

### Current Address

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### SUMMARY

Over 18 years of academic research experience in the field of chemical engineering, specializing in biomass to value-added chemicals and fuels, renewable hydrogen production, micro-structured and optofluidic devices, multifunctional reactors, washcoating, supported bimetallic catalysts, bifunctional catalysts, reaction kinetics, microkinetic modeling, reactor design, high throughput experimentation. I also have teaching experience in a range of environments. ONE Post-Doc, FOUR Ph.D., EIGHT M.Tech. and ELEVEN B.Tech. students completed their projects under my supervision. Currently SEVEN Ph.D. and TWO M.Tech. students are working in various fields of research under my supervision. My research group is funded well with total research funding close to 2.0 Crores. The funding is from both government (SERB 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 devices for water splitting reaction to produce hydrogen.

Selected career accomplishments: Published THIRTY NINE peer reviewed international journal articles and THREE book chapters with over 750 total citations and an h-index of 13; TWO Indian patents filed; 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; 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-2:** “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 – Oct., 2022)
- **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., 2021)

### STUDENTS UNDER MY SUPERVISION

- I. National Post-Docs
  1. Dr. Anjireddy Bhavanam (worked on “Catalytic co-pyrolysis of lignocellulosic biomass and waste plastics”) August 2017 – January 2018, presently at NIT Jalandhar as an Assistant Professor.
- II. Ph.D. Students:
  1. Dr. Yedla Santosh Kumar (**Completed September 2019**, co-supervisor Prof. Golder, CL); Title: Modified Zeolites and Titania Catalysts for the Conversion of Carbohydrates to 5-Hydroxymethylfurfural.
  2. Ms. Devipriya Gogoi (**Submitted thesis on 19/07/2021**, 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.
  3. Mr. Mahaboob Alam (**Submitted thesis on 26/07/2021**); Title: Catalytic and Non-Catalytic Co-Pyrolysis of Torrefied Bamboo Biomass and Plastic: Synergism, Kinetics and Reaction Mechanism.
  4. Mr. Velaga Bharath (**Submitted thesis on 29/07/2021**); Title: Biomass to Specialty Chemicals: Advanced Catalysts, Processes and Techno-Economics.
  5. Mr. Anirban Chowdhury (Joined in Jan. 2016, working, co-supervisor Prof. Golder, CL); Title: Photoelectrochemical Reduction of Carbondioxide to Value-Added Chemicals.
  6. Mr. Ponnala Rambabu (Joined in July 2016, working); Title: Photocatalytic water splitting in opto-fluidic devices.
  7. Mr. Hanumanth Reddy Pemmana (Joined in July 2016, submitted thesis, co-supervisor Prof. Uppaluri, CL); Title: Conversion of Carbohydrates and 5-(Hydroxymethyl)furfural to Furandicarboxylic Acid (FDCA).
  8. Mr. Ameer Suhail (Joined CfN in July 2018, working, co-supervisor Dr. Pamu, PH); Title: Microreactors for flow-chemistry applications.
  9. Mr. Prasad Pala (Joined in Jan. 2019, working); Title: Photocatalytic water splitting in opto-fluidic devices
  10. Ms. Sarmistha Baruah (Joined in July 2019, working, co-supervisor Dr. Akshai Kumar, CH); Title: Direct-Ethanol Fuel Cells.
  11. Mr. Masresha Adasho (Joined in July 2019, working, co-supervisor Prof. P. Muthu Kumar, Mech); Title: Methanol steam reforming for hydrogen production.
- III. M.Tech Students:
  1. Mr. Yogendra Kumar (Completed in July 2016, Currently pursuing Ph.D. at IIT Madras); Thesis Title: Synthesis and Characterization of Ni/γ-Al<sub>2</sub>O<sub>3</sub> Catalyst by strong electrostatic Adsorption (SEA) Method
  2. Ms. Pooja Saxena (Completed in June 2017, Currently pursuing Ph.D. at IIT Bombay); Thesis Title: Conversion of Glucose to 5-HMF Using Ionic Liquid Encapsulated Zeolites
  3. Mr. Amit Kumar Kiste (Completed in June 2017, Currently working in an industry); 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 (Joined in July 2020, working); Thesis Title: Biomass conversion to valuable chemicals
  10. Mr. Rahul Agarwal (Joined in July 2020, working); Thesis Title: Glycerol to valuable chemicals
- IV. B.Tech Students:
1. Mr. Sonu Rudhra (Completed in May 2016); Title: Synthesis and Characterization of Mesoporous Template—ree Faujasite Type Zeolite-Y from Sodium Aluminosilicate Solution
  2. Mr. Pawan Kumar (Completed in May 2017); Title: Synthesis of Mesoporous Zeolite Y and Mordernite 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

## 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: 752, h-index: 13, i10-index: 19** (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 08/09/2021)

- 1) “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\***; (Accepted in ACS Applied Materials and Interfaces; DOI: 10.1021/acsami.1c11740).
- 2) “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\***; (Accepted for publication in Energy & Fuels, 2021; DOI: 10.1021/acs.energyfuels.1c01732).

- 3) “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).
- 4) “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>).
- 5) “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>).
- 6) 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)
- 7) “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).
- 8) “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)
- 9) “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)
- 10) “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).
- 11) “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).
- 12) “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).
- 13) “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)
- 14) “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)
- 15) “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).
- 16) “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)
- 17) “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)
- 18) “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)

- 19) “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)
- 20) “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)
- 21) “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)
- 22) “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)
- 23) “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)
- 24) “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)
- 25) “Reduced graphene oxide modified CuBi<sub>2</sub>O<sub>4</sub> 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)
- 26) “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)
- 27) “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)
- 28) “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)
- 29) “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.
- 30) “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.
- 31) “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).
- 32) “Design and Fabrication of a High-Throughput Microreactor and its Evaluation for Highly Exothermic Reactions”, **N.R. Peela**, I. C. Lee, and D. G. Vlachos, *Ind. Eng. Chem. Res.* 51 (2012) 16270–16277.
- 33) “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.
- 34) “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.
- 35) “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.
- 36) “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.
- 37) “Washcoating of  $\gamma$ -alumina on stainless steel microchannels”, **N.R. Peela**, A. Mubayi and D. Kunzru; *Catal. Today* 147S (2009) S17-S23.

- 38) “Fabrication of microchannels on stainless steel by wet chemical etching”, **N.R. Peela** and D. Kunzru; *J. Micromech. Microeng.* 17 (2007) N99–N106.
- 39) “Thermal Cracking of JP-10: Kinetics and Product Distribution”, **N.R. Peela** and D. Kunzru, *J. Anal. Appl. Pyrolysis* 76 (2006) 154-160.
- 40) “Catalytic Co-Pyrolysis of Wet-Torrefied Bamboo Sawdust and Plastic over the Zeolite HY: Synergism and Kinetics” M. Alam, and **N.R. Peela\***; (Revision Submitted)
- 41) “Levulinic Acid Production from Xylose and Furfural: Process Development and Techno-Economics” B. Velaga, S.P. Kumbhani, **N.R. Peela\***; (Revision Under Preparation)
- 42) “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. Pohorelý, E. Meers, M. Jeremiáš (Submitted).
- 43) “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\***; (Submitted)
- 44) “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\***; (Submitted)
- 45) “Semi-hydrogenation of Alkynes under Continuous Flow Conditions over Ni@C Derived from MOF-74(Ni)” V.R. Bakuru, B. Velaga, **N.R. Peela**, T.K. Maji, S.B. Kalidindi; (Under Preparation)

#### PATENTS

- 1) “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).
- 2) “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 (Reference number: 202031025327).

#### CONFERENCES

- 1) 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.
- 2) 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.
- 3) 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.
- 4) 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.
- 5) 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.
- 6) 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.
- 7) 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.
- 8) 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.

- 9) 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.
- 10) 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.
- 11) 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.
- 12) 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.
- 13) 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.
- 14) **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)
- 15) 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.
- 16) **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.
- 17) **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.
- 18) **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, Nov, 3 - 8<sup>th</sup> 2013, San Francisco, USA.
- 19) **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.
- 20) **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.
- 21) **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.
- 22) **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.
- 23) 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. “Lignocellulosic Biomass to Specialty Chemicals and Fuels” at the International Webinar on “Recycling and Solid Waste Management” at Andhra University, Visakhapatnam, India on 16<sup>th</sup> Sep 2021.
2. “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) 4<sup>th</sup> to 5<sup>th</sup> March, 2021.

3. “Photocatalysis for the Hydrogen Production” in the TEQIP Short-term Training Program on “Emerging Technologies for Next-Generation Bio-fuels and Bio-products” at AICTE-ATAL Sponsored Online Faculty Development Program organized by GMR Institute of Technology, Rajam, during 9<sup>th</sup> to 13<sup>th</sup> of September, 2020.
4. “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 21<sup>st</sup> to 25<sup>th</sup> of February, 2020 (I was the chief guest of this program).
5. 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 21<sup>st</sup>–22<sup>nd</sup> January 2020.
6. “Hydrogen Production from Renewable Energy Resources” in the TEQIP Training Program on “Recent Trends in Renewable Energy Utilization Technologies” at IIT Guwahati, Guwahati, during 8<sup>th</sup> to 12<sup>th</sup> of May, 2019.
7. “Process Intensification Using Microstructured Reactors” in the TEQIP Training Program on “Process Intensification in Chemical Industries” at SVNIT, Surat, Surat, during 6<sup>th</sup> to 10<sup>th</sup> of February, 2017.
8. “Catalyst Design for Complex Reactions” at JNT University, Kakinada on 30<sup>th</sup> of November 2016
9. “Overview of Bio-oil Upgradation” at Vignan’s University, Guntur on 29<sup>th</sup> of November, 2016
10. “Rational Catalyst Design” at Andhra University, Visakhapatnam on 14<sup>th</sup> of October 2016
11. “Metal Encapsulated Zeolites: Synthesis, Characterization and Applications” at KIC-TEQIP Short Term Course On “Recent Trends In Catalysis” at IIT Guwahati during 13 – 14<sup>th</sup> of May 2016
12. “Zeolites” at NEQIP (AICTE) Sponsored Short Term Course on Advance Materials for Engineering Applications at Assam Engineering College, Guwahati, during 25 – 29<sup>th</sup> of April 2016.
13. “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 7 – 11<sup>th</sup> of March 2016
14. “Bio-fuels” at KIC-TEQIP short-term course on Recent Trends in Renewable Energy Systems at IIT Guwahati during 23 – 24<sup>th</sup> of Jan., 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:
  - Fluid Mechanics (CL 202),
  - Chemical Reaction Engineering II (CL 308)
  - Process Intensification and Integration (CL 641) and
  - MTech seminar course (CL 599)
- Tutor for Engineering Drawing (ME111)
- Chemical Reaction Engineering laboratory (CL 417)

**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

- Faculty Advisor for the B.Tech. Chemical Engineering batch 2020 at IIT Guwahati.
- Associate Warden, Manas hostel, IIT Guwahati from 01/08/2020 to 31/07/2022
- 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>)

- 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 DUPC committee of Department of Chemical Engineering, IIT Guwahati from 01/04/2015 to 31/03/2018
- 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.
- 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 (IChE), Member ID: 56567.

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

- 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 I.I.T., Kanpur, Aug 2005 – July 2010.
- MHRD scholarship for the masters program at I.I.T., 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 masters 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