

### Current Address

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### SUMMARY

Over 20 years of academic research experience in the field of chemical engineering, specializing in biomass to value-added chemicals and fuels, green hydrogen production, micro-structured and optofluidic devices, multifunctional reactors, washcoating, supported bimetallic catalysts, bifunctional catalysts, reaction kinetics, microkinetic modeling, reactor design and high throughput experimentation. I also have teaching experience in a range of environments. ONE Post-Doc, SEVEN Ph.D., TWELVE M.Tech. and TWELVE B.Tech. students completed their projects under my supervision. Currently TWO Ph.D. students are writing their thesis and ONE Post-Doc, FOUR Ph.D., TWO M.Tech. and ONE B.Tech. students are working in various fields of research under my supervision. My research group is funded well with **FOURTEEN sponsored research projects** that are completed/on-going/sanctioned. The funding is from both government (SERB, MeitY and DST) and private funding agencies. The funding is of various categories such as sponsored, consultancy and technology transfer. Our group is currently working in the following research areas: Biomass conversion to value-added chemicals; Catalytic co-pyrolysis of biomass and waste plastic to transportation fuels; Mesoporous zeolites; Opto-fluidic microdevices for water splitting reaction to produce hydrogen.

Selected career accomplishments: Published **FIFTY THREE** peer reviewed international journal articles and **THREE** book chapters with over 1400 total citations and an h-index of 20; **ONE** Indian patent granted and **THREE** patents are filed (our of which two are published); Efficiently transformed lignocellulosic biomass to fuels and value-added and platform chemicals; Rationally designed bimetallic catalysts for gas phase reactions; Developed micro-structured reactors for steam ethanol reforming and photocatalytic water-splitting; Integrated micro-reactors with micro-heat exchangers; Designed and developed a 9-channel high-throughput catalyst screening system; Ph.D. from Indian Institute of Technology Kanpur, India; Post-Doctoral Research studies from the Department of Chemical and Biomolecular Engineering, University of Delaware; and currently, Associate Professor in the Department of Chemical Engineering at Indian Institute of Technology Guwahati, India.

### EDUCATIONAL QUALIFICATIONS

- **Post-Doctoral Researcher** (Chemical and Biomolecular Engineering), *April, 2011- July, 2014*  
**University of Delaware, Newark, USA.**
- **Ph.D.** (Chemical Engineering), *July, 2005 – November, 2010*  
**Indian Institute of Technology (IIT), Kanpur, INDIA, CPI: 7.88/10.0**
- **Master of Technology (M. Tech)**(Chemical Engineering), *July, 2002 – July, 2004*  
**Indian Institute of Technology (IIT), Kanpur, INDIA, CPI: 9.00/10.0**
- **Bachelor of Technology (B. Tech)** (Chemical Engineering), *August, 1998 – April, 2002*  
**J.N.T. University, Hyderabad, INDIA, 79.06 % of marks**

### ONGOING and COMPLETED R&D PROJECTS

- **Sponsored Project from IITG:** “Metal Encapsulated Zeolite Catalysts for upgradation of Bio-oil”, Budget: Rs. 5,00,000/-, Startup grant from IIT Guwahati. (Dec., 2014 – Dec., 2016)
- **Sponsored Project from SERB:** “Carbohydrates (Cellulose, Glucose and Fructose) Conversion to 5-Hydroxymethylfurfural using Ionic Liquid Encapsulated Mesoporous Zeolite Catalysts”, Budget: Rs. 31,70,000/-, Young Scientist Start up grant from SERB-DST (File No. YSS/2015/000911). (April, 2016 – July, 2019)

- **Sponsored Project from DST-CERI:** “Design and Fabrication of an Integrated Optofluidic Device for Solar Irradiated Water-splitting using Bio-synthesized Metal/TiO<sub>2</sub> Photocatalysts.”, Budget: Rs. 44,19,200/- The DST-CERI File No. is DST/TMD/CERI/C19(G). (July, 2016 – Dec., 2019)
- **Sponsored Project from IITG:** “Glucose and Xylose Conversion to 5-Hydroxymethylfurfural and Levulinic Acid”, Budget: Rs. 10,00,000/-, Top-up grant. (Dec, 2018 – Dec, 2020)
- **Sponsored Project from IMPRINT-IIC:** “Combined Catalytic Reforming and Upgrading Technique for Production of Biofuels in Circulating Fluidized Bed Reactor” Budget: Rs. 36,30,000/-(from SERB) + Rs. 31,00,000/- (from Industry in terms of cash + kind) = Rs. 67,30,000/-. (Co-PI and Prof. Nanda Kishore, Dept. Chemical Engg., IITG is the PI) (Oct, 2019 – May, 2022); File number: IMP/2019/000244.
- **Consultancy Project:** “Kinetic studies for production of HCl and Sodium bicarbonate from NaCl, H<sub>2</sub>SO<sub>4</sub> and ammonium bicarbonate: Phase-I” Budget: Rs. 15,87,000/- from Garima Industries, Guwahati (Co-PI and Dr. Rajesh Kumar Upadhyay, Dept. Chemical Engg., IITG was the PI) (Aug, 2016 – Aug, 2019)
- **Technology-Transfer Project:** “Coating of LTA zeolite membranes onto the ceramic tubes” Budget: Rs. 15,00,000/- from ChemDist Membrane Solutions Pvt. Ltd., Pune (Dec, 2020 – Dec, 2023)
- **ChemDist Center of Excellence (CoE) for Industrial NanoTech Innovations:** “Carbohydrates conversion to levulinic acid and formic acid at 2 L reactor scale” Budget: Rs. 18,63,000/- in cash, a pilot plant and 2 project staff in kind from ChemDist Membrane Solutions Pvt. Ltd., Pune (Feb, 2022 – Feb, 2025).
- **Sponsored Project from MeitY, GoI:** “Smart Wearable Advanced Nanosensing Technologies in Healthcare ASICs (SWASTHA)” Budget: Rs. 42,00,00,000/-, MeitY, GoI File Number 5(1)/2022-NANO (Co-PI and Dr. Akshai Kumar, Head, Center for Nanotechnology, IITG is the PI) (Mar, 2022 – Mar, 2026).
- **Sponsored Project from SERB (Core Research Grant, CRG):** “Sugars Conversion to Bio-based Monomeric Molecules” Budget: Rs. 40,20,000/-, SERB file number: CRG/2022/005144 (Jan, 2023 – Jan, 2026).
- **Sponsored Project from IITG-TIDF (TIH):** “Underwater natural resources to disinfectants and corrosion resistant materials” Budget: Rs. 18,88,000/- + manpower (TWO JRFs), Project number: TIH/TD/0113 (Feb, 2023 – Jan, 2024).
- **Sponsored Project from SERB (Core Research Grant, CRG):** “Investigation of the Reentrant Disorder Behavior and Catalytic Properties of Frustrated Pyrochlore Nanostructures” Budget: Rs. 61,71,000/-, SERB file number: CRG/2022/006155 (Co-PI and Prof. Subhash Thota, Dept. Physics, IITG is the PI).
- **Sponsored Project from BIRAC-BIG:** “Process Validation of Bamboo biomass conversion to levulinic acid and its derivatives for pharmaceutical applications” Budget: Rs. 50,00,000/-, Project Number: BIRAC/KIIT01881/BIG-SP/02/22.
- **Sponsored Project from SPARC:** “Integrated bio-refinery process for sustainable production of bio-crude oil from algal biomass and its upgrading to synthetic transportation fuels” Budget: Rs. 60,98,782/-, SPARC project number: P2704 (sanctioned) (Indian Co-PI and Prof. VV Goud, ChE, IITG is the Indian-PI).

## STUDENTS UNDER MY SUPERVISION

### I. Post-Docs

1. Dr. Anjireddy Bhavanam (National Post-Doctoral Fellow (NPDF) worked on “Catalytic co-pyrolysis of lignocellulosic biomass and waste plastics”) August 2017 – January 2018, presently at NIT Jalandhar as an Assistant Professor.
2. Dr. Sumana Paul (Institute Post-Doctoral Fellow (IPDF) working on “2-D materials for photocatalysis”) January 2022 – Present, Prof. Pravat Kumar Giri is a co-mentor.

### II. Ph.D. Students:

#### Completed:

1. Dr. Yedla Santosh Kumar (**Completed in Sep 2019**, co-supervisor Prof. Golder, CL); Title: Modified Zeolites and Titania Catalysts for the Conversion of Carbohydrates to 5-Hydroxymethylfurfural.

2. Dr. Mahaboob Alam (**Completed in Nov 2021**); Title: Catalytic and Non-Catalytic Co-Pyrolysis of Torrefied Bamboo Biomass and Plastic: Synergism, Kinetics and Reaction Mechanism.
3. Dr. Velaga Bharath (**Completed in Dec 2021**); Title: Biomass to Specialty Chemicals: Advanced Catalysts, Processes and Techno-Economics.
4. Dr. Devipriya Gogoi (**Completed in Dec 2021**, co-supervisor Prof. Golder, CL); Title: Design and Synthesis of Efficient Charge Transfer Photocatalysts for Visible-light-driven Green H<sub>2</sub> and O<sub>2</sub> Production.
5. Dr. Ponnala Rambabu (**Completed in May 2023**); Title: Photocatalytic water splitting in opto-fluidic devices.
6. Dr. Anirban Chowdhury (**Completed in June 2023**, co-supervisor Prof. Golder, CL); Title: Metal Oxides and Metal Sulphide Electrocatalysts for CO<sub>2</sub> and N<sub>2</sub> Conversion to Value-added Chemicals.
7. Mr. Prasad Pala (**Thesis submitted in May 2023**); Title: Optofluidic planar microreactors for the production of hydrogen and oxygen from photocatalytic water-splitting.

**Synopsis completed and Thesis writing:**

8. Mr. Hanumanth Reddy Pemmana (**Synopsis completed in Jan 2023** and writing thesis, co-supervisor Prof. Uppaluri, CL); Title: Studies on carbon-supported Pt-V and Ru-V bimetallic catalysts and microreactor technology for the green production of Lactic acid, 2,5-Furandicarboxylic acid, and 5-Hydroxymethylfurfural.

**Ongoing:**

9. Mr. Ameer Suhail (Joined CfN in July 2018, working, co-supervisor Dr. Pamu, PH); Title: Opto-fluidic microdevices for photocatalytic water-splitting.
10. Ms. Sarmistha Baruah (Joined CfN in July 2019, working, co-supervisor Dr. Akshai Kumar, CH); Title: Direct-Ethanol Fuel Cells.
11. Mr. Masresha Adasho (Joined ME in July 2019, working, co-supervisor Prof. P. Muthu Kumar, ME); Title: Methanol steam reforming for hydrogen production.
12. Mr. Prince Kumar Barnwal (Joined in Jan 2022, working); Title: 5-Hydroxymethylfurfural production in microchannel reactors.

III. M.Tech Students:

1. Mr. Yogendra Kumar (Completed in July 2016); Thesis Title: Synthesis and Characterization of Ni/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> Catalyst by strong electrostatic Adsorption (SEA) Method
2. Ms. Pooja Saxena (Completed in June 2017); Thesis Title: Conversion of Glucose to 5-HMF Using Ionic Liquid Encapsulated Zeolites
3. Mr. Amit Kumar Kiste (Completed in June 2017); Thesis Title: Conversion of CO<sub>2</sub> into Carbon Monoxide
4. Mr. Souradip Choudhury (Completed in July 2018, Currently working in AEC, Guwahati); Thesis Title: Conversion of Xylose to Furfural Using Ionic Liquid Encapsulated Zeolites
5. Mr. Pardeep Soni (Completed in July 2019); Thesis Title: Selective Production of Furfural by Xylose Dehydration using Zeolites.
6. Mr. Solanke Madhav Bhagwan (Completed in July 2020); Thesis Title: Continuous Flow Reactor for the Conversion of Carbohydrates to 5-(Hydroxymethyl)furfural.
7. Mr. Dharanikota Naga Phani Sai Kumar (Completed in June 2021); Thesis Title: Photocatalytic Reduction of Carbondioxide.
8. Mr. Reddi Ramu (Completed in June 2021); Thesis Title: Glycerol Oxidation to Lactic Acid.
9. Mr. Chetan Dhongdiya (Completed in June 2022); Thesis Title: Biomass conversion to valuable chemicals.
10. Mr. Rahul Agarwal (Completed in June 2022); Thesis Title: Glycerol to valuable chemicals.
11. Mr. Gundala Srikanth (Completed in May 2023); Thesis Title: Production and purification of levulinic acid and 5-hydroxymethylfurfural from fructose and sucrose.
12. Ms. Macharla Sumaithry (Completed in June 2023); Thesis Title: Conversion of carbohydrates to valuable chemicals: experiments and aspen plus simulations.
13. Mr. Saumya Samir Parikh (Joined in July 2022, working); Thesis Title: ASPEN+ simulation of biomass conversion processes.
14. Mr. Mayank Yadav (Joined in July 2022, working); Thesis Title: Direct Ethanol Fuel Cells.

IV. B.Tech Students:

1. Mr. Sonu Rudhra (Completed in May 2016); Title: Synthesis and Characterization of Mesoporous Template-free Faujasite Type Zeolite-Y from Sodium Aluminosilicate Solution
2. Mr. Pawan Kumar (Completed in May 2017); Title: Synthesis of Mesoporous Zeolite Y and Mordenite Nanocrystals and Its Use as a Catalyst in Glucose Dehydration to 5-HMF
3. Mr. Parde Rajat Prakash (Completed in May 2018); Title: Carbohydrates Conversion to Value-Added Chemicals
4. Mr. Tharun Kumar Vankunavath (Completed in May 2018); Title: Preparation of Cu<sub>2</sub>O Thin Film on ITO Glass for Photocatalytic Applications
5. Mr. Rajdeep Doley (Completed in May 2018); Title: Seed-Assisted Zeolite ZSM-5 Synthesis
6. Mr. Adharsh K Sivaram (Completed in May 2019); Title: Synthesis of Hydrogen by Photocatalytic Water Splitting Using Microreactors.
7. Mr. Vikash Kumar Gupta (Completed in June 2020); Title: Seed-Assisted Zeolite Synthesis.
8. Mr. Piyush Singh Mandavi (Completed in June 2020); Title: Micro-Extraction.
9. Mr. Kundan Roy (Completed in June 2020); Title: Separation of Two Immiscible Liquid Phases in Microdevices.
10. Mr. Rajesh Kumar Sahoo (Completed in April 2021); Title: Photocatalytic reduction of carbon dioxide.
11. Ms. Gitika Sonker (Completed in April 2021); Title: Direct ethanol fuel cells.
12. Ms. Sampada Mahajani (Completed in April 2023); Title: Green hydrogen production in optofluidic devices.
13. Ms. Poluri Sriya (working); Title: Direct ethanol fuel cells.

## PUBLICATIONS

### A. Book Chapters:

- 1) **N.R. Peela** and D. Kunzru, (2015) "Microstructured Reactors for Hydrogen Production from Ethanol" in Nanoscale and Microscale Phenomena: Fundamentals and Applications, S Khandekar and YM Joshi (Eds.) Book Series, "Springer Tracts in Mechanical Engineering" Pages 309 – 334. DOI 10.1007/978-81-322-2289-7
- 2) M. Alam, S.K. Yedla, S.T. Bhutia, V.V. Goud, **N.R. Peela\*** (2017) "Advancement in development of biodiesel production in last two decades: an Indian overview on raw materials, synthesis, byproducts and application" in Sustainable Biofuels Development in India, A.K. Chandel, R.K. Sukumaran (eds.), Springer International Publishing, Pages 167-188. DOI: 10.1007/978-3-319-50219-9\_7
- 3) **N.R. Peela\*** (2020) "Biomass Conversion to Selected Value-Added Chemicals Using Zeolites: A Review" in Reference Module in Materials Science and Materials Engineering. Vol. 5 23-28. DOI: 10.1016/B978-0-12-803581-8.11499-7

### B. Publications in refereed international journals

**ORCID:** [0000-0001-6243-8815](https://orcid.org/0000-0001-6243-8815)

**Scopus ID:** 29068162800

**Total citations: 1401, h-index: 20, i10-index: 33** (from Google Scholar,

[https://scholar.google.co.in/citations?hl=en&user=jmA\\_4DYAAAAAJ](https://scholar.google.co.in/citations?hl=en&user=jmA_4DYAAAAAJ), accessed on 21/08/2023)

- 1) "A simple template-free bioinspired route of 1D Bi<sub>2</sub>S<sub>3</sub> nanorods synthesis for electrochemical CO<sub>2</sub> reduction to formate" A. Chowdhury, C. Bhan, **N.R. Peela** and A.K. Golder (Accepted for publication in the Journal of Industrial and Engineering Chemistry, 2023; DOI: 10.1016/j.jiec.2023.06.055).
- 2) "Selective aerobic-oxidation of glycerol to lactic acid over ruthenium-vanadium bimetallic catalysts" H.R. Pemmana, P.K. Barnwal, R.V.S. Uppaluri, and **N.R. Peela\***; Journal of Industrial and Engineering Chemistry, 124 (2023) 224 – 231 (DOI: 10.1016/j.jiec.2023.04.010).
- 3) "Role of ZSM-5/AC hybrid support on the catalytic activity of Pd-Ag electrocatalysts towards ethanol oxidation: An experimental and kinetic study" S. Baruah, A. Kumar and **N.R. Peela\***; Electrochimica Acta, 453 (2023) 142357 (DOI: 10.1016/j.electacta.2023.142357).
- 4) "Activated Carbon Supported Ni-Co Layered Double Hydroxides Nanowires: An Effective and Low-Cost Electrocatalyst for Ethanol Electro-oxidation in Alkaline Media" S. Baruah, A. Kumar and **N.R. Peela\***; Journal of The Electrochemical Society, 170 (2023) 034509 (DOI: 10.1149/1945-7111/acc488).
- 5) "In-situ CdS Nanowires on g-C<sub>3</sub>N<sub>4</sub> Nanosheet Heterojunction Construction in 3D-Optofluidic Microreactor for the Photocatalytic Green Hydrogen Production" P. Rambabu and **N.R. Peela\***; International Journal of Hydrogen Energy, 48 (2023) 15406 – 15420 (DOI: [10.1016/j.ijhydene.2023.01.041](https://doi.org/10.1016/j.ijhydene.2023.01.041))

- 6) “A Tunable Bioinspired Process of SnO<sub>2</sub> NPs Synthesis for Electrochemical CO<sub>2</sub>-into-formate Conversion” A. Chowdhury, C. Bhan, **N.R. Peela** and A.K. Golder; *Journal of CO<sub>2</sub> Utilization*, 66 (2022) 102263. (DOI: 10.1016/j.jcou.2022.102263)
- 7) “Organic-inorganic hybrid photocatalyst consisting of highly conjugated metal complex and graphitic carbon nitride for efficient hydrogen evolution and Cr(VI) reduction” B. Das, L.P.R. Pala, M. Mohanta, M. Devi, D. Chakraborty, **N.R. Peela**, M. Qureshi and S. Dhar; *Journal of Materials Chemistry A*, 10 (2022) 23691–23703. (DOI: 10.1039/D2TA05200H)
- 8) “Visible Light Active IrO<sub>2</sub>/TiO<sub>2</sub> films for Oxygen Evolution from Photocatalytic Water Splitting in an Optofluidic Planar Microreactor” L.P.R. Pala and **N.R. Peela\***; *Renewable Energy*, 197 (2022) 902–910. (DOI: 10.1016/j.renene.2022.08.017).
- 9) “Unraveling high alkene selectivity at full conversion in alkyne hydrogenation over Ni under continuous flow conditions” V.R. Bakuru, K. Fazl-Ur-Rahman, G. Periyasamy, B. Velaga, **N.R. Peela**, M.E. DMello, K.S. Kanakikodi, S.P. Maradur, T.K. Maji and S.B. Kalidindi; *Catalysis Science and Technology*, 12 (2022) 5265–5273. (DOI: 10.1039/d2cy00875k)
- 10) “Levulinic Acid Production from Furfural: Process Development and Techno-Economics” B. Velaga, and **N.R. Peela\***; *Green Chemistry* 24 (2022) 3326 (DOI: [10.1039/D2GC00089J](https://doi.org/10.1039/D2GC00089J))
- 11) “Thermal plasma gasification of organic waste stream coupled with CO<sub>2</sub>-sorption enhanced reforming employing different sorbents for enhanced hydrogen production” V.S. Sikarwar, **N.R. Peela**, A.K. Vuppaladadiyam, L.B. Ferreira, A. Maslani, R. Tomar, M. Pohořelý, E. Meers, and M. Jeremiáš; *RSC Advances* 12 (2022) 6122-6132 (DOI: 10.1039/D1RA07719H).
- 12) “Catalytic Co-Pyrolysis of Wet-Torrefied Bamboo Sawdust and Plastic over the Zeolite HY: Synergism and Kinetics” M. Alam, and **N.R. Peela\***; *Journal of the Energy Institute* 100 (2022) 76–88; (DOI: [10.1016/j.joei.2021.11.004](https://doi.org/10.1016/j.joei.2021.11.004)).
- 13) “Optofluidic Microreactor for the Photocatalytic Water Splitting to Produce Green Hydrogen” P. Rambabu, S. Patel, D. Gogoi, R.V.S. Uppaluri and **N.R. Peela\***; *International Journal of Hydrogen Energy*, 47 (2022) 2152–2163 (DOI: 10.1016/j.ijhydene.2021.10.171).
- 14) “Green Hydrogen Production in an Optofluidic Planar Microreactor via Photocatalytic Water Splitting under Visible/Simulated Sun Light Irradiation” L.P.R. Pala, **N.R. Peela\***; *Energy & Fuels* 35 (2021) 19737–19747 (DOI: [10.1021/acs.energyfuels.1c02686](https://doi.org/10.1021/acs.energyfuels.1c02686)).
- 15) “Step-scheme heterojunction between CdS nanowires and facet-selective assembly of MnO<sub>x</sub>-BiVO<sub>4</sub> for an efficient visible-light-driven overall water splitting” D. Gogoi, A.K. Shah, P. Rambabu, M. Qureshi, A.K. Golder, and **N.R. Peela\***; *ACS Applied Materials and Interfaces* 13 (2021) 45475–45487; (DOI: 10.1021/acsami.1c11740).
- 16) “Synergistic Effect of Metal Complex and Dual Doped Graphitic Carbon Nitride for Superior Photocatalytic Hydrogen Evolution” B. Das, D. Gogoi, M. Devi, S.S. Dhar, and **N.R. Peela**; *Energy & Fuels* 35 (2021) 15223–15233 (DOI: 10.1021/acs.energyfuels.1c01732).
- 17) “Hollow cuboidal MnCo<sub>2</sub>O<sub>4</sub> coupled with nickel phosphate: A promising oxygen evolution reaction electrocatalyst” A.K. Shah, S. Bhowmick, D. Gogoi, **N.R. Peela**, M. Qureshi; *Chemical Communications* 57 (2021) 8027-8030 (DOI: 10.1039/d1cc02383g).
- 18) “Catalytic Co-pyrolysis of Wet-Torrefied Bamboo Sawdust and Linear Low Density Polyethylene (LLDPE) in Presence of Zeolite HZSM-5” M. Alam, D. Rammohan and **N.R. Peela\***; *Renewable Energy* 178 (2021) 608–619 (<https://doi.org/10.1016/j.renene.2021.06.109>).
- 19) “Synthesis of Cu<sub>2</sub>O NPs using bioanalytes present in *Sechium edule*: Mechanistic insights and application in electrocatalytic CO<sub>2</sub> reduction to formate” A. Chowdhury, **N.R. Peela** and A.K. Golder; *Journal of CO<sub>2</sub> Utilization* 51 (2021) 101622(1–12) (<https://doi.org/10.1016/j.jcou.2021.101622>).
- 20) “Silver grafted graphitic-carbon nitride ternary hetero-junction Ag/gC<sub>3</sub>N<sub>4</sub>(Urea)-gC<sub>3</sub>N<sub>4</sub>(Thiourea) with efficient charge transfer for enhanced visible-light photocatalytic green H<sub>2</sub> production” D. Gogoi, A.K. Shah, M. Qureshi, A.K. Golder, and **N.R. Peela\***; *Applied Surface Science* 558 (2021) 149900 (1–15). (DOI: 10.1016/j.apsusc.2021.149900)
- 21) “Rapid Synthesis of Hierarchical ZSM-5 Zeolites for the Reactions Involving Larger Reactant Molecules” B. Velaga, R. Doley, **N.R. Peela\***; *Advanced Powder Technology*, 32 (2021) 1033–1046 (DOI: 10.1016/j.appt.2021.02.002).

- 22) “Experimental insight into the coupling of methane combustion and steam reforming in catalytic plate reactor in transient mode” M.A. Ashraf, S. Tacchino, **N.R. Peela**, G. Ercolino, K.K. Gill, D.G. Vlachos, and S. Specchia; *Industrial and Engineering Chemistry Research* 60 (2021) 196–209 (DOI: 10.1021/acs.iecr.0c04837)
- 23) “Novel One-Step Process for the Production of Levulinic Acid from Furfural Over Hierarchical Zeolites in a Microwave Reactor” B. Velaga, **N.R. Peela\***; *Advanced Sustainable Systems*, 5 (2021) 2000205 (DOI: 10.1002/adsu.202000205)
- 24) “Wet Torrefaction of Bamboo Saw Dust and Its Co-Pyrolysis with Plastic” M. Alam, D. Rammohan, A. Bhavanam, and **N.R. Peela\***; *Fuel* 285 (2021) 119188 (DOI: 10.1016/j.fuel.2020.119188).
- 25) “Surface-engineering of decahedron shaped bismuth vanadate for improved photoelectrochemical water oxidation by indium doping coupled with graphitic carbon nitride quantum dots” A.K. Shah, T.K. Sahu, D. Gogoi, **N.R. Peela**, M. Qureshi; *Journal of Power Sources* 477 (2020) 229024 (DOI: 10.1016/j.jpowsour.2020.229024).
- 26) “Enhanced Photocatalytic Hydrogen Evolution using Green Carbon Quantum Dots Modified 1-D CdS Nanowires under Visible Light Irradiation” D. Gogoi, R. Koyani, A.K. Golder, and **N.R. Peela\***; *Solar Energy* 208 (2020) 966–977 (DOI: 10.1016/j.solener.2020.08.061).
- 27) “1-Butyl-3-Methylimidazolium Bromide Functionalized Zeolites: Nature of Interactions and Catalytic Activity for Carbohydrates Conversion to Platform Chemicals” S.K. Yedla, B. Velaga, S. Choudhury, A. Namdeo, A.K. Golder, **N.R. Peela\***; *Reaction Chemistry and Engineering* 4 (2020) 1738–1750 (DOI: 10.1039/D0RE00277A)
- 28) “Surface and photocatalytic properties of TiO<sub>2</sub> thin films prepared by non-aqueous surfactant assisted sol-gel method” L.P.R. Pala, V. Uday, D. Gogoi, **N.R. Peela\***; *Journal of Environmental Chemical Engineering* 8 (2020) 104267. (DOI: 10.1016/j.jece.2020.104267)
- 29) “Effect of Catalytically Silent Cerium Hydroxide in Cobalt - Cerium Mixed Double Hydroxide for Enhanced Water Oxidation Kinetics in BiVO<sub>4</sub> Photoanode” T.K. Sahu, S. Alam, D. Gogoi, **N.R. Peela** and M. Qureshi; *ACS Applied Energy Materials* 3 (2020) 5610–5619 (DOI: 10.1021/acsaem.0c00551).
- 30) “Low Overpotential and Stable Electrocatalytic Oxygen Evolution Reaction Utilizing Doped Perovskite Oxide, La<sub>0.7</sub>Sr<sub>0.3</sub>MnO<sub>3</sub>, Modified by Cobalt Phosphate” S. Bhowmick, A. Dhankhar, T.K. Sahu, R. Jena, D. Gogoi, **N.R. Peela**, S. Ardo, M. Qureshi, *ACS Applied Energy Materials* 3 (2020) 1279-1285. (DOI: 10.1021/acsaem.9b02167)
- 31) “Bio-template assisted hierarchical ZnO superstructures coupled with graphene quantum dots for enhanced water oxidation kinetics” S. Alam, T.K. Sahu, D. Gogoi, **N.R. Peela**, M. Qureshi; *Solar Energy* 199 (2020) 39–46. (DOI: 10.1016/j.solener.2020.02.015)
- 32) “Ag-doped TiO<sub>2</sub> Photocatalysts with Effective Charge Transfer for Highly Efficient Hydrogen Production through Water Splitting” D. Gogoi, A. Namdeo, A.K. Golder, and **N.R. Peela\***; *International Journal of Hydrogen Energy* 45 (2020) 2729–2744 (DOI: 10.1016/j.ijhydene.2019.11.127)
- 33) “Co-Pyrolysis of Bamboo Sawdust and Plastic: Synergistic Effects and Kinetics” M. Alam, A. Bhavanam, A. Jana, J.K.S. Viroja, and **N.R. Peela\***; *Renewable Energy* 149 (2020) 1133–1145 (DOI: 10.1016/j.renene.2019.10.103)
- 34) “Design of noble metal free hierarchical VS<sub>2</sub> onto WO<sub>3</sub> nanoflakes as an effective heterojunction strategy for enhanced photoelectrochemical water oxidation” C.T. Moi, G. Gogoi, T.K. Sahu, D. Gogoi, **N.R. Peela**, and M. Qureshi; *Sustainable Energy & Fuels* 3 (2019) 3481–3488 (DOI: 10.1039/C9SE00719A)
- 35) “Hexagonal boron nitride quantum dots as a superior hole extractor for efficient charge separation in WO<sub>3</sub> based photoelectrochemical water oxidation” M. Mohanta, T. Sahu, D. Gogoi, **N.R. Peela**, and M. Qureshi; *ACS Applied Energy Materials* 2 (2019) 7457-7466 (DOI: 10.1021/acsaem.9b01450)
- 36) “A Z-Scheme Strategy Utilizing ZnIn<sub>2</sub>S<sub>4</sub> and Hierarchical VS<sub>2</sub> Microflowers with Improved Charge Carrier Dynamics for Superior Photoelectrochemical Water Oxidation” G. Gogoi, C.T. Moi, A.S. Patra, D. Gogoi, **N.R. Peela**, and M. Qureshi; *Chemistry – An Asian Journal* 14 (2019) 4607–4615 (DOI: 10.1002/asia.201900545)

- 37) “Synthesized Hierarchical Mordenite Zeolites for the Biomass Conversion to Levulinic Acid and Mechanistic Insights for the Humins Formation” B. Velaga, R.P. Parde, J. Soni, and **N.R. Peela\***; *Microporous and Mesoporous Materials*, 287 (2019) 18 – 28. (DOI: 10.1016/j.micromeso.2019.05.049)
- 38) “Choline Chloride Functionalized Zeolites for the Conversion of Biomass Derivatives to 5-Hydroxymethylfurfural” **N.R. Peela\***, S.K. Yedla, B. Velaga, A. Kumar, A.K. Golder; *Applied Catalysis A: General* 580 (2019) 59 – 70 (DOI: 10.1016/j.apcata.2019.05.005)
- 39) “Reduced graphene oxide modified  $\text{CuBi}_2\text{O}_4$  as an efficient and noble metal free photocathode for superior photo electrochemical hydrogen production” A.K. Shah, T.K. Sahu, A. Banik, D. Gogoi, **N.R. Peela** and M. Qureshi; *Sustainable Energy & Fuels* 3 (2019) 1554 – 1561 (DOI: 10.1039/C9SE00129H)
- 40) “Seed-Assisted and OSDA-Free Synthesis of H-Mordenite Zeolites for Efficient Production of 5-Hydroxymethylfurfural from Glucose”, B. Velaga and **N.R. Peela\***; *Microporous and Mesoporous Materials* 279 (2019) 211 – 219 (DOI: 10.1016/j.micromeso.2018.12.028)
- 41) “Hybridization of Pd Nanoparticles with UiO-66(Hf) Metal-Organic Framework and the Effect of Nanostructure on the Catalytic Properties”, V.R. Bakuru, B. Velaga, **N.R. Peela**, and S.B. Kalidindi; *Chemistry – A European Journal* 24 (2018) 15978–15982 (DOI: 10.1002/chem.201803200)
- 42) “Ionic Liquid-Encapsulated Zeolite Catalysts for the Conversion of Glucose to 5-Hydroxymethylfurfural”, P. Saxena, B. Velaga and **N.R. Peela\***; *ChemistrySelect* 2 (2017) 10379–10386 (DOI: 10.1002/slct.201701955)
- 43) “Microkinetic Model for Total Oxidation of Ethane Over Pt”, **N.R. Peela**, J. E. Sutton, I. C. Lee, and D. G. Vlachos; *Ind. Eng. Chem. Res.* 53 (2014) 10051–10058.
- 44) “Development of a Microfuel Processor: Oxidative Steam Reforming of Ethanol and Water-Gas Shift Reaction on Noble Metal Catalysts in a Microreactor”, **N.R. Peela**, A. S. Sandupatla and D. Kunzru, *Int. J. Environ. Eng.* 6 (2014) 78 - 90.
- 45) “Core-Shell Nanocatalyst Design by Combining High Throughput Experiments and First Principles Simulations”, **N.R. Peela**, W. Zheng, I. C. Lee, A. M. Karim, and D. G. Vlachos, *ChemCatChem*, 5 (2013) 3712 – 3718 (Back cover art).
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- 47) “Steam Reforming of Ethanol in a Microchannel Reactor: Kinetic Study and Reactor Simulation” **N.R. Peela** and D. Kunzru, *Ind. Eng. Chem. Res.* 50 (2011) 12881-12894.
- 48) “Oxidative Steam Reforming of Ethanol over Rh based Catalysts in a Micro-channel Reactor”, **N.R. Peela** and D. Kunzru, *Int. J. Hydrogen Energy* 36 (2011) 3384-3396.
- 49) “Steam Reforming of Ethanol Over Rh/CeO<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub> Catalysts in a Microchannel Reactor”, **N.R. Peela**, A. Mubayi and D. Kunzru, *Chem. Eng. J.* 167 (2011) 578-587.
- 50) “Distributed Hydrogen Production from Ethanol in a Microfuel Processor: Issues and Challenges”, M.K. Moharana, **N.R. Peela**, S. Khandekar and D. Kunzru; *Renew. Sust. Energy Rev.* 15 (2011) 524-533.
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- 52) “Fabrication of microchannels on stainless steel by wet chemical etching”, **N.R. Peela** and D. Kunzru; *J. Micromech. Microeng.* 17 (2007) N99–N106.
- 53) “Thermal Cracking of JP-10: Kinetics and Product Distribution”, **N.R. Peela** and D. Kunzru, *J. Anal. Appl. Pyrolysis* 76 (2006) 154-160.
- 54) “Glycerol selective oxidation to lactic acid over platinum-vanadium bimetallic catalysts supported on activated carbon” H.R. Pemmana, R. Reddi, R.V.S. Uppaluri, and **N.R. Peela\*** (Submitted).
- 55) “Green hydrogen and oxygen production over IrO<sub>2</sub>/Pt/TiO<sub>2</sub> via photocatalytic overall water splitting under visible light illumination” L.P.R. Pala and **N.R. Peela\*** (Submitted).
- 56) “Synthesis of spinel type 2D Co<sub>3</sub>O<sub>4</sub> nanodiscs using gallic acid for electrochemical NH<sub>3</sub> formation by N<sub>2</sub> reduction” A. Chowdhury, **N.R. Peela** and A.K. Golder (Submitted).
- 57) “Boosting the Electrocatalytic Performance via Seed-Assisted In-Situ Encapsulation of Ni-Co Nanoclusters within ZSM-5: Influence of Temperature and Concentration Study” S. Baruah, A. Kumar, and **N.R. Peela\*** (Submitted).
- 58) “A Comparative Kinetic Study on Ethanol Electro-Oxidation Behavior at Pt/AC and Pt-Ag/AC Surface in Alkaline Media” S. Baruah, A. Kumar, and **N.R. Peela\*** (Under Preparation).

- 59) “Catalytic conversion of 5-Hydroxymethylfurfural to 2,5-Furandicarboxylic acid over carbon-supported ruthenium-vanadium bimetallic catalysts under base-free mild reaction conditions” H.R. Pemmana, P.K. Barnwal, R.V.S. Uppaluri, and **N.R. Peela\*** (Under Preparation).
- 60) “Continuous Synthesis of 5-Hydroxymethylfurfural from High Concentration Fructose Feedstock in a Micro-Helical Coiled Reactor using Sulfuric Acid and Maleic Acid as Catalysts” H.R. Pemmana, P.K. Barnwal, R.V.S. Uppaluri, and **N.R. Peela\*** (Under Preparation).
- 61) “Experimental Studies on Hydrogen Production from Steam Reforming of Methanol Integrated with Metal Hydride-based Hydrogen Purification System” M. Adasho, A. Kumar, P. Muthukumar\*, **N.R. Peela\*** (Under preparation).
- 62) “Hydrogen production by steam reforming of Methanol: A Review” M. Adasho, A. Kumar, P. Muthukumar\*, **N.R. Peela\*** (Under preparation).

#### PATENTS

- 1) “A one step process for preparing levulinic acid from C5 furanic compounds” **N.R. Peela\*** and B. Velaga, Indian patent filed on 16/06/2020 and granted on 29/12/2022 (**Patent number: 416062**; Application number: 202031025327).
- 2) “Conversion of glycerol to lactic acid” **N.R. Peela\*** Hanumanth Reddy Pemmana, Reddi Ramu and Ramgopal VS Uppaluri; Indian patent filed on 11/12/2021 (Reference number: 202131057709; Status: Published and response to first examination report (FER) is submitted)
- 3) “Production of levulinic acid from furfural and/or Xylose feedstocks” **N.R. Peela\*** and B. Velaga, Indian patent filed on 19/05/2021 (Reference number: 202131022345; Status: Published and response to first examination report (FER) is submitted).
- 4) “Electrocatalysts for Direct Ethanol Fuel Cells” **N.R. Peela\*** S. Baruah and Akshai Kumar, Indian patent filed on 23/06/2023 (Reference number: 202331042300; Status: Filed)

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- 2) S. Baruah, A. Kumar, **N.R. Peela**; Paper-Based Microfluidic Fuel Cell (PMFC) Technologies and their Applications, Research and Industrial Conclave (RIC)-Integration, IIT Guwahati, Assam, India (14/05/2023 – 16/05/2023)
- 3) S. Baruah, A. Kumar, **N.R. Peela**; Zeolite-4A Encapsulated Bimetallic Ni-Co Nanoclusters: A Noble Metal Free, and Efficient Electrocatalyst for Electro-oxidation of Methanol in Alkaline Media, International Conference on Nanomaterials for Electro-Catalytic Technologies (I-CONNECT), IIT Delhi, New Delhi, India (20/03/2023 – 22/03/2023)
- 4) P.K. Barnwal and **N.R. Peela**; 5-Hydroxymethylfurfural production from glucose using coiled microreactor Conference name- International Conference on Biotechnology, Sustainable Bioresources and Bioeconomy-2022 (BSB2-2022) Place- IIT Guwahati, Dec 7<sup>th</sup> 11<sup>th</sup> 2022
- 5) S. Baruah, A. Kumar, **N.R. Peela**, Activated Carbon Supported Ni-Co Layered Double Hydroxides Nanowires: An Effective and Low-Cost Electrocatalyst Towards Ethanol Oxidation Reaction in Alkaline Media; Oral presentation (online) at 241<sup>st</sup> ECS meeting, May 29<sup>th</sup> – June 2<sup>nd</sup> 2022, Vancouver, BC, Canada.
- 6) A. Chowdhury, **N.R. Peela**, A.K. Golder; A Facile Bioinspired Route of Spinel type Co<sub>3</sub>O<sub>4</sub> NPs Synthesis using Elaeocarpus Serratus L. Leaves Extract. NERC-2022. 20-22th May, 2022. Held at IIT Guwahati, Guwahati, Assam, India.
- 7) A. Chowdhury, **N.R. Peela**, A.K. Golder; A One-pot Bioinspired Route of Synthesis of SnO<sub>2</sub> NPs for Electrochemical CO<sub>2</sub>-into-Formate Conversion. NERC-2022. 20-22th May, 2022. Held at IIT Guwahati, Guwahati, Assam, India.
- 8) S. Baruah, A. Kumar, **N.R. Peela**, Kinetic Study of Ethanol Oxidation Reaction on Low-Platinum Pt-Ag/C Electrocatalysts for Fuel Cell Application; Oral presentation at North-East Research Conclave, May 20 – May 22 2022, IIT Guwahati, Assam.



- 9) S. Baruah, A. Kumar, **N.R. Peela**, Synthesis of low platinum PtAg/C nanoalloyed catalyst by gradual reduction method for ethanol oxidation in alkaline medium; Poster presented at Indian Nanoelectronics Users Program (INUP), April 4 – 6<sup>th</sup> 2022, IIT Guwahati, Assam.
- 10) P. Rambabu and **N.R. Peela**, Optofluidic microreactor for the photocatalytic water splitting to produce green hydrogen, ChemPlus 2022, March 11 – 13<sup>th</sup>, IIT Madras.
- 11) A. Chowdhury, **N.R. Peela**, A.K. Golder; Synthesis of AgNPs using bio-active compounds present in E. serratus L. extract: A proposed mechanistic pathway of synthesis. ChemCon-2021. 27-30th December, 2021. Held at CSIR- Institute of Minerals and Materials Technology, Bhubaneswar, India.
- 12) P. Rambabu, and **N.R. Peela**, Multiphase photocatalytic hydrogen generation in optofluidic microreactor; Oral presentation (online) at 74th Annual Session of Indian Institute of Chemical Engineers CHEMCON-2021, 27 – 30<sup>th</sup> Dec 2021, Bhubaneswar, India.
- 13) L.P.R. Pala and **N.R. Peela**; An Optofluidic Planar Microreactor for Green Hydrogen Production via Photocatalytic Water Splitting; Oral presentation (online) at HYPOTHESIS XVI (Hydrogen Power Theoretical & Engineering Solutions International Symposium), Nov 8–10<sup>th</sup> 2021.
- 14) D. Gogoi, A.K. Golder, and **N.R. Peela\***, “Carbon Quantum Dots (CQDs) Decorated One-Dimensional (1d) CdS Nanowires for Visible Light-Driven Water Splitting” in Hypothesis XV, Cape Town, South Africa, 2020.
- 15) B. Velaga and **N.R. Peela**, Two-step Production of Levulinic Acid from Biomass Derivatives Using Autogenous Catalyst and H-Mordenite Zeolite; Oral presentation (online) in 2<sup>nd</sup> International Conference on Future Aspects of Sustainable Technologies (FAST 2.0), 20 – 21<sup>st</sup> Oct. 2020, Central Institute of Technology, Kokrajhar.
- 16) A. Chowdhury, **N.R. Peela**, A.K. Golder; Bio-inspired Synthesis of Cu NPs and Its Application Towards Electrochemical CO<sub>2</sub> Reduction to Single Carbon Oxygenated Product. 2nd International Conference on Bioprocess for Sustainable Environment and Energy (ICBSEE-India-2020). 5-7th March, 2020. Held at NIT Rourkela, Odissa, India.
- 17) A. Chowdhury, **N.R. Peela**, A.K. Golder; A Facile Bio-inspired Route for the Synthesis of Cu<sub>2</sub>O Nanoparticles for Electrocatalytic CO<sub>2</sub> Reduction to Formate. Reflux 7.0, 28-29th September, 2019 at Indian Institute of Technology Guwahati.
- 18) B. Velaga and **N.R. Peela**, Insights in seed assisted method for the synthesis of hierarchical MFI zeolite for the conversion of biomass derivatives to platform chemicals; poster presentation in International Zeolite Conference 2019, 7 – 12<sup>th</sup> July 2019, Perth, Australia.
- 19) S.K. Yedla, A.K. Golder, and **N.R. Peela\***, “Choline Chloride Grafted Zeolites for the production of 5-Hydroxymethylfurfural from Carbohydrates Conversion” presented (poster) at RESEARCH CONCLAVE 2019, March, 14-17<sup>th</sup> 2019, Indian Institute of Technology Guwahati, India.
- 20) A. Chowdhury, **N.R. Peela\***, and A.K. Golder, “Bio-inspired Cu<sub>2</sub>O Nanoparticles for Photocatalytic CO<sub>2</sub> Reduction to Methanol”, presented (poster) at RESEARCH CONCLAVE 2019, March, 14-17<sup>th</sup> 2019, Indian Institute of Technology Guwahati, India.
- 21) D. Gogoi, A.K. Golder, and **N.R. Peela\***, “Plasmonic Ag nanoparticles on TiO<sub>2</sub> as a visible active photocatalyst for hydrogen production” presented (poster) at RESEARCH CONCLAVE 2019, March, 14-17<sup>th</sup> 2019, Indian Institute of Technology Guwahati, India.
- 22) L.P.R. Pala and **N.R. Peela\***, “Photocatalytic Degradation of Organic Dye over TiO<sub>2</sub> thin films prepared by non- aqueous surfactant assisted Sol-Gel method” presented (poster) at RESEARCH CONCLAVE 2019, March, 14-17<sup>th</sup> 2019, Indian Institute of Technology Guwahati, India.
- 23) B. Velaga and **N.R. Peela\***, “Seed Assisted OSDA Free Mordenite Synthesis for Carbohydrate Conversion to Value-Added Chemicals” presented (poster) at RESEARCH CONCLAVE 2019, March, 14-17<sup>th</sup> 2019, Indian Institute of Technology Guwahati, India.
- 24) D. Gogoi, A.K. Golder, **N.R. Peela\***, “Photocatalytic water splitting reaction using visible active Ag doped TiO<sub>2</sub>” presented (poster) International Conference on Advanced Materials for Energy Science and Technology (AMEST-2019) at Department of Energy Engineering, North-Eastern Hill University, February, 26<sup>th</sup> - 28<sup>th</sup> 2019, Shillong, India.
- 25) L.P.R. Pala and **N.R. Peela\***, “Photocatalytic Degradation of Organic Dye over TiO<sub>2</sub> thin films prepared by non- aqueous surfactant assisted Sol-Gel method” presented (poster) International Conference on Advanced

Materials for Energy Science and Technology (AMEST-2019) at Department of Energy Engineering, North-Eastern Hill University, February, 26<sup>th</sup> - 28<sup>th</sup> 2019, Shillong, India.

- 26) S.K. Yedla, A.K. Golder, and **N.R. Peela\***, “Glucose Dehydration to 5-Hydroxymethylfurfural over H-Type Zeolites in a Water/MIBK Biphasic System”, presented (oral) at ICPOLC-19, January, 27<sup>th</sup> 2019, Hyderabad, India.
- 27) S.K. Yedla, A.K. Golder, and **N.R. Peela\***, “Efficient Conversion of Carbohydrates to 5-Hydroxymethylfurfural over Mesoporous Zeolites” presented (oral) at ICET-19, March, 2<sup>nd</sup> 2019, Hyderabad, India.
- 28) B. Velaga and **N.R. Peela\***, “Selective Production of Levulinic Acid from Bamboo Biomass Using Mesoporous Mordenite” presented (oral) at CHEMCON, December, 27-30<sup>th</sup> 2018, Jalandhar, India.
- 29) D. Gogoi, A.K. Golder, and **N.R. Peela\***, “Photocatalytic Water Splitting over Bio-inspired Ag doped TiO<sub>2</sub> semiconductor” presented (Oral) at 71<sup>th</sup> Annual Session of Indian Institute of Chemical Engineers CHEMCON-2018 at NIT Jalandhar, December, 27-30<sup>th</sup> 2018, Jalandhar, Punjab, India.
- 30) S.K. Yedla, A.K. Golder, and **N.R. Peela\***, “One-Pot Production of 5-Hydroxymethylfurfural (5-HMF) from Carbohydrates by using different Solid Acid Catalysts”, presented (oral) at REFLUX 2017, March, 24-26<sup>th</sup> 2017, Indian Institute of Technology Guwahati, India.
- 31) S.K. Yedla, A.K. Golder, and **N.R. Peela\***, “Production of 5-Hydroxymethylfurfural (5-HMF) from Fructose over H-MOR Zeolite Catalyst” presented (poster) at REFLUX 2017, March, 24-26<sup>th</sup> 2017, Indian Institute of Technology Guwahati, India.
- 32) **N. R. Peela\***, “Microchannel Reactors for Ethanol to FC-Grade Hydrogen Production” HySA Workshop on “Fuel to Electricity” at Cape Town, South Africa during 26 – 27<sup>th</sup> of October, 2016 (Invited talk)
- 33) S. K. Yedla, A. K. Golder, and **N. R. Peela\***, “Studies on the Production of 5-hydroxymethylfurfural (5-HMF) from Cellulose- A Mini Review” presented (poster) at CHEMCON 2015, December 27-30<sup>th</sup> 2015, Indian Institute of Technology Guwahati, India.
- 34) **N. R. Peela**, I. C. Lee and D. G. Vlachos, “Rational Design of Bimetallic Catalysts for Metal Catalyzed Vapor Phase Reactions”, presented (oral) at International Conference on Nanoscience, Nanotechnology and Advanced Materials (NANOS-2015), December 14 - 17<sup>th</sup> 2015, Visakhapatnam, India.
- 35) **N. R. Peela**, W. Zheng, I. C. Lee, A. M. Karim, and D. G. Vlachos, “Rational Design of Bimetallic Catalysts for Total Oxidation Reactions”, presented (oral) at AIChE-2013 Annual Meeting, November 3 - 8<sup>th</sup> 2013, San Francisco, USA.
- 36) **N. R. Peela**, J. E. Sutton, I. C. Lee, and D. G. Vlachos, “Density Functional Theory Based Microkinetic Modeling of Ethane Total Oxidation Over Pt(111)”, presented (oral) at AIChE-2013 Annual Meeting, November 3<sup>rd</sup> – 8<sup>th</sup> 2013, San Francisco, USA.
- 37) **N. R. Peela**, W. Zheng, I. C. Lee, A. M. Karim, and D. G. Vlachos, “Design of Bimetallic Catalysts for Propane Total Oxidation”, presented (oral) at 3<sup>rd</sup> North American Symposium on Chemical Reaction Engineering, March 17 - 20<sup>th</sup> 2013, Houston, USA.
- 38) **N. R. Peela**, A. S. Sandupatla and D. Kunzru, “Hydrogen Production from Ethanol in a Microchannel Reactor”, presented at *Int. Conference on Sustainable Energy and Environmental Protection*, June, 5 – 8<sup>th</sup> 2012, Dublin, Ireland.
- 39) **N. R. Peela**, A. Mubayi and D. Kunzru, “Steam Reforming of Ethanol Over Rh/CeO<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub> Catalysts in a Microchannel Reactor”, poster presented at *11<sup>th</sup> Int. Conference on Microreaction Technology*, March 8 – 10<sup>th</sup> 2010, Kyoto, Japan.
- 40) **N. R. Peela**, A. Mubayi and D. Kunzru, “Washcoating of  $\gamma$ -alumina on stainless steel microchannels”, poster presented at *3<sup>rd</sup> International Conference on Structured Catalysts and Reactors*, September 27 - 30<sup>th</sup> 2009, Ischia, Naples, Italy.
- 41) M. K. Moharana, **N. R. Peela**, S. Khandekar and D. Kunzru, “Producing Hydrogen from Ethanol in a Microfuel Processor: Recent Developments and Challenges”, presented at *6<sup>th</sup> International Symposium on Multiphase Flow, Heat Mass Transfer and Energy Conversion*, July 11 - 15<sup>th</sup> 2009, Xi’an, China.

#### INVITED TALKS

1. “Green Hydrogen Production Using Optofluidic Devices” at Energy Environment Summit “Hydrogen Energy Resource & Opportunity (HERO-2023),” IPE, Visakhapatnam, during July 24<sup>th</sup> – 26<sup>th</sup> 2023.

2. “Engineering of photocatalytic overall water splitting to produce green hydrogen.” at the international conference ‘Recent Advances and Innovations in Solar Energy (RAiSE-2021)’, IIT Madras, Chennai (Virtual Mode), during December 02<sup>nd</sup> – 04<sup>th</sup> 2021.
3. “Lignocellulosic Biomass to Specialty Chemicals and Fuels” at the International Webinar on “Recycling and Solid Waste Management” at Andhra University, Visakhapatnam, India (Virtual Mode) on September 16<sup>th</sup> 2021.
4. “Advanced Photocatalysts for the Water Splitting Reaction to Produce Green Hydrogen” at the International Conference on 'Materials Chemistry and Catalysis' Tezpur University, Tezpur, India (Virtual Mode) March 4<sup>th</sup> – 5<sup>th</sup> 2021.
5. “Photocatalysis for the Hydrogen Production” in the TEQIP Short-term Training Program on “Sustainable Engineering for Industrial Development” at AICTE-ATAL Sponsored Online Faculty Development Program organized by GMR Institute of Techonolgy, Rajam, during September 9<sup>th</sup> – 13<sup>th</sup> 2020.
6. “Lignocellulosic Biomass Conversion to Bio-Products” in the TEQIP Short-term Training Program on “Emerging Technologies for Next-Generation Bio-fuels and Bio-products” at Dr. B. R. Ambedkar National Institute of Technology, Jalandhar, during February 21<sup>st</sup> – 25<sup>th</sup> 2020 (I was the chief guest of this program).
7. Plenary-talk on “Lignocellulosic Biomass Conversion to Value-Added Chemicals and Fuels” in the National Conference on “Recent Advances in Chemical Engineering” held in the Department of Chemical Engineering, Andhra University during January 21<sup>st</sup>–22<sup>nd</sup> 2020.
8. “Hydrogen Production from Renewable Energy Resources” in the TEQIP Training Program on “Recent Trends in Renewable Energy Utilization Technologies” at IIT Guwahati, Guwahati, during May 8<sup>th</sup> – 12<sup>th</sup> 2019.
9. “Process Intensification Using Microstructured Reactors” in the TEQIP Training Program on “Process Intensification in Chemical Industries” at SVNIT, Surat, Surat, during February 6<sup>th</sup> – 10<sup>th</sup> 2017.
10. “Catalyst Design for Complex Reactions” at JNT University, Kakinada on November 30<sup>th</sup> 2016
11. “Overview of Bio-oil Upgradation” at Vignan’s University, Guntur on November 29<sup>th</sup> 2016
12. “Rational Catalyst Design” at Andhra University, Visakhapatnam on October 14<sup>th</sup> 2016
13. “Metal Encapsulated Zeolites: Synthesis, Characterization and Applications” at KIC-TEQIP Short Term Course On “Recent Trends In Catalysis” at IIT Guwahati during May 13 – 14<sup>th</sup> 2016
14. “Zeolites” at NEQIP (AICTE) Sponsored Short Term Course on Advance Materials for Engineering Applications at Assam Engineering College, Guwahati, during April 25 – 29<sup>th</sup> 2016.
15. “Biomass Conversion into Bio-fuels: Prospects and Challenges” at KIC-TEQIP short-term course on advanced clean fuel technologies and alternative energy systems” at IIT Guwahati during March 7 – 11<sup>th</sup> 2016
16. “Bio-fuels” at KIC-TEQIP short-term course on Recent Trends in Renewable Energy Systems at IIT Guwahati during January 23 – 24<sup>th</sup> 2015

## **RESEARCH EXPERIENCE**

**Associate Professor (October 2018 – Present) and Assistant Professor (July 2014 – October 2018), Department of Chemical Engineering, Indian Institute of Technology Guwahati, Assam, India 781039.**

Current areas of research:

- Heterogeneous Catalysis and reaction engineering
- Biomass conversion to value added chemicals
- Bio-oil up-gradation to transportation fuels
- Carbon dioxide activation to valuable chemicals
- Metal encapsulated zeolites

**Post-Doctoral researcher (April 2011 – July 2014), Department of Chemical and Biomolecular Engineering, University of Delaware, Newark, DE 19711.**

Advisers: Prof. D.G. Vlachos and Prof. R.F. Lobo

- Designed bimetallic catalysts for hydrocarbon oxidation by combining high-throughput experiments and first principle Density Functional Theory (DFT) calculations based on Bronsted-Evans-Polanyi (BEP) relations and volcano curves.
- Developed a microkinetic model for catalytic total oxidation of ethane over Pt(111).

- Designed a nine channel high-throughput experimentation system using COMSOL MULTYPHYSICS and eventually fabricated and tested the same for catalyst screening for high temperature gas phase reaction (propane oxidation).
- Involved in design and integration of a microreactor for steam reforming of methane with combustion of methane.

**Senior Project Associate (December 2010 – March 2011), Indian Institute of Technology, Kanpur, INDIA 208016.**

Adviser: Prof. Deepak Kunzru

- Integrated ethanol steam reformer with heat exchanger and water-gas shift reactor.

**Research Scholar (August 2005 – November 2010), Indian Institute of Technology, Kanpur, INDIA 208016.**

Adviser: Prof. Deepak Kunzru

Title: Development of Microchannel Reactor for Steam Reforming of Ethanol.

- Developed chemical etching technique to fabricate microchannels on stainless steel. Designed and fabricated microreactors using laser micromachining and laser spot welding method.
- Developed a washcoating method for an adherent catalyst coating on non-porous substrates (e.g. stainless steel).
- Tested the microreactor for steam and oxidative steam reforming of ethanol to produce hydrogen with high selectivity at high temperatures and ambient pressure using various catalysts. Compared the microreactor performance with that of a conventional packed bed reactor.
- Estimated the kinetic parameters for steam reforming of ethanol. Simulated the reactor system in 2D using CFD software (COMSOL MULTIPHYSICS).

**Senior Project Associate (January 2005 – July 2005), Indian Institute of Technology, Kanpur, INDIA 208016.**

Adviser: Prof. Jai P. Gupta

- Estimated kinetic parameters for reactions of methyl isocyanate with water in presence of small amounts of chloroform and phosgene, using genetic algorithm.

**Masters research (January 2003 – July 2004), Indian Institute of Technology, Kanpur, INDIA 208016.**

Adviser: Prof. Deepak Kunzru

Title: Pyrolysis of Jet-1A and JP-10: Determination of Kinetics and Effect of Initiators

- Studied the product distribution and kinetics of thermal (gas phase) cracking of Jet-1A and JP-10 fuels in an annular tubular reactor at atmospheric pressure.
- Investigated the effect of initiators on the cracking of these fuels.

## TEACHING EXPERIENCE

**Associate Professor (October 2018 – Present) and Assistant Professor (July 2014 – October, 2018), Department of Chemical Engineering, Indian Institute of Technology Guwahati, Assam, India 781039.**

- Courses:
  - Chemical Reaction Engineering I (CL208)
  - Chemical Reaction Engineering II (CL302)
  - Fluid Mechanics (CL202)
  - Process Intensification and Integration (CL641) and
  - MTech seminar course (CL599)
  - Nano Device: Fabrication, Productization and Patent Writing (NT601)
  - Laboratory Safety and Risk Management: Principles (NT602)
- Tutor for Engineering Drawing (ME111)
- Chemical Reaction Engineering laboratory (CL 417)
- Mass transfer laboratory (CL313)

**Teaching Assistant (August 2005 – November 2010), Indian Institute of Technology, Kanpur, INDIA 208016.**

- Assisted in course work in tasks such as assignment grading, invigilation during exams, preparation of lecture notes, organizing external seminars, laboratory course conduction, etc.

**Lecturer (August 2004 – January 2005), National Institute of Technology, Warangal, Andhra Pradesh, INDIA 506004.**

- Taught two courses (Chemical Engineering Thermodynamics II and Mass Transfer I) to undergraduate students.
- Handled two laboratory courses (Fluid and Particle Mechanics; Instrumentation and Process Control) for undergraduate students.

### **ACTIVITIES**

- Member of the departmental (ChE, IITG) committee for recommending candidates who apply to the department to host them for DST INSPIRE/Ramanujan/Ramalingaswami Fellowships for a period of 3 years from 01/08/2022 to 31/07/2025.
- External member of DPPC committee of Department of Electronics and Electrical Engineering, IIT Guwahati from 01/04/2022 to 31/03/2024.
- Warden, Manas hostel, IIT Guwahati for a period of ONE year from 01/08/2022 to 31/07/2024.
- Associate Warden, Manas hostel, IIT Guwahati for a period of TWO years from 01/08/2020 to 31/07/2022.
- Member of DUPC committee of Department of Chemical Engineering, IIT Guwahati from 01/04/2015 to 31/03/2018 and from 01/04/2022 to 31/03/2024.
- Faculty Advisor for the B.Tech. Chemical Engineering batch 2020 at IIT Guwahati.
- In-charge of analytical laboratory, Department of Chemical Engineering, IIT Guwahati for a period of 2 years from 01/04/2018 to 31/03/2020.
- Member of organizing committee of BSB2-2022 - International Conference on Biotechnology, Sustainable Bioresources and Bioeconomy, held at IIT Guwahati, during 7 – 11<sup>th</sup> Dec 2022.
- Member of Scientific committee of the HYdrogen Power Theoretical & Engineering Solutions International Symposium (HYPOTHESIS XVII) 2022 held at Taipei (Taiwan), during 26<sup>th</sup> – 29<sup>th</sup> Sep 2022. ([www.hypothesis.ws](http://www.hypothesis.ws))
- Member of Scientific committee of the HYdrogen Power Theoretical & Engineering Solutions International Symposium (HYPOTHESIS XV) 2020 held at Cape town, South Africa during 3<sup>rd</sup> – 6<sup>th</sup> May 2020. (<http://hypothesis.ws/index.php>)
- Organized 4<sup>th</sup> National Workshop on NEMS/MEMS and Theranostics Devices (NWNTD – 2018) in the Center for Nanotechnology, IIT Guwahati during 26<sup>th</sup> – 28<sup>th</sup> of February 2018.
- Member of organizing committee of CHEMCON 2015 held at IIT Guwahati, during 27<sup>th</sup> – 30<sup>th</sup> Dec 2015.
- Organized a KIC-TEQIP short-term course on “Novel Catalysts for Industrial Use” at IIT Guwahati during 24 – 26<sup>th</sup> of August 2016.
- Organized a KIC-TEQIP short-term course on “Advanced Clean Fuel Technologies and Alternative Energy Systems” at IIT Guwahati during 7 – 11<sup>th</sup> of March 2016.
- Reviewer for more than TEN journals.
- Life member of Indian Institute of Chemical Engineers (IIChE), Member ID: 56567.

### **HONORS, AWARDS AND ACHIEVEMENTS**

- Young Scientist Start up award from SERB-DST (File No. YSS/2015/000911)
- Young Researcher award for the 3<sup>rd</sup> North American Symposium on Chemical Reaction Engineering Conference, 2013, Houston, USA.
- MHRD scholarship for the doctoral program at IIT Kanpur, Aug 2005 – July 2010.
- MHRD scholarship for the master’s program at IIT Kanpur, Aug 2002 – July 2004.
- Travel grant from the Department of Science and Technology, Government of India for attending 3<sup>rd</sup> International Conference on Structured Catalysts and Reactors, 2009, Ischia, Naples, Italy.
- Travel grant from the Council of Scientific and Industrial Research, Government of India for attending 11<sup>th</sup> International Conference on Microreaction Technology, 2010, Kyoto, Japan.
- Awarded first prize for best oral presentation at Chemference-2010, 13 – 14<sup>th</sup> July 2010, IIT Kanpur, INDIA.

- Awarded second prize in a technical quiz conducted in TECNOQUEST-2002 (A National level technical symposium held at Osmania University, Hyderabad).
- Secured an All India Rank of 109 (among 8,000) in Graduate Aptitude Test in Engineering (GATE)-2002, a national level admission test for admission into master's program in top institutes in INDIA.
- My article entitled "Fabrication of microchannels on stainless steel by wet chemical etching", published in J. Micromech. Microeng., 17 (2007) N99, has been downloaded more than 250 times in the first quarter of its publication. Across all Institute of Physics journals, only 10% of articles were accessed over 250 times this quarter.

#### **PERSONAL DETAILS**

- Date of Birth: 18<sup>th</sup> June, 1980
- Place of birth: Visakhapatnam, India
- Nationality: Indian
- Marital status: Married, one child.