bisai and **Madhumita Patel*** Recent development of biomass pretreatment technologies, presented at Recycle 2023, May 18-19 IIT Guwahati, India
3. Sebastian R, **Patel M**, Akbari M, Kumar A. Assessment of Renewable Jet Fuel Production Potential for Alberta. CIGR 2020, June 14-18, 2020, Quebec City, Canada.
4. Bowen M, Oyedun AO, **Patel M*,** Kumar A. Prospects of renewable natural gas in North America: A review of feedstock availability, conversion technology, economic viability and emissions reduction potential. Abstract submitted to the CSBE/SCGAB AGM and Technical Conference, July 14-17, 2019, Vancouver, BC.
5. Rahman W*, **Patel M**, Kurian V, Kumar A. Techno-economic assessment of introducing intermediate pyrolysis in small community landfills across Alberta. Abstract submitted to the CSBE/SCGAB AGM and Technical Conference, July 14-17, 2019, Vancouver, BC.
6. **Patel M***, Oyedun A, Kumar A, Gupta R.. Comparative experimental and techno-economic analysis of production cost of renewable diesel from woody biomass and agricultural residue, abstract accepted to the 15th International Symposium on Bioplastics, Biocomposites and Biorefining Conference, July 24 - 27, 2018, Guelph, Ontario.
7. **Patel M***, Oyedun A, Kumar A. A techno-economic comparison of centralized and distributed mobile pyrolysis systems for the production of bio-oil from hardwood, abstract accepted to the 67th Canadian Chemical Engineering Conference, October 22-25, 2017, Edmonton, AB.
8. **Patel M***, Oyedun AO, Kumar A. Production of renewable diesel from woody biomass and agricultural residue: a techno-economic analysis comparative study, abstract accepted for the ASABE 2017 Annual International Meeting, July 16-19, 2017, Spokane, Washington, USA.
9. **Patel M***, Oyedun AO, Kumar A. Techno economic analysis of bio-oil production from poplar hardwood for renewable diesel in Western

Canada, abstract accepted for the ASABE 2016 Annual International Meeting, July 17-20, 2016, Orlando, Florida, USA.

10. **Patel M***, Oyedun AO, Kumar A, Gupta R. Thermogravimetric analysis (TGA) and pyrolysis kinetic study of aspen and pine hardwood, abstract accepted for the ASABE 2016 Annual International Meeting, July 17-20, 2016, Orlando, Florida, USA.
11. **Patel M***, Kumar A. Review on production of hydrogenation-derived renewable diesel from bio-oil, presented at the CSBE/SCGAB Technical Conference and AGM 2015, Innovation in Water, Energy and Biosystems (iWEB) Positioning the Globe for 2050, July 5-8, 2015, Edmonton, AB, Canada.
12. **Patel, M***, Kumar, A. .Techno-economic comparison of a centralized and distributed mobile pyrolysis system for conversion of hardwood, presented at the 2015 ASABE Annual International Meeting, July 26-29, 2015, New Orleans, Louisiana, USA.
13. **Patel, M***, Zhang, X, Kumar, A. A review of economics and environmental footprints of lignocellulosic biomass thermochemical conversion technologies, presented at the 2015 ASABE Annual International Meeting, July 26-29, 2015, New Orleans, Louisiana, USA.
14. **Madhumita Patel**; Amit Kumar Techno-economic and life cycle assessment of renewable diesel production from lignocellulosic biomass in Western Canada poster presentation in Biological Solutions, Sept 30-Oct 2, 2014 in Edmonton, Alberta.
15. **Patel M***, Kumar, A. A Techno-economic analysis of bio oil production from woody biomass for renewable diesel production in western Canada, abstract accepted for the American Society of Agricultural and Biological Engineers Annual International Meeting, July 13-16, 2014, Montreal, QC
16. **Patel M***, Kumar A. Hydrogenation-derived renewable diesel production from bio-oil: A review, presented at the 2013 ASABE Annual International Meeting, July 21-24, 2013, Kansas City, Missouri, USA.
17. Asish Bisai and **Madhumita Patel** Recent development of biomass pretreatment technologies, presented at Recycle 2023, May 18-19 IIT Guwahati, India

Academic Research and Projects

Title of dissertation – M.Tech.: Worked on project "Kinetics and modelling of catalytic steam reforming of acetic acid for hydrogen production, under the guidance of Professor K. K. Pant from IIT Delhi.

Work experience:

Date June 2021- Present

Name of Employer IIT Dhanbad

Occupation and Position held Assistant Professor

Main activities and responsibilities

Teaching Undergraduate/Graduate students

Sl No	Course	Session	UG/PG	Feedback
1	Pollution Control and Management	Monsoon 2021-22, 215 students	Second year Undergraduate	NA
2	Environmental sciences	Monsoon ESI101, Section H , 2021-22	First year Undergraduate	NA
3	Environmental sciences	Winter 2021-22 ESI101,	First year Undergraduate	NA

4	Solid Waste Management	Winter 2021-22, 32 students	Third year Undergraduate	NA
5	Solid Waste Management (Lab)	Winter 2021-22, 32 students	Third year Undergraduate	NA
6	Pollution Control and Management	Monsoon 2022-23, 160 Students	Second and third year Undergradute	8.22/10
7	Solid Waste Management	Winter 2022-23, 35 students	Third year students	9.15/10 (Winter)
8	Solid Waste Management (Lab)	Winter 2022-23, 35 students	Third year students	NA
9	Energy Auditing and Management	Winter 2022-23, 30 students	UG, PG and PhD	9.32/10
10	Pollution Control and Management	Monsoon 2023-24, 137 Students	Second and third-year Undergraduate students	8.21/10
11	Environmental sciences	Monsoon ESI101 Section F, 131 students	First year Undergraduate	8.64/10
12	Solid Waste Management	Winter 2023-24, 38 students	Third year students	8.75/10
13	Solid Waste Management (Lab)	Winter 2023-24, 38 students	Third year students	NA
14	Energy Auditing and Management	Winter 2023-24, 41 students	UG, PG and PhD	8.22/10

Sponsored Research Projects

Faculty Research Scheme (FRS): Thermal Behaviour and Kinetic Analysis for Catalytic/Noncatalytic Copyrolysis of Plastic Wastes Integrated with Agricultural Residues (Status: Approved 22 Lakhs)

SERB SRG: Catalytic/Non-catalytic Co-Hydrothermal Liquefaction of Integrated Plastic Wastes with Food Waste/Agricultural Residue to Produce Renewable Transportation Fuel

TATA Steel: Economic Feasibility of Synthesis of Zeolite from Iron Ore Mine Wastes (Under Evaluation)

EU-DBT: DBT-EU joint call on "HORIZON-CL5-2024-D3-02-03: Development of smart concepts of integrated energy driven bio-refineries for co-production of advanced biofuels, bio-chemicals and biomaterials" (Submitted with EU partners)

GAIL: Proposal on "Zeolite-Based Catalysts Derived from Industrial Solid Waste for the Direct Conversion of Glycerol to Propylene: Comprehensive life cycle assessment" (Submitted with IIT Kharagour)

GAIL: Integrating Hydrothermal Carbonization with Dark Fermentation and Aqueous Phase Reforming for Renewable Hydrogen Generation from Microalgae and Food Waste (Submitted with IIT Kharagpur)

Consultancy Work

Cumulative Impact Assessment Study, Carrying Capacity Study and Ecosystem Services Study as per condition of Terms of References (ToR) of Expansion of Nigahi Opencast Coal Mining Project from 21 Mtpa to 25 Mtpa with an increase in leasehold area from 3018.40 Ha to 3582.723 Ha. (Ongoing)

Proximate and Heavy metal analysis of Moondihi Washery coal samples. (BCCL-done)

Supervising

Five Ph.D., 10 Master's (5 Ongoing and 5 Done), and 13 Undergraduate (9 done and 4 going)

Dates: February 2019 – July 2019

Name and address of employer: University of Alberta

Occupation or position held: Postdoctoral Fellow in Sustainable Energy Research Laboratory, Department of Mechanical Engineering

Main activities and responsibilities:

Production of renewable natural gas (RNG) from lignocellulosic biomass and waste

- Development of a detailed process model to produce RNG from gasification (conventional and hydrothermal) and anaerobic digestion process
- Estimation of production cost of RNG from the developed process model from a range of biomass feedstocks and wastes
- Development of a life cycle assessment model to estimate greenhouse gas emission

Thermo-Catalytic Reforming (TCR) plant for the semi-continuous operation to produce bio-oil

- Municipal solid waste (MSW) preparation involves drying, grinding, particle size separation, and finally, palletization to form pellets
- Carry out the intermediate pyrolysis experiment followed by catalytic reforming to produce high-value bio-oil
- Characterization of TCR products

Software: Aspen Plus®, Aspen Hysys, Aspen Economizer, Origin, Visio, MS Office, GREET (LCA software)

Equipment handled: Gas chromatography-mass Spectroscopy (GC-MS), Thermal Conductivity Detector (TCD), Flame Ionization Detector (FID), BET Surface Analyser, Thermogravimetric Analyser (TGA) analysis etc.

Award, Nominations and Scholarship received:

- University of Alberta Doctoral Recruitment Scholarship
- Shell Enhanced Learning Fund
- Best poster presentation award in Biological Solutions Forum 2014
- Graduate teaching scholarship, IIT Delhi
- Ph.D. Research and Teaching Assistantship – University of Alberta
- Graduate Thesis Award in CSBE/SCGAB conference, Vancouver, 2019
- Institute Nominations for BIS Solid Waste Management Sectional Committee CHD 33
- Institute Committee member to develop the holistic model for Net Zero Holistic Model for IIT(ISM) Dhanbad